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Unlocking climate finance and investment in Zimbabwe: An analysis of the forestry sector performance

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ABSTRACT

Globally, forest and tree resources directly support about 1.6 billion people's livelihoods. The forestry business provides both informal and official employment opportunities, generating approximately $244 billion in global forest product trade. The African region is more vulnerable to climate change due to constraint financial, institutional and technological capabilities. Given the importance of the forestry sector, there has been a rapid increase in initiatives to mitigate overexploitation of forests and address the developmental challenge of climate change such as the 2021 Glasgow Forestry Declaration and the 2015 Paris Climate Agreement. These are now on many countries' domestic development agendas. Therefore, the study explores the relationship, between climate financing and performance of the forestry sector in Zimbabwe covering period 2010 to 2018.

To investigate the status of climate financing in the forestry sector in Zimbabwe, the mixed method approach was employed since it gives detailed, contextualized insights of qualitative data and generalizable, externally valid insights of quantitative data. The qualitative technique was employed to reinforce the quantitative technique in giving deep insight on the importance of climate financing in the forestry sector from the different experts in the field of climate finance and the forestry sector.

According to the findings of the study, it can be noted that climate finance plays an important role in forestry sector performance as measured by Return on Assets and Return on Equity for the three companies evaluated. The results further highlighted that minimal funds are being channelled to the forestry sector despite their far greater demands as also demonstrated by the responses from the questionnaire and the interview guide. The results suggest that the Government of Zimbabwe, companies and all the organisations in the forestry sector must invest in climate financing to improve the performance of the sector. The unlocking of climate finance in the sector will assist in mitigating the constraints encountered by the sector because of climate change, such as increasing pests and diseases through purchasing chemicals for tree treatment and by assisting communities in dealing with droughts, as they rely heavily on forests during droughts. Additionally, the study found that capacity building for developing high-impact, quality and bankable projects; data availability; and co-financing were critical enablers for securing climate finance. The study recommended that governments should play a much larger role in raising public awareness on the critical roles played by forestry and the potential positive outcomes they have if they receive unhindered financial provision.

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List of Acronyms

AF	Adaptation Fund
AFOLU	Agriculture, Forestry and Land Use
FAO	Food and Agriculture Organisation
FC	Forestry Commission
FDI	Foreign Direct Investment
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environmental Facility
GHG	Greenhouse Gas
GoZ	Government of Zimbabwe
IPCC	Inter-governmental Panel on Climate Change
LEDS	Low Emissions Development Strategy
NTFP	Non-Timber Forest Products
ODA	Official Development Assistance
OECD	Organisation for Economic Co-operation Development
POLS	Pooled Ordinary Least Squares
REDD+	Reduced Emissions from Deforestation and Degradation
ROA	Return on Assets
ROE	Return on Equity
SFM	Sustainable Forestry Management
SSA	Sub-Saharan Africa
UN	United Nations
UNDF	United Nations Development Fund
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USD	United States Dollar

CHAPTER ONE: INTRODUCTION

1.1 Introduction

Forest and tree resources assist people all around the world in terms of their health provision and livelihoods, contribution to economic growth, provision of wood fuel for cooking and heating, shelter, fodder for animals and provision of employment opportunities among other benefits. Global forest product trade and commerce generates around US $244 billion, with developing countries accommodating more than 20% (Food and Agriculture Organisation (FAO), 2020). The forestry sector employs nearly fifty million people, both in informal and formal settings (World Bank, 2008). In Southern Africa, the forestry sector contributes between 4% and 19% to the Gross Domestic Product of six countries that have high cover with Democratic Republic of Congo contributing 19.2% with Zimbabwe and Zambia contributing 3.9%, respectively (African Natural Resources Centre (ANRC), 2021).

Forests are critical in moderating the consequences of climate change, which, if left unaddressed, is projected to lower the standard of living for a large proportion of humanity worldwide. Due to the limited development and deployment of technology, combined with constrained financial resources and untimely response to alleviate the impart of climate change, the African continent is recognised as one of the most affected continents (Boko et al., 2007; Intergovernmental Panel on Climate Change (IPCC), 2013).

Addressing climate change, has emerged as one of the most pressing global challenges (Dube & Nhamo, 2018). This requires global collaboration and private and public sector engagements, the rich and poor communities (Mattoo & Subramanian, 2013). International inclusive strategies to alleviate climate change culminated in the Paris Climate Agreement in 2015 at the 2015 climate summit that was held in France and the 2021 Glasgow climate conference also adopted the Glasgow Forestry Declaration. Actions and reforms to limit desertification, land dilapidation and deforestation were agreed upon and have since been a priority on the domestic and political agendas of several participating countries.

The enormous forests impact on climate change through carbon sink and storage functions, as well as their role as an alternative adaptation strategy for communities during droughts, demonstrates forests' important role in climate change adaptation and mitigation (Van Bodegom, Savenije & de Wit, 2009). As a result, the forestry sector has a critical function in alleviating climate-related challenges and strengthening communities' adaptive capacity.

Hence, this study intends to examine options to unlock climate finance and investment in Zimbabwe, with particular emphasis on the forestry sector.

The chapter outlines background of the study, statement of the problem, research objectives, research questions, justification of the study, definition of key terms and organisation of the study.

1.2 Background of the Study

Globally there is an undergoing of unprecedented adjustments in the variability and patterns of climate phenomena, which might result in the extinction of human life and jeopardise sustainable growth unless critical actions are instigated to rein in human conducts that are driving climate change (Government of Zimbabwe (GoZ), 2016). Adedeji, Okocha, and Olatoye (2014), stated that the rise of sea levels and partly increase of temperatures in some areas of the world are a clear indication that climate change is a reality. This is supported by seasonal contrasts in sharp rainfall (Imada et al., 2017), solar energy intensification (Ohunakin, Adaramola, Oyewola, Mathew, & Fagbende, 2015), heartened dissimilarities in rainfall frequency (IPCC, 2013), and a surge in the frequency and intensity of extremely wind events (Bloom, Kotroni, & Lagouvardos, 2008), which are just a few of the evolving climate change trends.

Climate change effects include, amplified cyclones frequency for instance Cyclone Idai in 2019 in Zimbabwe; increased storm frequency and intensity (IPCC, 2013); increased salinity of the soil (Dasgupta, Hossain, Huq, & Wheeler, 2015); and amassed water level oscillations in some rivers (Ubeda et al., 2013). Human lives, economic progress, the environment and food availability are endangered by climatic change. Davis and Hirji (2014) demonstrated that transportation, infrastructure development, forests, agriculture just to mention a few are all susceptible to climatic changes. Poverty and lack of adaptation capacity in Africa makes the continent more vulnerable to the adverse effects of climate change (IPCC, 2007, 2013; Nakhooda, Caravani & Bird, 2011).

To avoid climate system interference from greenhouse emission (GHG), nations established a position in the shadow of United Nations Framework Convention on Climate Change (UNFCCC) in 2009. The UNFCCC endeavours that global temperatures must not surpass 2°C. However, current domestic and international initiatives are inadequate to maintain global temperatures to less than 2 degrees Celsius (Allen et al., 2019; Rogeji et al., 2010). This is

primarily because an exponential growth on GHG emissions and energy consumption is anticipated in the coming decades, particularly for emerging nations (International Energy Outlook, 2019; Hagem & Holtsmark, 2009). As supported by Jarso's (2011), he claims that climate change has repeatedly been characterised as the Achilles heel of Africa's capability to accomplish sustainable development goals.

The Kyoto Protocol (1998), imposed legally enforceable requirements on industrialised countries to cut their GHG emissions. African countries swiftly ratified the aforementioned conventions to demonstrate the critical nature of climate issues. To underscore their commitment, the Government and Heads of State of African Union urged affiliated states to consider climate change in their various developmental policies.

A study by Nakhooda, Caravan and Bird (2011) assert that the African region generates approximately 4% of global GHG emissions and they further debate that the continent is more sensitive to changes in climatic environment than other regions (Watson & Schalatek, 2021). The recent IPCC report stated that whilst Africa's emissions have increased in the last decade (7%), most of the emissions in Africa are land based (4%) (IPCC, 2022), thereby showing the vulnerability of the African continent to climate change. Climate change is likely to wreak havoc on the African region, affecting not only humans, but also species and ecosystems of flora and fauna (Ohunakin et al., 2015). As a result, the region qualifies for major adaptation funding because of its climate change vulnerability (Watson & Schalatek, 2021).

Financial assistance to developing countries is a critical component of an effective and efficient environmental system (Biermann et al., 2012). This type of financial assistance is commonly referred to in the literature as climate finance (World Bank, 2019; Michaelowa & Michaelowa, 2012; Buchner, Falconer, Herver-Mignucci, Trabacchi, & Brinkman, 2011). Climate finance can be defined as financial flows targeted at either climate change adaptation or mitigation actions (Glemarec, 2011; van Melle, Hohne, & Ward, 2011). A range of sources can be utilised to fund climate financing which includes private and public national, regional and international sources (Watson & Schalatek, 2021; World Bank, 2019). In light of the preceding, it can be concluded that emerging economies require financial assistance to strengthen their capacity for mitigating and adapting to climate change (Pedo, 2021; Chirambo, 2018).

Additionally, Le Quéré et al. (2018) argued that forests are critical in the adaptation and mitigation process to climate change. However, the landscape covered by forests has decreased

by approximately 3% within 15 years (1990 to 2015). Low-income countries suffer from the fastest pace of forest loss (Keenan et al., 2015). Forestry's vital role in mitigating and adapting to climate change necessitates an in-depth analysis on the relationship between climate financing and the forestry sector.

There is limited empirical literature on the influence of climate finance on the timber industry with ANRC (2021) indicating that trade of forests products is positive for primary products and increasingly negative for secondary and tertiary forest products. Some studies (Federici, Lee, & Herold, 2017; Grassi et al., 2017; Rockstrom et al., 2017) elucidate the importance of forests in climate change mitigation and adaptation measures. Deforestation can be minimised or avoided, forest degradation can be reduced, replanting can be promoted, and appropriate forest management practises can be used, according to the authors. It has been found that the storage and reduction of carbon dioxide from the atmosphere by trees is a powerful tool in the fight against global warming (Le Quéré et al., 2018; Ellison et al., 2017).

Forests are not only limited to climate change mitigation, nonetheless they also enhance water quality, air quality, reduce soil erosion and contribute to well-being and development (Daniel, Umazi Udeagha, & Jacob, 2016). Therefore, this study sought to explore the relationship between forestry sector performance and climate financing and identifying climate financing key enablers in the forestry industry.

1.3 Statement of the Problem

Climate finance has been hailed as cure-all for the ill effects of global warming especially in developing nations such as Zimbabwe. Numerous scholars (Federici et al., 2017; Grassi et al., 2017; Rockstrom et al., 2017) contend that the fight against anthropogenic climate change cannot be won unless the forestry industry is involved. Buchner et al. (2015) claim that the sector has received a meagre 3% of the available climate financing. Le Quéré et al. (2018) estimate that the forestry industry has a 25% practical abatement capability, suggesting that the industry can reduce around 25% of its yearly GHG emissions.

Additionally, the American, European and Asian regions, have been able to attract significant financing to support climate-compatible development investments. At present, less than 1% of official development assistance is directed toward sustainable forest management, and public sector finance seldomly doubles that amount. Castrén, Katila, Lindroos, and Salmi (2014) highlighted that about US $70–160 billion is needed annually to meet the global need for

financing. In comparison to other regions, Africa's forestry investment, especially Zimbabwe, is lagging (Afful-Koomson, 2015; World Agroforestry Centre, 2009). Therefore, the research sought to determine how climate finance affects Zimbabwe's forestry sector and to identify key enablers for climate finance investment in Zimbabwe's forestry sector.

1.4 Research Objectives

The study's primary purpose is:

1. To ascertain the influence of climate finance on the forestry sector's performance in Zimbabwe.

To supplement the primary purpose, the following specific objectives have been established:

2. To ascertain the climate finance constraints confronting Zimbabwe's forestry sector.

3. To identify the existing key enablers, in unlocking climate finance and investment in Zimbabwe's forestry sector.

1.5 Research Questions

The major research topic that steers the study was as follows:

1. What is the influence of climate finance on the forestry sector's performance in Zimbabwe?

To provide context for the major research topic, the study further addressed the following subsidiary questions:

2. What are the climate finance constraints confronting Zimbabwe's forestry sector?

3. What key enablers exist in unlocking climate finance and investment in Zimbabwe's forestry sector?

1.6 Research Hypothesis

The study sought to answer the following research hypothesis:

H_0: There is no discernible association between climate finance and the forestry sector's performance in Zimbabwe.

H_1: There is a strong correlation between climate finance and the forestry sector's performance in Zimbabwe.

1.7 Definition of Key Terms

1.7.1 Climate Finance

There is no globally agreed definition or requirements for climate finance. The UNFCCC operational definition of climate finance is as follows:

"Finance that aims at reducing emissions and enhancing sinks of greenhouse gases and reducing vulnerability and maintaining and increasing the resilience of human and ecological systems to negative climate change impacts".

The general understanding is that climate finance should contribute to climate change mitigation and adaptation. To migrate to a minimal, climate-resilient economy, these financial resources are required. The following are some of the most important sources of climate finance:

- **Domestic and Public –** These are Government revenue from taxes and national budget. They require an efficient and robust tax administration with high-impact spending and quality risk management to improve efficiency and effectiveness.
- **Domestic and Private –** organisations and enterprises, as well as institutional investors such as pension and insurance funds, are all involved.
- **International and Public –** Such funding can be linked to official development assistance (ODA), multilateral fund mechanisms such are the Adaptation Fund and Green Climate Fund. It also constitutes bilateral support, grants, and concessional funding.
- **International and Private –** This type of financing focuses on Foreign Direct Investment (FDI). It can also include philanthropic funding, remittances, market approaches, and sovereign wealth funds focusing on private sector type of investment returns.

