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THE VALUE OF DEVOLVED WATER RESOURCES MANAGEMENT INSTITUTIONS (DWRMI) IN INCREASING AGRICULTURAL PRODUCTIVITY OF WATER CATCHMENT AREAS WITH PARTICULAR REFERENCE TO SAVE CATCHMENT IN ZIMBABWE

BY

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AN ASSIGNMENT SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER PUBLIC SECTOR MANAGEMENT COLLEGE OF BUSINESS, PEACE, LEADERSHIP AND GOVERNANCE

2024

Abstract

This study examined the value of devolved water resources management institutions (dwrmi) in increasing agricultural productivity of water catchment areas with particular reference to Save Catchment area in Zimbabwe. The qualitative interpretivist paradigm was adopted as the guiding research philosophy. The research data was collected using qualitative research instruments such as in-depth interviews, Focus Group Discussions and documentary search. Thematic and content analysis methods were utilised as data analysis tools. Target respondents were selected using both probability and non-probability sampling techniques. The study findings indicated that the establishment of devolved water resources management institutions in Save Catchment is a welcome initiative in the context of the Second Republic of Zimbabwe's devolution agenda which seeks to empower local communities as they take direct control of their own local resources. The study established a positive relationship between devolved water resources management institutions and agricultural productivity in Save Catchment area as relevant local management institutions take full responsibility of water resources management and control for irrigation farming and industrial activities in the area, hence increased agricultural productivity. However, the existence of devolved water resources institutions in the study area was noted with several limitations compromising agricultural productivity. These challenges include but not limited to financial constraints, technological challenges, undue political influence, corruption, climate change, among others. The study recommended the imperative need to address these challenges in order to improve the utility of these decentralised governance institutions in the water resource management in Zimbabwe.

Key words:

agricultural productivity; devolved water resources management institutions, devolution

Declaration

I affirm that this study is my original work except where sources have been cited and acknowledged. The work has never been submitted, nor will it ever be submitted to another university for the award of a degree.

MAZANI JONATHAN DZINGAI 27/03/24

Student's Full Name Student's Signature

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Copyright statement

Acknowledgements

This work has not been an individual effort. Consequently, the success of my dissertation depended largely on the encouragement of many people. First and foremost, I extend my sincere gratitude to Africa University for awarding a place for study and experienced Lecturers who made it possible to accomplish this milestone.

Secondly, I would like to show my deepest appreciation to my supervisor, Dr. Aaram Gwiza. His tremendous useful comments, patient guidance, critical contributions and persistent help made this work a success. I would like to extend my thanks to lecturers and classmates in MPLG class of 2023 at Africa University for the valuable experiences and good advice.

I would also like to thank the following organizations for their support of this study: Macheke Sub-catchment Council, Agritex, Makoni Rural District Council, Save Catchment Council, ZINWA and others mentioned within this study

Finally, I would like to thank my Wife and Children for their endless love, encouragement and unequivocal support throughout, as always, for which my mere expression of thanks likewise does not suffice.

Dedication

I dedicate this work to my beloved parents who toiled for my education and sacrificed the descent life they deserved to make sure I attained a bachelor's degree without which I could not have enrolled for this Master's Degree programme.

List of Acronyms and Abbreviations

AGRITEX	Agriculture Research Technicacal Extension Services
AI	Amnest International
AMID	Air and Marine Interdiction Division
ARDS	Agriculture research and Development services
CARE	Cooperative for Assistance and Relief Everywhere
CCs	Catchment Councils
CFU	Commercial Farmers union
CMS	Catchment Management Strategy
CNY	Chinese Yuan
COVID 19	Corona Virus disease of 2019
DIFID	Department for International Development
DMAs	District Metering Areas
FAO	Food and Agriculture Organisation
FGD	Focus Group Discussion
GoZ	Government of Zimbabwe
GEF	Global Environmental facility
HDR	Human Development Report
ICM	Integrated Water Resources Management
IWRM	Intergrated Water Resources Management
MSCC	Macheke Sub Catchment Council
R&D	Research and Development
RDCs	Rural District Councils
SCCs	Sub-Catchment Councils
SL	Sustainable Livelihoods
SSA	Sub Saharan Africa
UFW	Unaccounted for Water
UN	United Nations
UNDP	United Nations Development Program

UNESCO	United Nations Education Scientific and Cultural Organisation
UNICEF	United Nations International Children Education Fund
WASH	Water Sanitation and Hygiene
WDN	Water Distribution Networks
WFP	World Food Program
ZIMSTAT	Zimbabwe Statistics
ZINWA	Zimbabwe National Water Authority

Definition of Key Terms

Agriculture Productivity is measured as the ratio of agricultural outputs to inputs.

Catchment in this case is an area with a natural boundary where all surface water drains to a common channel to form rivers. Larger catchments are made up of smaller areas, sometimes called sub-catchments

Decentralisation the transfer of control of an activity or organization to several local offices or authorities rather than one single one

Devolution refers to the transfer or delegation of power to a lower level, especially by central government to local or regional administration

Institution an established official organization having an important role in a society, such as the Church or parliament

Integrated water resources management is a process that promotes the coordinated development and management of water, land and related resources in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems.

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CHAPTER 1: INTRODUCTION

1.1 Introduction

The study focuses on the value of devolved water resource management institutions in increasing agricultural productivity of water catchment areas with particular reference to Save Catchment area in Zimbabwe from 2013 to 2023. This general introduction provides the background, rationale and statement for the study to put the primary guiding research question into proper context. Subsequently, the arising secondary research questions that serve as propositions for the research objectives are also provided. The significance and scope of the study are presented in brief. The chapter concludes with a chronological outline of the chapters presented in the thesis.

1.2 Background to the study

Zimbabwe, like many other regional countries, is endowed with vast water resource which is critical for enhancing agricultural production among other domestic and commercial purposes. The country is landlocked, bordered by Zambia, Namibia, Mozambique, Botswana, and South Africa. The Zimbabwean government through the Ministry of Lands, Agriculture, Water, Climate and Rural Resettlement is responsible for water resources management. The total area of the country is: 390,580 km2 of which land is 386,670 km2 and the rest is covered by water bodies (World Bank, 2016). Zimbabwe's economy requires water to support its various activities and processes. The country's population is an estimated 16 million people deriving their livelihoods directly or indirectly from water resources through agriculture, manufacturing and other related activities (Muzari, 2016). There are several different climatic conditions in catchments as

one moves from Eastern Highlands which normally receives annual totals in excess 1200mm while the drier parts in the South East receive less than 400mm per annum with distinct climatic regions from Region I to Region V (Ncube, 2015). Zimbabwe has a unique watershed dividing the country into a dense river network. Almost all of the rivers in Zimbabwe drain into water channels that form trans-boundary waters (Shwatuk, 2002). Water sharing at trans-boundary level is one of the major focus areas for water strategic management units.

The Water Act of 1998 which repealed the water rights Act became effective in 2000 and also gave birth to Zimbabwe National Water Authority Act of 1998 which created a separation of functions between commercial activities related to water resources development and management vested in ZINWA the government Engineer and statutory functions vested in the Department responsible for Water Affairs (Pazvakavambwa, 2002).The level of development is estimated to be less than 50% of the available water resources in the country. Access to and development of water resources is governed by the Water Act. While access to water for basic use and to sustain life is free, any use of water from which an economic benefit is derived is classified as commercial use in which case a user would be required to obtain a permit for such use. Water management in Zimbabwe is currently governed by the Water Act (Chapter 20:24) of 1998. The Water Act is complemented by other Acts and policies. Before 1998, the Water Act of 1976 was in use to govern water use and development. Weaknesses in the Water Act of 1976 led to major water sector reforms. Some of the key weaknesses in the previous Water Act are that the Act was not supported by Water Policy to guide the development and management of water resources. Further, water allocation was based on the Water Right

System. A right holder had priority of access over any user who applied after him. In other words, water was allocated on the Priority Date System. Water rights were issued in perpetuity and it was difficult to accommodate new entrants when all water was fully allocated regardless of the economics of water use. Because of this Priority Date System; and given that the majority of landowners were whites, it was perceived that entitlement to water was racially skewed and had followed the skewed distribution of land (Shwatuk, 2002). A water right was issued against a property and could be passed on to the next landowner if ownership changed hands.

However, the majority of people lived in Communal Lands which essentially were State Land and, hence, could not technically apply for a water right. This raised questions around issues of equity as water could only be allocated to a minority of the population. There was no clear water pricing policy to pay for entitlement and use of water (Ncube, 2015). Besides paying for the processing of a water right and for the infrastructure required to access the water, there were no other fees payable by those given the right to the water; the water supply policy was too much supply-oriented; the environment, including pollution issues, was not given much consideration (Pazvakavambwa, 2002). Groundwater development and protection was largely ignored. The Act did not clearly articulate Integrated Water Resources Management issues which were gaining prominence globally. The Water Act of 1976 had been amended several times and was increasingly becoming complicated to administer and in addition to the above weaknesses, administration of the Water Act was centralized (Mutiro, Makurira, Senzanje & Mul, 2006). Provincial Water Offices existed but had little say in decision making on water allocation and management outside water held in government dams. In areas of

high activity, users formed Water Boards to manage water but these could not be described as inclusive stakeholder management. In addition, water allocation was left with the Water Court based in Harare and was responsible for allocation and dispute resolution across the whole country (Munzungu, 2002). Thus, the water resource management process was centrally executed. In the event of water shortage, the process of reallocation was very long and complex. A water right could not be revised, even if the right holder was not exercising his or her water rights unless if the right holder was compensated. Once granted, there was no requirement to pay for the possession of the water right or to contribute towards general water service provision. This meant that Central Government had to pay for water development and management. Unfolded scenarios were a compelling case for most government to reform their water management systems.

Effort made by the Zimbabwean government to fully utilize water resources through decentralization of water management is not commensurate with the production output in agriculture and other sectors of production. The Zimbabwean economy continues to decline despite the availability of water resources that can be utilized through irrigation, production and aquaculture. Proper utilization of water resources is important and it can result in reserving foreign currency that was used in importing agricultural products such as maize wheat. Water resource utilization brings more harm than good in an economy, if there is no adequate utilization. Zimbabwe is being faced with low agricultural production despite the abundance of water sources within the country and this has led to loss of jobs, increasing poverty and decline in export revenue. In the context of

devolution, this study seeks to analyze the utility of devolved water resources management institutions on agricultural productivity.

Particularly in the African region, the past decade witnessed a large number of countries undergoing or are in the process of implementing water sector reforms. The reforms have generally been driven by international calls for more efficient and sustainable water management approaches (Marios, 2004). The need for a global water management review has gathered momentum since the United Nations Convention on Sustainable Development the Earth Summit held in Rio de Janeiro in 1992. The modern focus of water management efforts has been to consider the environment as a legitimate user. Water management functions have also been decentralized to the catchment or watershed scale where stakeholders have a larger say in the management of water in their own areas. Two different processes drove the water sector reforms of 1994 in Zimbabwe (Pazvakavambwa, 2002), ahead of other sub-Saharan countries in Africa. The first factor was the general global concern pressing for a more efficient and sustainable approach to water management. The second factor was water legislation that was perceived to be inconsistent with present trends in Zimbabwe.

Water management has been decentralized to stakeholder-managed Catchment Councils (CCs) and Sub-Catchment Councils (SCCs). The new Water Act and the Zimbabwe National Water Authority (ZINWA) Act came into effect on January 1st 2000. Following the gazzetting of the two Acts, Catchment Councils and ZINWA were formed. Seven Catchment Councils (CCs) were formed nationwide during the period June to July 1999 (Mupindu, Murimirudzombo & Changunda, 2004).Under the present arrangements, a

new framework for water management has been formed to: involve stakeholders in water management; replace water rights with water permits, which expire after a set period, create more efficient water allocation processes, develop catchment water use plans, with the full participation of stakeholders, treat the environment as a legitimate user, form new stakeholder driven institutions to facilitate more efficient water management. Zimbabwe has seven catchment areas where water is being managed and these are Mazowe, Runde, Mzingwane, Gwayi, Sanyati, Manyame and Save. As a result of these developments, CCs and SCCs were formed as key institutions to manage water affairs on the ground on a day-to-day basis from year 2000 todate (Mupindu et al, 2004). The Zimbabwe National Water Authority (ZINWA) was formed with the primary role of taking over the commercial functions of the Department of Water Development.

The reforms of water management require a strategic aspect on utilization of water resource, as a resource water can contribute positively to an economy in different industries such as agriculture, mining, manufacturing which results in more foreign currency generation and increase in GDP (Gross Domestic Product). However, if water resource is underutilized or mismanaged, the economy may end up importing goods that could be manufactured or grown within our boarders and it creates BOP (Balance of payment) deficit.

1.3 Problem statement

Recently, academic interest in devolution as an alternative governance approach has increased (Steeves J, 2015). However, evaluating how well the devolved system is working in the field is a continuous effort. Notwithstanding evident intuitive connections, there is no comparable data on how and why decentralization matters for institutional

performance in specific sectors. By examining the connections between decentralization and water institutional transformation throughout the counties, we aim to close the evidence gap. The success of Zimbabwe's decentralised water systems should be clarified by this study. Studies on water service providers in underdeveloped nations (Zekri & Easter, 2007) revealed a negative association between planned outcomes, actual outcomes, and the number of resources used. Data Envelopment Analysis based on water reforms was utilized to evaluate the success of WSPs (Sambu & Tarhule, 2013) in order to meet the MDGs by 2015.

Effort made by the Zimbabwean government to fully utilise water resources through decentralization of water management is not commensurate with the production output in agriculture and other sectors of production. The Zimbabwean economy continues to decline despite the availability of water resources that can be utilized through irrigation, production and aquaculture. Proper utilization of water resources is important and it can result in reserving foreign currency that was used in importing agricultural products such as maize wheat. Water resource utilization brings more harm than good in an economy, if there is no adequate utilization. Zimbabwe is being faced with low agricultural production despite the abundance of water sources within the country and this has led to loss of jobs, increasing poverty and decline in export revenue. In the context of devolution, this study seeks to analyse the utility of devolved water resources management institutions on agricultural productivity.

1.4 Purpose statement

The purpose of this study is to establish the sustainability and effectiveness of assigning management of water resources to the sub catchment areas on agricultural productivity

1.5 Research objectives

This study sought to:

1.5.1 Conceptualise the devolved water resource management institutions and agricultural productivity.

1.5.2 Evaluate effectiveness of the institutional and legislative frameworks of devolved water resource management system in Zimbabwe.

1.5.3 Discuss the global/regional best practices of devolved water resources management institutions for agricultural productivity and how they compare with Zimbabwean scenario.

1.5.4 Suggest the strategies that can be adopted to improve devolved water resource management institutions on agricultural productivity in Zimbabwe.

1.6 Research questions

The guiding research questions are:

1.6.1. What do the concepts devolved water resource management institutions and agricultural productivity entail?

1.6.2 How effective are the institutional and legislative frameworks governing devolved water resource management system in Zimbabwe?

1.6.3 What are the global/regional best practices of devolved water resources management institutions for agricultural productivity and how do they compare with the Zimbabwean scenarios?

1.6.4 Which are the strategies that can be adopted to improve devolved water resource management institutions on agricultural productivity in Zimbabwe?

1.7 Significance of the study

The study will derive its merit in the following respects:

1.7.1 **The Government of Zimbabwe (GoZ)**

The study will inform national government policies to better align or revise the existing legal framework, policies and the guidelines of devolution process on water resource management in Zimbabwe. Further, the findings may influence the government to develop appropriate policies to enhance devolution processes so as to improve water provision to the public and thus propel the country towards achieving Vision 2030. Furthermore, the GoZ might use of the findings to come up with strategic interventions to enhance devolution and water provision to its citizens. Finally, this study came up with policy recommendations, which can be utilised by the government and relevant development partners to improve management and leadership skills in relation to water provision.

1.7.2 To Management and the board of directors

It is expected that the findings of this study will help Catchments management to design appropriate strategies to maximise benefits of proper utilization of water resource.

1.7.3 To the researcher and the academics

This study will enhance the researcher to fulfill the requirements of the Master of Public Sector Management and bridging learnt concepts to practice. The academics will find the study to be useful in understanding the impact of utilising water resource to the nation at large.

1.7.4 To the researcher and the academics

This study will enhance the researcher to fulfill the requirements of the Master of Public Sector Management and bridging learnt concepts to practice. The academics will find the study to be useful in understanding the impact of utilising water resource to the nation at large.

1.8 Delimitation

The study will cover Catchments from 2013 to 2023. The study will also focus on the Save catchment area and its seven Sub catchment councils units namely Upper Save,

Lower Save, Budzi, Pungwe, Macheke, Odzi and Devure. Stakeholders within the Save catchment area will be included in this study. The research findings will solely be for addressing problems associated with underutilization of water resource in Zimbabwe.

1.9 Limitations

Devolution remains a controversial issue in Zimbabwe due to the unitary state of governance. Many key informants in policy-making bodies shied away from giving responses on record with fear of losing their jobs. Time and travel constraints due to lack of funding to visit all sub-catchments in Save Catchment council. In Government and government enterprises COVID-19 restrictions also met the researcher who was also formally employed and constrained with work assignments. However, to cater for these limitations, the researcher used an introductory research letter from the university to help the respondents understand the aims and objectives of the study and also provided face masks and hand sanitizer to respondents who did not have masks.

1.10 Outline of the thesis chapters

Chapter One is introductory and presents the basic and scientific orientation to the research.

Chapter Two provides a systematic review of and appreciation of relevant literature on the research topic. It investigates, among others, the unfolding scenarios with regards to water resources management processes, systems and praxis in Zimbabwe. The underlying

theories and conceptual frameworks of water resource management are also discussed to identify extant gaps to be addressed.

Chapter Three entails the methodological orientation which the research used to undertake the study.

Chapter Four entails the presentation and analysis of the research findings in line with the research objectives.

Chapter Five will present the findings and the analysis of the entire study. The chapter presents the key research findings, conclusions and recommendations of the study.

CHAPTER 2 LITERATURE REVIEW AND THEORETICAL FRAMEWORK

2.1 Introduction

The chapter provides a systematic conceptualisation and contextualisation of devolved water resources management and agricultural productivity which serve as the broader framework for this study. The need for a deeper conceptual understanding in this particular study has prompted the review of the relevant literature on devolution, water resources management and agricultural productivity. As such, a systematic review of the relevant literature in this study enables the researcher to interrogate the critical application, theoretical and value considerations in improving the practice and processes of devolved water resources management systems as a way of improving agricultural productivity in Zimbabwe and regionally.

2.2 Theoretical framework

This section is a brief discussion of a few complementary theories seeking to put the study into its proper perspective. Therefore, the respective theoretical orientations are systematically presented as follows:

2.2.1 Stakeholder theory

This qualitative study was informed by stakeholder theory. In his seminal work “Strategic Management: A Stakeholder Approach," R. Edward Freeman initially expounded on the concept of stakeholder theory. According to Freeman's thesis, a company can only truly succeed if all of its stakeholders are satisfied not just those who stand to gain financially

from its shares. The identification and description of several interest groups, including as workers, clients and consumers, suppliers, shareholders, local communities, etc., was one of its most significant contributions. In particular case of devolved water resources management stakeholders are water users starting from domestic to commercial users (industrialists, agriculturalists, miners, institutions) in both private and government institutions. The managerial decision-making process finally resulted in definitions that limited the range of possible stakeholders because so many diverse parties were involved. The theory, as suggested by Miles and Friedman (2006), was used to illustrate the two key principles, the organisation legitimacy and stakeholder fiduciary principles. The principle of organisation legitimacy argues for the management of the organisation by considering the benefit of the stakeholders, the rights of various groups are considered as well as their participation in decisions that substantially affect their welfare. In integrated water resources management under the devolved system of water governance institutions which are made up of the stakeholders, stakeholder theory succeeded in challenging the usual analysis frameworks, by suggesting that stakeholders' needs should be put at the beginning of any action to boost community ownership and hence the creation of Catchment council and Sub-catchment councils with the assistance of ZINWA as sacretariate.

Preston (1995) argue that the theory has three distinct but mutually supportive aspects, descriptive, instrumental, and normative:

The descriptive approach is used in research this to describe and explain the characteristics and behaviors of Water institutions (ZINWA, Catchments and Sub-catchments Local authorities that is urban and Rural Local authorities) including how

they are managed, how the Councilors who are board members considers corporate constituencies, the way that Water resources officers think about managing, and the nature of the Save catchment itself.

The instrumental approach uses empirical data to identify the connections that exist between the management of stakeholder groups and the achievement of Save Catchment goals as stateted in the Water Act and Zimbabwe's constitution on devolution (most commonly detailing productivity of Save catchment area its profitability and efficiency issues)

The normative approach, identified as the core of the theory by Donaldson and Preston (1995), examines the function of the corporation and identifies the "moral or philosophical guidelines for the operation and management of the corporation" which also include the role of Catchment devolved institutions in terms of awareness and corporate social responsibility as carried out by save catchment council.

Therefore, for the purposes of this particular study, the stakeholder theory enlightens the issue of sustainable livelihoods in water use by considering the benefits of stakeholders in the usage of water resource as a right for all. The management is obliged by this theory to meet the requirements of the stakeholders in any given time. On another scholarly angle Stakeholder theory, according to management scholar Samuel F. Mansell (2016), undermines the fundamental ideas of a market economy by extending the political concept of a "social contract" to the corporation. This could lead to an increase in the likelihood of managers acting in their own self-interest by taking advantage of weak stakeholders. Devolution value and stakeholder empowerment in line with water

resources management can be analysed using the institutional theory as a supporting tool to this qualitative research.

2.2.2 Institutional theory

This theory considers the procedure by which structures including tenets, standards, and schedules, wind up plainly settled as legitimate rules (Cole, 2011). Cole affirms that organisations are social structures that have accomplished a high level of versatility, they are made out of social intellectual, standardising and regulative component that, together with related exercises and assets, give steadiness and importance to social life. In this manner, making a formal budgetary establishment suggests extra expenses and limitations as the benefactor foundations ends up plainly managed and directed (Edwin, 2009). The theory of this nature mainly deals with the standards and legitimate issues; this helps the institution to come up with a framework that they deal with in assuring that the sustainability livelihood has been achieved through the use of water resource.

Using this theory, the researcher was able to better understand and study Save Catchment and Sub-catchments thanks to this theory and its theoretical contributions, which offer several viewpoints for doing so. According to Hatch and Cunliffe (2006), theory then acts as a guide when outlining various perspectives on the interaction between an organization and its atmosphere. This is one way that Institutional Theory and its theoretical contributions can account for the institutionalization of innovative systems in the water sector. The researcher was able to assess the ability of Save catchment council in

persuading their stakeholders to achieve the devolution agenda. The ability to analyze concerns about the structure and forms of organizations across all industries in a different way is a key component of institutional theory of organization. The emphasis on credibility, accepted ideas, and field participants offers a dynamic and ingrained understanding of how Subcatchments and other organisations under Save Catchment behave. An abundance of empirical research has enhanced this technique. On the other hand, institutional theory has also come under fire. The concept of field is more illusive than concepts like industry or interorganisational networks; organizations are viewed as being localized manifestations of institutions; and people's perceptions are sometimes criticized for being unduly basic. However, institutional theory offers compelling justifications for the actions and decisions made water resouces management institutions.

2.3 Literature review

Zimbabwe is a semi-arid country heavily reliant on regular rains (generally November to April). Mean annual rainfall is low and many rivers in the drier parts of the country are not perennial. Zimbabwe has made extensive investments in large, small, and medium dams, though current utilization is only about 22 percent of mean annual run-off. Zimbabwe’s management of its water resources is critical to its economic growth. Droughts and inability to manage its water resources cost Zimbabwe a significant percentage of its GDP (MWR, 2003). The country has a forward-looking Water Act and undertook significant reforms in the 1990s to create a Zimbabwe National Water Authority (ZINWA) to manage the national water resources. But the water resource sector has been badly hit by the economic downturn and the lack of investment has nullified

many of the reform gains. As a kind of strategic resources, water resources are not only an important condition of economic and social sustainable development, but also a precondition of improving ecological environment. Water utilization structure is one of the most important elements in water resources and effective water resources management.

