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RWANDA BANKERS' ASSOCIATION

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Climate Related Risks and Green Finance: The Case of Rwanda.

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Abstract

In the contemporary era of technological advancement, the global economy faces three significant challenges: environmental change, energy constraints, and financial crises. The reason behind this is that economic progress brings about costs to nations in the form of environmental degradation. A potential solution for achieving harmony between the economy and nature is green finance. Green finance is regarded as financial support for environmentally sustainable development, aiming to significantly reduce greenhouse gas emissions and air pollution. It is crucial to enhance green finance in various sectors such as agriculture, green buildings, environmental protection, and other sustainable initiatives for combating climate related risks and thereby attain economic development of the country. This paper seeks to examine the role of green finance in addressing climate risks, assessing the current state of climate risks in Rwanda, analyzing the challenges and opportunities for banks in implementation of green finance as well as well as draw inferences that are relevant to policies for enhancing the effectiveness of green finance in combating climate risks.

Keywords:

Environment; Green finance; Climate Risks; Green investments; Renewable energy

1. Introduction

Green financing is increasingly becoming essential in business risks management. All nations, whether developed or developing, strive to embrace green financing as one of the mitigation measures. Green finance is a broad concept. It embodies the provision of finance in a manner that supports investments that is climate friendly. Such investments are underpinned by regulatory measures such as support financial market participants play a role in research and development for creating pollution treatment facilities, ecological protection and restoration, as well as promoting the utilization of non-fossil energy.

It is projected that global green financing in green infrastructure will reach USD40 trillion between 2012 and 2030. That speaks to the fact that green financial products and services are increasingly becoming integral in fostering sustainable relationships, given the inherent connection between the business sector and the environment. In light of the intensifying threat of climate change, there is need to evaluate the effectiveness of green finance initiatives in mitigating climate-related risks, particularly in regions vulnerable to its adverse effects. Despite increasing recognition of the importance of green finance, the extent of its impact on combatting climate-related risks in Rwanda remains unclear. (UN-Habitat, 2023)

Based on the foregoing, this paper seeks to assess the effectiveness of green finance mechanisms in addressing climate change challenges and enhancing resilience in Rwanda. We delve into the intricacies of green financing, highlighting its importance in the context of the environmental impact of business operations. In so doing, we highlight the challenges and opportunities for banks in implementation of green finance as well as draw inferences that are relevant to policies for enhancing the effectiveness of green finance in combatting climate risks.

The approach of this paper is to undertake a comprehensive assessment of literature alongside a critical the examination of observed trends in the context of Rwanda that infuses qualitative expert interviews. The exploratory approach that we take acknowledges that not many studies specific to Rwanda's Green finance market have been undertaken. We anticipate that this will open the ground for further deeper exploration of the subject.

The rest of the paper is organized as follows. Section 2.0 provides a background that supports the understanding of climate related risks and green finance in a general context as well as how that relates to the situation in Rwanda. This is flowed in Section 3.0 by literature overview with a leaning on the connection between climate risks, green economy and green finance. Sectio 4.0 outlines the green growth landscape in Rwanda and zooms in on the aspect of green finance upon which conclusions and inferences are drawn in Section 5.0.

2. Contextual Background

Climate change presents significant risks to businesses. Until recently, the financial impacts of climate change were not widely considered by business leaders. That view has evolved, and many business leaders are now mainstreaming it. Climate risk is the exposure to damage or loss due to climate change. It presents threats to business operations and bottom lines through both physical risks and transition risks.

Understanding climate risk and its impact on businesses is crucial for making informed decisions and taking steps to mitigate potential consequences. By recognizing the challenges climate risk presents and taking proactive measures, businesses can ensure they are prepared to respond to the current and expected increased costs of climate change to their business (Radicle,2023). Businesses that embrace climate risk management will likely have a greater opportunity to achieve long-term success and resilience.

The threat of climate risk for businesses is multi-faceted and impacts many aspects of operations. Physical risks are the most obvious, presenting direct impacts of climate change on businesses and their assets, such as flooding and wildfires. Transition risks are a newer type of climate risk but are becoming increasingly important as the world shifts towards a low-carbon economy. These risks arise from policy changes, technological advancements, and shifts in market preferences that can impact the value of certain assets or business models. Transition risks are a vital consideration for businesses looking to remain competitive in a changing world. Liquidity risks involve legal and reputational consequences for entities that contribute to climate change or fail to adequately address it.

The world is currently confronting an unparalleled climate crisis, with profound implications for both the environment and economies. The higher carbon dioxide (CO2) emissions from developed countries have led to climate risks that disproportionately affect developing nations. The failure of developed nations to meet developing countries' expectations regarding climate finance further compounds this imbalance. An important question arises: why do countries with lower greenhouse gas (GHG) emissions bear the greatest burdens of climate challenges?