Climate finance resources can be routed through a different financing instruments and intermediaries. Among the financing instruments are reimbursable, non-reimbursable, convertible, and hybrid grants, loans (concessional, subordinated/first loss, and senior), project

debt, guarantees, quasi-and pure equity, and on/off balance sheet financing (Climate Policy Initiative, 2021).

1.7.2 Forestry Sector

FAO defines the forestry sector as all economic activities that rely primarily on the production of commodities and services derived from forests. According to Solberg, the forest sector includes "both forestry and forest industry, as well as the linkages between these two sectors" (Solberg, 1986). Similarly, Buongiorno describes it as "all the operations associated to the growing and harvesting of wood in forests, the transportation and transformation of this wood in forest industries, and the use of the resulting products" (Buongiorno, 2014).

1.7.3 Forestry Sector Performance

In this study forestry sector performance is defined as the ability of the forestry sector to valorise forestry products and create profit.

1.8 Justification and Scope of the Study

The study contributes to the development of a favourable investment environment by addressing supporting principles such as legislation, governance, national policies, regulations, transparency, data availability, and infrastructure, to name a few in Zimbabwe. Additionally, this study will examine the role that climate action can play in the future financing of the forestry sector. Strategies will be presented to alleviate the hurdles to their full participation.

The study is critical to a variety of stakeholders given that it cannot be overstated how critical it is to determine the impact of climate-related forest expenditure on the government. This type of investigation is required to monitor and evaluate money flows with the goal of increasing openness and accountability for climate financing (Paris Agreement, 2015). If the ratio of climate-related expenditure on forests are quantified in relation to total climate funding in national budgetary systems, it assists policymakers in determining the scope of national climate change mitigation and adaptation measures (Dasgupta, 2021).

Additionally, it supports policymakers in determining if national climate change policies are meeting their objectives. The study's findings will help the government formulate and implement policies, as well as strategies for attracting private enterprise financing to promote the industry's expansion.

To the academic community, the study is expected to make major theoretical contributions by demonstrating how climate change studies might attempt to reflect on the financial contributions of the forestry sector, particularly the potential for scalability. Thus, the only information available indicates that the forest management industry is underfunded (Lang, Gondo, & Moeini-Meybodi, 2020). The study's findings will either corroborate or contradict such assertions. This will help shape the debate of climate-affiliated forestry expenditure. Additionally, the study findings have a great contribution in the body of academia since they may fill a geographical vacuum that exists today. The limited researches that exist were done in other regions or economies in completely different settings, and no comparable study has been completed in Zimbabwe. However, the work of Gondo (2012), Jacovelli (2014) done in Africa and Carle, Duval, and Ashfordc (2020) on a global scale, prove to be invaluable resource as it focuses on financing with the African forestry sector.

The research findings may provide lessons to both public and private forest industry about the importance of climate finance and ways to mobilise the funds to build the sector. Finally, civil society organisations play a critical part in advocating for global environmental action; thus, the results of the study might shape future advocacy tactics and policies for mobilising climate funding for Zimbabwe forestry sector investment.

1.9 Organisation of the Study

The research is organised into five chapters. Chapter One summarises study's background, statement of problem, research aims and questions, and provides the justification of the study. Chapter Two provides critical assessment of the available literature, looking at the broader forestry sector and specifically in relation climate finance. Thereafter, Chapter Three details the study's research methods and analysis of the results. Chapters Four provides discussion and presentation of the study's findings. Lastly, study’s conclusion and avenues for future research are presented in Chapter Five.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The Chapter looks at the theoretical and empirical literature of the study focusing on the role of the forestry sector in economic growth and the relevance of forests and forestry. An overview of Zimbabwe's forestry governance framework and an evaluation of the economic benefits to be gained from forestry follow. Furthermore, an overview is provided for climate finance and forest management.

2.2 Overview of Forests and Forestry Sector

Since time immemorial, forests play a vital role in society and the economy by performing a wide range of essential tasks, such as purifying the air, lowering wind speed and erosion, recycling nutrients, providing habitat for species, and many more (Hyde, 2010). Forests can be regarded as ecosystems comprised of soil, organic materials, and the interplay of biodiversity. Woody vegetation dominates forest ecosystems, which can range from huge and thick to sparse and sparsely populated (Gill et al., 2017). According to their climate (temperate or tropical), ownership (public or private), age, and economic and social significance (among other factors), forests can be categorised in numerous ways (Blaikie et al., 2014).

Forests have a varied range of species that are highly adaptable to a variety of environmental conditions. This richness and adaptive capacity help forests cope with natural and human-induced stresses, such as wildfires. By contrast, forestry is defined as “the study, art, science, and practise of managing natural resources linked with forest areas for the benefit of mankind." In other words, it includes everything from conservation to replanting to research to the support of commercial forest services (through grants, loans, or subsidies) (Blaikie et al., 2014). Dasgupta (2021) recently released research on natural capital accounting recognises the value and economics of biodiversity, along with ways that natural capital can be accounted for in national GDP. Additionally, the research emphasises that the rate at which humans have harmed natural systems, compounded by climate change, has brought biodiversity, including forests, to the brink of collapse, as their capacity to adapt is continually being weakened.

2.3 Importance of the Forestry Industry

The literature generally agrees that forests contribute to economic growth and development. (Oyetunji, 2019; FAO, 2014). Millions of people are employed in the forestry sector. According to the World Bank (2016), over 13,2million people are formally employed in the timber industry and generates US$600 billion of gross value added. However, employment and value generated can be potentially higher since the sector is largely informal. In Sub-Saharan Africa, the charcoal business alone employs about 7 million people (Agrawal et al., 2013).

According to the FAO (2014), forest sector contributed approximately 0.9% of world's GDP. In times of crisis, forests provide nutrition for communities, while the impoverished rely upon forests for revenue. However, opposing developmental and poverty-reduction demands, like urbanisation and farming, have consistently been main determinants of deforestation and degradation in Zimbabwe, with the country destroying over 300,000ha of forest every year (Boucher et al., 2011). Tobacco growing in Zimbabwe is a significant cash crop, generating over US $1 billion annually and accounting for over 10% of GDP (Chingosho, Dare, & van Walbeek, 2021). It is also a significant contributor to deforestation. In Zimbabwe, the lack of alternate energy sources for cooking and a low level of electrification have also contributed considerably to deforestation, as households rely on wood fuel (Boucher et al., 2011).

While forests contribute significantly to livelihood improvement (Arce, 2019), public funding for sustainable forest management (SFM) continues to be an issue due to competing economic requirements for example farming, education, and health, which were exacerbated by climatic changes and rapid deforestation and land degradation (Sotirov, Pokorny, Kleinschmit, & Kanowski, 2020). As many governments in the developing world struggle to raise the finances required to mitigate climate change threat, emphasis is largely centred on FDI potential in climate adaptation and minimal carbon development (United Nations Framework Convention on Climate Change, 2014). Financing a sustainable and resilient society requires developing low-income countries' capacity to stimulate private and public investment to address major environmental issues (Glemarec, 2011). Investing in impoverished nations to assist them lessen GHG emissions and acclimatise to the catastrophic effects of climate change is referred to as climate finance in this context.

2.3.1 Non-Timber Forest Products (NTFP) Contribution

In both emerged and developing economies alike, forests serve a multitude of purposes and provide an extensive array of products (Abebaw et al., 2012). On the other hand, products are typically classified into two categories: Timber and non-timber forest products (NTFPs). NTFPs are attained from forests and are not usually as valuable as timber. Belcher (2003) defines NTFPs as a derogatory term that refers to all forest products other than timber. Forests are the most diverse foreign bionetwork, NTFPs of various kinds are included that play critical economic, social, and ethnic roles in a number of indigenous civilizations (Abebaw et al., 2012). Honey, gum, resin, spices, bamboo, and ecotourism are all commercially significant NTFPs (Adanech & Lema, 2017). NTFPs that are not for commercial purposes include farm implements and building materials for the dwelling, as well as fodder, medicinal plants, and sustenance for humans (Abebaw et al., 2012).

In terms of wealth, research indicates that the share of NTFP revenue contribution varies according to the local community's wealth categories (relatively low, middle, and wealthy) (Adanech & Lema, 2017; Dagm, Wubalem, & Abdella, 2016). As a result, the NTFP income share ranges from 4% to 35% for the wealthy, 9 to 55.5 percent for the middle class, and 31.8 to 57.5 percent for the poor, respectively. According to these studies, the poor receive the majority of NTFP income, followed by the middle class and, ultimately, the wealthiest. This demonstrates that the poor rely more heavily on forest resources, hence these communities have low adaptive capacity as the forests are vulnerable to the changing climate. Local communities are primarily involved in NTFP for personal or local use in small quantities to maintain daily welfare and viability for the purpose of making money from products such as honey, spice, gum and resin or a mix of the two categories.

2.3.2 Sustainable Forest Management and NTFPs

NTFPs are essential not just for rural communities located close to wooded areas, as well as for the environment. In accordance to Pancel (1993), biodiversity abounds in tropical woods array NTFPs that fulfil various roles, together with conservation, sustainability, and economics. Falconer (1996) connected an increasing appreciation of the importance of NTFPs to an increased awareness of tropical forest concerns and devastation. Recent scientific data has established that NTFPs assist people to meet their needs while protecting the forest environment and establishing the framework for more sustainable forest management (Food and Agriculture

Organisation, 1995). Bestowing to Hunt, NTFPs are occasionally known as "black box" management of the forest because they are integrated (undated). As a result, these things serve as a vehicle for achieving environmental objectives (Wilkinson & Elevitch, 2000). This is accomplished by increased revenue from NTFP trading, which is intended to function as a stimulus for them to sustainably manage and maintain their forests through participatory forest management (Ros-Tonen, 2000). NTFP extraction is preferred over other land uses because it is believed to do the least amount of damage to the forest while preserving its integrity (Ros-Tonen & Wiersum, 2003). According to Ros-Tonen (2000), Conservation reserves were promoted as an environmentally friendly strategy for maintaining indigenous population's right for forest resources.

While numerous researches have demonstrated the value of NTFPs to local communities, Ros-Tonen and Wiersum (2003) environmental, economically and socially goals must be balanced in the extraction of NTFPs, which has led to scepticism regarding how NTFP harvesting from natural forests can contribute to forest conservation. This is because, as the same author points out, any benefits to forest people from NTFPs come at the expense of the environment. That is why some have criticised the concept of conservation through commercialisation. There are a variety of ecological repercussions to commercial NTFP extraction, including a progressive fall in plant vitality, a reduction in the establishment rates of harvested species' seedlings, the possibility of animal population disruption, and nutrient loss from harvested material (Peters, 1996).

Additionally, Gonfa (2019) asserted that the impact of NTFP harvesting varies by species and quantity harvested. However, when contrasted to the consequences of logging or forest conversion, these are considered minor compared to other uses of land (Ros-Tonen, 2000). In addition, NTFPs contribute to a country's export revenues, even though most of them are used domestically. Therefore, the economic importance of NTFPs in tropical rain forest environments has significant implications for traditional tropical forest management and land use planning. Non-timber forest products (NTFPs) have a unique ability to generate cash from forests without the need for harvesting trees (Gonfa, 2019), hence, increasing participatory approach to managing forests that provide critical environmental services, including supporting mitigation and adaptation interventions in the face of climate change.

2.4 Forestry and Climate Change

Climate change is a relatively novel idea, as are mitigation and adaptation methods, and few scholars have published extensively on the issue (Grassi et al., 2017; Rockstrom et al., 2017). Nonetheless, numerous academics have worked to develop strategies for mitigating the factors that contribute to climate change. This section will first review the research regarding how climate change and climate funding affected the natural resources and the environment. After that, the focus will be on the forest industry's climatic changes and climate financing.

Rockstrom et al. (2017) examined the countries' road maps for lowering carbon emissions from various businesses. Rockstrom et al. (2017) explained, the agreement assumes 50% possibility that by 2100, global warming should be kept at 1.5 degrees Celsius. The same scholars found that the Paris Agreement's 2015 road map for decarbonisation is clear, however, countries' climate commitments fall short of achieving the set Paris goals due to other competing socio-economic needs. They bring up the fact that governmental promises and science-based goals continue to be at odds. Grassi et al. (2017) concur, stating that 187 countries accounted for 96 percent of global net emissions in 2012, with the majority of them being industrialized. They explain that debates about forests as a climate change mitigation measure have been complicated and treated as a secondary choice. The issue of forests and plants remains critical in terms of countries decreasing their net carbon emissions under the Paris Agreement (Bataille et al., 2018; Grassi et al., 2017).

Figure 2.1. illustrates that climate change has impacted a variety of socioeconomic sectors that include health, education, infrastructure development, water resource management, energy and energy efficiency, agriculture, forestry, and ecosystem management (Davis & Hirji, 2014). Climate change and its related stresses influence human development through sustaining or destabilising livelihood systems; particularly those of the poor and vulnerable. Climate change poses a serious threat to the most vulnerable and marginalised populations, who rely significantly on natural resources. (Pedo, 2021; Kumar & Yashir, 2014). According to recent evidence, the African continent is going to be devastated by climate change, affecting not only individuals but also their livelihoods and sources of revenue (Watson & Schalatek, 2021; Nakhooda et al., 2011).