2.3.1 Devolved water resource management: The concept and phenomenon

The water sector is especially vulnerable to poor governance as well as corruption, hence the need for devolution. This is meant to devolve or hand over power and authority to local government the responsibility for managing river systems and enforcing laws and regulations at the local level (Gleitsmann, 2015). In addition, devolution entails management of water resources on a catchment basis with involvement of stakeholders in each catchment area. Worldwide, devolution continues to be perceived and implemented as a measure for enhancing the provision of social services, through the allowance of a closer linkage of local area needs with the public policy (World Bank, 2012). In Africa, devolution has grown significantly in the last twenty years. Some African countries that have embraced this form of decentralization include Uganda, South Africa, Ethiopia, Mali, Tanzania, Mozambique, Kenya, Nigeria and Ghana (Riedl & Dickovick, 2010).

2.3.2 Agricultural productivity: A conceptualisation

Productivity expresses the varying relationship between agricultural output and one of the major inputs, like land or labour or capital. Agricultural productivity according to Hanumanthappa (2014:395), is therefore defined as "the ratio of the index of total agricultural output to the index of total inputs used in farm production. It is a measure of the efficiency with which inputs are utilised in production, other things being equal." Agricultural productivity is measured as the ratio of agricultural outputs to inputs. While individual products are usually measured by weight, which is known as crop yield, varying products make measuring overall agricultural output difficult.

2.3.3 Sustainability

Ekman (2007) states that the notion of sustainability has been regarded as both an objective in community development projects and as an avenue to policy development and design. Further, it was contended that the idea of maintainability has a horde of definition in the writing accessible, and additionally in down to earth utilization among improvement specialists. This is on account of the idea is emphatically dependent upon the circumstance in which it is connected. In view of this contention, Brown and Covey (2007) opine that a decent definition must determine plainly the specific circumstance and the estimation scales to be utilized.

2.3.4 Livelihood

A livelihood comprises of capabilities, assets (stores, resources, claims and access) and activities required for a means of living; a livelihood is sustainable which can cope with and recover from stress and shocks, maintains or enhance its capabilities and assets, and provide sustainable livelihood opportunities for the next generation; and which contributes net benefits to other livelihoods at the local and global levels and in the short and long term (Carney, 1999).

2.3.5 Sustainable livelihood

Sustainable livelihoods approaches have increasingly been developed and adopted by many development institutions as a means of analysis and of action by depicting processes through which individuals and households use all or part of it in their reach to make their living. Department for International Development (DFID‟s) Sustainable Livelihoods, Cooperative for Assistance and Relief Everywhere (CARE‟s) Household Livelihood Security and United Nations Development Programme (UNDP) Human Development are examples of agencies implementing through Sustainable Livelihood Approaches (Gowing, 2003). Scones (2009) defines livelihood resources as the basic material and social, tangible and intangible assets that people use for constructing their livelihoods. These livelihoods resources are conceptualized as different types of „capital‟ to stress their role as a resource base. These resources or assets are natural, economic or financial, human and social capital. The DFID (2011) reported that in order to have improved rural livelihoods; structures and processes need to be transformed. These include; initiating changes in local institutions, reforming institutions through change of

culture, norms, that limit access to the livelihood resources and assets. Another critical dimension is reforming communities through training on existing policies that undermine their existence as well as pass more information to the community members to be able to articulate issues that affect them. Another strategy may be carrying out community capacity building on areas of access to be able to reach many people. This means that certain members of the community are given priority to be able make and participate in decision-making processes to be able to address issues affecting the concerned community. Sustainable Livelihoods (SL) outcomes are more income and more economically sustainable livelihoods, increased well-being (non-material goods such as self-esteem, sense of control and inclusion, physical security, health, access to services, political enfranchisement, maintenance of cultural heritage), reduced vulnerability to external trends, shocks and seasonality, improved food security-which is of fundamental importance and more sustainable use of the natural resource (water resource) base (Twigg, 2001).

2.3.6 Sustainable livelihood and water use

SL approach and the impact of water interventions can be traced through a chain of linkages in which time, distance, management, energy released by less illness and reduced time spent on buying medical treatment, are used in additional activities that contribute to increased well-being (Dercon & Krishina, 2000). The role that water plays in livelihoods in rural areas in developing countries is manifold; health, agriculture, domestic collection, flood/drought, livestock, renewable natural resources, ceremonial etc. with land, it can be argued that water is the most significant input into a sustainable

livelihood in Africa (Gowing, 2003). The above inputs are further segregated into; availability, quality, management and time and distance used to collect the resource. According to Human Development Report (HDR, 2000), the UN Committee on Economic, Social and Cultural declared that water is a human right that each one is entitled to sufficient, safe, acceptable, physically accessible and affordable for personal and domestic use. These five core issues represent the foundations of water security. Yet they are widely violated. The report further says that poor households are less likely to get their water from a variety of improved sources. The DFID (2011) reports that in Sub Saharan Africa, there are several countries including; Angola, Zimbabwe, Democratic Republic of Congo, Eritrea, Ethiopia, Guinea, Madagascar, Rwanda, Sierra Leone and Kenya are the most vulnerable in terms of access to safe water as well as hunger.

Household water was segregated into the following uses: consumption, hygiene and amenities. Water for consumption refers to water content in beverages and food. Hygiene refers to the minimum water to wash one's body, clothes, utensils, food, clean the home, and for sanitation. Amenities refer to other uses which include bathing, watering gardens, washing cars. Through these categories, water utilized or consumed may vary from each item discussed that may cause a vulnerability to the household assets. Food and water security are related and that food security is an outcome of a set of vulnerabilities, dependent on how people gain access to production and exchange of opportunities (Brown & Covey, 2007). This is impacted by the broad expenditure, in time, labour or money, invested by households in gaining access to water. There are also important gender and age specific issues involved in the division of labour for water collection. In

Africa, where most agricultural labour is undertaken by women, productive impacts can be significant.

2.3.7 Overview of water resources and their main uses

Zimbabwe is an atypical sub-tropical country with one rainy season (November to March). The country's average rainfall is 657 mm/annum and varies spatially from the eastern highlands (1,000 mm) to low lying areas such as valleys (400 mm) in the southern part of the country. Net annual open evaporation ranges from 1,400 mm in the high rainfall areas to 2,200 mm in the low-lying areas. According to Ncube (2015), Zimbabwe's rainfall pattern can be best described as erratic, unreliable, and insufficient and only 37 percent of the country receives adequate rainfall for agriculture. Trends over the years have shown that a majority of Zimbabwe's wet seasons are often punctuated by mid-season droughts which affect crops resulting in poor harvests (Mamombe, Kim, & Choi, 2017). There are seven internal river basins whose watersheds yield 11.26 km3 of freshwater per year. In addition, the country also has 1 to 2 km3 of ground water per year located in four aquifers viz., Lomagundi dolomite, Nyamandhlovu forest sandstone, Kalahari sands, and Save alluvial deposits. Thus, the country has 12.26 km3 of water available per year. Much of the surface water (circa 45%) is stored in the government dams and the other 55% in some 5, 700 dams found in former large-scale commercial farming areas, mines, and plantation estates. While the figures cannot be readily confirmed there are also a number of small dams constructed by NGOs and rural communities. The figure below illustrates the catchments areas distributed in Zimbabwe.

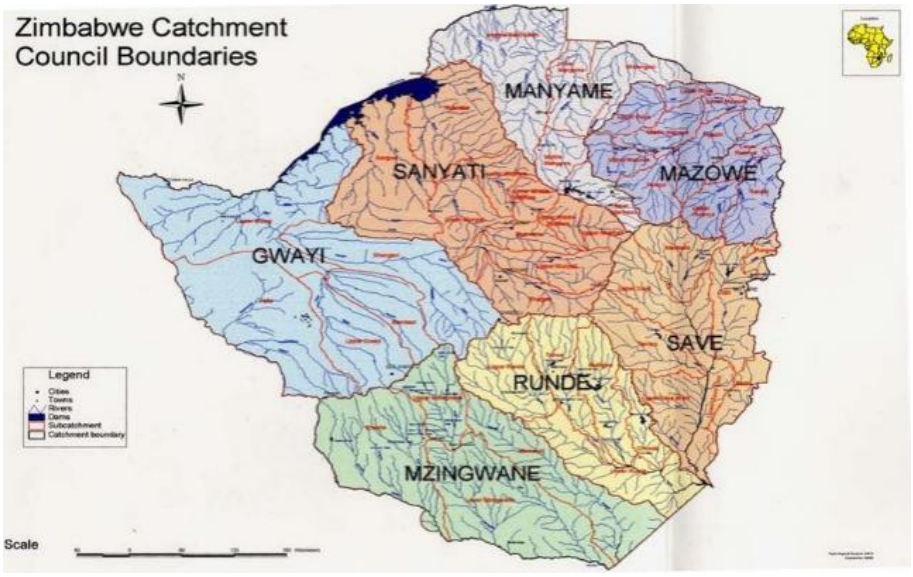


Figure 2-1 Map of Zimbabwe Catchments (Dzawanda B, Ncube S, 2020)

Figure 1: above is a map showing Zimbabwe's 7 major catchments catchments which includes Save CC. Of the total of water the estimated exploitable yield is 8.5 km3 of water per year of which 56% is already committed leaving 3.7 km3 /year for irrigation and other sectors. Close to 550,000 hectares of land in Zimbabwe is irrigable but of this amount of land only 33.6% (200,000 ha) has been developed. The amount of land under irrigation includes functional and non-functional irrigation systems, as well as informal irrigation schemes (Manzungu, 2015). The failure to irrigate the other 350,000 ha is largely due to the prevalence of a mismatch between the location of irrigable land and water. While the mismatches are noted, there is considerable unutilized water in government dams and Department of Irrigation estimates that up to 15,600 ha could be irrigated if the water in 23 government dams was fully utilized (Gowing, 2003). Further, an FAO (1990) study shows that an additional 200,000 to 250,000 hectares of land that is currently irrigable can be brought under irrigation. Underground water is tapped mainly through boreholes and records show that there are over 16,000 boreholes scattered across the country but

other experts believe that they could very well be in excess of 50,000. The total annual abstraction of ground water for the rural communities is estimated at 35 x 106 m3 while that for the agricultural sector is estimated at 350 x 106m3. Groundwater is also being drawn for several Growth Points and Rural Service Centres e.g Nyamandhlovu and Gokwe; urban centres e.g Bulawayo, and rural institutions e.g schools and clinics.

According to Muzari (2016), overall, groundwater presently contributes not more than 10% to the total water use in Zimbabwe. Increasing water demand due to the expanding urban and rural populations and the industrial, mining and agricultural sectors requires proper assessment, planning, development and management of water resources in Zimbabwe to avoid over-exploitation and degradation of its quality. At the moment water management leaves a lot to be desired as dams are not reaching their expected life expectancy due to siltation, poor drainage from irrigation schemes, leakages in urban areas, loss of capacity of ground water recharge due to soil compaction and algal capping – all combine to paint a bleak picture on the future of physical water (GEF, 2013). Climate change will invariably affect water withdrawals especially against the predicted decreasing precipitation trend (1mm to almost 15 mm per decade) and the 2°C and 3°C increase in temperature which will also mean higher crop evaporative demand

2.3.8 Global experiences of water resource utilization structure

2.3.8.1 The case of Tianjin, China

Tianjin is located in the northeast of North China Plain and in the center of Bohai economic circle. As the largest port city of North China, Tianjin is an important communication hub, directly connecting Beijing to Northeast China, East China and the Pacific Ocean (Cui & Deng, 2009). The annual precipitation of Tianjin is 560 mm–720 mm on average, with the precipitation from June to August comprising 75% of total annual precipitation. With the rapid development of economy and society, the water shortage of Tianjin became more and more serious. In fact, water resources had become a key restrictive factor of the sustainable development in Tianjin. After the construction of Luanhe-Tianjin water diversion project, Luanhe River became an important water source for Tianjin. According to Zhai., Wang., Zheng., and Huan, 2011) the total water consumption of Tianjin increased from 2.206 billion m3 in 2004 to 2.337 billion m3 in 2007. Its annual growth rate was 1.94% on average. The total water consumption of Tianjin in 2008 and 2009 fluctuated slightly. From 2010 to 2013, the annual growth rate was 1.85% on average. From 2004 to 2013, the agricultural water consumption of Tianjin accounted for 48%–59% of the total water consumption, and it was the largest water user in Tianjin.

2.3.8.2 Agriculture water resource utilisation

Agricultural water consumption could be divided into three stages. From 2004 to 2007, it increased from 1.198 billion m3 to 1.384 billion m3, and the annual growth rate was 4.93% on average; after 2007, it decreased to 1.097 billion m3, and the annual growth rate was 7.45% on average; hereafter, it increased slightly (Zekster & Lorne, 2008). The agricultural water consumption changed because the decrease of cultivated area and effective irrigation area and the increase of efficient water saving irrigation area. Indeed, the cultivated area of Tianjin decreased from 0.42 million hm2 in 2004 to 0.39 million hm2 in 2013, and its annual change rate was ´0.63% on average; the effective irrigation area decreased from 0.35 million hm2 in 2004 to 0.31 million hm2 in 2013, and its annual change rate was ´1.5% on average; efficient water saving irrigation area increased from 0.19 million hm2 in 2004 to 0.29 million hm2 in 2013, and its annual growth rate was 5.16% on average and 20 billion CNY in 2013 and its annual growth rate was 6.86% on average (Zhai et al. 2011). Fishery output value had weak correlation with agricultural water consumption. Other impact factors had moderate correlation with agricultural water consumption. It appeared that the adjustment of agricultural structure and the improvement of water saving irrigation technology influenced the agricultural water consumption. In these years, Tianjin City conducted the strategic layout of taking planting as a foundation and taking breeding industry as sustainable development emphases (Shwatuk, 2017). With the promotion of water saving irrigation technology, unreasonable irrigation methods were eliminated. On this basis, supposing that, the agricultural water of Tianjin developed in a sustainable direction.

2.3.8.3 Industrial water resource utilisation

According to Saunila (2013), from 2004 to 2012, the industrial water consumption of Tianjin accounted for 17%–23% of total water consumption. Its change could be divided into two stages: from 2004 to 2008, it reduced from 0.507 billion m3 to 3.81 billion m3, and its annual change rate was 6.89% on average; from 2008 to 2013, it increased from 0.381 billion m3 to 0.537 billion m3, and its annual growth rate was 7.11% on average. The change of industrial water consumption was significantly influenced by the policy and regulation. In order to achieve sustainable water resources management, Tianjin City proposed "regulations on water saving of Tianjin" in 2002, which was the first local regulation on water saving in China. From 2004 to 2013, the industrial output value of Tianjin increased from 168.59 billion CNY to 727.55 billion CNY, while the water consumption of 10,000 CNY industrial output value decreased from 30.07 m3 to 7.38 m3. The water saving technology was improved and the industrial structure was adjusted. Zhai et al (2011) point out that, consequently, from 2004 to 2008, the industrial water consumption decreased. However, in 2009, the administrative division of the New Coastal Region of Tianjin was reformed. The rapid development of the New Coastal Region of Tianjin accelerated the industrial economic development of Tianjin. At this time, the industrial output value of Tianjin was 398.78 billion CNY, and the New Coastal Region of Tianjin accounted for only 9.2% of Tianjin; in 2013, the industrial output value of Tianjin was 727.55 billion CNY, and the New Coastal Region of Tianjin accounted for 70.6% of Tianjin. The supernormal development of the New Coastal Region of Tianjin was an important explanation for the increase of the industrial water consumption of Tianjin after 2008. As a large industrial city, controlling total water consumption while

ensuring the economic development was a challenge for Tianjin (Zhai et al, 2011). All of the impact factors had moderate correlation with the industrial water consumption of Tianjin.

2.3.8.4 Domestic water resource utilisation

From 2004 to 2013, the domestic water consumption of Tianjin accounted for 20%–25% of the total water consumption. The change of the domestic water consumption could be divided into two stages: In the first stage, the domestic water consumption increased steadily, while in the second stage, it reduced with fluctuation. Specifically, from 2004 to 2010, it increased from 0.453 billion m3 in 2004 to 0.548 billion m3 in 2010, and its annual growth rate was 3.22% on average; and from 2010 to 2013, it decreased from 0.548 billion m3 to 0.515 billion m3, and its annual change rate was 2.69% on average. The basic explanation for the change of the domestic water consumption of Tianjin was population growth. The resident population increased from 10.24 million in 2004 to 14.72 million in 2013, and the annual growth rate was 4.12% on average. With the simultaneous improvement in living standard, per capita domestic water consumption increased from 123.6 m3 in 2005 to 142.34m3 in 2013. All of the impact factors had moderate correlation with the domestic water consumption of Tianjin.

2.3.8.5 Ecological water resource utilisation

Given the importance of ecological environment protection and sustainability, the ecological water consumption of Tianjin was also studied. It increased from 48 million m3 in 2004 to 136 million m3 in 2012, and its annual growth rate was 13.9% on average; in 2013, it reduced by 33.8%. Certain factors may explain this change in ecological water

consumption. For example, the per capita green area of Tianjin increased from 13.87 m2 in 2004 to 15.76 m2 in 2013, and its growth rate was 13.6% on average; the garden green area increased from 14238.1 hm2 in 2004 to 23916 hm2 in 2013, and its annual growth rate was 5.93% on average; the park area increased from 2424 hm2 in 2004 to 7279 hm2 in 2013, and its annual growth rate was 13% on average.

Analysis of water utilization structure was prevalent in some scientific literatures. (Liu, Yao, & Gao, 2003), qualitatively analyzed the change of water utilization structure of Beijing from 1980 to 2000. (Jenerette, 2006), asserted that the water utilization form depended on population, livestock, climate change, and ecological water supply condition etc. This author judged that there would be continuous water supply crisis in most cities, so attention must be paid to sustainable water resources management. Furthermore, the impact factors of water utilization structure were chosen by principal component analysis to satisfy the requirement of water resources management (Jenerette, 2006).Indeed, ecological water consumption is very important for sustainable ecological development. Paola et al, (2015), presented a multi-objective approach for the automatic partitioning of a water distribution network into District Metering Areas (DMAs). On this base, Paola, Galdiero and Giugni (2015) presented a model for valve setting in water distribution networks (WDNs), with the aim of reducing the level of leakage. In general, water consumption can be divided into four categories: industrial, agricultural, domestic and ecological. (Marios, 2004), supposed that the impact factors of water consumption included population growth, sustainable economic development, technical progress, land

use pattern, urbanization progress. Cui and Deng (2009) proposed that the impact factors of domestic water consumption mainly included resident income and water price.

2.3.9 Water resource utilisation in Africa

Water is the basis of life and is a driving force for economic and social development and for poverty reduction. The provision of adequate supply of potable water in urban areas in developing countries is essential for life. For instance, in developing countries the provision of adequate potable water supply in addition to drinking and cleaning, improves health by reducing incidence of water-related illness such as diarrhea and cholera (WHO, 2015). Since all life depends on water, present trends of water waste and pollution threaten the earth's basic life support systems. Already, 1.1 billion people do not have access to safe drinking water and almost 2.5 billion do not have access to adequate sanitation, by 2025 almost a third of the world's population will face water shortages and will have to divert water from irrigation and food production to household consumption, implying further underdevelopment. In order to address these problems, effective management of water resources is essential for sustainable growth and poverty reduction. Water resources have been one of the most important areas of concern during the past three decades.

Since the turn of the 20th century, the utilisation of fresh water for economic purposes has posed a big challenge. Arsano (2007:7) contends, "In as much as water resources are shared, the upstream and downstream users will have to agree on principles and

mechanisms of water and water resource management". This would thus require that the various sectoral interests come together and are dealt with in conjunction acknowledging all major aspects of the water system, while seeking to balance the various interests involved (Arsano, 2007). The challenge is to find appropriate structures and strategies to coordinate policy, planning and implementation holistically.

A sense of the economic value of water implies the attachment of different values to different uses of water. These values will vary from setting to setting as decided by the community, although it is invariably the case that survival and public health uses will be high-value uses; whereas recreational uses will be comparatively lower-value (Easter, 1997). Further for instance, the physical features of the country of Africa are composed of highlands, plateaus and lowlands; the highlands are mostly associated with high rainfall, several springs, lakes, streams and rivers (MWR, 2003). Because there is plenty of water in the highlands, people do not value water very much. In the lowland areas, where water is scarce; people give more value to water. While Africa is among the most endowed continents in terms of freshwater resources, its people have the lowest access to clean water for drinking and sanitation; the lowest per capita food production; and the lowest access to the water-dependent services such as electricity (hydropower). More than 40% of Africa's population has inadequate access to water as opposed to 15% in Latin America and 20% in Asia (GWP, 2010).

Africa has over 50 significant water basins spanning nearly all countries. For 14 of these, practically their entire national territories fall within shared river basins. There are also large inland water bodies such as lakes Victoria, Chad and Kariba (World Bank, 2016). In Sub-Saharan Africa (SSA), international river basins constitute the principal source of water resources. About one-third of the world's international river basins are found in SSA. The distribution of water in major parts of Africa is characterized by complex patterns and striking paradoxes which exhibit an abundance of rainfall over the equatorial zone contrasted by extensive and extreme aridity of the Sahara Desert in the north and the Kalahari Desert in the South. About 50 percent of the total surface water resources of the continent are in one single river basin that is the Congo basin and 75 percent of total water resources are concentrated in eight major river basins that is the Congo, Niger, Ogoague (Gabon), Zambezi, Nile, Sanga, Chari-Logone and Volta (Yilma, 2007). In Africa, only a minimal amount can currently be used as viable fresh water. Besides, several rivers and lakes have undergone a marked reduction in flow rates and surface area (UNESCO, 2005).Groundwater wells are also threatened by desertification.

According to Yilma (2007), in the past 20 years, available freshwater resources in Africa have greatly declined due to severe and prolonged drought. Water pollution resulting from industrial effluent, urban run-off, sewerage and agro-chemicals are on the increase and continue to deteriorate freshwater quality and affect its quantity. The sharp decline in availability of freshwater supply due to hydrologic, climatic and environmental change is visible even in the Congo-Zaire basin (Saunila, 2013). The meteorological and hydrological services in the African region are not efficient due to government budgets.

As a consequence, there is insufficient data to support water development projects and the development of national plans for water resources management. Rivers are the main sources of freshwater in the region. However, several of the rivers and lakes in Africa are undergoing a marked reduction in flow rates with Lake Chad facing the most serious problems (World Bank, 2004).

With regard to water use and management, the major water-consumptive uses in Africa are for agriculture activities and human settlements (Beekman & Pietesen, 2007). However, there has been an increasing use of water in the industrial sectors which is affecting water quality. It is predicted that by the Year 2025 several African countries will experience water scarcity. As it stands now, 11 countries are experiencing water stress and are countries undergo water scarcity conditions (World Bank, 2004). Rapid population growth, expansion of irrigation areas and industrialization has put pressure on the available water resources. For the developing countries of Africa, a major portion of the needed increase in safe drinking water and sanitation facilities is expected to come from existing fresh water rivers through sustainable use of water resource management. According to Saunders, Lewis and Thornhill (2012), in Sub Sahara Africa, urbanization heightens the relationship between available water quantity and water quality. Cities are faced with mounting costs of water shortages, water treatment, well deepening and development of new sources. A high proportion of big industries are located along river banks and coastal zones of West Africa. Such an arrangement leads to pollution from municipal and industrial discharges, which, combined with overexploitation of available

water resources threatens the river catchment environment as well as the supply of freshwater resources (World Bank, 2004).

More than 50% of the lake basin of East Africa's population does not have access to piped water (WHO/UNICEF, 2004). They depend on natural sources like springs, streams and rivers. Such sources should be protected from any form of degradation. Unfortunately, urban centres along the shores of the lake and river throw their industrial and domestic waste into the river and other water bodies. Government departments that are supposed to control pollution or degradation of water resources are still not decentralized in their operations. They lack finance and human resources to effectively carry out their mandates.