The International Energy Agency (IEA) highlights that the carbon emissions of China, the United States and India account for 85% of the world's total. This situation sparks debates about the injustice of carbon emissions and economic development. For example, although Bangladesh's global GHG emissions are less than 0.35%, it is considered the most vulnerable country to climate risks, with estimates suggesting potential losses of 2% and 9.4% of its gross domestic product (GDP) by 2050 and 2100 due to climate risks, as indicated by the global climate risk index published annually by German Watch, a Germany-based international organization. (IPCC, 2018.)

2.1. Contextual Background

Green finance broadly involves the mobilization and utilization of funds from diverse sources to enhance the natural environment and mitigate the impacts of climate change-induced disasters, whether natural or human-made. The United Nations Framework Convention on Climate Change (UNFCCC) defines green finance as financial support—coming from public, private, and alternative sources—aimed at backing actions for both mitigation and adaptation to address climate change challenges. It stands as a crucial objective within the realm of sustainable development.

The financial sector assumes a pivotal role in the battle against climate change by supporting initiatives that reduce climate-related risks and alleviate the repercussions of adverse climate events. Institutional investors with a long-term perspective can contribute to the rebalancing and redistribution of risks associated with climate change, thereby upholding financial stability. Various financial instruments, such as catastrophe bonds and indexed insurance, serve as hedging mechanisms against the escalating risk of natural disasters. Additionally, instruments like green stock indices, green bonds, and voluntary de-carbonization initiatives play a role in redirecting investments towards environmentally friendly sectors.

From a regulatory standpoint, central banks and other oversight bodies are adapting their frameworks and practices to address the intricate risks posed by climate change. This adaptation involves enhancing climate risk disclosure and classification standards, empowering financial institutions and investors to better evaluate their climate-related exposures. Simultaneously, it aids regulators in comprehensively assessing systemic risks within the financial system.

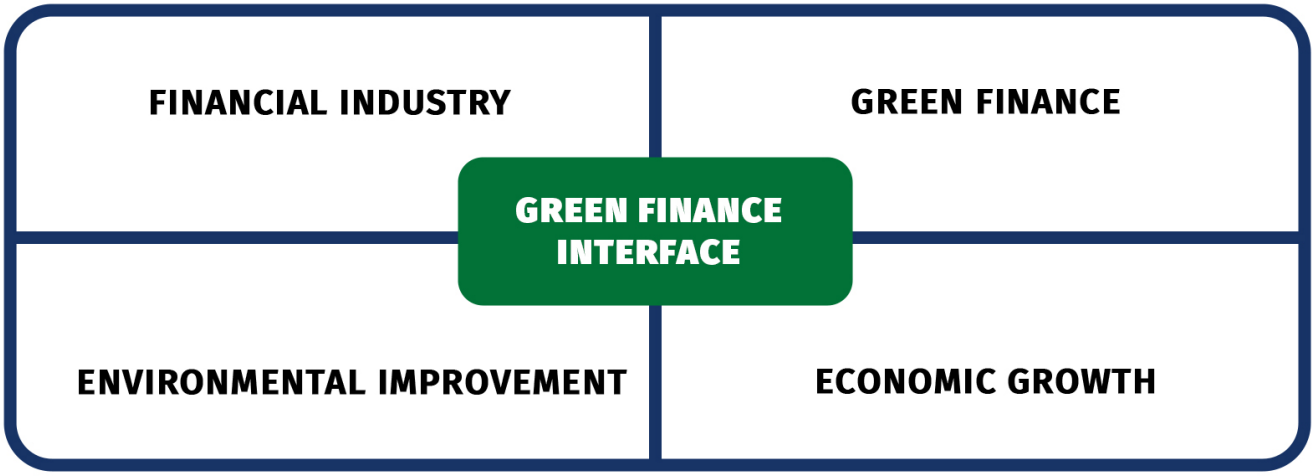
Since 1990s natural contemplations have begun to assume a greater part in the field of venture fund, affecting and molding the hierarchical schedules representing loaning choices. Green fund covers the change of the regions of natural corruption, for example, air contamination, water contamination and shortage, encroachment of streams, uncalled for transfer of mechanical, medicinal and family waste, deforestation, and loss of open space and loss of biodiversity. It must be eco-accommodating and can add to destitution easing. It is a key way to deal with fuse the monetary part in the change procedure towards low-carbon and asset proficient economies, and with regards to adjustment to environmental change. (Chaudhary and Bhattacharya 2006).

Green finance can be categorized into three main types: the framework of green, financing, financial support for industries or firms, and financial markets. Concerning climate change, green financing encompasses both mitigation and adaptation projects. Many private investors often perceive the risks associated with environmentally sustainable initiatives as not justified by the expected returns. Public financing mechanisms can potentially tip the balance in favor of perceived profitability by offering soft loans or guaranteeing credits from private banks, for example. Public funding plays a crucial role in stimulating private investment. As noted by the United Nations Economic and Social Commission for Asia and the Pacific, it can contribute to Financing an Inclusive and Green Future (Hee, 2010).

A basic but important question is: how does green finance work? Green enterprises and innovations are currently in different stages of advancement, thus necessitating varying levels of funding from diverse capital sources. Generally, there are three primary sources: domestic public finance, global public finance, and private sector finance. Domestic public finance refers to direct funding by a government, while global public finance involves funding from international organizations and multilateral development banks. Private sector finance encompasses both local and global financing sources. Green financing can be structured in various ways using different investment frame work.