Figure 2.1: Key socio-economic sectors affected by climate change

Source: Davis and Hirji (2014)

At constant prices, Zimbabwe is expected to enjoy decades of economic growth, with GDP expanding from US $19.6 billion in 2020 to 119.1 billion in 2050 (a seven-fold increase) (Government of Zimbabwe, 2021a). According to the GoZ (2021a), Zimbabwe's low-emission economic development would boost the country's business-as-usual (BAU) greenhouse gas emissions , which are anticipated to rise from 36.6 MtCO2eq in 2020 to 65.3 MtCO2eq in 2050 (doubling over this period). The Low Emissions Development Strategy (LEDS) report (2021a), Zimbabwe's primary contributors to high emissions are energy, Agriculture, Forestry and Land Use (AFOLU) sectors, industrial operations and product consumption, followed by waste, accounting for 33% and 54% of total national emissions, respectively (Figure 2.2). As a result, all climate resources must be directed towards the first two sectors without disregarding the others. While the majority of results-based payments are made in the AFOLU sector, there remain certain difficult problems regarding land-based mitigation, particularly in agriculture (Rose et al., 2012).

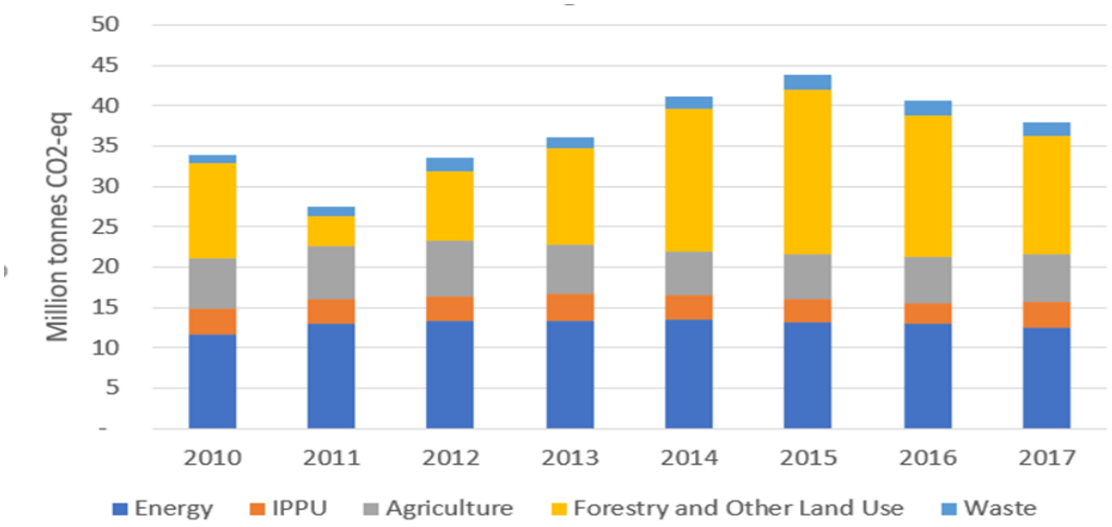


Figure 2.2: Total GHG Emissions in Zimbabwe between 2010 and 2017, MtCO2e
Source: Government of Zimbabwe (2021a)

Emissions from energy use will reach 26.5 MtCO2eq in 2030 and 37.5 MtCO2eq in 2050, according to government projections. This can be linked to the increasing usage of fossil fuels in the production of energy, transportation, and other applications. The cumulative effect of the mitigation strategies identified in Zimbabwe's (LEDS) has the ability to reduce predicted BAU energy sector emissions from 37.5 to 16.2 MtCO2eq in 2030 (a 57 percent decrease) (GoZ, 2021a).

A major contributor to global warming pollution is AFOLU, which includes agriculture, forestry, and other land uses. AFOLU and BAU emissions are expected to peak around 2034 (at 32.4 MtCO2eq) and then gradually decline to 22.7 MtCO2eq by 2050. Apart from halting net deforestation by 2030, the most critical intervention is expanding the use of conservation agriculture, which enhances soil organic carbon and farm and animal management profits. By implementing these steps, GHG emissions are estimated to be reduced by 36.2% to 14.5 MtCO2eq by 2050. In order to help the GoZ meet its Paris Agreement commitments, the 2021 Nationally Determined Contribution points to forests as a significant source of combating climate change (GoZ, 2021b).

According to Giglio, Kelly, and Stroebel (2021), climate finance is critical for minimising and hedging climate risk. The scholars emphasised the importance of climate change money being directed into "green" project investments to build a globally sustainable economy. They claimed that financial markets-based climate finance facilitates the transfer and sharing of climate-related risk. "Green bonds" are a result of financial markets' encouragement of new financial

products, including "green bonds." as Giglio et al. (2021) describe. Developing countries such as Zimbabwe have not reaped large benefits from carbon markets, but the platform is increasing. Zimbabwe and other African countries must strengthen their capacities in order to profit from the expanding global carbon markets and environmental and service-based result payments, as well as others associated with the Reduced Emissions from Deforestation and Forest Degradation (REDD+) project.

Carrozza (2016), Climate change is projected to cause water and food scarcity, and a rise in floods, in various nations throughout the globe, according to a report focusing on the Asia-Pacific region. She claims that, at a time when the global population is growing at a pace of around 1% per year, each degree of global warming will deplete water resources by at least 20%. Carrozza (2016) stated that this will exacerbate the world population's susceptibility risk in the future. She did, however, emphasise the importance of developed and developing countries redirecting money flows toward measures of responding to climate change to lessen the global warming effects.

After examining the interplay of climate change with other sectors of the economy and a snapshot of Zimbabwe's greenhouse gas emissions and the role the forestry sector play, the following part summarises the Zimbabwean forestry industry governance framework. Various legal, policy, and institutional frameworks have been built in Zimbabwe to enable sustainable resource management and resource use for the benefit of all people.

2.5 Climate Change and Forestry Governance Framework

Three coherent strategic interventions on climate change exist, Namely, the National Climate Policy, the Climate Change Response Strategy, and the revised Nationally Determined Contribution of 2021. The trio substantially borrows from international conventions and treaties, including but not limited to the United Nations Framework Convention on Climate Change, the Kyoto Protocol, and the Paris Agreement. At this point, the crucial question is whether the country requires a specific piece of climate change legislation. Furthermore, in the lack of climate-specific legislation, environmental legislation in its present form may not be adequate to resolve environmental issues from an adaptation and mitigation standpoint.

Zimbabwe's forest sector is governed by systems in which the state has a prominent role in overseeing the use of forests and their resources. State woods are managed by the Forestry Commission (FC), which is part of the Ministry of Environment, Climate, Tourism, and Hospitality Industry. Their purpose is to promote the growth, preservation, safeguards, and responsible exploitation of every forest resource in Zimbabwe (www.forestry.co.zw). The Commission was established in 1957 and is governed by the Forest Act (Cap 19:05) and the Act on Communal Land Forest Produce (Cap 19:04). The Parks and Wildlife Act (20.14); the Environment Management Act (Chapter 20.27); the Communal Lands Act; the National Environmental Policy of 2009; and the National Climate Policy of 2017 are other supporting laws and policy frameworks.

State, private, and communal ownership are the three primary types of forest tenure. Rural district councils and traditional leaders have overseen communal ownership. Traditional leaders are critical to achieving Sustainable Forest Management, which has benefited from society natural resource management initiatives. State forests, in contrast, have encountered their own set of difficulties. According to Mutekwa and Gambiza (2017), local populations were previously excluded from public forestry management, resulting in violent clashes between residents and forest officials. On the other hand, the land reform initiative has wreaked havoc on state land management in ways never seen before (Mutekwa & Gambiza, 2017).

While Mukwada (2007) believes that relocation does not always result in environmental deterioration, but that it can be used to liberate ecological integrity that local people seek for survival, the Forestry Commission's experience was quite dissimilar. For instance, Mapfungautsi State Forest in Gokwe South district, which was enacted in 1953 and covers 101 000 hectares, half of the forest has been occupied by illegal squatters (Chadenga, 2016). This is not confined to national forests; certain private forests and lumber plantations have also been impacted, with an estimated total of over 20,000 hectares unlawfully occupied (Tsiko, 2017). Climate change-related concerns are also altering the legislative landscape of forestry management, not just in Zimbabwe, but internationally. In recent years, funding for SFM and programmes such as Reduced Emissions for Deforestation and Forest Degradation (REDD) has increased dramatically, ensuring that forests are adequately managed and that people benefit from them. (Castrén et al., 2014).

Consequently, numerous frameworks for financing low-emissions, development that is eco-friendly and climate-resilient have been devised. The United Nations Development Fund (UNDF) and United Nations Development Programme (Flynn, 2011) developed a framework methodology to assist developing countries in selecting and implementing the desired blend of policies and financial instruments for climate fund mobilisation relative to domestic development priorities. These processes comprise recognising potential techniques for adaptation and mitigation strategies, evaluating critical obstacles to technological dissemination, deciding on an acceptable policy mix, and selecting financial choices to foster an enabling policy environment. As a result, when evaluating how to mobilise financing and investments for the forestry sector, these approaches may be considered. As a result, the purpose of this research was to assess if the several parts of law are sufficient in their existing form or whether new legislation on climate finance and SFM is required. Several environmental statutes were reviewed and compared to international treaties and accords.

2.6 Climate Finance and Investment in the Forestry Sector

Climate finance, as defined by the UNFCCC, is financing at transnational, regional, national, and local levels coming from private, public, or other financing sources. Additionally, loans, grants, and ODA are also sources of funds aimed at helping with adaptation and mitigation efforts (Hirsch, 2018; de Nevers, 2011). Climate finance is a term that denotes to money granted to emerging economies to assist with their adaptation and mitigation efforts (Nakhooda, 2013). To reduce emissions in a meaningful way, especially in sectors that produce large quantities of greenhouse gases, climate finance is essential.

Climate funding is also critical for adaptation since appropriate sources of funding will be necessary to provide countries with the means to adjust to the adverse impacts of climate change and mitigate its repercussions. The World Bank forecasts that between 2010 and 2050, developing nations should spend around 70 and 100 billion dollars on adaptation (World Bank, 2010) and according to UNEP (2021), annual adaptation requirements for developing countries alone, they are valued at $70 billion.

Globalization’s emerging trends, exacerbated by climate change, pose enormous difficulties for policymakers worldwide. Governments in emerging markets and developing countries are battling to strike a balance between developmental needs and the imperative to address climate change. South Africa is a good example as it is still highly dependent on coal and phases the

GHGs emissions reduction dilemma to foster just shift to a minimal carbon economy. Conversely, investors are more concerned about the environment and seek out sustainable and high-impact investment options. As a result of the rising need for investments in sustainable forest management, the forest sector has seen a rise in direct investment and international climate financing (Lang et al., 2020)

There is widespread agreement that financing a sustainable forestry sector needs mobilising sufficient, accessible, and incremental financial flows as well as a varied array of financing sources. Numerous financial instruments were accessed (Hirsch, 2018; Buchner et al., 2015). In addition to the Green Climate Fund and the Least Developed Country Fund, the Paris Agreement also establishes the Adaptation Fund and the Special Climate Change Fund (GCF). UN REDD, Climate Investment Funds (CIF), the Global Partnership for Social Accountability, the Global Environmental Facility (GEF), and Small Grants Program are all funds that are not part of the United Nations Framework Convention on Climate Change (SGP) (Hirsch, 2018).

According to the research, climate finance's role in reducing GHG emissions has received substantial attention (Grubb, Laing, Counsell, & Willan, 2011; Schneider, Schmidt, & Hoffmann, 2010; Zerriffi & Wilson, 2010). On the other hand, Buchner et al. (2015) The forestry industry, according to this argument, has been unfortunate in its receipt of climate-related funding, receiving only 3% of the available funds. It is inconceivable that the forest sector would be so underfunded in light of the immense importance of forests to the economic development and progress of a country. A lack of research has been done into the impact of climate finance on the forestry sector's financial health. This indicates that scholars have either disregarded or neglected this topic, leaving it devoid of empirical support. This is a glaring omission from the knowledge atlas, creating a need for vigilant researchers to develop information in the underserved sector (Sandberg & Alvesson, 2011). In view of the above, this study's primary focus will be on this component. In this session, the concept of climate finance will be examined, as well as its various types and how it has impacted the forestry sector's performance.

According to the Routil (n.d.) of the United Nations Framework Convention on Climate Change (UNFCCC), the Southern African Development Community (SADC) received an average of $804 million each year between 2013 and 2017, with Tanzania, South Africa, and Mozambique as the leading recipients. While Zimbabwe's climate finance flows grew in 2014 because of the

formation of the Climate Change Management Department in 2013, they remain low in comparison to other SADC countries.