2.3.10 Water resource utilisation in Zimbabwe.

Water is a core development issue in Zimbabwe. It is central to agriculture, rural, urban and industrial development. Water is a key input in the mining and energy sectors and it is fundamental for navigation, fisheries, national parks, natural ecosystems, recreation and assimilating waste from urban, industrial, mining and agricultural sources of pollution (Muzari, 2018). Available estimates made in 2007 suggest that agriculture accounts for 82% of surface water use while domestic and industrial use accounts for about 15% and mining 3%. Current estimates of different uses are not available although water demand for irrigation has dropped drastically. Effective water resources management requires optimal water resources allocation systems that maximizes set

objectives such as crop yield (Reddy, et al., 2008); hydroelectric power generation (Mujumdar, Nirmala, & Bayesian, 2007), and other uses such as flood control (Sharma, Patel, & Jothiprakash, 2016). Optimal water allocation is the consideration of all the water users and allocation of water equitably. According to Manjengwa (2014), man-made reservoirs are among the most efficient infrastructures to manage water supply as well as minimize the enormous impacts of droughts. These infrastructures, coupled with the need for improved operational skills of watershed-scale reservoirs and water distribution networks necessitates the development and application of water allocation models (Juízo & Lidén, 2010)

2.3.10.1 Irrigation

Zimbabwe places very high priority on irrigation development. The total developed irrigated area in the year 2000 was estimated at 200,000 of which 180,000 hectares were characterised as formal irrigation schemes and over 20,000 hectares were in the form of wetland gardens, all in all accounting for over 80% of national water demand (Ncube, 2015).It is estimated that internally renewable water resources can command an extra 300,000 hectares at 10% risk. If efficient water utilisation technologies for example drip are deployed and a 20% risk factor is adopted, this area can be doubled to 600,000 hectares. With the use of trans-boundary water resources, the total potential that can be irrigated will be boosted to over 2,000,000 hectares. According to Mamombe et al. (2017), currently about 135,000 hectares of the developed 200,000 hectares is functional thus making rehabilitation of irrigation schemes in all farming sectors of the country a priority in revitalizing the country's irrigated agriculture and therefore ensuring restoration of water demand and thus increased revenue from water utilisation.

2.3.10.2 Hydropower

Zimbabwe's current demand for electricity is 1900 to 2200 Megawatts (MW) while the generating capacity is 1200 to 1300 MW. This represents a large deficit that is met by importing power from neighboring countries and load shedding which results in widespread and frequent power cuts (Mutiro et al. (2006). Power requirement for mining is estimated to grow at 29% in 2012. Therefore, urgent rehabilitation of existing power stations is needed together with the development of new hydropower stations such as Batoka on the Zambezi River. According to Muzari (2016), hydropower plants need to be incorporated in existing internal dams such as the Osborne, Mazvikadei, Manyuchi, Tokwe Mukosi and Tshangani dams in combination with irrigation. Hydropower elements need to be incorporated in future major dams to support Zimbabwe's economic growth. The rapidly growing demand for electricity has not yet been translated into water demand figures.

2.3.10.3 Urban water supply and sanitation

Decentralized urban water supply and sanitation services have been practiced in Zimbabwe since the 1890s. Urban WSS services were built on revenues from urban consumers and provided by local authorities through their water and sewerage departments. With time, urban authorities took on roads, storm water drainage, electricity and social services that included schools, health and other community services. Twenty nine percent (29%) of Zimbabweans live in urban areas. Urbanization is increasing at a rate of almost 4% per year.

2.3.10.4 Rural water supply and sanitation

Since independence, Zimbabwe gave priority to rural water sanitation and hygiene (WASH) and made significant progress in the rural sanitation and hygiene from 1980 to 2009. According to WHO (2015), rural water usage (excluding agricultural use) does not constitute a substantial demand on the country's water resources but has a very substantial impact on the wellbeing, health and poverty, especially in the poorest rural communities in the country. Therefore, apart from the construction of boreholes, wells and small dams, there is also a strong need to train the rural folk on rain water harvesting.

2.3.10.5 Factors influencing water resource utilisation

The approach adopted in the research follows the so-called PESTLE analysis, a framework or tool typically used in business and management to analyze the environment they are operating in or are planning to launch new operations in, or monitor the macro-environmental (external) factors that have an impact on that environment. Apart from PESTEL there are other factors that may influence water resource utilization, these include; population, climate, finance, history and administration and governance. It is expected that this framework will facilitate understanding of the dynamics of the problem and it could be used to provoke further research directions.

2.3.10.6 Political factors

Politics always plays a role in the success or failure of any process. In this case, there was a marked political influence in the pricing of water. In a bid to retain popularity, politicians aimed to keep the price of water as low as possible. Politicians frustrated the implementation of the pricing policy, which cannot afford to subsidize water service provision to maintain standards in good water service delivery (Shwatuk, 2002). The policies pertaining to management of water resources determines the approach taken by relevant authorities to managing the resource and directly impacts other driving forces and pressures. A consequence of Zimbabwe's economic recession and hyperinflation from 2000 was that government resources declined to the point of having no value and line ministries only received a fraction of what was budgeted. Zimbabwe's policies have a significant effect on the development of the water resource utilization due to the dynamic nature of demand and supply. Governance deficits, political violence, human rights and rule-of-law violations are deep challenges in Zimbabwe (AI, 2017). Corruption in Zimbabwe has become endemic within its political, private and civil society sectors. Zimbabwe ranks 163rd out of 176 countries in Transparency International Corruption Perceptions Index.

2.3.10.7 Economic factors

Zimbabwe has experienced considerable economic challenges over the last fifteen years, with a sharp economic decline (36% GDP decline between 2000 and 2015), and one of the worst periods of hyperinflation in history. Human Development Index ranks

Zimbabwe among low human development countries: 172 out of 186 countries in 2016, compared to 1998, when it ranked 130 out of 174 countries. After a brief rebound following the introduction of a multi-currency regime in 2009, Zimbabwe's economy once again decelerated sharply since 2012 (GIIN, 2016). The economy has increasingly suffered from lack of investment from both underground and surface water sources. The Government currently has no balance of payments support from major multilateral and bilateral institutions or donors due to huge debt arrears of over $7 billion and an almost $2 billion domestic debt (Manneko, 2015). In recent times, cash shortages have left the government struggling to pay civil servants their monthly salaries, leading to government to introduce bond notes.

The fear of bond notes becoming a worthless currency and returning the country to the unpopular period of hyperinflation sparked continuous protests in 2016 (AI, 2017). According to the World Bank, despite near-term adverse developments, 'Zimbabwe's growth prospects appear to be favorable in the medium to longer run' provided the risks and challenges associated with investment spending are addressed (WorldBank, 2016). The economy of Zimbabwe can be turned around by several factors; one of them is proper utilization of water resource. There is no industry that functions without the availability of water resource. The 2018/2019 season has a drought experience, this could have been solved by taking advantage of the underutilized water in different catchment areas to irrigate and secure food reserves. The economy is going to lose a lot of foreign currency in importing agricultural products such as soya beans and wheat in particular.

2.3.10.8 Social factors

The opportunity cost of water collection can be of social and economic dimensions. The burden of collecting waterfalls disproportionately on children; the result may be lost education. Other areas that may be affected include health, nutritional and safety dimensions (DFID, 2002). An estimated of 10 million of Zimbabweans (62% of the population) live below the poverty line (UN, 2016). Rural areas are home to two thirds of Zimbabwe's population, 79% of the poor and 92% of the extreme poor (WorldBank, 2016), Unemployment rate is 11%. Of those employed, some 94% are in the informal economy (ZIMSTAT, 2014). Roughly 10% of Zimbabwe's population has emigrated due to the country's poor economic shape (GIIN, 2016). Poor basic services continue to undermine the resilience of vulnerable people. About 2 million require improved access to water, sanitation and hygiene. HIV remains the fifth highest in the world, at 13.7% (WHO, 2015). The adult literacy rate for Zimbabwe population stands at 98%, in 2014, one of the highest in Sub-Saharan Africa (WorldBank, 2016).

2.3.10.9 Technological factors

The innovation capability of an organization environment is a key factor to defining the competitiveness and market position in an increasingly competitive global (Lawson, 2001). Innovation capability is generally defined as the ability to consistently conceptualize and practicalize novel ideas that deliver both short term and long-term profits to an organization. The strategic importance of acquiring technological and innovation capabilities is widely accepted within management circles as a tool for building sustainable competitive advantage for organizations. Research and development (R&D) and innovation are crucial to building technical capabilities, and hence form the

key drivers of change and determinants of growth in many industries and service sectors (Saunila, 2013).

When complimented with other factors such as strategic direction, organizational capabilities and dynamic interaction with the firms' ecosystem, innovating organizations are therefore able to build dynamic capabilities based on strong managerial capabilities at both the corporate as well as the business unit level. The need to develop innovation metrics was proposed from the resource-based view approach to managing competitive advantage (Muller, 2005; Barney, 2001). Resource based theories suggest that product innovation depends on leveraging of organizational capabilities and resources Barney, (2001). Resource allocation is one of the key imperatives to measuring technology and innovation capabilities. The current situation in utilizing water resource is lagging behind when it comes to technological advancement. This trajectory has caused more negative than positive and there is a loss of water resource from house hold, manufacturing, agricultural to industrial level, which could have been solved by technological endeavors.

2.3.10.10 Agricultural factors

The agricultural sector is pivotal to the economy of Zimbabwe, providing 40 % of export earnings and employing 67% of the work force. Although Zimbabwe has some 4.3 million hectares of arable land, it is estimated that less than 3 million hectares are cultivated (WFP, 2016). White maize is the main staple food, tobacco is by far the most important export crop, accounting for almost half of the agriculture exports. Other cash

crops include cotton, tea, coffee, sugarcane, and soya bean. Agriculture in Zimbabwe is mainly rain fed and is vulnerable to drought and mid-season dry spells. Livestock ownership is generally low, except for the dry regions. Between 2000 and 2008 production of maize dropped 76% (UN, 2016). Agricultural exports declined by 53% during the same period (AMID, 2012). Zimbabwe, which used to be a net food exporter to neighboring countries, turned into a country with severe food shortages (Ncube, 2015), and a net importer, importing more than 20% of its food commodities from South Africa. Only 7% of small-scale farm areas are under irrigation. Access to water is a major issue for the small-scale farmers in Zimbabwe. In 2016, during the consultation process for the preparation of the Interim Poverty Reduction Strategy Paper, the farmers identified lack of irrigation as the top priority issue to be addressed in order to improve the food security situation of the country.

2.3.10.11 Climate change

Increasing climate pressures will inevitably lead to rising food prices weighing heavily on household and national budgets. Disadvantaged social groups will therefore be condemned deeper into hunger and malnutrition. Household-level vulnerability in Zimbabwe is influenced, amongst other factors, by inequitable land distribution, low education, poor infrastructure, gender inequality, dependence on climate-sensitive resources, poor health status, and HIV/ AIDS (Muzari, 2016). Zimbabwe has one of the most variable rainfall patterns in the world in terms of distribution across time and space, although dry spells and droughts are part of a normal cycle (Manjengwa, 2014). Climate change is already occurring in Zimbabwe. The last 30 years have seen the warmest

surface temperature, reduced rainfall and more frequent droughts (GEF, 2013). Such changes have been impacting the primarily agro-based economy.

In the coming decades Zimbabwe will likely experience a decrease in total amount of rainfall, more frequent and longer mid-season dry periods, erratic rainfall distribution across the country and more droughts and floods that may recur in successive years (Braizer, 2015). These impacts are expected to increase the occurrence of crop failures, pests, crop disease, and the degradation of land and water resources. The harmful effects of poor land-use practices, notably deforestation, soil degradation and water pollution. Areas regarded 'excellent' for maize will decrease from the current 75% to 55% by 2080 under the worst-case scenario (RZ, 2015). Most of the small-scale farmers in Zimbabwe lack adequate knowledge and training on climate change adaptation and sustainable environmental practices, which further increases vulnerability and risk to agriculture and the environment (Impact, 2016).

2.3.10.12 Relationship between water utilisation and economic development

Predictions of national and global water use have been criticized for being inaccurate and for not taking into consideration economic development. Of the little research that does address water use as a function of economic development, some claims no relationship.

2.3.10.13 Water for social and economic development

Water plays an important role in all sectors of the economy. It is critical to food and agriculture, energy, health, industry, transport and tourism development and other uses. The role of water in the development of these sectors makes it an important factor in formal and informal employment creation (UNICEF, 2004). Water for consumption refers to water content in beverages and food. Hygiene refers to the minimum water to wash one's body, clothes, utensils, food, clean the home, and for sanitation. Amenities refer to other uses which include bathing, watering gardens, washing cars. Through these categories, water utilized or consumed may vary from each item discussed that may cause a vulnerability to the household assets.

2.3.10.14 Water for domestic use

Water for domestic purposes is mainly used for drinking, cooking, washing, bathing and sanitation. In addition, water is used for subsistence gardening and support of domestic animals, subsistence fishing, the making of bricks, the dipping of domestic animals and fire-fighting. It is further estimated that domestic use per unit consumption rate in the urban areas is taken as 180 litres/capita/day for the larger urban areas (cities), 150/litres/capita/day for small urban areas (small towns) and 45 litres/capita/day for rural areas (WHO, 2015). The amount and quality of water consumed by a community determines its standard of living. The benefits from supply of sufficient quantities and good quality water and sanitation are important for the sustenance of health. In areas where access to water and sanitation has visibly improved this has yielded direct

economic benefit for the people of Zimbabwe. According to WFP (2016), for households and economies relying on the sale of labour, the cost of losing a day's labour can be exceptionally high at particular times of the year. The opportunity cost of water collection can have social, economic dimensions. For example, when the burden of collecting waterfalls disproportionately on children, the result may be lost education, health and safety of children among other multiplier effects. Economically, improving water and sanitation services worldwide would have great benefit (Saunders, 2014). It is estimated that each dollar invested in improving water and sanitation could yield $3-34 depending on the region, and $ 7.3 billion in health-related costs could be avoided each year, (Lenton, Lewis, & Wright, 2005)

2.3.10.15 Water for food and agriculture

In the food and agriculture sector, water is a prime factor in the production of adequate food for the country. Water is necessary for crop production (whether rain-fed or irrigated) and for livestock production. It is also important in the sustenance of the fishing and aquaculture industry, which has an important role to play in the provision of recommended levels of nutrition needed by people. According to Muzari (2016), agriculture is given priority in government's planning for social and economic development. Considerable investments have been in the food and agriculture sector. Continued security of supply of water for agriculture will in turn secure the production food and other agriculture products. The agriculture sector provides employment to a large percentage of the population.

2.3.10.16 Water for industry

Water in industry is used for various purposes such as steam generation for heating, cooling, product dilution, reagent make-up, product or surface washing and transportation of materials or wastes (Rees, Cessford, Connelly & Ree, 2002). The water quality requirement varies depending on the intended use. Apart from the provision of employment in industries, water greatly contributes to exports of some of the manufactured products that provide a source of foreign exchange such as wheat and fuel.

2.3.10.17 Water for energy

Water is essential for the production of energy, a vital input to the socioeconomic development of the country. Hydro-electric power is the main driver of the country's industrial development. Currently Zimbabwe and the whole Southern African region are experiencing serious power shortages resulting in regular load shedding which is affecting economic production (Ncube, 2015). The situation will become more serious in the coming years and requires integrated planning and development of infrastructure that can be used for power generation. Zimbabwe has not fully exploited its hydropower potential and as a result electricity coverage for domestic lighting and heating, mining, industrial, and agriculture and manufacturing is low resulting in the continued overexploitation of wood fuel, which increases deforestation. Pazvakavambwa (2002) argues that, apart from hydro-power generation, water is a critical requirement for growing crops such as sugar cane, maize, sorghum, soya beans for producing bio-fuels to

supplement hydro-electricity. For this to be realized there is a need to encourage private and public investments in the energy sector.

2.3.10.18 Water for recreation and tourism

Water supports wildlife and other tourist resources and maintains a balanced ecosystem for the sustenance of tourism. Zambia's major tourist sites such as national parks, waterfalls, wetlands and national forests are situated near to or along rivers and lakes (Ncube, 2015). Tourism operators take advantage of the aesthetic value of water and locate infrastructure contiguous to or near a water resource. The Victoria/Mosi-oa-tunya Falls on the Zambezi River offers the most popular single tourist attraction in the country. Its dependence on the availability of water is well appreciated. Other tourist attractions along the Zambezi River include water rafting downstream the Falls and boating on Lake Kariba as well as upstream of the Falls.

2.3.10.19 Water resources information and monitoring

Basic information on the source, quantity and quality of water and interplay of human and natural factors on water resources is vital for effective and efficient water resources management. Fundamentally, information on water resources is necessary for planning and managing the resource as its quality, quantity, and availability varies over time and location (Robinson & Zajicek, 2005). Timely information is important in providing early warning of immediate disasters such as droughts, floods or chemical toxic spillages and seepages, thus mitigating the adverse effects of loss of life, property and economic

production. Currently there is inadequate information for effective water resources management.

2.3.10.20 Improved drinking water source

Improved drinking water source refers to one that is protected from contamination (WHO/UNICEF, 2004). If water is collected from a safe source, unsafe handling or storage of water can contaminate water, making household water treatment an important means of ensuring safety (WorldBank, 2016). It is critical to note that peoples‟ basic standards can be satisfied if the round trip to the water source is 30 minutes or less (Ncube, 2015). When families are able to collect water within the said requirements, time that is more meaningful would be used to carry out other development initiatives in the household and thereby improve on the livelihoods and eventually on the living standards of the family and community.

2.3.10.21 Strategies of utilising water resource at local level.

The Strategy provides direction to the water sector as a whole and the relevant water institutions in particular on ensuring water utilization in an economy and profitable way. It takes into account the needs of the sector and the availability of financial, human and other resources (Makurira, 2006). The development of a Catchment Management Strategy (CMS) for each of the catchments. The CMSs will include procedures for water resources management. The strategy is to develop a water resources assessment and monitoring system, based on a catchment approach that includes appropriate data and

information dissemination systems. The contemporary approaches towards women in the development process focus on the socially determined roles and responsibilities that are diverse and dependent on specific socio-cultural settings that are dynamic. Women were generally viewed as being outside the development process into which they must be integrated.

2.3.10.22 Improving water resources assessment

The strategy is to develop a water resources assessment and monitoring system, based on a catchment approach that includes appropriate data and information dissemination systems. The current limited assessment of water resources should be expanded within ten years to cover the entire country. The main indicator for achievement should be the publication of an annual water resources assessment report for the entire country. Institutional set-up and the strengthening of capacity (human resources and material/equipment) and the definition of roles and responsibilities are crucial to avoid duplication and to build lean, effective and efficient water resources management institutions.

2.3.10.23 National classification of water resources

Zimbabwe's water resources are not uniformly distributed in space and time and in terms of quantity and quality, and therefore it is not economically feasible or desirable to protect and utilize all water resources to the same degree. There is therefore need, for management purposes, to have a classification system of water resources. In this regard

the water resources classification system can categorize water resources into various management classes, each representing different levels of protection and utilization. Components of the National Classification system will include: an inventory of all surface water and groundwater resources, the assignment of a management class to all the inventoried water resources, an inventory of all existing water users and uses, noting quantities used, quality and purpose, the specification of measurable parameters such as chemical and bacteriological quality for each class of water.

2.3.10.24 The reserve water

The reserve water is the quantity and quality of water required to satisfy basic human needs, for all people who are or may be supplied from a particular water resource, and to protect aquatic ecosystems in order to secure ecologically sustainable development and use of the water resource. It has priority over all water uses and the requirements of the Reserve must be met before water can be allocated for other uses. For cases where water is already allocated for use the requirement of the ecological reserve may be met progressively over time. Strategies for the Reserve Water include: analysis of existing surface water and groundwater data in terms of quantities and the existing water allocations, determination of projected domestic water demand, developing methods and capacity for the determination of reserves, all existing water allocations shall be reviewed to ensure that the reserve water is catered for.

2.3.10.25 Putting in place mechanisms that promote equal access to water for all Zimbabweans

Equal access to water for all Zimbabweans should be recognised as one of the most immediate issues to be addressed and this requires water allocation options that promote equal access to water for all. The options for promoting equal access to water are guided by viewing water resources objectively as a "common-property" resource.

2.3.10.26 Legal and institutional provisions

The strategy is to develop and strengthen Legal and Institutional provisions so as to ensure that water resources are managed effectively and efficiently and within the law. There are many organizations involved in water resource management in the country. These organizations include the Ministry in charge of water affairs, other Government Ministries, State Corporations, and Local Authorities etc. These organizations have been constrained in the management of water resources by institutional weaknesses, including poor organizational structure, non-existence of certain institutions, conflicting or overlapping functions and responsibilities, bureaucracy, inadequate funds, lack of skilled personnel and shortage of essential facilities.

2.3.10.27 Gender in water resources management

The contemporary approaches towards women in the development process focus on the socially determined roles and responsibilities that are diverse and dependent on specific socio-cultural settings that are dynamic. Women were generally viewed as being outside

the development process into which they must be integrated. However, this approach marginalised the issues because it dealt with women only issues with men not being actively involved. As a result, either the issues were relegated to women's organisations, desks set up specifically for women or to specialists, resulting in the marginal improvement of the status of women. In addition, this approach polarised the discussions resulting is social tensions. The contemporary approach views women as closely integrated into the socio-political and economic system characterised by gender inequalities. This has therefore led to the mainstreaming approach as the main strategy for improving the status of women. Mainstreaming means that women must be given the opportunity to fully participate and benefit from development. This strategy can promote the objective of equality and ensure that women are not passive recipients of development. The approach requires that women issues should not be dealt with as separate issues but as part and parcel of the integrated water management issues. The approach has two main focuses i.e. integration and agenda setting. Integration involves widening the gender concerns across many sectors, while agenda setting aims at transforming the existing development agenda with a gender perspective. The involvement of women in decision-making is a key strategy.

2.3.10.28 Integrated catchment planning

Integrated catchment planning involves the assessment of land, people and water resources in an interactive environment along natural river flow boundaries or catchments. The new thrust in land/water use planning should be to use river catchments/basins as the planning unit. It is therefore important that various planning

authorities adopt the catchment as the planning unit to enhance co-ordination and avoid duplication of services. This approach requires adequate stakeholder participation in all planning phases. However, due to the extensive nature of the catchments, usually covering tens of thousands of square kilometers, there is need for decentralising management structures to the lower tier such as the sub-catchment to facilitate catchment planning. For effective stakeholder participation in planning, the users must be aware of the issues, concepts and principles in catchment planning. Water should be used to intensify land use, and so improve land productivity in order to absorb the pressure on the land resources. Multi-disciplinary teams of various experts should combine efforts and skills to plan for land and water resources in an integrated manner. Flexibility should be allowed so that catchment plans capture and accommodate both spatial and temporal diversity. Catchment planning is expected to be responsive to the needs of the users and should be relevant to the socio-economic situation of the area.

2.3.10.29 Pollution prevention approaches

The pollution prevention approach to water quality management involves reducing pollution at the source, recycling of waste to reduce the quantity and/or toxicity and to minimize present and future threats posed by hazardous substances to human health and to the environment. Polluters should take voluntary action towards reducing pollution at source through waste treatment and introduce recycling in their production systems. For hazardous pollutants that pose severe threats to the environment due to toxicity, persistence and extent of bioaccumulation, a precautionary approach should be adopted aimed at minimising or preventing entry of such substances to the water environment.

Remediation strategies can be developed at the catchment level to address the measures required to effect the improvement in the condition of degraded and impaired water resources, or contaminated land areas. Clean-up levels and targets, remediation approaches and measures, as well as prioritisation of remediation focus and effort, will be primarily dictated by appropriate risk-based approaches. However, rule-based best management practice measures could be appropriate and a requirement in some cases. The repair or rehabilitation of aquatic ecosystems can be given initial priority.

2.3.10.30 Control of invasive alien vegetation

Invasive alien vegetation is undesirable because they impact on biodiversity, ecological functioning and the productive use of land. There is evidence that they use more water than the natural vegetation they replace, and can result in significant reductions in runoff and groundwater recharge in some of the catchments where they occur. The management of invasive alien vegetation must be approached in a co-ordinated multi-sectoral way. Where it is deemed to be to the benefit of water resources, biodiversity or land management, alien plants can be removed from public land. Private land owners should be encouraged to take responsibility for the control of alien vegetation on their property. Punitive measures may be taken against landowners that fail to manage, or remove when ordered to do so by the relevant authority, alien vegetation on their property. Punitive measures may be fines, or a reduction of water use allocation comparable to the losses ascribed to alien invasion on the property in question.

2.3.11 Market based strategies

2.3.11.1 Water pricing

The most important tool of the market-based strategies for water demand management is water pricing. This is so because water consumption for all uses is somewhat sensitive to price. More efficient water use in all sectors can therefore be promoted by adopting a water pricing policy that is based on the user pays principle where the user pays the full economic cost of water. It should be recognised that since industrial and agricultural water price elasticities tend to be higher than those for domestic consumption, a given water price increase will tend to provide a greater incentive to the former users to conserve water. It should also be pointed out that when users are charged the full economic cost of water, it is obviously possible that the price could be out of the reach of some users. This may therefore require special treatment of low-income users through targeted subsidies.

2.3.11.2 Effluent charges

Industrial effluent charges based on the "polluter pays" principle have significant effects on the use of water by industries. The efficient use of water in industry is mainly driven by industrial effluent or pollution charges to protect the environment from degradation. The "polluter pays" principle should therefore be applied in its entirety. This should include a monitoring charge for managing discharge permits, an environmental charge that will be based on the quality of effluent, applying a standards-based approach, and a penalty charge for transgression.

2.3.12 Technology-based strategies

This section presents the water resources management which are anchored on technology.

2.3.12.1 Reduction of unaccounted for water (UFW)

Unaccounted for water should be reduced through a comprehensive program. This program consists of universal metering for both production as well as for sales, leak detection programs, updating system mapping to discover which users have legal connections and which do not, improved maintenance, and long-term replacement programs for old installations. The potential gains from a comprehensive program to reduce UFW are unlikely to be realized without substantial financial resources that will be required to implement the various elements of the program.

2.3.12.2 Conjunctive use of water

Conjunctive use of surface and groundwater should be encouraged. This means that during the wet season when there is surplus surface water, communities should rely on surface water. This would allow time for the groundwater resources to be recharged, which can then be used as a buffer during the dry season.

2.3.12.3 Water demand management in the agriculture sector

Since the agricultural sector accounts for a large proportion of water use in Kenya, introduction of water demand management in this sector is imperative. More efficient irrigation approaches and technologies should be adopted. These include: assessing the

irrigation potential of soils in terms of water loss; this includes determining soil texture, moisture retention properties and the slope and then choosing the more water efficient soils, identifying the suitable water saving technology and the efficient production level.

2.3.13 Mandatory strategies

Mandatory measures can be used to supplement the economic and technical measures. These include the ban on the use of hose pipes and water closures. Their biggest weakness perhaps is that they do less well than the other strategies to encourage more efficient use of water resources since they are more costly in terms of information requirements, staffing and enforcement than the other options to meeting similar objectives.

2.3.13.1 Public awareness

The success of a water demand management program will depend on user cooperation. The stakeholders must understand the need for water demand management. Many urban consumers have no knowledge of their water source, supply capacity or availability, and necessary treatment and distribution costs. Conditions or problems of concern should be communicated to key community leaders, who play a significant role in establishing the program goal. The goal of most public awareness programs in the field of water demand management is the development of a conservation ethics among water users. Long-term results in eliminating wasteful water-use habits are best achieved by educating young people. Teaching children to respect the value of water will help them grow into

responsible adults with a conservation ethic. A good place to begin this education programme is in the schools.

2.3.14 Gaps in literature review

Most research undertaken and reported in sustainable access to safe drinking water has focused on the relationship between water and disease. Not much has been written about the costs to health and the proper utilisation of water that may affect individual involved in using water (DFID, 2010). Through this study which was undertaken in Save catchment area on the variables discussed was interpreted and information shared. There is need to carry out an assessment how water project is being implemented by water utilisation related factors. This coupled with research and secondary data may help in adding knowledge base on related water projects and their challenges in communities. The researcher, therefore, adopted the following conceptual framework to further guide the study in understanding how devolved water resource management institutions can lead to agricultural productivity as illustrated below.

2.4 Conceptual framework

Independent Variable **Moderate variable** **Dependent variable**

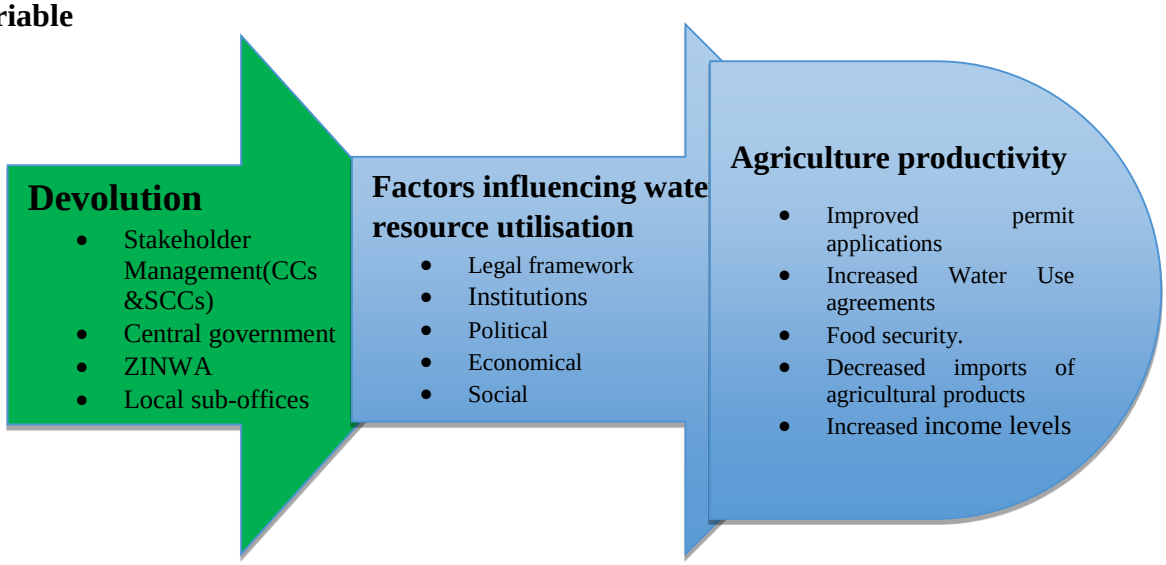


Figure 2-2 Conceptual Framework (Researcher's own construction, 2023)

As illustrated in the diagram above, devolution is regarded as the most effective governance approach to providing high-quality services to local people by giving them the opportunity to participate in decision making as target beneficiaries. Lack of water resources and inadequate water infrastructure endanger public health and standard of life while impeding the country's ability to thrive economically and socially (Cherunya et al., 2015). As demonstrated above, devolution through its agents or stakeholders such as CCs and SCCs, is done in alignment with factors that influence water resource utilisation. These include legal frameworks and available technology. When all factors are equal, agricultural productivity is increased.

According to Saxon (2017) basically, productivity is a physical relationship between output and the input which gives rise to that output. Thus, increases in productivity, whether in industry or agriculture, is generally the result of a more efficient use of some

or of all the factors of production, viz., land, labour and capital. Attention may specifically be focused on the productivity of land, because it is the most permanent and fixed among the three conventional categories of inputs (land, labour and capital). According to Hanumanthappa (2014), whereas the productivity of land is of primary importance as a determinant of the total level of food and agricultural production, the productivity of labour is mainly important as a determinant of the income of the population engaged in agriculture. The productivity of labour is a somewhat more complex concept than land productivity.

The conceptual framework was pertinent to the research as it brought out the strength of the institutions, the caliber of the leadership, and the transparency, efficacy, sustainability, and efficiency with which sector institutions and key stakeholders manage their resources as the primary determinants of good governance. It helped to assess the devolved system's effectiveness in the field of agriculture and put an emphasis on small holder irrigation, climate change mitigation and smart agriculture adoption.

2.5 Chapter summary

This chapter provided a review of the related literature guided by research objectives of the current study. It presented first, the stakeholder theory as well as the institutional theory as frameworks that informed this study. It then discussed key issues of devolved water resource management as a concept and phenomenon before settling on conceptualising agricultural productivity. The chapter also provided a global experience

of water resource utilisation structure in China then focused at factors influencing water resource utilisatiom as well as legal and institutional provisions before establishing gaps in the literature reviewed.

CHAPTER 3 RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the procedures and steps in the research plan that were used to carry out the study. The research approach and tools which were utilised are also presented. Overall, the research methodologies adopted in the form of research philosophy, study design, and sampling procedures, data collection instruments, and data analysis approaches are systematically presented.

3.2 Research philosophy

The manner in which any given social inquiry is undertaken needs to be understood in the context of the research philosophy subscribed to. In the previous section, the researcher outlined the research questions and research objectives guiding this particular study. Therefore, the purpose of this section is to define research philosophy and briefly discuss its role for the purpose of compiling this thesis.

The term “research philosophy refers to a system of beliefs and assumptions about the development of knowledge” (Saunders, Lewis and Thornhill 2003:101). Importantly, these beliefs determine the way in which data related to the research phenomenon should be collected, analysed and applied. “Research philosophy addresses the most fundamental issues of knowledge of the reality (ontology) and how this is known to be true (epistemology)” (Saunders et al. 2003:101).

Since these parameters describe perceptions, beliefs, assumptions and the nature of reality and truth (knowledge of that reality), they can influence the way in which the research is undertaken, from design and strategy through to conclusions (Saunders et al. 2003:101). Research philosophy is normally divided into two main strands, namely positivism and anti-positivism. However, for the purposes of compiling this thesis, the researcher adopted interpretivism as the qualitative research philosophy to guide the foregoing study. According to Rahman and Alharthi (2016:55), "the philosophical basis of the interpretivist paradigm, is rooted in the mere fact that methods applied to acquire knowledge about human and social sciences can't be the same as its application in the physical sciences". Rahman and Alharthi (2016:55) add that "this is primarily due to the fact that humans interpret their world and then act based on such interpretation, while the world does not". According to Pham (2018:3) the "interpretivist paradigm adopts a relativist ontology in which a single phenomenon may have multiple interpretations rather than a truth that can be determined by a process of measurement".

Due to the qualitative nature of this study, the interpretivist paradigm was adopted in line with Creswell's (2007) assertion "that the interpretivist perspective enables the researcher to gain a deeper understanding of the phenomenon and its complexity in its unique context instead of trying to generalise the base of understanding for the whole population" (Creswell's 2007 cited in Pham 2018:3).Similarly, Hammersley (2013) emphasises that some multiple interpretations are developed among human relationships and that interpretivist researchers should try "to understand the diverse ways of seeing and experiencing the world through different contexts and cultures to try and avoid bias in

studying the events and people with their own interpretations" (Hammersley 2013 cited in Pham 2018:3).

3.3 Research design

Definitions of the concept "research design" are multi-varied as they are proposed in the literature. These variations are mainly as a result of different contexts and fields where academics and researchers are situated in the research process. According to Burns and Grove (2003:195), "a research design relates to a blueprint for conducting a study with maximum control over factors that may interfere with the validity of the findings". In the view of Parahoo (1997:142), it is "a plan that describes how, when and where data are to be collected and analysed". Relatedly, Leedy (1997:195) defines research design as a plan for a study, providing the overall framework for collecting data. For Durrheim (2004:29), research design is "a strategic framework for action that serves as a bridge between research questions and the execution or implementation of the research strategy".

The three common approaches to conducting research are quantitative, qualitative, and mixed methods and from these, the researcher adopted the qualitative research approach (Leedy and Ormrod 2001:14). The researcher adopted a case study approach.

3.3.1 Case Study

A case study is a type of research design where a small number of factors connected to a particular area of study are examined in great detail. It is an excellent technique for obtaining first-hand information. A questionnaire can be used as a research tool in a case study. Although this tool is extensively used, it has the drawback that because of its structured form, respondents could submit responses that they do not completely support. Interviews are also frequently conducted. They could also be entirely unstructured, structured, or semi-structured. The drawback of interviews is that circumstances can change from one time to the next, particularly if more than one individual is collecting the data. The utilization of case studies in the formulation of theories is very beneficial. Osuala (2005:187) lists the following additional goals of case studies:

- They are excellent starting points for further inquiries. They may reveal variables, events, processes, and relationships that merit more in-depth examination because they are so intensive and produce rich subjective data. In this manner, a case study may serve as a springboard for research questions in the future. Methods, procedures, or policies are tested in pilot research to identify any challenges that must be overcome before the main study is started.

- Case studies can be used for a variety of purposes, but the majority of them rely on finding a case that is representative of many other cases. After such a case is examined, it can offer insights about the category of events from which it was derived.

- A case study could offer anecdotal evidence to support more general conclusions.
- A particular study might disprove a broad generalization. A single instance can make a substantial contribution to the development of a theory and help to refocus future research in the field.
- When the pertinent habits can't be changed, a case study is preferred.
- A case study might be useful on its own as a singular instance.

3.4 Population and sampling procedure

A population is a group of individuals, objects or items from which samples are taken for measurement, (Babbie & Mouton 1998). Target population refers to the specific pool of cases the researcher intends to study. The evaluation team visited all the seven sub catchment councils and discussed with key informants in all the sub catchments. Purposive sampling was used, where key informants were identified. The sample size was comprised of fifty (60) participants of ages 18 and above.

The researcher visited three sub catchment councils and discussed with key informants in all the sub catchments. Purposive sampling was used, where key informants were identified. Purposive sampling of the 60 participants selected for this study was adopted since the participants were information rich. Creswell (2014) points out that, purposive sampling is critical when key informants are information rich. Thus, the sub catchment area council workers as employees have all relevant information pertaining to the value of DWRMI in Zimbabwe. Most of them as demonstrated in the demographic data tables of this study had many years of working experience with the studied water catchment

area. It is these employees who constituted most of the interview participants who shared their individual views about the value of DWRMI in agricultural productivity. During the fieldwork, files and other literature relevant to the sub catchments were studied. The researcher gathered information from CC and sub-catchments. The researcher made visits to Odzi, Pungwe, Macheke, and Save Catchment Council to gather data. The method of data collection, the types of informants, and the number of conversations held with each type of informant are all displayed in Table 1 below.

Table 3-1 Types of informants, and the number of discussions

Method of data collection	**Category of informants**	**Number of discussions**
Focus Group Discussions	Irrigators (small scale)	1
	Community members	1
	CFU members	1
	Macheke SCC members	1
Interviews	CC staff	2
	CC members	2
	Odzi scc staff	2
	Pungwe scc staff	1
	Pungwe scc members	2
	Macheke scc staff	2
	ZINWA	2
	ZFU	1
	Agritex	2
	Irrigators	2
	Traditonal leadership	2

	Commercial farmers RDCs	1 1
Observations	Conservation activities (e.g vertiver plantations) State of rivers-siltation and state of Major and small dams	

3.5 Data collection instruments

To investigate social phenomena as that which the study tackled, the research needed to use semi-structured interview guides, focus group discussions and document analysis. This was to enable the youth and the duty bearers to fully explain their experiences and views and gather enough data while staying in context and relevant to all objectives of the study.

3.5.1 Interview guide

The researcher conducted semi-structured interviews in which the interviewer made use of an interview guide with a set of questions and the respondents were to respond to these questions in their own words (Creswell, 2014). The interview guide enabled the researcher to obtain the required data concerning the objectives of the research as well as save time for both the researcher and respondents given that the interviews were scheduled during their free hours.

However, it is important to note that an interview guide was self-developed and not rigidly followed to enable the collection of critical information regarding personal experiences (Miller & Brewer 2003). In some instances, the researcher had to rephrase questions in a language that is more relatable to the participants, especially those that did not understand what devolved water resources management is.

3.5.2 Focus Group Discussions (FGDs)

Focus group discussion is a form of qualitative research which involves gathering people from similar backgrounds or experiences together to discuss a specific topic of interest (Creswell, 2014). This technique was critical to the environment in which the study was conducted as it saved time but gather many views. Four (4) FGDs were held with residents and key members of the community. Discussions were held to gather information about the role and participation of communities in SCCs, changes made to the development and management of water resources in the SCCs, activities carried out by the SCCs, issues

and difficulties faced by the communities in implementing the project, and suggestions for how the CC and SCCs could improve their support and services.

3.5.3 Group interviews and in-depth individual interviews

Group interviews and in-depth individual interviews are described together because they were both used to gather the same kind of data. The sole distinction is that two to four individuals with similar positions and responsibilities were interviewed together in group interviews. Because other group members can verify factual information, group interviews are preferable to solitary interviews.

With the following categories of informants: CC representatives, SCC members, SCC and CC secretariat, Stakeholders like Rural District Councils, Department of Water, Ministry of Rural Resources, ZINWA, key influential, implementing partners, and other water development and management organizations/persons, in-depth individual/group interviews were conducted.

3.5.4 Documentary search

This technique was employed in the study whereby it encompassed the use of documents to extract or derive data. In particular, documents ranging from Clientele data volume of water abstraction. Statistics taken from SCC registers to show increase or decrease in the number of water users per annum, statistics of clients on Permit water and those under agreement water. Study of water properties (Dams, weirs, Boreholes, Canals and irrigation infrastructure) built before and after the inception of devolved IWRM.

Documentary research has been a staple of social research since its earliest inception. Documentary products are especially important for the researcher, providing a rich vein for analysis (Hammersley and Atkinson, 1995: 173). In this study, the use of Acts of parliament, constitution, academic papers, ministerial directives and other official documents on devolution and water both public and private domain helped the researcher to obtain information about the access water for agriculture and primary use (domestic).

3.6 Data collection procedure

During the process of data collection, measures of prevention had to be introduced where people were only allowed to be few and following the rules which was: the use of mask, alcohol gel, also required a social distancing, when having meeting with the allowed numbers of people involved. Following the procedure, the researcher selected participants and were organized following the relevant to the research questions. This technique was suitable for the research because it could enable the researcher to identify the potential respondents in a very easy manner. To proceed with the research there was first a good communication with the authorities in order to comply with the rules of social distancing, and have acceptance to proceed with the meeting where measures were stated by the state.

The above process was guided by the interview form which was shared following some adjustments based on the results. Furthermore, the data collection procedure was also guided by techniques in order to identify the participants who were engaged with the experience of the study that was relevant to the research. Then when undertaking

interviews, there was a need for creation of a list of those who needed to be interviewed and then identify information that needed to be gathered. The interview and focus group discussions were conducted based on the objectives of the study, upon with assistance of a secondary sources, the internet to Google for information relating to the research study from written documents such as the related report or information related to people devolution of integrated water resources management in relation to agricultural productivity

3.7 Analysis and organization of data

The data from the interviews, focus group discussions and documentary research was in the form of handwritten notes and documents. Before the transcription process, the available recordings were transferred from the voice recorder and stored in a password-protected computer accessible only to the researcher and the co-investigators (Babbie & Mouton 1998).

3.7.1 Content analysis

Content analysis is the interpretation of the information (content) contained in a message. It is a "method of analyzing written, verbal, or visual communication messages," according to Cole (1988). The study of recorded human communications, such as diary entries, books, newspapers, films, text messages, tweets, Facebook updates, etc., is known as content analysis. As the scientific study of communication's content, content analysis actually examines the contexts, meanings, subtexts, and intents that are present in the messages. Content analysis was utilised to allow the researcher in examining

secondary data in line with the study. The methods entailed systematic classification process of categorizing and finding themes or patterns (Hsieh & Shannon, 2005) as guided by the research objectives.

In particular, the researcher sought to investigate the utility of devolved water resources institutions in Zimbabwe with Save catchment as a case study. Thus, the researcher selected a sample from a number of significant SCCs and CC reports for content analysis. This qualitative data analysis approach allows for a more thorough and precise interrogation of issues based on themes and sub-themes which emerged during the analysis process.

3.7.2 Thematic analysis

Thematic analysis is a qualitative data analysis method that involves reading through a data set and identifying patterns in meaning across the data (Braun & Clarke 2006). The researcher used thematic analysis to identify the key pillars of the study and how they relate and impact devolved water resources management on agricultural productivity by extracting themes from objectives.

3.7.3 Validity

Validity relates to the appropriateness of any research value, tools and techniques, and processes, including data collection and validation (Mohamad et al., 2015). The researcher used validity in research to acknowledge the existence of various realities,

outlines the researchers' own experiences and points of view that could have led to methodological bias, and offers participant opinions in a straightforward and honest manner. In this research validity was used on respondents' qualification analysis.

3.7.4 Reliability

Reliability in research refers to the consistency of a measure. It demonstrates whether the same results would be obtained if the study was repeated. The researcher made employed reliability to ascertain if the test or tool used is reliable, and gives consistent results across different situations or over time. Study with high reliability can be trusted because its outcomes are dependable and can be reproduced.

3.8 Ethical considerations

Confidentiality and anonymity were pivotal in this study as it involved government officials, community, leadership and young people on a controversial topic. The researcher strived in adhering to ethical guidelines as much as possible. There are several ethical principles researchers need to be aware of when conducting research, adhering to a do no harm strategy. These considerations are based on the general ethics of Social Work practice. It was critical to observe the participants best interests, by applying the guiding principles of safety, confidentiality, respect, fairness and non-discrimination to make them free to discuss the challenges they face holding leadership accountable which was part of the research objectives.

3.8.1 Avoidance of plagiarism

As a matter of academic importance and also with legal and known ethical implications, the researcher will endeavor in the conduct of this study and academic submissions to credit the work of other authors and implementers of social accountability and youth inclusion and civic engagement.

3.8.2 Informed consent

The researcher attempted to obtain informed consent from respondents prior to their participation. The researcher made sure that the participants are well informed about the purpose of the research so as to eliminate any misconceptions with local authorities. As a result, the researcher obtained a letter of consent, allowing her to conduct research with the key informants (Miller & Brewer 2003).

3.8.3 Voluntary participation

Participation in the study was strictly on a voluntary basis and no participants were forced, coerced or tricked into participation. Participants were advised at the start of the interview that it is within their rights to withdraw at any stage of the research if they no longer felt comfortable to continue (Babbie & Mouton 1998).

3.8.4 Physical and psychological harm

The researcher ensured that those taking part in the research were not subjected to distress. They were protected from physical and mental harm (Miller & Brewer 2003).

This means the researcher was not supposed to embarrass, frighten, offend or harm participants. At all times the researcher respected the safety, dignity of the participants no matter how important its completion was, it was done with special consideration of COVID-19 restrictions and regulations. The researcher at all times had the foresight of things and reduced the incident and risk of harms

3.9 Chapter summary

This chapter has outlined and justified the research methodology that was utilised in the study. As discussed above, the methodology outline comprised the research philosophy, the research design, research strategies, target population, and research instrument. Data analysis tools utilised in this study were also presented. Issues of validity and reliability to the current study were briefly discussed as well. The chapter further highlighted the ethical considerations upheld in undertaking this study. In the next chapter, the researcher is going to present and discuss the research findings in line with the guiding research objectives.

CHAPTER 4 DATA PRESENTATION, ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents and analyses the major findings of the study. It analyses and evaluates the research data with the purpose to addressing the ensuing research objective: 'To determine the utility of the devolved water resources management institutions on agricultural productivity in Save catchment area'. In this particular chapter, the study findings were generated from the qualitative data collection instruments which were utilised. These data collection tools include a document search, key informant interviews, and Focus Group Discussions. A thematic approach was used for presentation of the major findings that came from the study. The analysis of the findings is premised on the thematic and conceptual as well as contextual analyses.

4.2 Data presentation and analysis

4.2.1 Respondents Data

Basic respondents' information like gender, level of education, employment history, age group, qualification and occupation remain crucial to guide the interpretation and analysis of various forms of data from target respondents. The researcher was able to appreciate respondents' level of understanding, perceptions and views on the study topic. For example, profiling gender and employment status was important since the perceptions of the participants were normally attached to gender. In this case, it would be possible to categorise responses and make inferences on the gender in the study, work experience and the academic qualifications of the participants would also assist in determining the ability of the participants to articulate critical issues related to the utility of devolved

water resources management institutions on agricultural productivity in Zimbabwe. Therefore, respondents' information was presented as follows:

4.2.2 Gender distribution

The table 4.1 below shows gender distribution of the respondents who participated in the study.

Table 4-1 Gender of the participants

Gender	**Frequency**	**Cumulative Percent**
Female	32	53
Male	28	47
Total	**60**	**100**

As shown in the table 4.1 above, of all the 60 participants, 32 (53%) were female and the rest male. However, the selection of the participants was based on their accessibility.