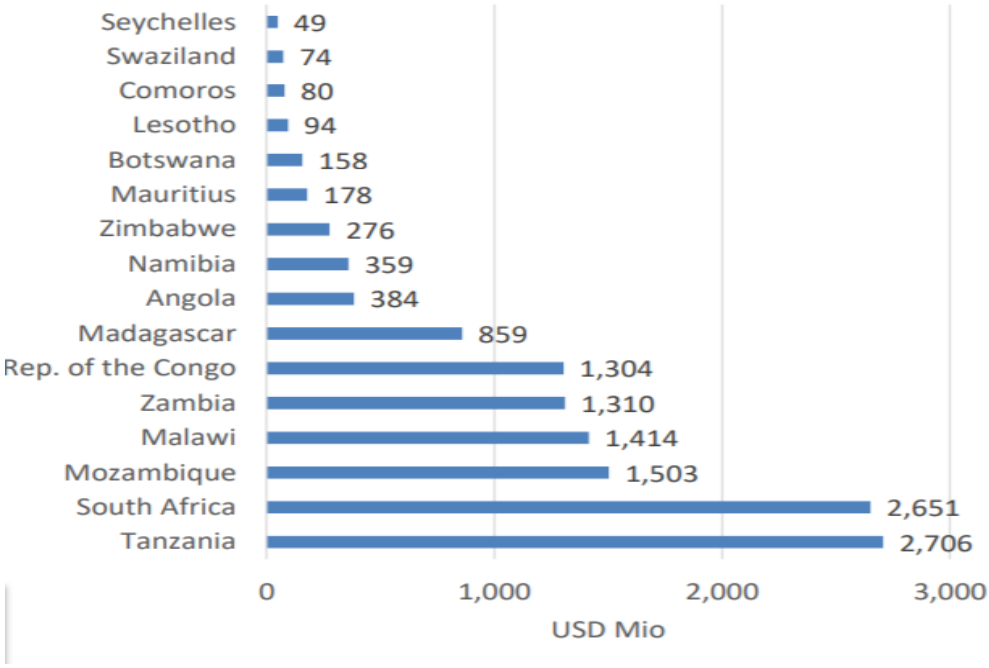


Figure 2.3: SADC total Climate Finance Flows 2013-2017

Source: Routil (n.d.)

The OECD (2019) reports that public environmental finance has climbed by approximately 36% between 2013 and 2018, followed by 3% in 2019, including climate-related export credits. In 2018, bilateral public climate finance accounted for the lion's share, totalling USD32.7 billion. Germany, France, and the United States are the primary climate financiers. Nevertheless, countries such as the United Kingdom have boosted their funding for forestry and biodiversity. According to the Independent Commission for Aid Impact (2021), between 2015 and 2020, the United Kingdom spent 1.2 billion pounds on forestry and biodiversity protection and management under multilateral and bilateral funding channels. Peru, Brazil, and Tanzania have benefited from REDD+ forestry financing (Norman & Nakhooda, 2015) Zimbabwe has one REDD+ project registered on the voluntary carbon market, which covers 784,897 hectares of forest in the country's northwest. Commoditizing and financializing forests via carbon markets and results-based initiatives has garnered conflicting reactions. According to Leach et al. (2015), while such programmes appear to be beneficial on paper, they actually result in greater conflict between communities and rural authorities, who are the caretakers of the woods, and the investors who finance these projects. However, Dasgupta (2021) argues that

accounting for natural capital and scaling up nature-based solutions will boost forest financing and sustainable management.

2.7 Chapter Concluding Remarks

The chapter delved on the theoretical literature review which explained the key socio-economic sectors affected by climate change. Additionally, the literature review section highlighted that there is a gap in terms of climate financing in Zimbabwe necessitating ways of unlocking climate financing in Zimbabwe in order to position the country on a favourable position to address the adverse effects of climate change. Therefore, the forthcoming chapter presents the research methodology that was employed by the study.

CHAPTER THREE: RESEARCH METHODOLOGY

This section of the study outlines the research method employed by the study in answering the research questions stated in Chapter 1. The chapter first gives an account of the research philosophy employed by the study, followed by research design. The chapter also outlines the sample size and data characteristics, research instrument and reliability test, followed by the analytical framework, plan for data analysis and presentation and concludes with ethical considerations. The research was carried out during the COVID-19 lockdown.

3.1. Research Approach

In any study, there are three possible research techniques that can be utilised, namely qualitative (open-ended); quantitative (close-ended) and the mixed method approach which is the integration of both quantitative and qualitative techniques (Creswell, 2014). To explore the research questions, the study adopted the mixed method research approach.

3.1.1 Mixed method Approach

Many scholars realized that the need and complexity of the phenomenon being studied necessitated a mixture of qualitative and quantitative procedures that could better address the research objectives than each technique could alone (Fetters & Molina-Azorin, 2017; Cresswell, 2014). Quantitative and qualitative methodologies are no longer viewed in opposition to one another. Rather than that, they reflect polar positions, with one study being more quantitative than the other. The mixed-methods technique is in the central of the spectrum (Creswell, 2014). In single research or a series of linked investigations, a researcher may use a combination of quantitative and qualitative approaches. If both components are conducted concurrently, or if one component is completed first and the other second, this can be done concurrently or sequentially (Fetters & Molina-Azorin, 2017).

The use of mixed method approach was motivated by the following advantages which are the "complementary strengths," and triangulation capabilities enshrined in the mixed method technique. Johnson and Christensen (2017) stated that each technique has distinct advantages and disadvantages, they should be combined to maximise research quality by achieving significant benefits while minimising overlapping disadvantages.

Triangulation allows investigating the same research question through different data gathering and analysis methods to acquire a full knowledge about the research problem. Additionally, this enables comparison of results of one approach to those of another (Fetters & Molina-Azorin, 2017).

The selection of a mixed methods strategy for this study seeks to achieve a better balance in terms of the nature, quality, and generalizability of the research findings from analyzing the relationship between climate financing and forestry sector performance.

3.2 Research Design

There are three primary research designs used in conducting mixed methods research which are: convergent parallel, sequential explanatory, and sequential exploratory (Creswell, 2014). A convergent parallel design entails collecting qualitative and quantitative data simultaneously and combining them to provide a comprehensive analysis of the research question (Creswell, 2014). The sequential explanatory and sequential exploratory designs involve the successive collection of data in which the findings of one approach are explained, expanded upon, or extended upon using a different method. A sequential explanatory approach was selected for this study.

3.2.1 Sequential Explanatory Design

The choice of the research design was informed by the nature of the research questions hence the adoption of the sequential explanatory design. The sequential explanatory research design was done in two phases. The first phase entails the collection of quantitative data which was done in two stages (1) from the audited financial statements of companies in the forestry sector and (2) closed ended questionnaire. The second phase was collection and analysis of the qualitative data. The second qualitative phase was designed in a manner that it follows from the results of the first quantitative phase. The researcher interprets how the qualitative results helps to explain the initial quantitative results.

The sequencing of the research design is presented in Figure 3.1 below.

Figure 3.1: Sequential Explanatory Design

Source: Author Computation (2022)

The first quantitative phase was used to ascertain the influence of climate finance on the forestry sector performance and climate financing issues and constraints confronting the sector. The follow up second qualitative phase was employed to have a deeper understanding of the climate financing issues and constraints as well as identifying key enablers in unlocking climate finance and investment in Zimbabwe's forestry sector.

The primary advantage of employing the sequential explanatory design is that it helps generate more holistic overall study findings because the first quantitative phase provides more representative and generalizable findings while the second qualitative phase provides a detailed, contextual understanding of climate financing in Zimbabwe's forestry sector (Green & Caracelli, 2003). The composition of the samples in each phase is the greatest obstacle of using a sequential explanatory design that directly relates to this study.

3.3 Quantitative Sampling, Data Collection and Analysis

3.3.1 Sampling

The first quantitative phase was done in two categories which involved use of audited financial statements from large organisations in the forestry sector followed by a semi close-ended questionnaire. The target population for the first category was the companies in the forestry sector with particular attention to three companies which are Forestry Commission, Border Timbers, and Allied Timbers, and this was mainly influenced by the availability of audited financial statements of the companies for the nine-year period from 2010 to 2018. As for the second category, the targeted population was all the expert stakeholders involved in the forestry sector and or climate finance in Zimbabwe. The panel of experts was drawn from the Forestry Commission, Ministry of Environment, Climate, Tourism, and Hospitality Industry, United Nations Food and Agriculture Organization (the primary partner in SFM), private forestry companies, and forestry civil society organisations.

To create a sample that was bi and representative as feasible, purposive sampling was employed to select survey participants. Teddlie and Yu (2007) note that purposive sampling is advantageous when the sampling objectives are to obtain a sample that is as representative of the population as possible and to achieve comparability (Teddlie & Yu, 2007). Regarding sample size, Kent (1993) notes that the sample size relies on the objectives of the study and the characteristics of the population. Being a nascent industry, the population of Zimbabwean stakeholders with the required experience and competence in climate financing and the forestry sector is small; consequently, n equals 35 was chosen as the target sample size for this study. To ensure comparability and representativeness, an equal representation of all stakeholder groups was sought.

3.3.2 Data Collection

The data collection process was done through two stages, firstly, collection of audited financial statements from the sampled companies and the available annual data was spanning from 2010 to 2018. This period was chosen primarily due to the availability of climate finance data and financial records for the sampled companies. The financial statements of these organisations were used to acquire secondary data, the Zimbabwe Statistics Agency (ZimStats), and the Organization for Economic Co-operation and Development (OECD).

Secondly, a self-administered semi structured survey questionnaire was used to collect the second phase of quantitative data. The quantitative data for this inquiry was gathered using a closed-ended questionnaire. The instrument was chosen because it enables descriptive and analytical research as well as the collection of opinions, upon which this study is based (Trigueros, Juan, & Sandoval, 2017). Additionally, the study instrument was chosen because questionnaires promote effective data collection because they are very simple to gather and analyse in a short period of time (Creswell, 2014). However, a major problem with surveys is that they seek answers solely through the use of closed questions, with little follow-up or probing (Creswell, 2013).

Although questionnaires lower the level of researcher bias, flaws in questionnaire design and language can add bias into the results and increase the likelihood of participants misinterpreting items (Meadows, 2003). Prior to giving the questionnaire to respondents, the researcher tested it with colleagues to ensure the clarity of meaning in the questions, the absence of ambiguity in the wording, and the overall appearance of the questionnaire.

Due to budgetary and scheduling constraints, Survey Monkey was used to conduct the surveys online as a web survey. An email containing a link to the survey was sent to potential respondents to invite them to participate. Some participants wanted to complete the survey offline, therefore the researcher printed copies of the survey, delivered them to the participants, and then collected them after one week. The survey questionnaire was accompanied by a cover letter that included an explanation of the goal of the study and a request to volunteer to complete the questionnaire. Participants' completion of the questionnaire and submission to the researcher constituted informed consent.

3.3.3 Data Analysis

The data analysis methods used in this study are based on the methodologies used by Siavhundu, Nyabunze, and Chinorwadza (2020) and were selected based on which approaches best matched this study, firstly to answer the research objectives and secondly to assure the validity and reliability of the results. The analysis was aided by the use of the statistical software SPSS.

3.3.3.1 Model Specification

The estimated general model was derived from Siavhundu, Nyabunze, and Chinorwadza (2020); Mazviona, Dube, and Sakahuhwa (2017); and Ortynski (2016). The study calculated two models governed by two accounting metrics of profitability: Return on Equity (ROE) and Return on Assets (ROA). These are the models:

$$ROA_{it} = \alpha + \beta_1 CF_{it} + \beta_2 Z_{it} + \varepsilon_{it} \quad (1)$$

$$ROE_{it} = \varepsilon + \beta_1 CF_{it} + \beta_2 Z_{it} + \varepsilon_{it} \quad (2)$$

Return on Assets is abbreviated ROA, whereas Return on Equity is abbreviated ROE. Climate Finance is denoted by CF, and Z is a matrix of explanatory factors and β are estimated coefficient. The error term (ε_{it}) is a random error term, which breaks down into $\mu i + \nu it$. Where μi represents the time invariant company-specific effect, while νit represents the remainder of the disturbance in the estimated regressions.

To start with, equations (1) and (2) were changed to a log-linear model, which eliminated heteroskedasticity and allowed for the interpretation of the results as elasticities (Gujarati, 2004). The Pooled Ordinary Least Squares (POLS) approach was used to conduct the regression

analysis. The model assumes that dependent variable does not exhibit temporal autocorrelation and the dependent variable and error term are normally distributed and the unit specific differences which nullifies the need to perform the autocorrelation and normality test (Wooldridge, 2002). The major advantage of this estimation approach is that it is easy to assess and minimizes the sum of squared residuals where the term residual entails the difference between actual and estimated values specified by the model (Wooldridge, 2002).

The dependent variable is believed to be devoid of temporal autocorrelation in this approach. Additionally, the technique presupposes that the error and independent terms are normally distributed and that the effects of each unit are identical. The key advantages of this technique are its simplicity of evaluation and its ability to minimise the sum of squared residuals, where residual refers to the gap between the real and estimated values provided by the model. (Wooldridge, 2003). Furthermore, we conducted a descriptive analysis and a Pearson correlation analysis.

3.3.3.2 Description and Measurements of Variables

Two dependent variables, one significant variable, and six control variables were included in the study, which are briefly discussed below.

Dependent Variable

The endogenous factor in this study was profitability. Studies by (Derbali & Jamel, 2014; Damodaran, 2007), there are two critical profitability accounting measures: Return on Assets (ROA) and (Return on Equity) ROE. The ROA is a measure of managerial efficiency, indicating the extent to which a business can profit from its assets. The ROE details the benefit that a shareholder is anticipated to gain from an investment, that is, return on equity. Both ROA and ROE were used as endogenous variables in this study.

Variable of Interest

Climate finance comprises global, regional, national, and local financing sources that may be public, private, or alternative, such as grants, loans, and official development assistance to fund mitigation and adaptation measures (Hirsch, 2018; de Nevers, 2011). As a result, this study will employ official development assistance to the forestry industry as a proxy for climate financing, with the expectation of a favourable link.

Control Factors

The control variables are classified as macroeconomic and firm-specific.