Table 4-2 Work experience of the respondents

Work Experience	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
1-5 years	20.0	33.33	33.33	33.33

6-10 years	15.0	25	25	25
10-20 years	25.0	41.67	41.67	41.67
Total	**60.0**	**100.0**	**100.0**	**100**

The Levine's test for equality variance with descriptive and inferential statistics was used shown in table 4.3 below**.**

Table 4-3Participants' responses in relation to their work experience

Experience	Levine's Test For Equality of Variance	F	Sig.	T	df	Sig.(2-tailed)	Mean differences	Std.error differences	95% confidence - interval of differences
									Lower & Upper
-Equal variance assumed		.173	.541	.838	19	.480	.326	.531	-2.219 .670
-Equal variance not assumed				.427	11.025	.578	.327	.437	1.188 .688

Table 4.3 above shows the responses in relation to their work experience. It is illustrative that within Save catchment area in Zimbabwe, the majority of its staff had an accumulative percent of 10 while those with 10-20 years had an accumulative percent of 6. This statistical evidence clearly indicates that within Save catchment area, their staff are well experienced for their duties and responsibilities If the p-value for the Levene test is greater than .05, then the variances are not significantly different from each other (i.e., the homogeneity assumption of the variance is met). If the p-value for the Levene's test is less than .05, then there is a significant difference between the variances. In this level-test example the significance of 0.154 is greater than the defined significance level of 5%. Thus, the null hypothesis is maintained and there is no difference between the variances of the three groups. Thus, the three samples come from populations with the same variance.

Respondents' qualifications levels are highlighted in the table below.

Table 4-4 Qualifications of respondents

Qualifications	**Frequency**	**Percent**	**Valid Percent**	**Cumulative Percent**
Certificate	20	20.0	20.0	20.0
Diploma	18	18.0	18.0	18.0
Degree	22	22.0	22.0	22.0

Post graduate	-	-	-	-
Total	**60**	**60.0**	**60.0**	**60.0**

Table 4-5 Levine's Test of Variance in relation to respondents' qualifications

Qualifications	Levine's Test For Equality of Variance	F	Sig.	T	Df	Sig.(2-tailed)	Mean differences	Std.error differences	95% confidence - interval of differences
									Lower & Upper
-Equal variance assumed		340	.655	.285	18	.679	-350	-720	-1.460 1.570
-Equal variance not assumed				.268	14.856	-880	-310	704	-1.668 1.388

The above table indicates that, within Save catchment area, all the employees are qualified for their job description with the majority of them (22 %) having attained degree certificates. However, the table also shows that the rest of the respondents had diplomas in relation to their work-related activities. This implies that the data collected from in-

depth interviews with these key informants was very rich and detailed to adequately inform the thematic areas of this study.

4.2.3 Research findings

In this section, the researcher presents the findings of the study based on key themes that emerged from guiding research questions. Therefore, these thematic areas were presented as follows:

4.2.3.1 Conceptualisation of devolved water resources management institutions

Majority of the participants, though they proffered different views on what devolved water resources management institutions are, demonstrated a deep understanding of the concept. They all concurred that this concept relates to the process where local water governance institutions are given the power or are constitutionally and legally empowered to be responsible for managing the use of different sources of water available in their respective jurisdictions. They emphasized that, their mandate is mainly to see to it that, through participatory approach, they demonstrate and encourage local authorities to ensure that as entrusted entities by the government, water is locally controlled and managed to the best interests of local people of its effective use. The above view is supported by one participant who remarked:

...The types of institutions in question are the ones that enjoy transferred power as they are entrusted by central government as local authorities through decentralization of the mandate to manage sustainably water resources issuing permits.

Another participant echoed,

...devolved water resources management institutions are those that monitor and advise sustainable use of water through a participatory approach at a local level.

The above remarks seem to concur with previous studies which consider water as a finite and critical resource, essential to sustain life, development and the environment. Therefore, it requires effective use, management and control for the benefit of the immediate communities and a crucial catalyst in the development thrust of every nation, it therefore requires an integrated management approach that is responsive to the immediate needs of local communities (Merrey, 2008; Molle, 2008; Miguel & Fernando, 1999). The term integrated includes technically appropriate water management that entails surface and groundwater, its quality and quantity, as well as the relationship between water and soil, and son. In this complex and challenging context, adequate information for sustainable management of water resources is fundamental for improving water governance and successful implementation of Integrated Water Resource Management (IWRM) strategies.

It is against this background that Rashirai, Mapedza and Zhou (2013) concur that, the decentralisation framework and the Dublin Principles IWRM emphasise the need for a participatory approach to water management. These commitments are in response to the decentralisation thrust of the Second Republic of Zimbabwe administration to empower local people in pursuit of vision 2030. The Zimbabwean government expressed its considerable commitment through decentralization of the management of irrigation

schemes. It has actually promoted farmer managed irrigation schemes so as to ensure effective management of scarce community-based land and water resources. Thus, understanding decentralisation is important since one of the key thrusts of IWRM is stakeholder participation (Rashirai et. al, 2013) which the decentralization framework upholds as enshrined in the Zimbabwe National Constitutional Amendment of 2013. With the role of government specified in Section 5 of the Zimbabwean Constitution, the Zimbabwe Constitution Amendment (No. 20) of 2013 establishes the framework for the devolution of governmental functions and responsibilities in Section 264. Local governments, provincial and metropolitan councils, and other governing bodies are, therefore, obliged to receive a devolution of powers and responsibilities under subsection 1.

However, while decentralisation is applauded for increasing citizen participation, in Zimbabwe as previously echoed by Makumbe (1998) that Village Development Committees (VIDCOs) and Ward Development Committees (WADCOs) were meant to facilitate grass roots participation at a local level in 'decision making processes for development planning and implementation' in their respective localities. Additionally, the respondents demonstrated an appreciation of the necessity for the Central Government to provide sufficient budgetary funding to support the devolved responsibilities in order for the devolution concept to bear anticipated goal of empowering and transforming the lives of local communities. In this regard Sub catchment Councils are forced to create and oversee their own budgets and determine their own development objectives, giving them more financial authority, which is helping them expand their irrigation hence

coming up with more home-grown production and economic growth. However, these committees as postulated by Makumbe, failed to execute their mandate due to various reasons which among others include lack of authority to raise resources, lack of capacity and the requisite skills (Makumbe, 1998). Merrey (2008)'s critique of IWRM has relevance here in that power dynamics have to be understood within decentralisation. The fact that 'decentralisation' is being implemented will not necessarily produce positive outcomes.

To this end, it is critical to mention that, poverty manifests itself in food insecurity. Over half of the population of Zimbabwe that live in rural areas practice subsistence agriculture, and are food insecure. This is why calls have been made to use water as a catalyst for development (Zimbabwe Vulnerability Assessment Committee ZIMVAC, 2020). One of the early steps taken towards this goal was a review of the national policy and legal frameworks, which resulted in, among other things, the adoption of IWRM-led reforms to address historical shortcomings (Dirwai, Kanda, Senzanje , & Bsari , 2020). Traditionally water management was characterised by unequal access on racial and socio-economic grounds, sectoral approaches, supply-oriented development, and use of administrative rather than hydrological boundaries as management units. The use of administrative units was discontinued because of a perceived lack of recognition of the interconnectedness and dependencies of hydrological systems at various scales. However, the 'naturalness' of the hydrological units in water resource management is increasingly coming under scrutiny because of its neglect of the underlying political choices (Meran , Siehlow , & von Hirschh, 2021).

Decentralization policy has been used in local and natural resources management since the 1960s. In Zimbabwe, decentralization efforts can be traced to the Prime Minister's Directive of 1984 which sought to establish local authorities hence the promulgation of the Urban and Rural District Councils Act of 1985. The Water Act of 1998 was also enacted with the view of promoting decentralized water management in Zimbabwe. Embedded in the Integrated Water Resources Management discourse which is also captured by the Water Act as the notion of broad-based user participation—including previously disadvantaged communal and small-scale, predominantly African farmers who are now participating in the issuance of permits (Meran , Siehlow , & von Hirschh, 2021).

4.2.3.2 Contextualisation of water resources management institutions in Save Catchment area

Despite some participants expressing challenges associated with devolving water resources management to certain institutions, most of the participants were supportive of the concepts of decentralisation with special reference to irrigation schemes in remote areas. They cited advantages of decentralisation to institutions including that of poverty alleviation, empowering smaller farmers as they become active participants in the entire management process in addition to increased agricultural productivity. Excerpts selected below demonstrate these findings:

...water management in irrigation schemes is highly commended. Decentralization will help in poverty alleviation since the position and status of poorer and smaller farmers is strengthened by their active participation in the management of their own local resources for sustainable development. The year 2023 will go down in the history of Zimbabwe as the year in which the country attained a record breaking wheat yield of some 467 905 tonnes, compared to 375 000 tonnes obtained last season. This is the highest record since growing of wheat started in 1966.

Another participant buttressed:

When farmers are given the opportunity to be active participants in the management of irrigation schemes that alone will enhance the productivity of the concerned irrigation schemes.

Similarly, another participant expressed that:

Decentralisation increases the sense of responsibility of the people who make use of water for their domestic and commercial activities. In turn, water utilisation will ultimately boost productivity at the same reducing poverty in most remote and disadvantaged areas.

To this end, these stances are evidenced by the number of established smallholder and large irrigation schemes throughout the Save catchment area. These include Nyanyadzi irrigation; Devuli irrigation scheme; Gudyanga irrigation scheme; Chibuwe irrigation scheme; Chiduku Tikwiri irrigation scheme; Middle Save and Chisumbanje irrigation scheme; and many others around Hippo Valley and Triangle besides the sugar plantations run by the Tongaat Hullets. Government under the second republic using devolution funds and funding from partners has created a business model for irrigation schemes so

as to run as registered businesses managed through a business manager seconded by Agriculture and Rural Development Agency (ARDA) in line with National development Strategy one (NDS1). New models are being implemented at schemes like Romsley irrigation registered as a company and equipped with recent smart agriculture irrigation systems (Nyadzawo T 2023). Thus, according to the Comprehensive Assessment of Water Management in Agriculture (CAWMA) (2007), a critical aspect of the supporting policy frameworks for the water sector is a focus on irrigation in Zimbabwe.

IWRM-led water reforms in southern Africa have emphasised the creation of new stakeholder institutions with little explanation of how they will operate at different levels, especially at the local level. A case in point is the subsidiarity principle, which advocates for water management to be undertaken at the lowest appropriate level. The wheat self-sufficiency attained in the year 2023 leveraged on imports and increased exports which is expected to rise exponentially by year 2030.

The subsidiarity principle, one of the key concepts in the Integrated Water Resources Management (IWRM) approach to water management, can be traced back to the Informal Consultation in Copenhagen in 1991 (Rosa, 2017). Defined as decision making at the lowest appropriate level (ICWE, 1992), subsidiarity espouses the idea that decision making in water management is best done at the lowest appropriate level where water is used. However, empirical evidence suggests that water management does not always follow the vertical models that are based on organograms (Manzungu, 1999). As shown by Saravanan et al. (2009), such ‘ideal speech’ water management approaches that are based on the notion of better communication are ineffective mainly because they fail to

engage with real life power bases and blocks that are intrinsic to water resource management (Mollinga, 2008).

Subsidiarity is about decentralisation of decision making in water management which was identified as one of the triggers for water sector reforms (Jaspers, 2003). This was because water management had for a long time been dominated by centralised decision making by state agencies. Subsidiarity connotes stakeholder participation as contained in principle two of the Dublin principles, which states that water development and management should be based on a participatory approach involving all relevant stakeholders (ICWE, 1992). The subsidiarity principle seems to be widely accepted. Although the principle has been widely embraced in southern Africa, Zimbabwe included, there are still conceptual and practical problems associated with it which this study may ascertain.

In addition, Water resource management in general and decentralisation of power to local institutions in particular can contribute to the broader national objective as entrenched in the National Development Strategy (NDS1) and Vision 2030. Besides, decentralisation can contribute to the SADC objective of regional integration (Muller, Chikozho, & Hollingworth, 2015). However, this faces a number of challenges due to policy, legal and institutional differences between the concerned countries. This is complicated by the fact that, while SADC adopted IWRM as its overall water resource management philosophy (SADC, 2006; Van der Zaag, 2005), there are differences in the way IWRM is understood

and implemented in practice (Jonker, 2007, Manzungu, 2004). However, the SADC Protocol on Shared Watercourse Systems was signed in 1995 in an effort to harmonise water management in the community's 15 member states.

4.2.3.3 The nexus between devolved water resources management institutions and agricultural productivity in Save catchment area.

The study revealed that the utility of devolved water resources management institutions on agricultural productivity is beyond measure especially in the context of the prevailing harsh El Nino drought induced drought which is threatening the country food security efforts. This meant that to devolve or hand over the responsibility for managing river systems and enforcing laws and regulations to the local water governance instituions is a very positive and a welcome initiative to boost agricultural production at a local level. This was supported by participant 6 who remarked:,

"*Devolution entails management of water resources on a catchment basis with the involvement of stakeholders in each catchment area to be able to manage and control water resource in agriculture. Worldwide, devolution continues to be perceived and implemented as a measure for enhancing the provision of social services, through the allowance of a closer linkage of local area needs with the public policy". This has become evident in the increase on permit database for catchment councils, the stakeholders are participating in the decision in processing and issuing of water permits.*

In a follow up question on the utility of devolved water resources management institutions on agricultural productivity in Zimbabwe, Participant 7 commented:

"I personally believe that productivity expresses the varying relationship between agricultural output and one of the major inputs, like land or labour or capital. Agricultural productivity therefore is the ratio of the index of total agricultural output to the index of total input used in farm production. It is measure of the efficiency with which inputs are utilised in production, other things being equal. Agricultural productivity is measured as the ratio of agricultural outputs to inputs. While individual products are usually measured by weight, which is known as crop yield, varying products make measuring overall agricultural output difficult".

Based on the above, it emerged the speculated view that the adjustment of agricultural structure and the improvement of water saving irrigation technology influence the agricultural water consumption within communities.

Apart from that, Participant 9 in her narration had this to say:

"I personally believe that the domestic water resource utilisation with introduction of smart agriculture grew exponentially beginning year 2020 up to 2023. The government made commitment in resourcing development of small holder irrigation into commercial businesses and register them as agribusiness companies. Through this initiative a record excess 80 000 planted hectares was recorded in the year 2023 growing season, and a subsequent bumber harvest of 375000 tonnes which defined the country into wheat self-sufficiency. However, the change of the irrigation water consumption could be divided into two stages: In the first stage, the irrigation water consumption increased steadily after the introduction of Transition Stabilisation Policy (TSP) that was characterised with 100-day targets, while in the second stage, it had a boom after a full funding of the small holder irrigation farmers under NDS1 where provinces and districts up to ward level

were tasked to grow their economy under the devolution mantra. A1and A2 resettled farmers planted bulk of the wheat crop accounting for 69.8% and the communal farmers contributed 6.95%.

The participant further commended that:

…based on the Integrated Water Resources Management (IWRM) principle 4 which says water has an economic value and should be recognised as an economic good, taking into account affordability and equity criteria, more funding should be given to small holder farmers to continue growing local gross domestic product. ZINWA in consultation with stakeholder groups in Save catchment is assisting in the signing of agreements to abstract water from state owned dams. The stakeholder benefit a dollar for every megalitre allocated and sold by ZINWA.

The above quote testifies the record of achievement in improving small holder irrigation productivity, farmers' participation and involvement in water management; institutional management, and adaptation to increasing water resource scarcity in the face of climate change. There has been a significant increase in permits issued by Save Catchment council to all classes of water users spanning from small scale to commercial irrigators with much inviolvement of the water users themselves. It is of importance to note that if the devolution aspect is supported with funding it will yield positive results and directly improve productivity.

Another participant, participant 10 commented on funding and water resource utilisation that;

The boost in both cereals Tobacco and cotton in the 2022/23 growing season reveal that devolution can be realised if the central government releases funding to farmers and Zimbabwe can return its bread basket status before the end of 2030.

Participant 10 further noted that*;*

"Analysis of water utilisation structure was prevalent in some scientific literatures and in general, water consumption can be divided into four categories: industrial, agricultural, domestic and ecological".

Furthermore, she pointed out that:

"*Water is the basis of life and is a driving force for economic and social development and for poverty reduction. The provision of adequate water for irrigation in Save Catchment area is essential for life. Zimbabwe's economy is heavily reliant on agriculture, accounting for 17% of the gross domestic product and providing 60% to 70% of the nation's employment.*

In a follow up question with regards to water use and management, one key informant pointed out that that the major water-consumptive uses in Africa (Zimbabwe included) are for agriculture activities and human settlements. However, in Zimbabwe, the agricultural technology and farm management know-how that had been developed by the white people were lost with the implementation of the Fast-Track Land Reform Programme (FTLRP) in August 2000, which involved the seizure of major farms owned by white people and their distribution to black people. It caused an acute food shortage and a precipitous plummeting of agricultural productivity. The FTLRP had a serious impact on the GDP's agricultural, forestry, and fisheries share, which remained low at

8.3% as of 2018. This is despite the fact that the agricultural sector is the major source of income, employing over 70% of the country's population.

4.2.3.4 Governance frameworks of devolved waters resources management in Save Catchment area

This is a critical section with which the study presents the various policies and institutions that have been established by government; and are currently in use for decentralisation of water resources management in the study area. It reflects the government's commitment towards realising the constitutional requirements of decentralising authority and power from the centre to the peripheries with a view to address colonial inherited regional imbalances. The governance frameworks comprise a plethora of pieces of legislations enactment and the institutions established in line with the devolution thrust of the government. This study will focus on the frameworks which govern water resources covertly or overtly in the study area.

Many were drawn to the idea of devolution because of their discontent with the central government, which was centralized, unaccountable, ineffective, unresponsive, and dictatorial. As a result, proponents of local government fought for devolution, which would enable communities to run their own affairs with little interference from the federal government (Masunungure & Ndoma, 2013). One of the guiding ideals and concepts of Zimbabwe is devolution of power, which is codified in the nation's new 2013

Constitution. The following are Zimbabwe's legally-mandated goals for the transfer of governmental authority and responsibility:

(a) To grant local governance authority to the people and increase their involvement in the State's decision-making process; (b) To advance a democratic, efficient, accountable, transparent, and cogent government for the entirety of Zimbabwe; and (c) To uphold and promote the country's peace, unity, and indivisibility. (d) to acknowledge communities' autonomy in running their businesses and advancing their own development; (e) to guarantee the fair distribution of regional and national resources. (f) To shift accountability and assets from the national government to provide a stable financial foundation for every local authority, province council, and metropolitan council.

The foundation for the devolution of governmental authorities and responsibilities is provided in Section 264 of the Zimbabwe Constitution Amendment (No. 20) Act 2013, with the levels of government delineated in Section 5 of the Zimbabwean Constitution. The delegation of governmental authority and duties to local governments, provincial and metropolitan councils, and other councils is outlined in subsection 1. The Zimbabwean Constitution further stipulates in Section 301(3) that the provinces and local authorities shall receive as their share of the national revenues in each fiscal year a budget equal to at least 5% of those revenues. For example, in the year 2019 alone a budget of ZWL $703 million was allotted for the 2019 fiscal year, to begin the devolution process. Central government, stipulated that the funds were to be used for capital projects. As much as the

constitution of Zimbabwe gave more power to local authorities to run and create their local GDP it leaves out the already existing devolution structure in the Water Act of 1998 which is an integrated approach based on Hydrological boundaries.

The Water Act is one of the legislations which govern the use and control of water resource in Zimbabwe. Until the recent revision of the Water Act (1998), two of the key changes in the Act are that they removed the concept of private ownership of water, and instead vests that in the President. Secondly, water rights are not anymore real rights in perpetuity. Instead, users need now to apply for a permit for use, for which a fee needs to be paid for secondary use. Though the Water Act of 1998 brought about significant change in the Water sector as it bridged a gap between small holder farmers and the large-scale commercial it has been long without amendments to the act and have since been overtaken by the devolution policies, TSP, NDS1 and vision 2030. Besides the National Water policy of 2013 which was not implemented because it lacked proper support of the Act forming it as the water act was now outdated and non-aligned to new devolution mantra in the second republic The prevailing Act was the Water Act of 1976. In general, the Water Act of 1976 was a good piece of legislation that brought any form of water use under control and aimed at the systematic allocation of water among users. According to the section 32 Of the Water Act anyone was entitled to access to water, as long as the water was for primary use (basic human sustenance) Buttressed under section 77 of Zimbabwe's 2013 constitution, "every person has the right to safe, clean, and potable water."

Any use of water from which the user would derive a benefit was deemed commercial use, and required a water right. All water rights were issued in Harare by the Water Court, which was based at the Administrative Court of Zimbabwe. The Water Act of 1998 does not dictate usage priorities. Stakeholder management organisations, or catchment councils, have been given this task. They are tasked with allocating and/or reallocating the available water in accordance with water competition. Section 13 of the Water Act, which requires Catchment Councils to create River System Outline Plans for their individual catchments, should, however, be followed when allocating resources. In times of abundance as well as scarcity, these river management plans would re-define water sharing policies and priorities of use. The environment, metropolitan areas, mining, and agriculture appear to be the main priorities when it comes to water allocation.

Prior to 2013, Zimbabwe lacked a water policy. Prior to then, policy concerns were inferred without having a specific document associated with them. According to Murungweni (2011) the following tenets served as a framework for the creation of the present Water Policy: Water access equity; user pays; polluter pays; environment as user of water; sustainability and catchment protection. Governance of water resources is a key global policy theme. Since the late 1990s, mainstreaming the concept of governance in water management has been led by the Global Water Partnership. The events in Zimbabwe after 2017 are a prime example of the government's audacious attempt to enact decentralization. Devolution is promoted as a means of resolving regional disparities, strengthening local democracy and civic engagement, and guaranteeing local economic development.

Nonetheless, the essay has demonstrated that devolution is a complicated reform, and the way complementing political, administrative, and budgetary reforms are managed will determine how well it works. Therefore, the move to a functionally devolved system of government requires constitutional recognition and protection of subnational administrations, but it is by no means adequate. Although constitutional recognition is a wonderful place to start, other institutional, legislative, and financial considerations are necessary for the devolution to be implemented effectively. Therefore, the passing of laws pertaining to devolution, fiscal devolution, intergovernmental relations regulation, capacity building, intergovernmental cooperation, and bolstering local democracy, The Framework for Action (FFA) document began this process by promoting a concept of integrated water resources management that 'promotes the coordinated development and management of water, land and related resources, in order to maximise the resultant economic and 'social welfare in an equitable manner without compromising the sustainability of vital ecosystems' (GWP 2000: 22). This approach sought to accelerate the devolution of responsibilities to water users and build transparent and accountable mechanisms for resource allocations (GWP 2000: 30). Many Southern Africa countries including South Africa, Mozambique and Zimbabwe have had such an approach and bundle of ideas embedded within new policy structures and national plans in the sector. Water in Zimbabwe is becoming increasingly scarce largely due to the growing demands for domestic, agriculture, and industrial water needs (Chimbiro & Soniye, 2023). This has also been compounded by rapid population increase as discussed in subsequent sections.

4.2.3.5 Water resource management in Zimbabwe

The water sector's overarching objective is to utilize water resources sustainably, which will enhance: 1) Fairness in freshwater access for all Zimbabweans; 2) Water efficiency among conflicting uses; 3) Providing WASH services that are sustainable and affordable; 4) Preserving the environment; 5) Safeguarding water sources, including the nation's dams and groundwater; 6) Ensuring the water sector's viability for consumers and institutions; 7) Promoting the nation's economic growth; 8) Handling the Water Act. If these objectives are met, Zimbabwe will once again be able to lead Africa in providing water and sanitation to its people. An estimated 10,000 or more dams exist in Zimbabwe, which is more than enough to guarantee the country's food security. Notwithstanding the remarkable number of dams, Zimbabwe and the Southern Africa subregion as a whole continue to struggle with the lack of arable land. According to the Food and Agriculture Organization, just 3.4 million hectares, or 7%, of Southern Africa's potentially 50 million hectares of arable land are under irrigation. This is not acceptable in an area where the main crop is cereals, especially maize, which is sensitive to dry spells. President ED Mnangagwa has already expressed the government's intention to fight climate change by making the most use of water bodies to improve.

An important industry for the revival and expansion of our economy is still agriculture. The modernization and industrialization of our agricultural sector will be quicker, more coordinated, and comprehensive under the reorganized Ministry of Lands, Agriculture,

Water, Climate, and Rural Resettlement. Planning, development, and use of our water bodies across the nation must be done strategically and concisely if we are to maximize land utilization for greater output. President Mnangagwa declared, "We will be pursuing further investments and cooperation in this respect," during the 2018 opening of Parliament.

The National Accelerated Irrigation Rehabilitation Programme, which aims to build 200 irrigated hectares each district by utilizing the nation's plentiful water sources with assistance from development partners, was announced just after the President's speech. A further US$36.5 million was allocated for the development of 7,000 hectares on 115 irrigation schemes throughout the nation under the 2019 national budget. The irrigation plans are anticipated to boost agricultural productivity and output while reducing the effects of climate change and drought. Furthermore, the government is restoring several irrigation systems with the assistance of development partners and funding from devolution Funds.

4.2.3.6 Institutions of water management and the creation of ZINWA

According to Mtisi and Nicol (2002) the water sector was previously characterised by a multiplicity of institutions with diverse and divergent interests. In addition, the various players operated from different ministries and departments as follows:

- Central government institutions such 'as the Ministry of Rural Resources and Water Development through the Department of Water Development.

- Ministry of Local Government, Public Works and National Housing through the National Action Committee for the Integrated Rural Water Supply and Sanitation Programme; Ministry of Agriculture, Lands and Resettlement through the Department of Agricultural, Technical and Extension Services (AGRITEX); Ministry of Health and Child Welfare; Ministry of Environment and Tourism; Ministry of Finance; the National Economic Planning Commission.

- Quasi government parastatal organisations such as the Agriculture and Rural Development Authority (ARDA, the Regional Water Authority, the District Development Fund and Agriculture Finance Corporation (now Agribank).

- Local government institutions such as, Urban and Rural District Councils that have a major role in terms of supplying 'Water to their residents.

- Stakeholder institutions, which include Catchment Councils.

- Research organisations such as the University of Zimbabwe and the Institute of Water and Sanitation Development (IWSD).

The existence of many institutions dealing with water posed several water governance problems. For instance, operational policies differed from one organisation to another. These institutions existed in line ministries that were vertically integrated and did not have horizontal integration. Duplication of activities was widespread leading to inefficiency of the water sector as a whole. The institutional set up was restructured to take into account the fact that government was no longer able to sustain the operations of the many institutions in the water sectors. The institutional restructuring exercise resulted in the transformation of the Department of Water Development into a statutory body, the

Zimbabwe National Water Authority (ZINWA), which was tasked with several objectives as stated by the Government of Zimbabwe (GoZ, 2000):

- To improve institutional coordination in the water sector, recognising the existence of a multiplicity of institutions involved in water governance.
- To address Government's failure to sustain the operations of the many institutions in the water sector.
- To deal with the need for the sector to move towards self-sufficiency through internal revenue generation, thereby reducing its dependence on direct allocations from government. In this context. the major task of ZINWA was to provide bulk raw and treated water to water users. In doing this it had to operate along commercial line, generating its own resources for operations and maintenance of infrastructure.

4.2.3.7 ZINWA functions

According to Chaumba Scoones, and Wolmer, (2003), ZINWA has functions at different levels:

- To advise the-Minister on the formulation of national policies and standards on water resources planning, management and development, dam safety and borehole drilling, and water pricing.
- To assist and participate in or advise on any matter pertaining to the planning of the development, exploitation, protection and conservation of water resources.

- To promote an equitable, efficient and sustainable allocation and distribution of water resources.
- To encourage and assist local authorities in the discharge of the functions under the Rural District Councils Act and Urban Councils Act, with regard to the development and management of water resources in areas under their jurisdiction and in particular the provision of potable water and the disposal of waste water.
- To provide technical assistance and advice to the Catchment Councils.

Since the enactment of the Water Act and ZINWA Act of 1998 there are no amendments to these two pieces of legislation. These two pieces of Law governing water resources protection and utilisation needs to be amended to suit the Changes in other laws in the country. The water Act needs to be amended to be in line with Zimbabwe's devolution laws in the 2013 amendment number 20 of the constitution. There has to be a guideline as to how the Water Act should be applied to be in line with government blueprints such as NDS1 and Vision 2030. Until March 2013 Zimbabwe was operating without a National Water policy. Before then, issues of policy were implied but could not be traced to any document. According to Murungweni (2011), the development of the current Water Policy was guided by the following principles: Equity to access of water; user pays; polluter pays; Sustainability; Environment as a user of water; and catchment protection.

The Water Act of 1998 specifies the establishment of Catchment Councils. About seven Catchment Councils are being established in the major hydrological zones of the country. These councils are expected to oversee Sub-catchment Councils, and water user groups

in their areas of jurisdiction. Sub-Catchment areas are based on sub-hydrological zone and on Intensive Conservation Area (ICAs). Catchment council's functions included preparing an outline plan for their river systems, determining' applications and granting water permits, regulating and supervising the use of water, supervising the performance of functions by Sub-catchment Councils, and dealing with conflicts over water this idea has resulted in local users being allowed to get water to kick start their projects and even growing. It reduces time frame for the processing of a new permit resulting in more time being spend on the field of work hence growing productivity. The Save Catchment water users as they are given power to govern the resource are also privileged with information and techniques to save water. Through devolution the change is noticeable with small holder irrigation farmers observed at Tikwiri irrigation scheme have improved as also shown by housing units being developed in the area and a decrease in school drop out by 30% from 2019 to 2023.

4.2.3.8 Sub-catchment Councils' functions

The functions, according Ministry of Lands, Agriculture, Fisheries, Water and Rural Development include: Regulating and supervising the exercise of permits for the use of water including ground water within the area for which may established; Reporting as required to the Catchment Councils on exercise of water permits within its areas; Monitoring water flows and water use in accordance with the allocations made under the permits; Assisting in the collection of data and participating in planning; Collecting sub-catchments rates, fees and levies.

4.2.3.9 Catchment councils

Catchment councils were established by an Act of Parliament as institutions that would be responsible for the management of water in a specified catchment. The logic for the creation and formation of catchment council is based on the river system of a particular area and is closely tied to the idea that basin-level integrated water resources management is the most efficient way of governing the resource. Thus, an area with its own river system feeding, but not necessarily, into the major river of a particular area would form a catchment. For instance, the rivers directly and indirectly flowing into Save River, would form Save Catchment. To this extent, seven major rivers in Zimbabwe constituted the seven catchments, namely Gwayi, Manyame, Mazowe, Runde, Sanyati and Save. Below the catchment, there are sub-catchments comprising a collection of the rivers that form the catchment of an area within the major catchment. For instance, for Save Catchment, there are rivers that form sub-catchment of Save, namely, Budzi, Devure, Lower Save, Macheke, Upper Save, Odzi and Pungwe.

The boundaries of sub-catchment and catchment areas span administrative boundaries, and this has implications on water management. Catchment areas are managed by chairpersons and vice-chairpersons of the sub-catchment areas that comprise a catchment area. Chairpersons and vice-chairpersons of a sub-catchment area constitute a catchment council. Sub-catchment areas care managed by representatives from commercial farming, communal farming, and small-scale farming, Rural District Councils (RDCs), traditional

leaders, industry, and both old and new resettlement schemes. These different stakeholders constitute a Sub Catchment Council. Thus, in this study, the Save Catchment Council is in charge of the Save Catchment Area.

4.2.3.10 Challenges associated with devolved water resources management systems in Save Catchment area

The participants in this study shared several challenges associated with devolved water resources management institutions in the Save Catchment Area. One major concern raised was of the IWRM programs which are not being appreciated as relevant in remote areas. Discouragingly, land degradation has worsened despite adoption of IWRM. They also include non-flexibility of programs and their allocated budgets that do not take cognizant of ecological variability. In addition, budgeted funds to support programmes are made to meet too many activities instead of focusing at priority issues.

One of the participants clearly expressed that:

…A number of challenges have threatened the relevance and sustainability of IWRM initiatives at the grassroots of the rural society.

This finding resonates with previous study that established that local assessment of integrated watershed management in the Save Catchment suggests that most projects have not been successful in enhancing participation, rural food security and incomes (Manzungu, 2004). Some projects have not managed to provide even the minimum drinking water and fodder needs of watershed inhabitants. Others have overlooked pastureland development and soil moisture conservation practices.

In view of the above, participant 5 commented:

...many IWRM projects have failed to arrest land degradation.

Continued lack of drinking and irrigation water in several areas in the Save Catchment shows that drought proofing interventions have not generated significant downstream impacts (WEF, 2020) Furthermore, the disappointing results in the Save Catchment are largely due to the flaws in the decentralisation of watershed management programmes, financing and implementation mechanisms currently used by stakeholders. Water scarcity is not only a natural outcome of climate patterns. It is more a result of population increase and the substantial growth in the demand for fresh water for urban use, agriculture, diverse amenities and industry. Already, more than a billion people in the developing world lack safe drinking water, which those in the developed world take for granted (WEF, 2020).

Participant 3 vividly expounded saying:

.....The idea of having a fixed budget for water management programs in the Save Catchment Area does not adapt to the wide biophysical and social economic variability among watersheds, and rigid adherence to guidelines prevents projects from sharing experiences and lessons.

Water resources management projects' multiple objectives caused the local authority to channel limited investments into a range of on-and off- farm activities, often involving tradeoffs among the interests of different stakeholders (Chitongo , 2020). Packages of

measures, from building check dams to promoting income generation activities, are too large and difficult to manage.

Similarly, participant 6 emphasized that:

...There is a challenge of spreading of funds over many actions that makes implementation and relevant actions slow to materialise.

Previous research has established that, IWRM Projects in the Save Catchment often apply unscientific soil and water conservation methods, which decreased the cost effectiveness of the interventions (Chifamba , 2013) IWRM initiatives in the Save Catchment also lack sustainability and equity. Projects in the catchment have no strategy for maintaining assets after the project support end; the only benefit that the communities derive from watershed projects is the possibility of short term paid work. Communities in Save Catchment see no long-term benefits from projects, so have little interest in operating and maintaining project assets. In addition, property regimes in the Save Catchment are incompatible with the 1995 watershed management guidelines. Land is inequitably distributed and ground water rights are bundled with landownership.

According to the (Chimbiro & Soniye, 2023) most watershed projects in the Save Catchment have a clear hierarchy of benefits and beneficiaries: those farm households that obtain improved irrigation benefit the most; other farmers obtain on-farm treatments such as field bunds; while those with no land or livestock benefit the least. Existing water management organisations are not successful in stimulating poor people's participation as they are unable to address their primary concerns such as a secure source of portable

water, employment and access to water for agricultural purposes (Brooke & Fenner , 2023). Integrated watershed management in the Save Catchment will not achieve the intended objectives unless these issues are placed at the center of a participatory process and initiate negotiations among different stakeholders and beneficiaries to avoid conflicts.

Conflicts can arise also due to misdistribution of water resources which is shaped by nature and also by climatic fluctuations (Chifamba , 2013). As a result, water-scarce countries, which often have high rates of population growth such as Zimbabwe, frequently find themselves involved in both internal and external conflicts over the scarce water resource. These conflicts may arise because national interests differ and nations develop diverging policies and plans which are not compatible (Chimbiro & Soniye, 2023). Areas which are more likely to have conflicts are regions in which scarcity, misdistribution and increase in demand interlock.

Two of the participants shared a similar view regarding the challenge of climatic changes causing insufficient rainfall adequate enough to be harnessed for irrigation along Save Catchment Area as shown in the excerpt selected below:

...*A common challenge today not only here in the Save Catchment Area but regionally is that of high climatic variability. It is one of the major challenges facing Zimbabwe in its management of water resources. The country depends heavily on surface water to meet its various requirements; but rainfall is variable and unpredictable (Participant 8).*

Participant 3 further remarked:

Here in the Save Catchment area, including the rest of Zimbabwe, the rainfall pattern is insufficient, unpredictable, and inconsistent. Most of the rivers here in Zimbabwe, particularly in the lowveld of the country, are not permanent, and even the region's major Save river does not flow worse during the dry season.

These findings resonate with what (Ndlovu, Barend, & Le Roux, 2020) established that, only 37 percent of the country receives adequate rainfall for agriculture. Consistently, the evidence from the past three decades indicates that hydrological variability experienced by Zimbabwe causes significant economic shocks. There is a strong correlation between rainfall variability and fluctuations in GDP growth. Improved water resources management is therefore critical to the stability and security required for sustained strong economic growth. According to Chifamba (2011), irrigation is indispensable for successful agriculture and significant quantities of stored water are required to meet agricultural and non-agricultural requirements. Currently, the supply of water is not sufficient to meet demand. To meet these existing shortfalls and the expected growth in aggregate demand for water resources, and to reduce the vulnerability of the economy to water shocks, the country will require an increase of some 6 million km^3 in the stored water capacity of dams by 2020. A substantial investment in pipelines and other means of water transport will also be required. The total investment in water storage and transport for the decade ahead is estimated at $2.142 billion (at 2009 constant prices). The indicative financing plan for this component of the program calls for $1.375 billion of investment by the private sector, including $1.2 billion for the proposed Zambezi-

Bulawayo pipeline, some $570 million of funding from the national government and $200 million of support from the donor community.

Against this background, it can be deduced that, management of water resources confronts many obstacles: first, because of the critical importance of water for human existence and secondly, because of its many uses: for drinking and domestic purposes, irrigation, fishing and navigation, hydropower generation, flood management, recreation, tourism and preservation of uses are often in conflict and the satisfaction of one obstructs the fulfillment of the other. Other major difficulties in the management of water resources are their sheer scale and the frequent gaps between policies, plans and practices (Braizer, 2015).

It is also critical to mention here that, the health of a nation depends upon the level of cleanliness of the domestic water supply. It is a problem that is often ignored or sidelined by the developed countries as it is only a problem of the poor and the developing countries. According to Jayawadena (2021) approximately one billion people, or one seventh of the world population, do not have access to clean and safe drinking water.

In a similar vein, it's clear that the big topic right now is global warming, which is a sign of climate change. According to the Intergovernmental Panel on Climate Change (IPCC), there have been notable increases in temperature since the 1970s, which they link to greenhouse gas emissions on a worldwide scale (Callahan, 2006). Additionally,

influential people and circles have publicized and supported the problem. The melting of ice caps and glaciers, rising sea levels, rising temperatures, and other signs of climate change unequivocally indicate that some regions of the world are experiencing noticeable warming. There is another school of thought at the same moment. As stated by Myers and Baslow (2002) though not as strong as those who support the theory of global warming, who believe that the problem is exaggerated, that warming is occurring locally, and that it is too soon to declare the problem to be a worldwide phenomenon. It is a truth that the world has experienced cycles of warming and cooling in the past, regardless of the reasons made in favor of or against global warming. One such issue facing the Save Catchment Area's decentralized water resources management organizations is climate change brought on by global warming.

In a more heart wrenching situation gender incensitivity, corruption, nepotism and a well calculated willful slow implementation of devolution are among other top challenges

One key informant stated that:

Although the efforts of the Second Republic administration's targets in NDS1 and vision 2030 are bearing fruits, corruption is still an elephant in the room as it is slowing government efforts to increase its agricultural productivity. A few politically connected individuals benefit first in almost all government initiatives and yet many of these beneficiaries of government inputs take them to black market and sell them even below subsidized prices. A number of Agritex xtension Officers are at the center of the storm as

they are involved in nepotism and favoritism in issuing out inputs and women are naturally sidelined because of lack of documents of tenure.

He further outlined that:

A number of center-pivots donated under government devolution are lying idle on farms due to lack maintenance and neglect by the beneficiaries. Most beneficiaries' male dominated with fewer women accessing due to lack of collateral security and tenure documents amongst this group.

Strong "resistance to change" from influential politically motivated interest groups may make it more difficult for the central government to maintain its political resolve to proceed with devolution. In this sense, robust legislative frameworks can strengthen public commitment and permanence in the distribution of funds to devolution projects. Zimbabwe's political will may be strongly sustained by a strong desire for better economic development results to halt economic decline as the nation works to become upper middle income by 2030. Maintaining political will can also be significantly aided by meeting the expectations of political stakeholders and constituents.

Despite the government's difficult decisions to empower women, their participation is still quite low. The foundation of the issue stems from Zimbabwean society's patriarchal structure. Here, the involvement and leadership of women are frequently seen through the restrictive prism of traditional gender norms, which feeds into social exclusion and reinforces stereotypes. Approximately 14 million people live in Zimbabwe, with 52% of them being women. Approximately 70% of the population, mostly made up of women,

reside in rural areas. The majority of the labor force in the largely agrarian national economy is made up of women, who get meager pay in this sector. (Zimbabwe National Statistics Agency (ZIMSTAT), , 2019) The majority of women do not own the land on which they primarily grow crops for livelihood. It will take a comprehensive strategy to end this cycle. The legal system must change in step with societal attitudes and practices. In light of this, it's critical to support girls' and women's access to formal and informal education as well as to resources such as money, jobs, land, and means of production.

Environmental pollution is another issue raised by participants as a problem faced by devolved water resources management entities in the Save Catchment Area. This is an unchecked byproduct of economic development that they claim is caused by the careless disposal of industrial, agricultural, and residential garbage in several water bodies. (Chimbiro & Soniye, 2023). Many rivers, including the Save Catchment Area, have slowly accumulated pollution over time, making them both chemically and biologically harmful as well as unsightly. Restoring these rivers to ecologically acceptable levels is therefore expensive, necessitating the adoption of the polluter pay concept in order to recoup expenses. (Carlisle & Gruby, 2019). One other challenge participants aired was the high levies charged by ZINWA. A participant clearly said:

....In line with the mandate of ZINWA, my major concern in the past few years has and is the progressively larger gap between the price of water charged by ZINWA and the domestic inflation rate. Given the current economic quagmire in which Zimbabwe is

found in, there is justification for raising such concerns. The current market economy leaves no one comfortable enough to make ends meet as bread and butter issues are the focus of every person if not Zimbabwean citizen.

In conclusion, it is critical to mention that, Catchment is a topographically demarcated region which is influenced by the atmosphere from above, the geosphere from below, and the biosphere and the hydrosphere from within (Chaffin., Garmestani., Gosnell, & Craig, 2016). The main challenges of catchment hydrology arise as a result of the interactions of influences from these various components, influences brought about by human activities and the need to ensure that the catchment processes are sustainable. Hence, there is need for real participation by all stakeholders. This is because, water is a subject in which everyone is a stake-holder. Real participation only takes place when stakeholders are part of the decision-making process. According to Brown (2011), this can occur directly when local communities come together to make water supply, management and use choices. Participation also occurs if democratically elected or other-wise accountable agencies or spokespersons can represent stakeholder groups.

According to the Breede-Gouritz Catchment Management Agency (2020), participation is an instrument that can be used to pursue an appropriate balance between a top-down and a bottom-up approach to IWRM. For some decisions the appropriate decision unit is the household or the farm; participation depends on the provision of mechanisms and information to allow individuals and communities to make water sensitive choices

(Carlisle & Gruby, 2019). At the other end of the spatial scale the management of international river basins will require some form of cross-national co-coordinating committees and mechanisms for conflict resolution. Similarly, IWRM requires gender awareness. In developing the full and effective participation of women at all levels of decision-making, consideration has to be given to the way different societies assign particular social, economic and cultural roles to men and women (Coles & Wallace, 2020). There is a need to ensure that the water sector as a whole is gender aware, a process which should begin by the implementation of training programmes for water professionals and community or grass root mobilizers (Dickin & Caretta, 2022).

Lack of staff and resources at the subnational government level to carry out service delivery responsibilities is another difficult obstacle facing devolution as a framework for service delivery (Muriisa 2008). "The creation of an enabling environment with appropriate policy and legal frameworks" is how the UNDP defines capacity building (Chitongo , 2020). One of the most important success factors in realising the goals of the government's devolution strategy is filling the human capacity gaps in Sub catchment councils. Qualified individuals are needed by SCCs to handle their finances, especially debt management. The 2018-2021 Ministry of Agriculture audit, noted that insufficient records and improper debt management procedures were two other issues SCCs had to deal with. The auditors identified a shortage and a stagnated staff growth in SCCs. As a result, the skills disparities among the three levels of government and their ramifications must be taken into account while discussing the critical success criteria for the implementation of devolution.

4.2 Chapter summary

This chapter presented and analysed the major findings of the study in line with set research objectives. The research findings interrogated in this chapter served as the foundation for the conclusions and recommendations made in Chapter Five. The chapter presents the research major findings in line with the key issues and themes highlighted in the research questions. A brief background of devolved water resources management institutions and agricultural productivity in Zimbabwe was presented to put the chapter's discussion into its proper perspective. Accordingly, the researcher went further to discuss the research findings in respect of themes emerging from collected data alongside the guiding research questions. Fundamentally, the various challenges related to devolved water resources management institutions were discussed with a view to propose possible alternatives for improving the new concept's implementation and adoption not only in Save Catchment area, but in the whole country. These challenges were presented with a comparative analysis of the experiences in other developing and developed countries to draw lessons, which, if fully utilised, can go a long way in improving Zimbabwe's unfolding scenarios. The next chapter is presenting a synthesis and conclusions of the study to map way forward for appropriate recommendations and suggest areas for further research.

CHAPTER 5 SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

African countries, like Zimbabwe, are faced with serious water resources governance challenges which has become a threat to improve agricultural productivity at local level. This entails a serious hindrance to sustainable socio-economic development interventions. The 2013 Constitution of Zimbabwe ushered in a new era for the government to reconsider and strengthen devolution as an avenue to bring governance closer to people, including water resources management. Based on the widespread emphasis in reality and in the extant literature on the imperative to improve and strengthen water resources management institutions at local spheres of government, the thrust of chapter is to provide a summary of the conclusions of this study. Further, the chapter seeks to propose possible alternatives to improve and strengthen devolved water resources management institution in the Zimbabwean water sector in general, and Save Catchment area in particular. The thesis explored, described, explained and deciphered various issues in view of the guiding theoretical and conceptual underpinnings and real applications of devolved water resources management institutions in Zimbabwe and also highlighted a comparative study of the concept with selected regional countries. A thematic approach and content analysis were used as data analysis tools.

5.2 Synthesis of research findings

This section provides a synthesis of the study in line with the guiding research objectives and secondary research questions. It also presents a brief summary of conclusions

generated from various key findings gathered in the respective chapters of the thesis. These conclusions are presented in line with the guiding research objectives afore-given, and the secondary research questions posed in Chapter One that are presented below in terms of the relevant chapters. Notwithstanding, these conclusions will not necessarily be presented in the sequential order of all the chapters since some of the issues discussed overlap, which provide crucial answers for the secondary research questions for each chapter.

Chapter One provided an overview of devolved water resources management institutions in Zimbabwe with a view to put the study into perspective. The background of the study has revealed that, pursuant to international best practices, Zimbabwe, like many other regional countries, has devolved water management to stakeholders. This follows the fact that, it is endowed with vast water resource which is critical for enhancing agricultural production among other domestic and commercial purposes (World Bank, 2016). Particularly in the African region, the past decade witnessed a large number of countries undergoing or are in the process of implementing water sector reforms. The reforms have generally been driven by international calls for more efficient and sustainable water management approaches (Marios, 2004). The need for a global water management review has gathered momentum since the United Nations Convention on Sustainable Development the Earth Summit held in Rio de Janeiro in 1992.

The background to the study further revealed that, water management has been decentralized to stakeholder-managed Catchment Councils (CCs) and Sub-Catchment Councils (SCCs). The new Water Act and the Zimbabwe National Water Authority (ZINWA) Act came into effect on January 1st 2000. Following the gazzetting of the two

Acts, Catchment Councils and ZINWA were formed. Seven Catchment Councils (CCs) were formed nationwide during the period June to July 1999 (Mupindu, Murimirudzombo & Changunda, 2004). Under the present arrangements, a new framework for water management has been formed mainly to involve stakeholders in water management. Zimbabwe has seven catchment areas where water is being managed and these are Mazowe, Runde, Mzingwane, Gwayi, Sanyati, Manyame and Save, the latter being the current study's study area. The Zimbabwe National Water Authority (ZINWA) was formed with the primary role of taking over the commercial functions of the Department of Water Development.