Macroeconomic factors

Economic growth, as measured by GDP, inflation as a proxy for policy, and macroeconomic instability were employed as external control variables. GDP measures the size and health of the economy and reflects changes in economic activity, whereas inflation measures the stability, independence, and control of monetary policy, which governs and generates investor confidence. As a result, the analysis forecasts a positive link between GDP growth and profitability. According to Mishkin (2008), low inflation reflects increased buying power, which results in an increase in economic growth, whereas high inflation signals currency depreciation, which results in a fall in buying power, hence impeding economic progress. As a result, the analysis projected a negative coefficient by using the consumer price index as a proxy for inflation.

Firm Specific Factors

Three internal (firm-specific) elements were used as control variables in the study: expense ratio, liquidity, and growth of business.

To begin with expense ratio is computed as total expenses as a proportion of total assets. The expense ratio provides insight into the variability of operating expenditures. When managed well, it adds positively to the performance of businesses, hence increasing profitability. As a result, an inverse connection is envisaged, with a decrease in operational costs there by heartening profits. Second, firms liquidity indicates the capability to meet short-run obligations (Mazviona et al., 2017). Because of this, the more liquid a company is, the more likely it is to be profitable, which suggests a positive correlation between the two.

Ahmed, Ahmed, and Usman (2011) noted that the best way to quantify a firm's growth is through results of changes in total assets as a percentage, the research used percentage changes as a measure of the company's progress because they indicate market penetration. They continued by emphasising the need for firms to focus not exclusively on business growth, since this could result in the abandonment of other critical objectives, resulting in a reduction in profitability. As a result, the study anticipated a positive association.

3.4 Plan for Data Analysis and Presentation

Additionally, data from the analytical framework was visualized using a range of SPSS version 21-created graphic representations, including pie charts, bar graphs, and tables. The use of tables as data display tools impairs their ability to distinguish between different types of data efficiently. The visibility of data and the ability to depict patterns more clearly are the primary considerations when deciding between pie charts and bar graphs. After data collection, data analysis begins.

Frequency Distribution

The frequency distribution is one of the most commonly used methods for summarising data in order to create a frequency table. Hair et al. (2013) emphasise that frequency is a collection of data that is organised by summing the occurrences of a certain value of a variable. The frequency distribution illustrates the extent to which various variable values were used across units of analysis.

Descriptive Statistical Analysis

Throughout the data analysis process, this study makes use of descriptive statistics to characterise the core properties of the data. The descriptive statistics will be used to generate simple summaries of the sample and measurements. As a result, both dependent and independent variables' means, medians, and standard deviations are calculated using descriptive statistics.

Chi Square Analysis

We utilised the Chi-square test of association to see whether there was a significant relationship between climate finance and the forestry sector's performance. If the probability value is smaller than the critical value, the null hypothesis is rejected, implying the existence of a significant link.

H_0: No correlation exists between the variables.
H_1: The variables are related in some way.

3.4.1 Questionnaire Reliability Test

The term "reliability" refers to the assurance that the same results and conclusions will be obtained if the same investigation was repeated. The Cronbach's Alpha test was employed by the research to determine the instrument's (questionnaire) trustworthiness, and the value should be larger than 0.70 (Cronbach, 1951). Additionally, a reliability test was conducted on the questionnaire's independent components.

3.5 Qualitative Sampling, Data Collection and Analysis

The following part describes the sampling, data gathering, and data analysis strategies utilized in the qualitative study second phase.

3.5.1 Sampling

The target population was all expert stakeholders involved in the forestry sector, environmental issues and development finance, where expert is defined as individuals with known and demonstrable experience and expertise in environmental issues, development finance and forestry sector. This includes Chief Directors at the Ministry of Environment, Climate, Tourism and Hospitality; Infrastructure Development Bank of Zimbabwe, academics (that is Professors); senior development finance practitioners; senior officers from the Forestry Commission, the United Nations Food and Agriculture Organization (the primary partner in SFM), private forestry companies, and forestry civil society organisations.

The sampling approach utilized was non-probability sampling, especially criterion-based purposive sampling. Purposive sampling involves the selection of participants based on a study’s unique objectives and research questions, rather than at random (Creswell, 2014; Palys, 2008). Palys (2008) emphasizes that the selected participants must possess the necessary knowledge and expertise for the study and be able to effectively reflect on the topic under examination. To do this, interviews were held with the most senior representatives of each stakeholder group in terms of position within the organization and years of experience within the industry. Partly because both the practitioners and the researcher have time constraints, only a small group of people were chosen for the interviews. There were twenty interviews conducted in all. This was comparable to the number of interviews conducted in previous qualitative investigations.

Guest, Bunce, and Johnson (2006) propose that the number of interviews for a qualitative study might range from 6 to 12 participants, however, Baker and Edwards (2012) consider 15 participants sufficient to obtain data saturation when participants have extensive expertise of the area of investigation. In order for the findings to be generalizable or applicable to the larger community, interviewees were chosen from each stakeholder group.

Creswell (2014) points out that a good procedure for sequential explanatory designs is to draw the samples for both phases of the research from the same population, but to ensure the individuals are not the same for each sample. However, for sampling, the stakeholders that participated in the first phase of the study were excluded to avoid internal invalidity. Surveying the questionnaire respondents, who helped develop the interview instrument in the first place, "would introduce confounding factors into the study" (Creswell, 2014).

3.5.2 Data Collection

The challenges and degree of climate funding in the Zimbabwean forestry sector, as well as proposals from stakeholders on how climate financing may be unlocked in the forestry sector, were identified by semi-structured interviews. There are two different types of interviews that may have been conducted: structured and open-ended. In structured interviews, all questions are planned and standardized in advance, and each responder is asked the same series of questions. Unstructured interviews lack a predetermined structure and set of questions (Bryman & Bell, 2007). Semi-structured interviews were used for this study because they are less time-consuming than unstructured interviews, give greater flexibility than structured interviews, and permit comparisons of replies across interviewees. The inability to generalize data acquired from a restricted number of individuals is a common critique of interviews. In this work, the second quantitative phase was mitigated using a bigger sample and by providing further validation of the interview results. Although the interviews were conducted as open dialogues, a framework consisting of a set of questions developed from the literature on the challenges and opportunities in the forestry sector and unlocking climate financing by Dasgupta (2021) was utilized.

Before the actual interviews began, two test interviews were done with the researcher's co-workers at the Ministry of Environment, Climate, and Tourism to polish interview questions and ensure efficient use of time. Due to the limits imposed by Covid19, all interviews were performed online via Microsoft Teams.

All interviews were obtained by audio recording with the prior consent of the respondents, and all twenty interviews were transcribed on the day of the interview to reduce recollection bias. All interview data and supporting documents have been archived electronically for five years on a password-protected hard disk.

Prior to beginning the study, the University of Cape Town's Ethics Committee granted approval for the use of human subjects to assure the ethical treatment and protection of the participants. Prior to the interviews, a formal invitation to participate in the study and an informed consent form were emailed to all prospective participants, together with an explanation of the study's goal and how the data would be utilized. The consent form also indicated that participants could withdraw from the study at any moment. Each responder signed this form prior to the start of the interview. To obscure the identify of each respondent, a pseudonym, specifically a number, was assigned. Any direct quotations from participants will only be identifiable by these numbers, for instance: Respondent 1.

3.5.3 Data Analysis

In qualitative data analysis, "order, structure, and meaning are brought to the mass of acquired data" (Marshall & Rossman, 1990). The interview transcripts and audio recordings were analysed using thematic content analysis, a five-step method created by McCracken (1988), and NVivo7, a software application that facilitates the flexible and rigorous analysis of qualitative data. The five steps were as follows:

1. The purpose of reading and evaluating the interview transcripts is to sift out the vital or relevant information and take notes on their observations.
2. Based on the interview transcripts and literature study used to lead the research, the software is used to develop preliminary descriptive and interpretive categories or themes.
3. Utilizing software, identify patterns or relationships within the preliminary categories or topics.
4. Examining the relevant information in the transcripts and researcher's notes that were uploaded into the software in Step One to identify the fundamental themes shared by all or most of the interviewees.

5. Examining themes from all interviews across groupings to identify prevalent themes within the data. These prevailing themes then served as the foundation for composing the data (Piercy, 2004; Mc-Cracken, 1988).

3.6 Reliability and Validity

Due to the importance of this area of research to the economic development of Zimbabwe, the researcher was conscientious of maintaining the reliability and validity of the methodologies used in each phase of the study. In qualitative research, reliability refers to the consistency of a researcher's approach (Gibbs, 2007). Utilizing the interview process helped to ensure uniformity throughout all interviews. Secondly, the researcher documented the processes used to conduct the research and publish findings, allowing them to be replicated or followed by a future researcher (Onwuegbuzie, 2013).

In qualitative research, validity refers to the precision of the research findings (Creswell, 2014; Gibbs, 2007). To ensure the accuracy of the research findings, in addition to taking written notes, the interviews were recorded to allow for post-interview content verification by the researcher, and transcription was performed within two days after the interview to reduce reporting mistake. Peer debriefing, in the form of academic supervisors' help, was also employed to "improve the accuracy of the narrative" (Creswell, 2014).

Utilizing an interview framework that gave theory-guided structure to the interview process as opposed to the researcher's own thoughts minimized researcher bias (Pannucci & Williams, 2001). Regarding respondent bias, the researcher practiced and developed her interview procedures prior to conducting the interviews to avoid using leading questions and to conduct the interviews in an objective manner that allowed the respondents to freely share their honest opinions. The researcher also assured respondents that their identity would be strictly maintained, which encouraged respondents to voice their opinions openly and freely (Creswell, 2014).

Reliability in quantitative research relates to the reproducibility of outcomes (Joppe, 2000) and the consistency or precision of the research equipment (Heale & Twycross, 2015). Cronbach's alpha was used to assess the reliability of the survey questionnaire (Burns, 2000). Validity refers to the precision with which a notion is measured or the veracity of the research findings (Heale & Twycross, 2015).

Content validity is the degree to which an instrument's items capture or represent the construct being measured (Onwuegbuzie et al, 2007). In this study, the questionnaire success factors were developed from the responses provided by experts throughout the qualitative phase, hence boosting the content validity. External validity refers to the generalizability of the study's results outside of the study's context (Creswell, 2014). Due to the nature of this study and the fact that the sample was purposefully chosen, its conclusions cannot be generalized to another context.

3.7 Ethical Considerations

Permission was obtained from the University of Cape Town and research was conducted on forestry enterprises, companies, and key informant organizations/individual stakeholders. The study's key informants were advised of their right to consent or deny participation. Additionally, participants were informed of the various levels of confidentiality associated with the reporting of the data they provided. (Best & Kahn, 2006; Jones & Kottler, 2006). Given the existence of two types of permission, the study relied on direct consent. It is best to obtain agreement directly from the respondent (Nagy, 2005).

The researcher took special care to safeguard every piece of information gathered. Prior to revealing specific information or data, clarification and consent were sought. The study's requirements necessitated the collection of all data. If it became necessary to use the data in other ways, additional consent from affected parties would be obtained. Once the research is complete, the data collected will be instantly destroyed.

3.8 Chapter Concluding Remarks

The chapter looked at the research methodology focusing on the research approach that was employed on the study. The study utilised the mixed method approach since it allows utilising both quantitative and qualitative research techniques making the approach more superior to a single technique. Further, both secondary and primary data which was collected from audited financial statements and key informants through questionnaires and interviews. Frequency distribution, descriptive statistical analysis and chi-square approach were employed as the data analysis plan for the research. Following this chapter is presentation and discussion of the research findings.

CHAPTER FOUR: PRESENTATION AND DISCUSSION OF RESULTS

4.1 Introduction

This section of the study presents and discusses the research results. The quantitative data results are presented conjointly with the qualitative research findings from the interviews. The chapter was presented based on each research question. The discussion is mainly based on the conclusions of primary data obtained through audited financial statements, questionnaires and interviews. The analysed data is presented in graphs, pie charts, and tables, along with a discussion of the findings.

4.2 Response Rate

The questionnaires were distributed to 35 targeted respondents, with a 91.4% (n=32) response rate whilst of the 20 targeted interviewees only 55% (n = 11) responded. The interviewees' response rate was low as some of the respondents cancelled the scheduled interviews last minute due to prior commitments and the difficulty of operating under COVID-19 WHO guidelines. Table 4.1 summarises the results.

Table 4.1: Response Rate

	Questionnaire		**Interviews**	
	Respondents	**Rate**	**Respondents**	**Rate**
Targeted population	35	100%	20	100%
Available population	32	91.4%	11	55%
Absent population	3	8.6%	9	45%

Source: Survey data (2021)

4.3. Participants' Demographic Information

Table 4.2 shows the characteristics of the participants. Amongst the 35 participants, 25% (n = 8) were females and 75% (n = 24) were males, suggesting that most of the respondents were males compared to females. Whilst the marginalised such as women and rural people are the major users of forests and other natural resources (Dankelman & Davidson, 1988) at technical and governance levels, the forestry sector is male dominated. As for the working experience distribution of the participants, the results revealed that most the participants' experience ranged between 11 and 15 years (34%), followed by those who had an experience of 6 to 10 years (25%) and 15 years and above (25%), and lastly with those with 0 to 5 years' experience

(16%). Role in the company of the respondents was examined; the results suggest that majority of the participants are into operational position (47%), followed by policy formulation and planning (44%) and lastly, 9% their roles are in finance and marketing. As for the sectors the companies operate in, most of the sampled respondents are in the public sector, NGOs, and private sector that is, 28%, 22% and 18%, respectively whilst other respondents are into research organizations (13%), development agency (13%) and community-based organizations (6%).