Chapter Two was a review of relevant literature to allow the researcher's familiarisation with the ongoing scholarly debates as well as identifying the current knowledge gaps on the study topic. Discussions in this chapter were largely informed by two complementary theories expanded by: Miles and Friedman (2006)'s Stakeholder Theory (ST) as well as Cole's (2011) Institutional Theory (IT). These have been reinforced by devolution as the study's conceptual framework that underscores the essence of devolving water management to independent stakeholders as devolved water management institutions. The ST's main principle of organisation legitimacy argue for the management of the organisation by considering the benefit of the stakeholders, the rights of various groups are considered as well as their participation in decisions that substantially affect their welfare. To the contrary, the IT mainly emphasizes standards and legitimate issues so as to assist institutions to come up with a management option that ensures sustainable livelihoods of all stakeholders through efficient use of water resources available in any catchment area. However, it is critical to state at this point that, devolution as a practical

concept is one sure way to providing high-quality water management services (Cherunya et al., 2015).

A global comparative analysis of the study topic suggested that, devolution is regarded as a panacea for ensuring efficient provision of social services, through the allowance of a closer linkage of local area needs with the public policy (World Bank, 2012). This is against a backdrop that the water sector is especially vulnerable to poor governance as well as corruption, hence the need to decentralize management and control of water resources so that relevant stakeholders are empowered to make informed decisions on how this scarce resources can be utilised for improved agricultural productivity which is cardinal for sustainable community development. . This is enhanced since water governing authority is devolved to local institutions which are mandated to manage river systems and enforcing laws and regulations at the local level (Gleitsmann, 2015).

On a global scale, several nations have devolved water management rights to local authorities. For instance, China has successfully adopted devolution to one of its catchment area of Tianjin to ensure adequate supply of water as a resource for sustainable industrial productivity including agriculture (Zhai, Wang., Zheng., & Huan, 2011). Similarly in developing countries, Zimbabwe included, the provision of adequate potable water supply in addition to drinking and cleaning, through devolution measures, has not only improved health by reducing incidence of water-related illness such as diarrhea and cholera (WHO, 2015), but has also increased agricultural productivity.

Previous research has it that, since the turn of the 20th Century, the utilization of fresh water for economic purposes has posed a big challenge. According to Arsano (2007:7), “In as much as water resources are shared, the upstream and downstream users will have

to agree on principles and mechanisms of water and water resource management". Thus, the need and essence of devolved water management institutions.

Chapter Three includes the methodological orientation utilised for the purposes of completing this thesis. Due to the qualitative nature of the study, the interpretivist paradigm was adopted as the guiding research philosophy in line with Creswell's (2007) assertion that, "the interpretivist perspective enables the researcher to gain a deeper understanding of the phenomenon and its complexity in its unique context instead of trying to generalise the base of understanding for the whole population". Since this study focused at one of Zimbabwe's seven catchment areas: the Save Catchment Area, compelling the researcher to adopt a case study approach as his research design. Purposive sampling of fifty (60) participants of ages 18 and above was used in this study. These participated guided by three data gathering instruments triangulated: face to face individual interviews; focus group discussions; and observations. Thematic content analysis was the main way of data analysis employed in this study.

Transferability, credibility, dependability and confirmability were observed to ensure trustworthiness of the findings of this study (Creswell, 2014; Kumar, 2011). All ethical considerations and trustworthy issues were honored following a clear explanation to all participants of the significance of the study where participation was voluntary and withdrawal at any point during data gathering attracted no penalty. According to Grix (2010:144), "participants in any study must do so willingly without any form of coercion." Consent forms were signed and anonymity of participants guaranteed.

Informed consent relates to "…the participants' understanding of the nature and purpose of the study" (Yin, 2011:46).

Chapter Four was a presentation and discussion of the study's findings in line with the guiding research objectives. Analysis of research findings were presented in the following sub-headings derived from the themes which emerged from in-depth interviews conducted. :

5.2.1 Conceptualisation of devolved water resources management institutions

The research findings indicate that although most participants held varying opinions regarding the definition of devolved water resources management entities, their understanding of this concept had a commonality. They agreed that these institutions have the authority and duty to oversee the usage of the various water sources that are accessible in a particular location by working with all relevant parties in a participatory manner. Rashirai, Mapedza and Zhou (2013) agrees that the Dublin Principles IWRM and the decentralization framework highlight the necessity of a participatory approach to water management. Comprehending decentralization is crucial because it challenges a fundamental component of integrated risk management (IWRM), namely stakeholder engagement, as stated in the Zimbabwe National Constitutional Amendment of 2013.

Less research and monitoring has been done on the connections between agriculture, the environment, and hydrology than on water policy. If this gap persists, there is a chance that decision-makers will make poor decisions and that policies won't be properly implemented and assessed. Due to climate change, agricultural and water resources are entering a period of increased risk, increased variability, and uncertainty, which exacerbates these gaps in science, monitoring, and understanding. Hence expanding our

understanding of the connections between surface water and groundwater flows, as well as the links between agriculture and water availability is impetus to the working of water institutions in Save Catchment council. Save Catchment, however, adapt at least in part to their poor water conditions through storage and inter-basin transfers of surface water, groundwater extraction, or both. Effective water institutions have been crucial to the success of such adaptations through funding from implementing partners and devolution funds.

5.2.2 Contextualisation of water resources management institutions in Save Catchment area

With regards to contextualisation of water resources management institutions, most of the participants were supportive of the concept of decentralisation with special reference to irrigation schemes in remote areas. They sighted advantages of decentralisation to institutions including that of poverty alleviation, empowering smaller farmers as they become active participants in the entire management process in addition to increased productivity. In addition, water resource management and decentralisation of power to local institutions in particular, were attributed to contribute to the broader national objective as entrenched in the National Development Strategy (NDS1) and Vision 2030.

The participants revealed that decentralisation has the benefit of facilitating the process of recognising the potentially divergent interests of various stakeholders and of looking for solutions that reduce the likelihood of difficult-to-resolve disputes arising. Devolution has proven that it offers the adaptability needed to address the shifting goals and concerns of various stakeholder groups over time. The goal of decentralisation is to create a strong

system of checks and balances amongst the many players in the industry. Through competition and emulation, this may increase the catchments' level of accountability, decision-making transparency, and operational efficiency while also assisting in cost reduction hence potentially aiding to the achievement of the National Vision of an upper middle-income society by 2030. A decentralised approach may also aid in facilitating conflict resolution by lessening the impact of potential disputes among various parties. By allowing users to affect system performance to their advantage, decentralisation seeks to increase the involvement of water users in decision-making at various levels. The final users are shielded by these institutions from the cultural prejudices and self-serving motives of technicians and administrators. Decentralisation brought in well-defined stakeholder participation in the area of water allocation as prescribed in the Water Act chapter 20:24 and accompanying statutory instruments such as S.I 47 of 200.

5.2.3 The nexus between devolved water resources management institutions and agricultural productivity in Save catchment area.

In reacting to the above theme, the study revealed that the ~~value of~~value of devolved water resources management institutions on agricultural productivity is specially to improve the relationship between the nation's government and local governments in the governance processes. This is because there has been a greater emphasis on the preparation and execution of work plans at the national level, as well as on monitoring and supervision. This will entail more Extension employees. Incentives for extension officers must also be given through proper facilitation, compensation, and advancement. Therefore, in order to increase household incomes and overall agricultural output, sufficient funding should be allotted to the devolved agricultural extension services, such

as a predetermined portion of the agriculture sector budget. The NDS1 blueprint sets aside 5% of the national budgeted income for devolution and the Agritex extension officers were equipped with motorbikes and protective clothing through devolution Funds. The devolution funds resulted in the acquisition of implements to enable the efficient tillage and water saving equipment such as centre pivots being allocated to small holder irrigation schemes in Save catchments such as Nyanyadzi irrigation, Chisumbabnje Chiduku tikwiri among others. Even though irrigation technology has advanced significantly in Save Catchment, there are still several challenges in effectively managing and distributing water. As a result, there is significant underutilization of the potential created, high costs, unequal distribution, disagreements, and inefficient use of water. However, in some areas/locations, there exist institutional activities that are aimed at improving water distribution and management; these initiatives demonstrate a process of arriving at improved institutional arrangements and an improvement in agricultural productivity. Although guidelines and policies under government interventions are typically homogeneous and top-down, there is significant variety and divergence in local uptake and acceptance, which warrants further investigation.

5.2.4 Governance frameworks of devolved waters resources management in Save Catchment area

This is a critical section with which the study presents the various policies and institutions that the study's participants, given their qualification as personnel employed by the Save Catchment Area, expressed that, there are several policies and legislations that have been established by government to promote good water governance not only in the Save

Catchment Area, but across all the seven catchment areas of Zimbabwe. Some participants vividly said that, the current enactments in place, demonstrate the government's commitment towards realising the constitutional requirements of decentralising authority and power from the centre to the peripheries with a view to address colonial inherited regional imbalances. The Water Act has no amendments since 1998 when it was put into law. It is the same document that saw the establishment of Catchments and Sub catchments and informed their operations which started in the year 2000. Even if the Act requires urgent attention to make sure it is also aligned with constitution on devolution. The government of Zimbabwe was ranked the best in the implementation of the Integrated Water resources management due to its effectively devolved system of water governance and this has further been strengthened by the 2013 constitution amendment number 20 which is the mainstay of devolution of central government functions.

The Water Act governs the use of water in Zimbabwe and it brought any form of water use under control as it aimed at the systematic allocation of water among users. According to the Act, anyone was entitled to access to water, as long as the water was for primary use (basic human sustenance). Any use of water from which the user would derive a benefit was deemed commercial use, and required a water right. Governance of water resources is a key global policy theme. Since the late 1990s, mainstreaming the concept of governance in water management has been led by the Global Water Partnership through the Framework for Action (FFA) document (GWP 2000: 22). Water institutions are essential for improved management of Save's water resources. While there are

instances of unplanned bottom-up initiatives, laws, rules, and government programs have a major role in the establishment of these institutions. Water User Associations exhibit significant variety in spite of this. Stakeholder participation in Save Catchment has been determined to be advantageous on several counts and in numerous sites, according to the research. It is often acknowledged that increased accountability, enhanced sustainability of operations, lower government costs, and better water management are all facilitated by stakeholder participation. Though much more work needs to be done, Save Catchment has made significant strides toward creating an institutional framework for stakeholder participation. Although special Acts have been passed to allow stakeholder participation, the process of implementing and expanding stakeholder participation is still slow. Research, however, demonstrates that there are excellent examples of stakeholder participation applied successfully and producing a notable influence in Save Catchment. With the exception of the weak involvement of women and youth, it is observed that the Save stakeholder engagement institutions are quite inclusive of farmers from both lower and upper social and economic categories. The devolution results show significant progress, but decisions about capital investment and water pricing are still made at a very centralized level.

According to the research, there are significant differences in how different water user associations handle stakeholder participation. The Save Catchment research highlights the value of government backing, farmer initiative, and education in tandem with the same endeavor. It demonstrates the advantages of devolution and decentralization of decision-making, despite the fact that farmers still lack initiative because of the

government's top-down strategy. It also demonstrates how considerably stakeholder participation is aided by switching from a top-down to a bottom-up strategy.

A positive and significant correlation has been shown between improved performance and the active participation of tail reach farmers, elderly farmers, and youngsters. Regarding devolution, the findings indicate that improved performance is substantially and favorably correlated with a larger total devolution of decision-making/activities.

Devolution of planning has a favorable and significant correlation with performance among the many decisions/activities. Devolution of investment, however, is significantly and negatively correlated. Devolution is therefore positively correlated and has the potential to greatly improve Save Catchment's agricultural productivity and performance in water resource management. In particular, devolution in the areas of planning, water release, farmer price-fixing, water fee collection, and repair and maintenance is particularly beneficial.

5.2.5 Challenges associated with devolved water resources management systems in Save Catchment area

The study revealed several challenges associated with devolved water resources management institutions in the Save Catchment Area including that, IWRM programs are not being appreciated as relevant in remote areas. Legal provisions in the Water and ZINWA Acts are not aligned with the Constitution hence cannot eliminate any envisaged contradictions that can militate against the implementation of devolution. The distinct lack of capacity among government tiers responsible for implementation of devolution, a

number of sub-catchment councils in Save are still renting offices and have no motor vehicles only 3 out of the eight SCCs in Save catchment council have one Motor vehicle each. Human capital lacks capacity in current governance practices such as procurement and disposal of public assets, public finance, and integrated result based management and reporting.

Although it is desirable to look for so-called "win-win" situations, it is frequently challenging to actually implement these. It is a fact that difficult choices must be made and that there will be winners and losers when it comes to distributing water among rival customers. Therefore, the goal must be to create institutions with the authority and respect to uphold their choices, even when they are unpopular.

One of the most crucial but often most misunderstood ideas in the water industry is devolved water resources management. It is misinterpreted because the majority of people believe that it is "someone else's business" in the key subsectors of irrigation, industry, water, and sanitation. Some are that, land degradation has worsened despite adoption of devolved IWRM. However, it was created as a philosophical framework to unite the many industries. It is significant because it provides a means of escaping the "zero-sum game" of sectoral competition in the many regions of the world where overuse and poor use of water are endangering both its quantity and quality.

Among other challenges also included is non-flexibility of programs and their allocated budgets that do not take cognisant of ecological variability. In addition, budgeted monies to run programmes are spread on too many activities instead of focusing at priority issues. According to Rogers and Hall (2003), the failure to effectively manage water resources in the Save Catchment Area are largely due to the flaws in the decentralization of watershed management programmes, financing and implementation mechanisms currently used by stakeholders.

5.3 Conclusions

This study reached a conclusion that Zimbabwe, like any other low-income economies, adopted the devolution concept in line with her 2013 Constitutional Amendment. The devolution concept is widely credited as a roadmap to decongest duties and responsibilities from the central government and give a controlled autonomy to local spheres of government to tackle their peculiar issues of development. By so doing, the government indicates its commitment to empower local people as they have the power and authority to make decisions on the use and control of their local resources for their own benefit. Establishment of devolved water resources management institutions is, in itself, a positive government move to allow local stakeholders to manage and control water as a critical resource in the development of their respective local communities, particularly in the agricultural sector. The government of Zimbabwe decentrlised its water management system through the water Act which created stakeholder institutions called Subcatchment councils based on hydrological boundaries.

This study established and concluded that the initiative is largely informed by the Stakeholder theory and the Institutional theory which all underline local participation in strategic decision making in order to improve their well-being. Experience in Save Catchment area confirmed that water resource management for irrigation and domestic use is done at local level. There are various institutions established at local level to determine how water should be utilised, accounted for in various irrigation agricultural schemes taking place in the area, This is a welcome development that evidently reduces bureaucracy in the use, management and control of water resource not only in the study area but the entire nation. The post-2013 Constitutional Amendment witnessed the Ministry of Lands, Agriculture, Fisheries and Rural Development further adopting devolution as a decentralization concept in the water sector; and finally resulting in decongesting the duties and responsibilities of water resources management from the department of water which was a centralized system of governance. The overarching objective was to enhance agricultural productivity in the country as well as ensuring that local people benefit from direct control and ownership of their valued resources including water. In effect, the Second Republic administration, assuming power in 2018, underlined devolution as one of the key enablers to achieve the Vision 2030 blueprint, as well as pursuing the goal number one (zero poverty) of the UN-SDGs by 2030.

As the study unfolded, it was concluded that whilst the concept of devolution was adopted in the study area (through the creation of the devolved water resources management institutions), unfolding scenarios have not yet lived up to expectations. The general impression is that there are several inhibitive factors as discussed in the preceding chapter which, unfortunately, compromise the performance and impact of these autonomous

institutions on agricultural productivity in the study area. Based on the above conclusion, the study proposes a more practical conceptual framework seeking to provide a firm ground to understand how devolved water resource management can be of value to agricultural productivity in Save Catchment area in particular and Zimbabwe in general. The workability of this conceptual framework entails addressing the challenges raised in Chapter Four using the following recommendations:

5.4 Recommendations

The following recommendations are made to improve the role of devolved water resource management institutions in agricultural productivity in Zimbabwe.

- Policy makers should hold in-service training workshops for water resources management institutions' personnel and all interested stakeholders so as to have a common understanding and appreciation of government initiatives before grass-root implementation. deficiencies in skills that hinder the complete execution of devolution initiatives at all levels of government activities aimed at enhancing capacity to fill in known gaps throughout all levels of government; The civil service's professionalization program for auditors and accountants introduces them to the constantly evolving worldwide standards in these fields; the curriculum of training institutes is aligned with the increasing skills gaps resulting from the devolution process. For effective stakeholder participation in planning, the users must be aware of the issues, concepts and principles in catchment planning. It has been determined that even though Save Catchment was able to build the institutions needed under the Water Act (1998), stakeholders are not being involved in the catchment planning process. For effective stakeholder

participation in planning, the users must be aware of the issues, concepts and principles in catchment planning. It has been determined that even though Save Catchment was able to build the institutions needed under the Water Act (1998), stakeholders are not being involved in the catchment planning process. According to the research, a large number of respondents among stakeholders were unaware that catchment councils and sub-catchments even existed. According to the report, representatives of stakeholder groups are not participating in the catchment planning process on their behalf. The lack of publicity surrounding catchment planning is one of the main obstacles to stakeholder participation. The lack of financial resources by the stakeholder institutions to organize consultative sessions and involve all parties in the process has an impact on participation as well. Additionally, it was discovered that the Save Catchment Council and the Zimbabwe National Water Authority (ZINWA) were not including stakeholders in catchment planning because they are unsure of which organization should be in charge of what during the process.

- There is need to develop and strengthen Legal and Institutional provisions so as to ensure that water resources are managed effectively and efficiently and within the law. The Water Act should therefore be amended to be in line with current constitution; NDS1 and Vison 2030 which details the devolution agenda and government targets on productivity and Gross domestic product. The development, supply, and upkeep of pertinent, reasonably priced irrigation technology for communal farmers ought to be the primary priority of a new water strategy. Greater local control over water rates should be a feature of water policy.

The money raised can be used to maintain irrigation infrastructure in shared irrigation schemes and to finance programs aimed at developing water resources. In addition to the construction of a water price structure that is consistent with cost and social efficiency, a policy that fosters a culture of paying for commercial irrigation water and guarantees that water money is reinvested in the development and management of water resources is necessary.

- Scale-up the existing efforts on water data and assessments and strengthen integrated data and information, real-time and digital information systems, including water accounting and comprehensive and quality data for effective agricultural water management. Emerging technologies are thought to play a key role in this regard for integrated data collection, analysis, and effective usage. In order to improve future intelligent and sustainable agricultural systems, a concept for the full integration of digital technology should be devised to effectively enhance productivity in communities. A variety of experiences and specialties that allows for the identification of obstacles and knowledge gaps as well as cutting-edge smart technology can be found from other countries in the first world where digital technologies are embraced. The proposed solution comprises several features, such as smart digital tool data collection methodologies, platforms for data handling and sharing, Artificial Intelligence application for data integration and analysis, edge and cloud computing, Block chain application, decision support system, and governance and data security system. Zimbabwes' environmental satellite launched in space recently is the starting point.

- Conduct catchment irrigation needs mapping to address water scarcity and drought in a changing climate, and the needs for irrigation services in many small holder irrigations to direct devolution funds for specific goals. Research, development, extension, professional advice and training to improve business management skills can help build small holder irrigation farmers' self-reliance and preparedness. These areas warrant significant government funding provided they are well targeted, area appropriate and deliver a demonstrable community benefit. Small-scale irrigation is becoming increasingly important in the fight against poverty, to increase food security, and to fortify communities against the effects of climate change. However, irrigation alone is not a magic bullet; rather, irrigation plans should be viewed as intricate socio-ecological systems. The success of smallholders is contingent upon their ability to effectively manage their farming operations. Farmers may become more productive and increase the profitability of their farms with the help of new, simple-to-use tools and recently provided chances to experiment and work together to solve challenges.

- ZINWA should be given a well-defined mandate so it does not play a dual role of regulating water use and at the same time gazette tariffs and collect revenue for the benefit of the growth of the stakeholder entities. That ZINWA, catchment councils, and sub-catchment councils reconfigure in order to establish a distinct division of responsibilities.

- Catchment councils should be allowed to employ their employees with technical know-how of water resources infrastructure and hydrology to avoid confusion being caused by ZINWA manager who runs catchment council business on day to day but does not report. Save Catchment Council should be able to choose a Catchment Manager who will report directly to the council rather than ZINWA. The role of Catchment Manager ought to be filled by someone with managerial training and experience, as well as a thorough awareness of the range of activities occurring within the catchment, rather than being limited to engineers with the necessary qualifications. Civil or water engineering experience should only be considered an asset rather than a requirement. Understanding the connection between water and its surroundings is important for the manager to have.

- Strengthen support to Members, upon request, in resource mobilization efforts to address water resources management-related challenges, through the devolution funds and other funding from partners such as the Green Climate Fund., Agriculture and the overall sustainable development agenda revolve around water. Integrated water resources management (IWRM) and creative solutions that address the hazards associated with climate change and inadequate water governance are essential to sustainable agriculture. To accomplish all of the Sustainable Development Goals (SDGs), there is a need for stronger political will to be combined with more effective and consistent measures that recognize, value, and manage water in a holistic and integrated way.

5.5 Suggested areas for further research

Based on the findings of this study, several recommendations are made for further research relating to the utility of devolved water resources management institutions on agricultural productivity in Zimbabwe: the case of Save Catchment Area.

In this study, the prevalence of corruption in such institutions influenced the value of devolved water resources management institutions. A study on other factors that influence effective management of water catchment areas such as the Save Catchment Area would further provide strategies that could enhance the utility of these devolved water resources management institutions in enhancing productivity.

Since in this study, a single case study of one of the seven catchment areas of Zimbabwe, which is the Save Catchment Area was used, further study should be carried out using more case studies to enhance generalisability of study findings to similar other cases elsewhere.

Similarly, based on the fact that this was a qualitative study, a quantitative survey of all catchment areas in Zimbabwe could also be carried out for comparison of findings and increase of credibility and trustworthiness. Since data collection instruments used in this qualitative study included non-participant observations, individual interviews and focus group discussions, a qualitative study in which varied categories of stakeholders are also observed could be done to ascertain their understanding, conceptualization and contextualisation of devolved water resources management institutions and their value in enhancing productivity in Zimbabwe.

References

AI. (2017). *2016 Annual Report. Amnesty International.* Amnest International.

Arsano, Y. (2007). *Ethiopia and the Nile dilemmas of national and regional hydroponics, Centre for Security Studies, Swiss Federal Institute of Technology, Zurich, Switzerland. Zurich, thesis presented to the faculty of arts of the University of Zurich, Doctor of Philosophy.* Switzerland: University of Zurich.

Barney, J. (2001). Is the Resource Based View a Useful Perspective for Strategic Management Research? Yes. *Academy of Management Review*, 41-56.

Beekman, H. E., & Pietesen, K. (2007). Water Resources Management in Africa Issues and Opportunities,. *Proceedings of theBiennial Groundwater Conference 2007.* Bloemfontein-South Africa,.

Best, J. W., & Khan, V. (2009). *Research in Education.* New Delhi: India: Prentice Hall.

Braizer, A. (2015). *Climate change in Zimbabwe. Research Advocacy Unit. Konrad Adenauer Foundation.*

Brooke , A., & Fenner , R. A. (2023). *Improving urban water management and building water supply resilience in the city of Harare, Zimbabwe – a systems view.* UK: Cambridge university .

Brown , L., & Covey J. (2007). Organizational Development in Social Change Organizations: Some Implications for Practice‟, in Sikes, W., Drexler, A. and Grant J. (eds) . *The Emerging Practice of Organizational Development, Alexandria*.

Bryman, A. (2008). *Social Research Methods.* . Oxford: Oxford University Press.

Carney, D. (1999). *Introduction to sustainable rural livelihoods: What difference can we make?* London.

Cederblom, J. B., & Paulsen, D. W. (2001). *Critical Reasoning: Understanding and Criticizing Arguments and Theories.* Wadsworth/Thomson Learning.