Table 4.2: Demographic Information of the Respondents

Demographic Factor		Frequency	Percentage
Gender: Male		24	75%
Female		8	25%
Working Experience: 0 to 5 years		5	16%
	6 to 10 years	8	25%
	11 to 15 years	11	34%
	15 years & above	8	25%
Role in the company: Policy & Planning		14	44%
	Operational	15	47%
	Finance & Marketing	3	9%
	Other	0	0%
Sector: Private		6	18%
Public		9	28%
Development Agency		4	13%
Community based organization		2	6%
Non-Governmental Organization		7	22%
Research Organization		4	13%

Source: Survey data (2021)

The study further went on to examine the key management objectives of the forests that are being managed by the respondents and the outcomes are shown in Figure 4.1 below.

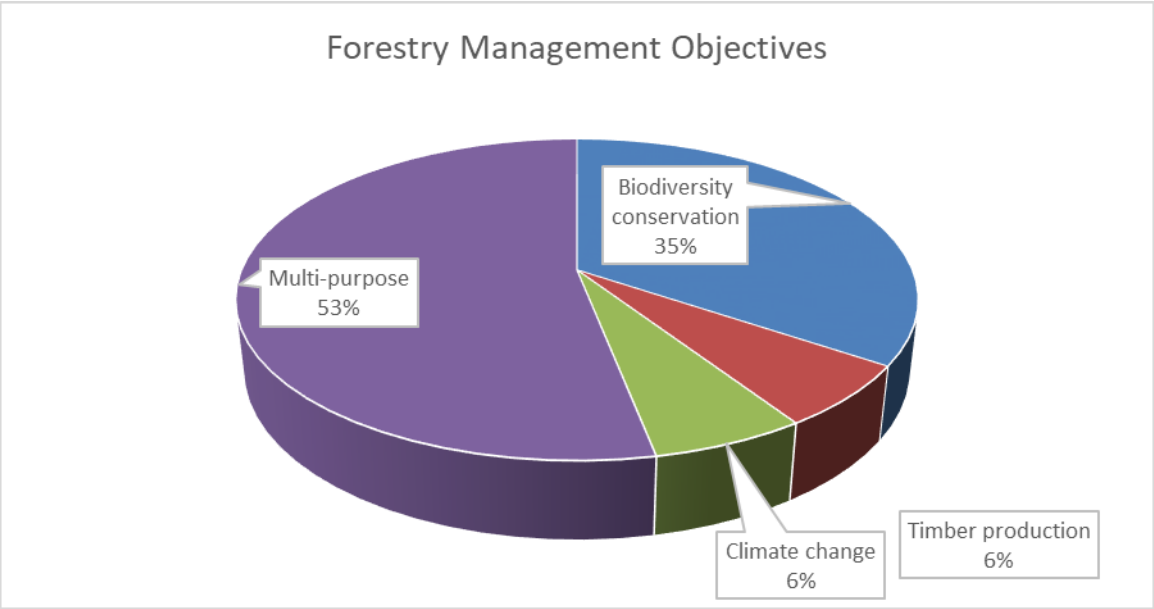


Figure 4.1: Forestry Management Objectives

Source: Survey data (2021)

Figure 4.1 shows that it is noticeable that most of the respondents' main management objectives is for multipurpose reasons (53%) which include productive use e. g. timber generation, soil and water protection, forestry skill development and recreational services, among other factors. Moreover, 35% highlighted that the main objective of their firms is for biodiversity reasons, followed by 6% who are more concerned about timber production and climate change, respectively. These findings were complemented by interviewee respondent number 3 who indicated that whilst social and environmental benefits were important, financial flows to the sector were limited and climate finance could be unlocked and channeled to these forestry benefits and they said:

> *"The climate funds can be used for regenerating forests and related micro climates for commercial purposes like earning income from forests products like indigenous fruits and edible caterpillars. The increase in demand for organic food and eating healthy is leading people to associate indigenous fruits and other forestry products with natural remedies but their contribution is still not accounted for in national GDP".*

The results suggested that most of the managers in the forestry sector objective is multipurpose implying that they focus on various matters such as timber production, biodiversity, climate change mitigation, preservation of nature among others not only in silos of timber production, biodiversity, and climate change.

4.4. Research Instrument Reliability Results

The most common method for checking reliability of a research instrument is the Cronbachs' Alpha and the following conditions holds an alpha value less than 0.40 is considered unreliable, whilst 0.40 to 0.59 is marginally reliable, whereas 0.60 to 0.79 is reliable and lastly, 0.80 to 1.00 is considered highly reliable according to Yang and Green (2011). Grounded on the above assertion by Yang and Green, an alpha coefficient value above 0.60 is deemed a reliable scale and Table 4.3 summarises the findings.

Table 4.3: Research Instrument Reliability Results

Items	Cronbachs Alpha	Number of Items
All items	0.8240	37
Impact of climate change on forests	0.6710	5
Importance of climate change	0.7502	12
National climate change laws and regulations	0.7918	2
Climate change related adaptation and mitigation responses	0.6972	4
Capacities and support to undertake climate change adaptation and mitigation	0.7025	3
Climate Financing and Investments in the Forestry sector	0.7729	6

Source: Survey data (2021)

The findings highlighted an overall Cronbachs' alpha coefficient of 0.824, which is above the rule of thumb implying that the research instrument employed by the study is reliable. The Cronbachs' alpha coefficient was calculated separately for climate change effects on forests (0.671), the significance of climate change (0.7502), national climate change legislation and regulations (0.7918), climate change adaptation and mitigation responses (0.6972) and capacities and support for climate change adaptation and mitigation (0.7025) and climate financing and investments in the forestry sector (0.7729). As a result, it is possible to conclude that the study instrument subsets were trustworthy.

4.5 Climate Change Constraints confronting Zimbabwe's Forestry Sector

This section of the study presents the climate change constraints that are hindering the performance of the forestry sector and the adaptation and mitigation strategies implemented by different organisations.

4.5.1 Forests and Climate Change

This section of the study presents findings on how the respondents view the climate change's impact on forests and importance of climate change in relation to the forestry sector. The descriptive statistics approach was employed which entails arithmetic means (Mean) and standard deviations (Std Dev) on all the constructs. The mean score entails the average values of the response whilst standard deviation details the degree of variation from the average.

Table 4.4: Effects of Climate Change

Factor Description	Mean	Mean Response	Std. Dev
Increase in extreme weather events e.g drought, storms	2.67	Low Impact	0.512
Decrease in water availability	3.73	Low Impact	0.617
More severe and frequent forest fires	4.13	Medium Impact	0.817
More outbreaks and damage by pests and diseases	4.72	High Impact	0.221
Changes in forests habitat and biodiversity	3.87	Low Impact	1.333
Overall	4.75	High Impact	0.818

Source: Survey data (2021)

Climate change had severe effects on the environment, including forests, as shown in Table 4.4, including a very huge surge on extreme weather events, a remarkable reduction in water availability, severe and very much often forest fires, shifts in forest habitat and biodiversity, increases in atmospheric availability of carbon emissions concentrations and nitrogen deposition (Serdeczny et al., 2016). According to the most recent IPCC report (2021), forests will not be able to cope in the long run if climate change is not slowed. According to the reports:

> *"Under scenarios with increasing CO^2 emissions, the ocean and land carbon sinks are projected to be less effective at slowing the accumulation of CO^2 in the atmosphere".*

The study further investigated how climate change will affect forests as a result of the anthropogenic effects. The results (Figure 4.2) highlighted that climate change will highly impact timber production which has got a bearing effect on employment and availability of timber in the country. Furthermore, climate changes have a tremendous effect on loss of forest ecosystem services as suggested by 43% of the respondents who indicated that climate change results in severe loss of forest ecosystem services. Additionally, 30% detailed that it has low

impact, whilst 27% said it has got medium impact. The results further detailed that climate change increases production and delivery costs of forestry products as indicated by 43% of the respondents in favour of high impact followed by medium impact (31%), followed by low impact (20%) and lastly, no impact (7%). A total of 46% of the respondents strongly support the notion that climate change highly negatively impacts forests-based employment, followed by 32% with the view that it has got medium impact and lastly, 22% in support of the view that it has got low impact.

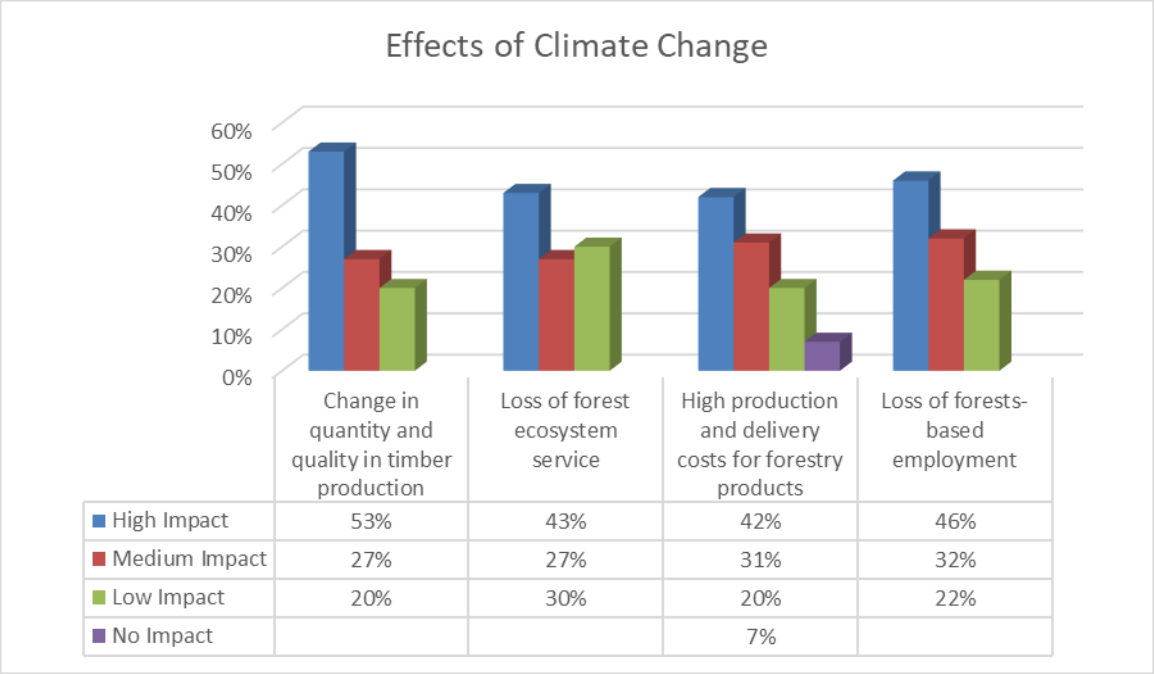


Figure 4.2: Effects of Climate Change

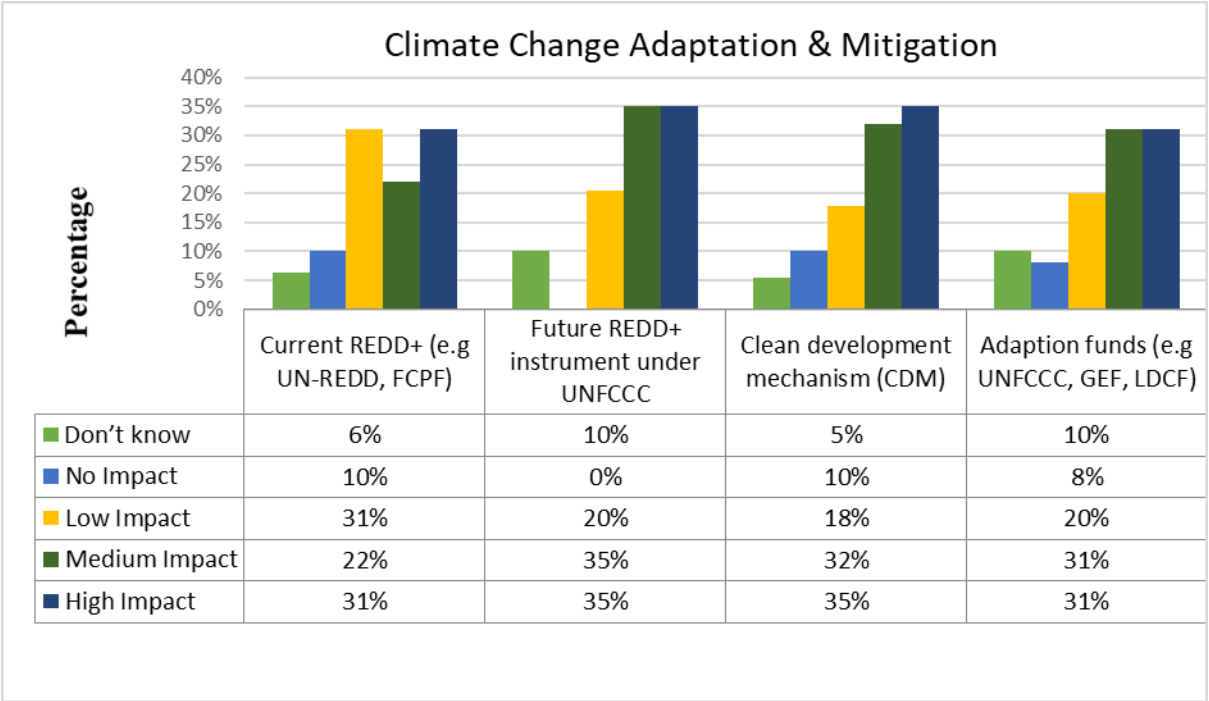
Source: Survey data (2021)

Climate change is making forests more vulnerable which causes a decline in growth rate, degradation in health, increased sensitivity to pests and most critically an abnormal mortality rate. Changes in the frequency and intensity of forest wildfires, insect and pathogen outbreaks and severe events like high winds caused by climate change may be more relevant in forestry than the direct impact of rising temperatures. Changes in temperature and precipitation patterns are predicted to have a significant direct influence for modified and natural forests. Numerous models of biogeographical showed 500 km or more polar ward shift in potential vegetation for the CO^2 climate for boreal zones (Cramer et al., 2001). Climate change has primarily affected African forest habitats through changes in precipitation patterns (particularly the effect of the El Nino-Southern Oscillation (ENSO) (Butt et al., 2015) and the Subtropical Indian Ocean Dipole (SIOD) with succeeding impacts on availability of groundwater and soils (Müller,

Waha, Bondeau, & Heinke, 2014). According to the Forestry Commission, Cyclone Idai cost Zimbabwe millions of US dollars in forest losses in 2019. The destruction of roads also hampered access to the protected national forests.