Chifamba , E. (2013). *Community Participation in Integrated Water Resources Community Participation in Integrated Water Resources.* Masvingo: Great Zimbabwe University.

Chimbiro , H. T., & Soniye, I. M. (2023). *Growing Water Scarcity in Zimbabwe: A Threat.* Harare: ZELA.

Chitongo , L. (2020). Dynamics of fostering a harmonious use of dwindling local water resources amid the vagaries of climate change: lessons from the Biriiri-Runhenga Water Project in Chimanimani district of Zimbabwe. *Loyola Journal of Social Sciences*.

Cole , F. L. (1988). *Content analysis: process and application. Clinical Nurse Specialist.*

Cole, C. (2011). A Theory of Information Need for Information Retrieval That Connects Information to Knowledge. . *Journal of the American Society for Information Science and Technology*, 62, 1216-1231.

Coles, A., & Wallace, T. (2020). *Gender, Water and Development.* London: https://doi.org/10.4324/9781003085461.

Cooper, D. R., & Schindler, P. S. (2001). *Business Research Methods* . Boston: McGraw-Hill Irwin.

Creswell, J. W., & Poth, C. N. (2017). *Qualitative inquiry and research design: Choosingamong five approaches.* . Los Angels : Sage publications.

Crotty, M. (1989). *The foundations of social research.* London : Sage.

Cui, H., & Deng, Y. (2009). Factors influencing residential water consumption. . *Water Resource Protocol*, 25, 83–85. .

Dercon, S., & Krishina , P. (2000). In Sickness and in Health: Risk Sharing within Households in Rural Ethiopia. *Journal on Political Economy*, 688-727.

DFID. (2010). *Sustainable Livelihood.* London : DFID.

DFID. (2011). *Research for Development: evidence papers.* Retrieved January 12 , 2023, from http://www.dfid.gov.uk/r4d/evidencepaper

Dickin, S., & Caretta, M. A. (2022). *Examining water and gender narratives and realities.* https://doi.org/10.1002/wat2.1602.

Dirwai, T. L., Kanda, E., Senzanje , A., & Bsari , T. (2020). *Water Resource Management: IWRM strategies for Improved Water Management. A Systematic Review of Case Studies of East, West and Southern Africa.* Pietermaritzburg: niversity of Kwazulu Natal.

Easter, K. B. (1997). *Economic Mechanisms For Managing Water Resources: Pricing, Permits, and Markets, In: Biswas A.K. (eds): Water Resources: Environmental Planning, Management and Development* . New York: Mc Graw-Hill.

Edwin, L. (2009). *Managing external resources in the health sector in South Africa. Centre for Health Policy.* London: University of the Witwatersrand, and Health Policy Unit, London School of Hygiene and Tropical Medicine.

Ekmanm, K. (2007). Gleaners, Do-gooders, and Balers Options for Linking Sustainability and Economic Development. . *Community Development Society,*, 112-129.

Elkjaer , B., & Simpson , B. (2011). *"Pragmatism: A lived and living philosophy. What can it offer to contemporary organization theory?", Tsoukas, H. and Chia, R. (Ed.) Philosophy and Organization Theory (Research in the Sociology of Organizations,.*

Flick, U. (2023). *An Introduction to Qualitative Research.* London: Sage.

GEF, G. E. (2013). *Zimbabwe: Coping with Drought and Climate Change.*

GIIN, G. I. (2016). *The Landscape for Impact Investment in Southern Africa.* Zimbabwe : UKAid Impact Program.

Government of Zimbabwe Water Act. Chapter 20: 24. (1998). Harare: Government Printers.

Gowing, J. (2003). *Food security for sub-Saharan Africa:.*

GOZ, G. o. (1998). Zimbabwe National Water Authority Act of 1998.

GOZ, G. o. (Undated). Towards Intergrated Water Resources Management. (M. o. Development, Ed.)

GWP, G. W. (2010). *ter and sanitation* .

Hatch, M. J., & Cunliffe, A. L. (2006). *Organization theory. Modern, symbolic and postmodern perspectives. Oxford: Oxford University Press.*

HDR. (2000). Human Development Report. *Beyond scarcity: Power, poverty and the global water crisis*.

Hsieh, H. F., & Shannon, S. E. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research, 9,* 1277-1288.

Impact, G. (2016). *1st National Stakeholders Consultation on the Development of a Climate-Smart Agriculture Manual for University level and Professional Level Agriculture Education in Zimbabwe. Concept Note.*

Jenerette, G. (2006). A global perspective on changing sustainable urban water supplies. . *Globe. Planet. Change*, 50,202–211.

Jensen , J. (2012). Promoting Practical Sustainability, Quality Assurance Group-PIAlOPRE. . *The Australian Agency for International Development. AUSAID government publications.*

Juízo , D., & Lidén , R. (2010). *Modeling for transboundary water resources planning and allocation: the case of Southern Africa.* Hydrological. Earth Systems. Science. doi:https://doi.org/10.5194/hess-14-2343-2010

Kinneat, T. C., & Taylor, J. R. (1996). *Marketing Research: An Applied Approach.* McGraw-Hill,.

Klenke, K. (2008). *Qualitative Research in the Study of Leadership* . Bingley UK: Emerald Group.

Lawson, B. S. (2001). Developing Innovation Capability in Organizations:. *A Dynamic Capabilities Approach. International Journal of Innovation Management,,* 377-400.

Leedy, P. D. (1997). *Practical Research* (6th ed.). Coulumbus: Merril.

Lenton, L. R., Lewis, K., & Wright, A. M. (2005). *Water and Sanitation, Health Dignity and devvelopment,*. London: Earth Scan.

Liu, B. Q., Yao, Z. J., & Gao, Y. C. (2003). Trend and driving forces of water consumed structure changes in Beijing. pp. 25, 38–43.

Mamombe, V., Kim, W., & Choi, S. (2017). Rainfall variability over Zimbabwe and its relation to large-scale atmosphere–ocean processes. *International Journal of Climatology* , 693-697.

Manjengwa, J. (2014). *Children and Climate Change in Zimbabwe.* . Harare: UNICEF.

Manneko, M. (2015). Climate Change and Sustainable Development: What is at Stake at Paris and Beyond? *Conference on Climate Change and Development in Africa (CCDA-V).* Harare: United Nations Aconomic forum for Africa UNECA.

Marios, S. (2004). Global and regional water availability and demand prospects for the future. . 13, 61–75.

Masunungure, E. V., & Ndoma, S. (2013). *THE POPULAR QUEST FOR DEVOLUTION IN ZIMBABWE.* Afro Barometer.

Meran , G., Siehlow , M., & von Hirschh, C. (2021). *The Economics of Water.* Spring Nature.

Miles, A., & Friedman. (2006). The Quest for Financial Sustainability:. *Foundations in Southeast Asia. Introduction to Financing Development in Southeast Asia: Opportunities for Collaboration and Sustainability*.

Mouton. (1996). *Research Methodology.*

Mujumdar, P., Nirmala, B., & Bayesian, A. (2007). Stochastic optimization model for a multi-reservoir hydropower system,. 21, 1465–1485. doi:doi.org/10.1007/s11269- 006-9094-3

Muller, A. V. (2005). Metrics for Innovation: Guidelines for Developing a Customized Suite of Innovation Metrics. . *Strategy on leadership*, 37-45.

Muller, M., Chikozho, C., & Hollingworth, B. (2015). *Water and regional integration: The role of water as a driver of regional economic integration in Southern Africa.* Pretoria: Water Research commission.

Munzungu , E. (2002). *The process and dynamics of catchment management in Zimbabwe.* Harare, : Save Africa Trust Publications. .

Mutiro, J., Makurira, H., Senzanje, A., & Mul, M. (2006). *Water productivity analysis for smallholder rainfed systems: a case study of Makanya catchment, Tanzania.*

Muzari, W. (2016). *Climate Change Adaptation in Zimbabwe Volume 5 Issue 1, January 2016.* Retrieved 8 2023, 2016

MWR. (2003). *Water and Development, Quarterly Bulletin of the Ministry of Water Resources.* Addis Ababa: Ministry of Water Resources.

Ncube, W. (2015). *From Bread Basket to Beg Basket. The Zimbabwean. 8 Aug. 2015.*

Ndlovu, E., Barend, P., & Le Roux, T. (2020). Impact of climate change and variability on traditional farming systems: Farmers' perceptions from south-west, semi-arid Zimbabwe. *Journal of disaster risk management*, 742.

Paola, F., Galdiero, E., & Giugni, M. (2015). *A jazz-based approach for optimal setting of pressure reducing valves in water distribution networks.* . Eng. Optim. .

Pazvakavambwa, S. (2002). *The process and dynamics of catchment management in Zimbabwe.* Harare: Save Africa Trust Publications.

Reddy, B., Ramesh, S., Kumar, A., Wani, S., Ortiz, Ceballos, H., & Sreedevi, T. (2008). Bio-fuel crops research for energy security and rural development in developing countries. *Bioenergy Resources*, 248-258.

Rees, B., Cessford, F., Connelly, R., J, C., & R, B. (2002). *Optimum use of water for industr and Agriculture phase 3, Part A - Industrial Component**. Bristol: Environment Agency, Rio House, Waterside Drive, Aztec West, Almondsbury.

Robinson, C. W., & Zajicek, J. M. (2005). The effects of a one-year school garden program on six constructs of life skills of elementary school children. *Growing minds*, 453-457.

Robson. (2002). *Real World Research: A resource for social Scientists and Practitioner-Researchers.* Oxford: Blackwell Publishers Ltd.

Rosa, W. (2017). *Transforming Our World: The 2030 Agenda for Sustainable Development. In A New Era in Global Health.* New York: Springer Publishing Company.

RZ, R. o. (2015). *Zimbabwe National Nutrition Strategy.*

Saunders, A. M., & Boettinger, J. L. (2007). *Incorporating classification trees into a pedogenic understanding raster classification methodology.* Wyoming USA: Green River Basin.

Saunders, M., Lewis , P., & Thornhill, A. (2012). *"Research Methods for Business Students" 6th edition, .* Pearson Education Limited.

Saunders, R. (2014). Effectiveness of Research-Based Teacher Professional Development:. , 39(4). *Australian Journal of Teacher Education*, 39.

Saunila, M. a. (2013). Facilitating Innovation Capability through Performance Measurement: A Study of Finnish SMEs. *Management Research Review,*, 991-1010.

Scoones, I. (2009). Livelihoods Perspectives and Rural Dvelopment. Journal of Peasant Studies. *velopment. Journal of Peasant Studies*, 171-196.

Sharma, P., Patel, P., & Jothiprakash, V. (2016). Efficient discretization of state variables in stochastic dynamic programming model of Ukai reservoir. 22, 293–304. Retrieved February 13 , 2023, from https://doi.org/10.1080/09715010.2016.1204632

Shwatuk, L. A. (2002). *The process and dynamics of catchment management in Zimbabwe.* . Harare: Save Africa Trust Publications.

UN, U. N. (2016). *Humanitarian response: April 2016 to March 2017.*

UNESCO, U. N. (2005). *Groundwater Resources Map of the World of the World-wide Hydrogeological Mapping and Assessment Programme.* New York.: UNESCO.

WEF. (2020). *The Global Risks Report.* Geneva, Switzerland: Forum, T. W. E.

WFP, W. F. (2016). *Zimbabwe Country Brief.*

WHO. (2015). A Review of the Operation and Future Development of the WHO Healthy Cities, Programme. *World Health Organization, Geneva*.

WHO/UNICEF. (2004). Joint Monitoring Programme for Water Supply and Sanitation. *Meeting the MDG drinking water and sanitation target: a mid-term assessment of progress.*

WHO/UNICEF. (2004). *Joint Monitoring Programme for Water Supply and Sanitation: Meeting the MDG drinking water and sanitation target: a mid-term assessment of progress.*

world, & Bank. (2004). *World Development Report, Making services work for poor people*. Oxford: Oxford University Press.

WorldBank. (2016). *Macroeconomic Outlook of Zimbabwe.*

Yilma, E. D. (1997). Strategic Issues of Fresh Water Management in Africa. *Journal of Africa Development, United Nations Economic Commision for Africa (UNECA).*

Zekster, I. S., & Lorne, E. (2004). *Groundwater resources of the world: and their use. IHP Series on groundwater.*

Zhai, Y., Wang, J., Zheng, J., & Huan, H. (2011). Evolution and driving forces of water consumed structure in Beijng during the past 30 years. . 26, 635–643.

Zhang, Y., & Wildemuth , B. M. (2009). *Qualitative Analysis of Content. In B. Wildemuth (Ed.), Applications of Social Research Methods to Questions in Information and Library Science, pp.308-319.* . Westport, CT: Libraries Unlimited.

Zimbabwe Vulnerability Assessment Committee ZIMVAC. (2020). *Rural Livelihoods Assessment Report. Harare, Zimbabwe:* . Harare Zimbabwe: Food and Nutrition Council.

Zimbabwe, G. o. (Udated). *Towards integrated water resources management. Harare, Ministry of Rural Resources and Water Development* . Harare: Government Printers.

Zimbabwe., G. o. (1998.). *Zimbabwe National Water Authority Act. Chapter 20: 25.* . Harare,: Government Printers.

Appendix A: English/Shona Consent Letter

Dear Participant

My name is Jonathan Dzingai Mazani. I am a student at College Of Business, Peace, Leadership and Governance Africa University doing Master of Public Sector Management. I am conducting research for my dissertation entitled: The utility of devolved water resources management institutions on agricultural productivity.

This research will benefit the respondents as it will provide a platform for them to share their knowledge and experience on water resources utilization and governance in Save Catchment, Zimbabwe. The study is significant as it will provide new knowledge and to organizations including the government. The assessment on the extent to which devolution of water resources management by catchments and sub-catchments improves agricultural productivity in Zimbabwe.

I invite you to participate in this study by completing the attached questionnaire as honestly and objectively as possible. Your responses will significantly contribute to the research and will enable me to form an opinion as well as recommendations in my dissertation. The completed questionnaires will be collected by 07/10/2023. The information gathered will be treated in strict confidence and a summary of the results will be available on request. The questionnaire is anonymous as you are not required to fill in your name. Additionally, I assure you that any information you will provide shall be used for academic purposes only. Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. It should take you about 20 minutes to complete the questionnaire. I hope you will take the time to complete the questionnaire and submit it at your earliest convenience

For information, you can contact me on 0775 052411or email on jonathanmazani@gmail.com I wish to thank you in advance for your cooperation and assistance in this exercise.

Thanking you in advance_____

Jonathan D Mazani (Student, Researcher)

Shona

Zita rangu ndinonzi Jonathan Dzingai Mazani. Ndiri mudzidzi muCollege Of Business, Peace, Leadership And Governance pa Africa University ndirikuita zvidzidzo zveMaster of Public Sector Management. Ndirkuta tsvakurudzo inemusoro wekuti: The utility of devolved water resources management institutions on agricultural productivity.

Tsvakurudzo iyi ichatibatsira kuti tive tinopana mazano neizvo tinoziva maringe nekushandiswa kweMvura munharaunda yeSave Catchment muZimbabwe. Tsvakurudzo iya ichapa ruzivo rutsva kumabhizimisinemapazi aksiyana siyana ehurumende. Tsvakurudzo iyi ichatipa kuti tizive apo mapazi akapiwa basa rekutungamirira kupiwa nekushandiswa kwemvura anova macatchments nemasub-catchments awandudza zvakadii mabasa ekurima muZimbabwe.

Ndinokukumbirai kuti musununguke kundibatsirawo kupindura mibvunzo yandichakubvunzai. Ndinokukumbirai kuti mundipe mhinduro dzenyu musi 05 Kurume 2023 usatiti wapfuura. Minduro dzamuchandipa dzichange dziri pakati pangu nemi uye ruzivo retsvakurudzo iyi yose asi muchidimbu munogona kuiwana kwandiri kana muchinge maikumbira. Mhinduro dzose dzamuchapa hadzizoshambadzwi uye hamufaniri kunyora zita renyu pammhinduro dzenyu. Mhinduro dzenyu ndichadzishandisa muzvidzizo zvangu bedzi.

Hamuzomanikidzwi kupindura mibvunzo iri pagwaro iri pasina kumanikidzwa asi zvichabva pakuti munkasunguka kupinduramibvunzio iyi uye munotenderwa kurega kupindura mibvunzo iyi kana makangofunga kuti hamuchadi kueenderera mberi nemibvunzo iyi. Mubvunzo iyo ingangotora chinguva chinoita maminetsi makumi maviri chete. Mukava nemimwe mibvunzo munondibata panamba iyi 0775 052411 kana kundinyorera tsamaba pakero inoti jonathanmazani@gmail.com. Ndinoda kukutendai neutora nguya yenyu kupindura mibvunzo iyi.

Ndinotenda

Jonathan D Mazani (Mudzidzi, Mutsvakurudzi)----------

Appendix B: Guiding Research Questions

1. Are you aware of devolution and agricultural productivity trends in Save Catchment?
2. What do you think is the importance of stakeholder involvement and participation in integrated water Resources management in Catchment and Sub catchment areas?
3. Is there any relationship between devolution of Water resources management institution and agricultural productivity?
4. Is there any notable change in the water institution that can be attributed to the implementation of devolution in the Second Republic?
5. What is the level of Locals involvement and participation in organisations involved in Water resources management in Save Catchment Area?
6. Why is are stakeholders not participating in IWRM?
7. What are the strategies that can be adopted to improve devolved water resource management institutions on agricultural productivity in Zimbabwe?
8. What can be done to ensure sustainable involvement and participation of the women and girls in IWRM since they are the major user of water?

Appendix C: Africa University Research Ethics Committee Approval

AFRICA UNIVERSITY
A United Methodist Related Institution
Investing in Africa's future

AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE (AUREC)

P.O. Box 1320 Mutare, Zimbabwe, Off Nyanga Road, Old Mutare-Tel (+263-20) 60075/60026/61611 Fax: (+263 20) 61785 website: www.africau.edu

Ref: AU2742/23 6 April, 2023

MAZANI JONATHAN DZINGAI
C/O Africa University
Box 1320
MUTARE

RE: **THE UTILITY OF DEVOLVED WATER RESOURCES MANAGEMENT INSTITUTIONS ON AGRICULTURAL PRODUCTIVITY IN ZIMBABWE: THE CASE OF SAVE CATCHMENT AREA**

Thank you for the above titled proposal that you submitted to the Africa University Research Ethics Committee for review. Please be advised that AUREC has reviewed and approved your application to conduct the above research.

The approval is based on the following.

a) Research proposal

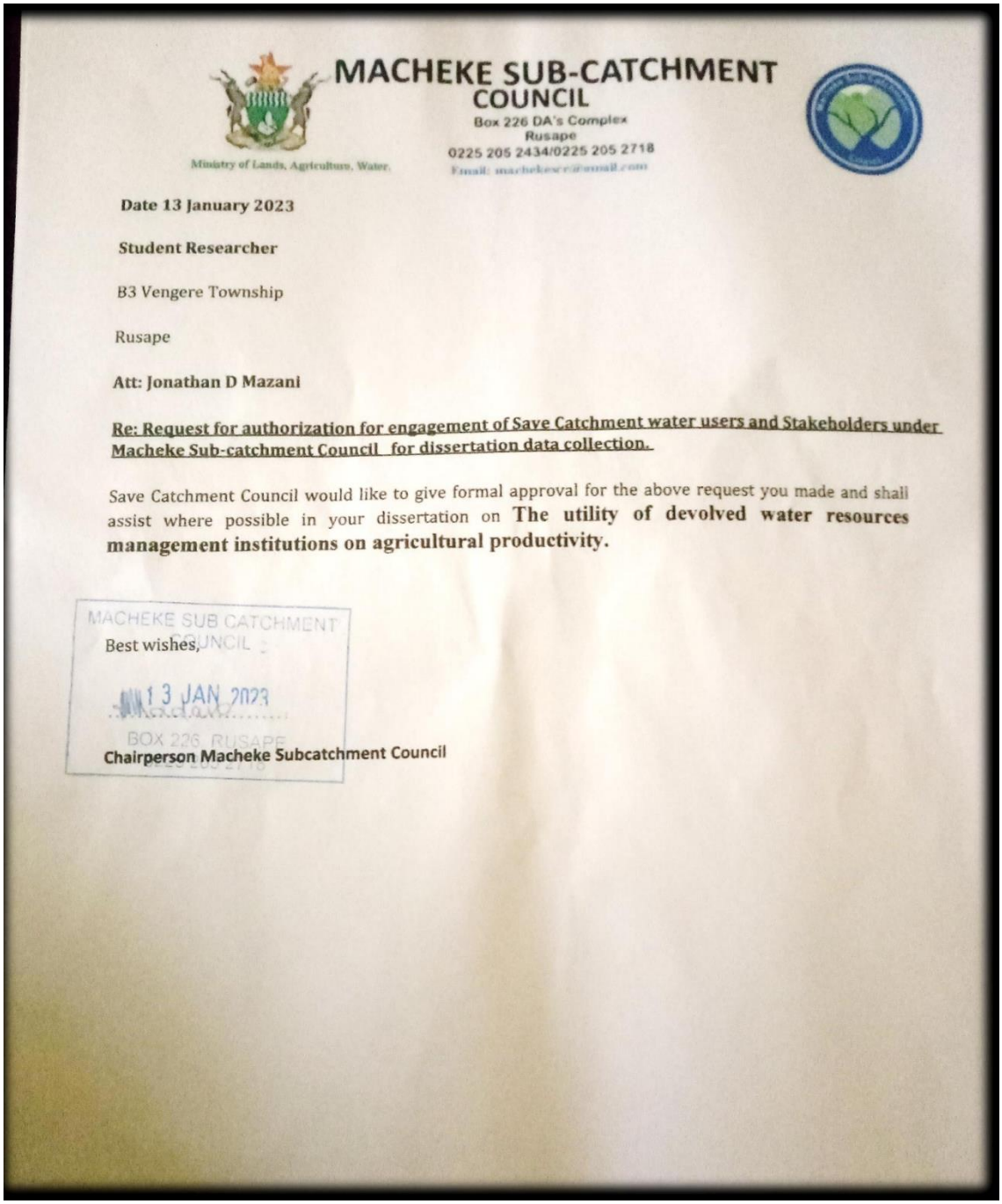
- **APPROVAL NUMBER** AUREC 2742/23
  This number should be used on all correspondences, consent forms, and appropriate documents.
- **AUREC MEETING DATE** NA
- **APPROVAL DATE** April 6, 2023
- **EXPIRATION DATE** April 6, 2024
- **TYPE OF MEETING** Expedited
  After the expiration date this research may only continue upon renewal. For purposes of renewal, a progress report on a standard AUREC form should be submitted a month before the expiration date.
- **SERIOUS ADVERSE EVENTS** All serious problems having to do with subject safety must be reported to AUREC within 3 working days on standard AUREC form.
- **MODIFICATIONS** Prior AUREC approval is required before implementing any changes in the proposal (including changes in the consent documents)
- **TERMINATION OF STUDY** Upon termination of the study a report has to be submitted to AUREC.

AFRICA UNIVERSITY
RESEARCH ETHICS COMMITTEE (AUREC)
APPROVED
P.O. BOX 1320, MUTARE, ZIMBABWE

Yours Faithfully

MARY CHINZOU
ASSISTANT RESEARCH OFFICER: FOR CHAIRPERSON
AFRICA UNIVERSITY RESEARCH ETHICS COMMITTEE

Appendix D: Authorisation Letter



MACHEKE SUB-CATCHMENT COUNCIL

Box 226 DA's Complex
Rusape
0225 205 2434/0225 205 2718
Email: macheke

Ministry of Lands, Agriculture, Water.

Date 13 January 2023

Student Researcher

B3 Vengere Township

Rusape

Att: Jonathan D Mazani

Re: Request for authorization for engagement of Save Catchment water users and Stakeholders under Macheke Sub-catchment Council for dissertation data collection.

Save Catchment Council would like to give formal approval for the above request you made and shall assist where possible in your dissertation on **The utility of devolved water resources management institutions on agricultural productivity.**

MACHEKE SUB CATCHMENT COUNCIL
13 JAN 2023
BOX 226, RUSAPE

Best wishes,

Chairperson Macheke Subcatchment Council