4.5.2 Strategies to Climate Change Adaptation and Mitigation

A step further was taken by the study to examine the adaptation and mitigation of climate change responses and the results are presented in Figure 43 below using a Likert scale. The results indicated that the common group of the participants 31% advocated for high and low impact, 22% were in favour of medium impact whilst 10% no impact and 6% did not know about the initiative of the current REDD+, for instance UN-REDD, FCPF. These results are in favour of the notion that the current REDD+ adaptation and mitigation approach improves the performance of the forestry sector. As for the future REDD+ instrument under UNFCCC, the results detailed that 35% were in support of high impact and medium impact, whilst 20% were in favour of low impact and 10% did not know about the initiative. With respect to clean development mechanism as an adaptation and mitigation tool, most of the respondents highlighted that it had high impact (35%), followed by medium impact (32%), followed by low impact, no impact and did not know, that is 18%, 10% and 5% respectively. Lastly, adaptation funds (that is UNFCCC, GEF, LDCF) was viewed to have a significant impact as an adaptation and mitigation strategy since 62% of the respondents highlighted that it had high and medium impact whilst 20% detailed that it had low impact and lastly, 18% contended that it had no impact and did not know about the initiative.



	Current REDD+ (e.g UN-REDD, FCPF)	Future REDD+ instrument under UNFCCC	Clean development mechanism (CDM)	Adaption funds (e.g UNFCCC, GEF, LDCF)
Don't know	6%	10%	5%	10%
No Impact	10%	0%	10%	8%
Low Impact	31%	20%	18%	20%
Medium Impact	22%	35%	32%	31%
High Impact	31%	35%	35%	31%

Figure 4.3: Climate Change Adaptation and Mitigation

Source: Survey data (2021)

The study further investigates the relationship between climate financing and forestry sector performance and the results are presented below.

4.6 Influence of climate finance on the Forestry sector's performance in Zimbabwe

To understand the influence of climate finance on the performance of the forestry sector, an Ordinary Least Squares regression analysis was conducted and Table 4.5 presents the results. The results highlighted an R-squared value of 0.649 for the Return on Assets model whilst 0.672 for the Return on Equity model implying that approximately 65% and 67% of the variation in forestry sector performance is explained by climate financing, inflation, Gross Domestic Product, business growth, liquidity and expense ratio as measured by ROA and ROE respectively. The Durbin Watson and F-statistic results suggested that the model was correctly specified hence the results are reliable and robust.

The results highlighted that inflation has got an inverse relationship with forestry sector performance suggesting high policy inconsistency whereas the positive coefficient of GDP entails an increase in demand for forestry services such as timber. Furthermore, the positive coefficient of company growth supports the relevance of economies of scale, which are mostly experienced by large organisations in an industry; as a result, huge companies may supply

services at low costs making them more competitive to enjoy and obtain excessive profits. As for liquidity, the results indicated that high cash flows had a positive coefficient. In other words, the higher the share of liquid assets, the lower the risk that the company will run out of cash, because a high liquidity ratio is associated with a high solvency ratio and thus a higher chance of winning large bids.

Perhaps interestingly, the study's findings revealed that expense ratio has a favourable impact on profitability. A possible explanation to this outcome would be the increase or share allocation of more finance to staff expenses which in a broader view, the high salaries are more of an incentive to boost morale and maximize work input. All in all the results points to a positive correlation between expense ratio vis-à-vis profitability (Saona Hoffman, 2011).

Table 4.5: Ordinary Least Squares Results

	Return on Assets		**Return on Equity**	
	Coefficient	**Standard Error**	**Coefficient**	**Standard Error**
CF	0.1712	*0.0244***	0.2712	*0.0320***
INF	-0.0112	*0.0046***	-0.0364	*0.0067***
GDP	0.0109	*0.0042***	0.1063	*0.0330***
BG	0.2219	*0.0392***	0.2070	*0.0243***
LIQ	4.6626	*0.8047***	4.3779	*0.5510***
EXR	0.1310	*0.0194***	0.1684	*0.0344***
R - squared	0.649		0.672	
Durbin Watson statistic	2.107		2.413	
F-statistic	7.249***		6.659***	

*Source: Survey data (2021); *** ** (*) denote statistical significance at 1%, 5% & 10%*

Furthermore, study results revealed a positive association amongst climate financing and forestry sector performance for both performance indicators. This implies that climate funding is important in determining forestry sector performance, emphasising the need to unleash climate money. A percentage change in climate finance results in a 17.12 percentage change in forestry sector performance as evaluated by ROA, whereas a 27.12 percentage change in ROE. These changes strongly emphasise the importance of climate financing in the Zimbabwean forestry sector as it will assist in curbing the challenges that are being faced by the forestry

sector because of changes in the climate such as pests and diseases through buying chemicals for treatment of the forests.

The study further investigated the relationship between climate finance and forestry sector performance through conducting a chi-square test and the results showed a probability score of 0.019 indicates that there is a favourable relationship between climate finance and forestry sector performance suggesting that climate finance improves forestry sector performance.

Table 4.6 Chi-Square Test Results

Test	Statistic	Decision
Chi-Square	11.788**	The association between the variables is statistically significant

*Source: Survey data (2021); ** denote statistical significance at 5% level*

From the interviews, Respondent 4 highlighted that climate finance plays a major role in enhancing performance of the forestry sector and if the organisations in the forestry sector seriously commit themselves to climate financing a big turnaround might take place in the sector. This is so because the funds might be channelled towards addressing some of the climate change related challenges that are being faced by the sector which include pest control, natural disasters among others. The direct quote from the respondent was that:

"Climate finance is strategic in providing alternative and innovative forestry finance and forestry sector had the opportunity to be funded as a mitigation or adaptation initiative or both by virtue of its nature as a carbon sink as well as a source of livelihood for communities."

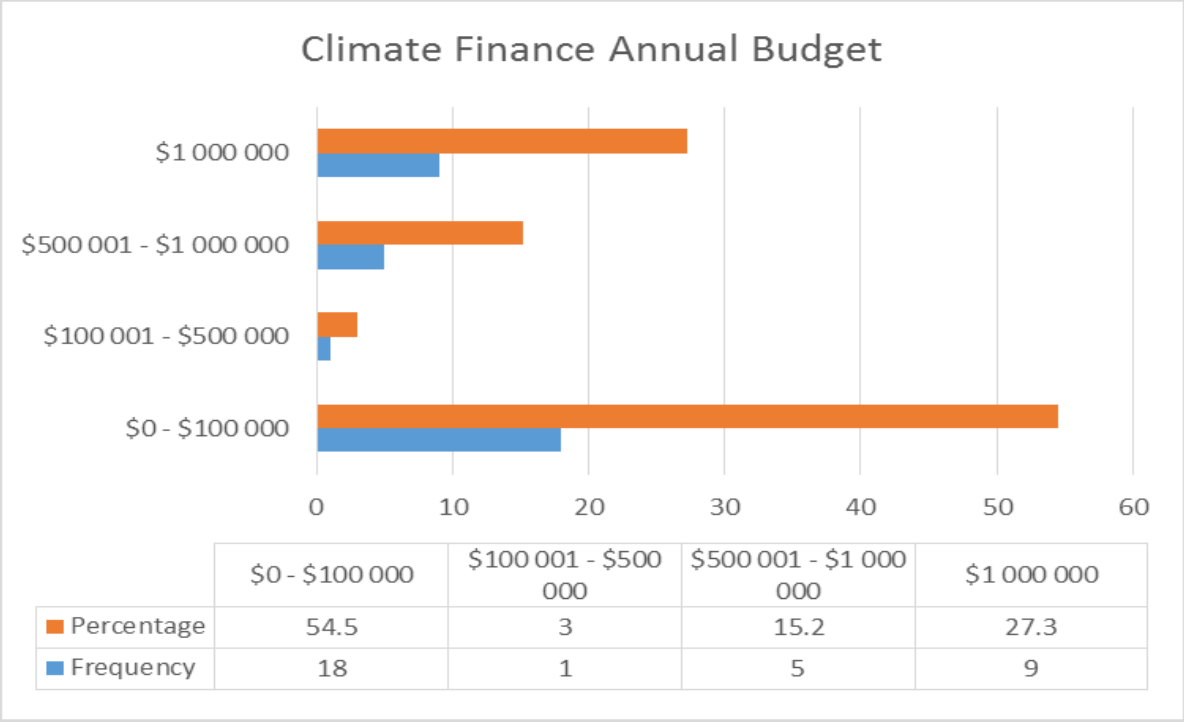
The above assertion was supported by respondent 10 who stated that:

"The Zimbabwean forestry sector need to take a step further towards allocating some of their proceeds towards climate change as this will secure the future of our children and the forestry industry at large as it has been experiencing climate related challenges in the last decade."

From the discussion, it can be noted that climate finance is a major significant determinant of forestry sector performance and there is need for the Zimbabwean forestry sector at large to be more committed towards climate financing. The study further presents the key opportunities and enablers existing in the forestry sector to unlock climate financing for Zimbabwe.

4.7. Existing enablers to unlock climate finance and investment in Zimbabwe's Forestry sector

To have a deeper understanding on the opportunities and enablers that exist in unlocking climate finance and investment in Zimbabwe forestry sector, the study first presents the status of climate financing in the sector and the results are highlighted in Figure 4.4.



	$0 - $100 000	$100 001 - $500 000	$500 001 - $1 000 000	$1 000 000
Percentage	54.5	3	15.2	27.3
Frequency	18	1	5	9

Figure 4.4: Climate Finance Annual Budget

Source: Survey data (2021)

From Figure 4.4, 54.5% of companies showed that they have a budget between US$0 - $100 000 towards climate financing. This to a greater extent shows that majority have less finance channelled into the forestry sector. Respondent 5 pointed out that:

"One of the major challenges in Zimbabwe is that management of most companies focusing on profits and shareholders dividends without paying attention to the needs of the environment they are operating in which then distorts their commitment towards climate financing".

The above assertion was supported by Respondent 9 who stated that,

"There is need for awareness's and workshops that focus on the importance of climate financing not just to the society but to organisations as well".

However other promotions are not to be ignored, that is those who still claim to finance the climate related sectors depicted by the extreme right bars. During the interviews, most respondents indicated that whilst the climate finance needs were high, limited resources were available to address the existing needs. This is consistent with Gundu-Jakarasi (2019) as referenced from OECD, World Economic Forum and Bloomberg, who states that there is climate financing gap of between US$5-$7 trillion each year for global infrastructure to combat climate change and keep global warming below 2 degrees temperature rise by 2030.

In addition, the study examined ways to improve climate financing and the findings are shown in Figure 4.5 below. It is noticeable that most of the participants were in favour of the strategy of providing capacity to support forestry projects developments followed by mapping financiers that provide financing in forestry sector followed by identifying source of co-financing.

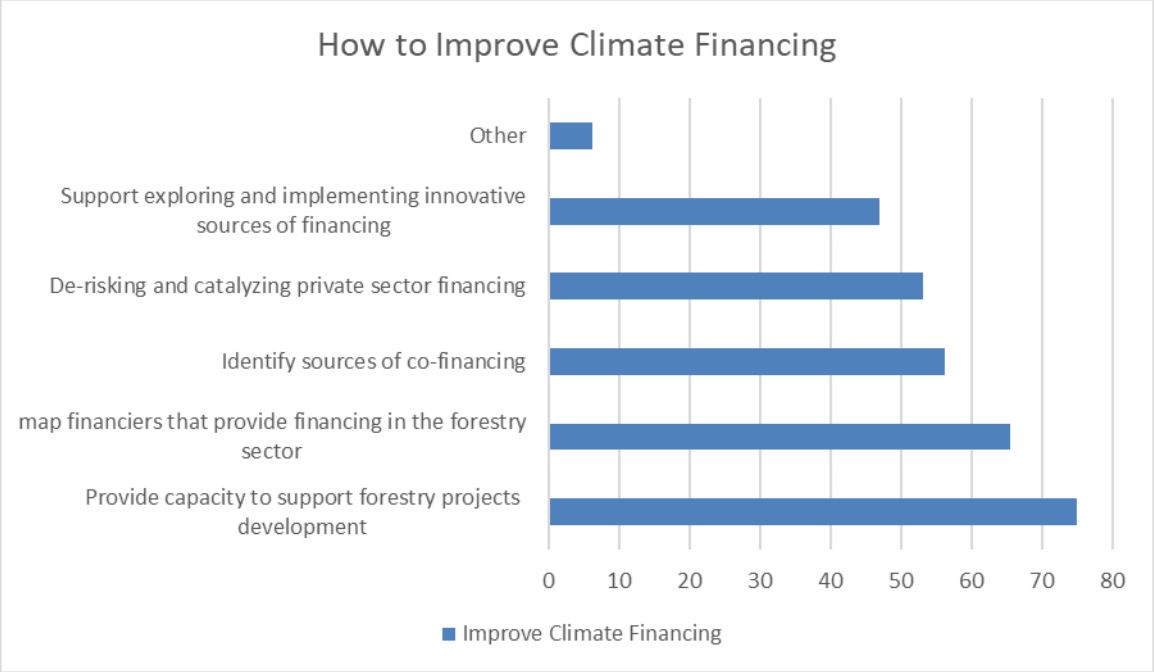


Figure 4.5: How to Improve Climate Financing

Source: Survey data (2021)

Another strategy that was supported by the respondents as a possible means of improving climate financing was de-risking and catalysing private sector financing and support exploring and implementing innovative sources of financing. Therefore, it can be concluded that there is need for the Zimbabwean government to come up with ways of providing capacity to support forestry projects development as it was the key area of concern. Some of the ways may include the establishment of a 'think tank', a technical committee that will be responsible for developing quality and bankable climate smart forestry project proposals, and mapping technologies and

practices for scalability and replicability to build climate resilience in forestry sector and among communities. An integrated approach to programing to advance promotion and commercialization of non-timber forests should also be adopted.

Following the discussion of the results comes the research conclusion and recommendation based on the study findings.

4.8 Chapter Summary

The chapter focused on presentation of the research results. The results highlighted that climate financing has a positive statistically significant relationship with performance of forestry sector in Zimbabwe. The key enablers and opportunities in the forestry industry include, providing capacity to support forestry project development, mapping financiers who supply forestry industry finance and identifying sources of co-financing, derisking and catalysing private sector financing. Most forests in Zimbabwe have been devastated by fires, illegal settlements, and illegal mining. The forthcoming chapter outlines the summary, conclusions and recommendations of the study.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1. Introduction

The section of the research outlines the research summary and possible recommendations that answer the research questions and possible policy recommendations according to the findings.

5.2. Summary and Conclusions

Climate change within the developing, African countries has proven to be one of the most consistent shifts affecting not only Zimbabwe nor the African continent but rather the whole world. Heavy rains and floods were experienced in Germany, China and Kenya whilst veld fires were experienced in Algeria, Australia and USA among others in 2021 alone. This has demonstrated that climate change effects are increasingly becoming more frequent and even the developed countries are not resilient enough to address the challenges. Public financing is not sufficient to address the climate change challenges and sectors such as forestry tend to be considered as secondary with limited budget. The need for unlocking financial investment within Zimbabwe for the forestry sector has proved to be inevitable. Grassi et al. (2017) and Rockstrom et al. (2017), all supported that global climatic change is taking its course and therefore there is need to support forestry sectors financially. The need to unbolt a massive financial support package for the forestry sector has proven to be critical.

Having access to climate finance can be cumbersome, hence there is need to develop institutional skills to develop quality projects and programmes that can be supported by different partners. Therefore, the study's sought to answer the following research questions:

What is the influence of climate finance on the forestry sector's performance in Zimbabwe?

The results of the Ordinary Least Squares regression analysis show a positive relationship between climate finance and forestry sector performance. For the forestry sector, this suggests that climate finance is critical, highlighting the need to unlock climate funds. These developments highlight the importance of climate finance in the Zimbabwean forestry sector since it will help combat pests and diseases caused by climate change by purchasing chemicals to treat the forests. Using a chi-square test for hypothesis testing, the study found a positive association between climate finance and forestry sector performance, with a likelihood score of 0.019.

What are the climate financing obstacles and limits confronting Zimbabwe's forestry sector?

According to study findings, most forests in Zimbabwe have been devastated by fires, illegal settlements, and illegal mining. Due to a lack of mature timber, some plantings have had to be cut early. The use of old harvesting and processing equipment and firefighting trucks has slowed growth. Furthermore, poaching and unlawful trade in forest products had hampered growth and rising production costs and the brain drain that occurred around 2006–2008 also hurt the sector.

What key opportunities and enablers exist in unlocking climate finance and investment in Zimbabwe's forestry sector?

From the findings, it can be concluded that some of the key enablers and opportunities in the forestry industry are providing capacity to support forestry project development, followed by mapping financiers who supply forestry industry finance and finally identifying sources of co-financing. De-risking and catalysing private sector financing were also suggested as ways to improve climate finance. As a result, the Zimbabwean government must devise strategies to encourage the development of forestry initiatives, which was the main worry. A "think tank" or technical committee may be established to improve climate resilience in the forest sector and among communities.

5.3. Policy recommendations

In relevance to this study, unlocking climate finance and investment in Zimbabwe focusing more on forestry is important and the following policies, recommendations and advice as below are being made:

- More finances should be channelled or allocated to the forestry sector within the annual national budgets for the country.
- More human resources, not only limited to finance, that is human and capital investments also need to be channelled into forestry sector to curb ever increasing adverse climatic changes locally, regionally and internationally. This should include skills development to formulate quality and bankable climate change and forestry projects to access global bilateral, multilateral and private sector climate financing.

- Governments should also play a much-increased role in public awareness of the portent roles played by forestry and possible results if they get unhindered financial provision.
- There is need to develop natural capital accounting tools to ensure that the forestry services and benefits generated the forestry sector in its entirety and considered and accounted for even in national GDP.
- There is need to establish a National Climate Fund to support climate related forestry activities and provide co-financing required by most multilateral funding tools/mechanisms such as the Green Climate Fund.
- Developing quality, high impact and bankable projects require good data and baseline studies. There is need to invest in forestry inventories, develop emission reference levels and the REDD+ Strategy to mobilise climate finance at scale for the Forestry Sector.

5.4. Avenues for future research

It is of great importance that future studies be carried over, how other nations outside Africa are dealing with climate finance since the overall effect of climatic change are not only felt in Zimbabwe or African emerging nations which do not possess the ability to properly finance alienated sector. Climate change cannot be financed by traditional financing instruments; future research can focus on different financing instruments that can be developed to support inclusive, green and sustainable growth in the sector. Additional work can also explore how gender responsive is climate finance in the forestry sector considering that women and most of the poor are affected by climate change and 6largely depend on forests for their livelihoods. Considering that the study was done during COVID-19, which affected economies and the health sector, additional work can focus on how climate finance can support post-COVID green recovery in the forestry sector towards low emissions development and climate resilient nations.

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Annex 1: Research Questionnaire

Dear Participant

I am Veronica Nonhlanhla Jakarasi, student number JKRVER001, an MCom student at Graduate School of Business, University of Cape Town. You are cordially asked to take part in a study titled: '**Unlocking climate finance and investment in Zimbabwe. An analysis of the forestry sector performance'.** Your participation in this project is voluntary. The questions will be answered anonymously, and no individual identification will be required, therefore confidentiality needs have been considered in this study. Please note that after the study is completed, the data will be discarded. The information gathered will be utilised to create research reports such as journal articles, conference presentations, and dissertations, and the responses will be aggregated or anonymous. Your privacy, and that of the organisation you represent, will be protected.

It will take 30 minutes to respond to this questionnaire. I would appreciate if your responses were received **by no later than Friday, 18 June 2021.** My contact details are as follows:

Cell: +263 772 496 626
Email: Jkrver001@myuct.ac.za/verogundu@gmail.com

Instructions:

- Please fill in the blanks on the form.
- By putting an X in the corresponding box, you can choose one response.
- Please enlighten in brief words wherever essential.
- Do not inscribe your name on the form as it is supposed to remain unidentified.

Unlocking climate finance and investment in Zimbabwe Questionnaire

Date……/……. /**……** **Questionnaire No**…….

Section A: Demographic Information of the Respondents

Gender	Male	
	Female	

How many years do you have in the forestry sector	0 – 5 years	
	6 – 10 years	
	11 – 15 years	
	16 years or more	

What is/are the main management objective(s) for the forests you manage	Timber production	
	Soil and water protection	
	Biodiversity conservation	
	Multi-purpose	

Other, please specify, ……...

In which of the following sectors would consider yourself?	Private sector	
	Public sector	
	Community based organization	
	Non-governmental organisation	
	Education or research organisation	

Other, please specify, …….

What is your role in the company/organisation	Policy and planning	
	Operational (field)	
	Marketing	

What is your role in the company/organisation	Policy and planning	
	Operational (field)	
	Marketing	

Other, please specify, …….

Section B: Impact of climate change on forests

Do you feel that the climate has changed over the last few decades?	Yes	
	No	
	Don't know	

If the answer is yes, in what ways do you think the following trends, driven by climate change and/or other forces, have impacted the forests that you are responsible for managing or administering? Please tick appropriate box, *5 – high influence, 4 – medium influence, 3 – low influence, 2 – no influence, and 1 – do not know.*

	5	4	3	2	1
Increase in extreme weather events e.g drought, storms					
Increase/decrease in water availability					
More severe and frequent forest fires					
More outbreaks and damage by pests and diseases					
Changes in forests habitat and biodiversity					
Altered forest productivity and ecosystem services					

Section C: Importance of client change

How important would you consider climate change when compared to other challenges faced in forest management? Please tick appropriate box, *5 – very significant, 4 – significant, 3 – justly significant, 2 - slightly significant, and 1 - not significant*

	5	4	3	2	1
Land use conflicts					
Governance issues					
Limiting or perverse government policies					
Economic feasibility					
Access to financial resources					
Lack of information and/or technical assistance					

What effects of climate change would consider particularly important from a forestry management perspective? Please tick appropriate box, *5 – Very important, 4 – Important, 3 – Somewhat important, 2 – No effects, and 1 – Do not know*

	5	4	3	2	1
Increase in extreme weather events					
Decrease in water availability					
More forests fires					
More pests and diseases					
Increase in number of invasive species					
Increase in number and occurrence of natural disasters					
Altered forest productivity and ecosystem services					

How might forests and people be impacted by climate change in the next decade? Please tick appropriate box, *5 – high effect, 4 – medium effect, 3 – low impact, 2 – no impact, and 1 – do not know*

	5	4	3	2	1
Change in quantity and quality in wood supply					
Loss of forest ecosystem service					
Increased uncertainty in the supply of wood and non-wood forest products					
High production and delivery costs for forestry products					
Loss of forests-based employment					
Loss of biodiversity					

Section D: National climate change laws and regulations

Has the government developed national policies, strategies or legislation aimed at climate change that have a direct or indirect impact on the forest sector	Yes	
	No	
	Don't know	

If yes have you made changes to your management plans, practices or reporting procedures as a result of the related government policy changes?	Yes	
	No	

Section E: Climate change related adaptation and mitigation responses

In your view, what impact will current or anticipated financial support mechanism have on forest management? Please tick appropriate box, 5 – high effect, 4 – medium effect, 3 – low effect, 2 – no effect, and 1 – do not know this initiative

	5	4	3	2	1
Current REDD+ (e.g UN-REDD, FCPF)					
Future REDD+ instrument under UNFCCC					
Clean development mechanism (CDM)					
Adaption funds (e.g UNFCCC, GEF, LDCF)					

Other, please specify:

……..

……..

Section F: Capacities and support to undertake climate change adaptation and

Do you receive any support e.g technical, financial, capacity building etc related to forest management and climate change issues	Yes	
	No	

If yes, please specify the type of the origin of that support

……

……

What kind of help, in your opinion, would be required to tackle climate change in your forest area?

Policy and financial incentives to undertake mitigation	
Policy and financial incentives to undertake adaption	
Access to loans	
Improved access to technical information	
Improved access to training and technical assistance	
Improved public awareness on forest and climate change	
Information on carbon markets	

Other, please specify:

……..

……..

Section G: Climate Financing and Investments in the Forestry sector

Do planned investments in the forestry sector consider impacts of climate related factors?	Yes	
	No	

Do you understand the term climate financing?	Yes	
	No	

Does your organization plan any investments in the next 5 years towards climate financing?	Yes	
	No	

If yes, please tick the range of the total annual budget in USD towards climate financing

$0 - $100 000	
$100 000 - $200 000	
$200 000 - $300 000	
$300 000 and above	

What do you believe can be done to improve climate financing in the forestry sector?

…….

END OF THE QUESTIONNAIREE
THANK YOU

Annex 2: Interview Guide

Interview Guide Questions

Student Name: Veronica Nonhlanhla Jakarasi,

Student Number: JKRVER001

Topic: Unlocking climate finance and investment in Zimbabwe. An analysis of the forestry sector performance.

Questions:

1. What is your academic background and working experience?
2. What do you understand about climate financing?
3. What do you think are the opportunities for climate financing in supporting forestry sector performance?
4. What do you think are the challenges and barriers to accessing climate finance both domestically and internationally?
5. What do you suggest should be done to promote climate financing, particularly in Zimbabwe?
6. What can be done to unlock investment in the Zimbabwean forestry sector?
7. What challenges do you think are impeding growth and performance of the forestry sector in Zimbabwe?
8. What measures do you suggest that can be implemented to unlock investment and climate financing towards the forestry sector, particularly in Zimbabwe?
9. With respect to institutional arrangements and strategic partners, what can be done to foster climate financing, and forestry sector performance?
10. Do you have anything else to add?