Green finance plays a pivotal role in low-carbon, environmentally friendly development as it serves as the nexus between the financial sector, climate change, and economic growth (Figure 1). The transition to a green industry often encounters a gap between knowledge and action, with the missing link being "green finance." Many proposals for green industries require financial investment, and numerous business models in the green sector are untested or uncertain. Consequently, traditional finance may find it challenging or economically unattractive to support these unproven or unconventional green industrial proposals (Gao, 2009)

Figure 1: The Green Finance Interface



Source: Compiled by author

The figure illustrates a symbiotic relationship between the financial industry, green finance, environmental improvement, and economic growth.

Positioned on the left side, highlights the traditional financial sector's role in impacting the environment.

On the right side, emphasizes the emergence of sustainable financial practices and their potential to drive economic development.

At the center lies the "Green Finance Interface," symbolizing the integration of green finance principles into traditional financial systems, which serves as a bridge between financial activities and environmental sustainability goals.

The product package by the private sector can be broadly summarized below.

Table 1: Green Finance Products

Retail Finance	GREEN FINANCE	Corporate /Investment Finance
• Green Mortgage • Green Home Equity Loan • Green Commercial Building Loan • Green Car Loan, Credit Card		• Green Project Finance • Green Securitization • Green Venture Capital & Private Equity • Technology Leasing • Carbon Finance
Asset Management		**Insurance**
• Fiscal Fund (Treasury Fund) • Eco Fund, Carbon Fund • Cat Bond (Natural Disaster Bond) • Eco ETF		• Auto Insurance • Carbon Insurance • Catastrophe Insurance • Green Insurance

Source: Compiled by author

2.1.1. Green Finance Assets and Liability Products for Banks

Green Finance Liability Products

According to UNEPFI 2019, Green liability products on the liability side of a bank's balance sheet refer to financial instruments and services that banks offer, which are specifically designed to support environmentally sustainable projects and initiatives. These products are part of green finance, aiming to mobilize capital for projects that have positive environmental impacts. Here are some key green liability products commonly associated with green finance:

Green Bonds

These are debt securities issued by banks to finance projects that have environmental benefits, such as renewable energy, energy efficiency, sustainable agriculture, and pollution prevention for-example a bank might issue a green bond to raise funds specifically for lending to solar or wind energy projects.

Green Deposits

These are deposit products where the funds are exclusively used to finance green projects. Customers deposit their money with the assurance that it will support sustainable initiatives for-example: An individual or corporate customer deposits funds into a green savings account, and the bank uses these deposits to finance renewable energy projects.

Green Savings Accounts and Certificates of Deposit (CDs):

These products allow customers to save money while ensuring their deposits are used to support green projects. For-example a green CD might offer a fixed return to the depositor, with the bank using the funds to finance environmentally friendly projects.

Sustainability-Linked Bonds

These bonds are issued with terms linked to the issuer's sustainability performance targets. If the bank meets or exceeds specific environmental goals, the bond terms may include financial incentives or penalties. The bank has a liability to repay the bondholders, with the added condition of performance-based adjustments for-example a bank issues a sustainability-linked bond with a lower interest rate if it achieves a certain reduction in its carbon footprint.

Green asset products:

According to UNEPFI 2019, Green finance asset products for banks encompass various financial instruments and services tailored to support environmentally sustainable projects and initiatives. Banks can offer various green finance asset products to promote and fund environmentally friendly projects. Some of the key examples of green assets for banks are highlighted below:

Green Bonds

Debt securities issued to finance projects that have positive environmental benefits. These projects can include renewable energy, energy efficiency, clean transportation, sustainable water management, and more.

Green Loans

Loans specifically designed to support projects that improve environmental sustainability.

Sustainable Investment Funds

Investment funds that focus on companies or projects with strong environmental, social, and governance (ESG) practices.

Energy Efficiency Financing

Loans or leases provided for projects that enhance energy efficiency in buildings, manufacturing processes, and other areas.

Renewable Energy Financing

Financial products aimed at supporting the development and deployment of renewable energy sources like solar, wind, and hydroelectric power.

Green Mortgages

Mortgages that offer better terms for homes meeting certain environmental standards, such as energy efficiency or sustainable building certifications (e.g., LEED).

Green Asset-Backed Securities (ABS)

Securities backed by pools of green assets, such as loans for electric vehicles or energy-efficient equipment.

Climate Bonds

A type of green bond specifically aimed at raising funds for projects that mitigate or adapt to climate change.

Sustainability-Linked Loans (SLLs)

Loans with terms that vary based on the borrower's achievement of predefined sustainability performance targets.

Green Equity Investments

Direct investments in companies that operate sustainably or are involved in green projects.

Green Project Finance

Long-term financing for large-scale green infrastructure projects, such as renewable energy plants or sustainable urban development.

2.1.2. Public and private Green Finance

According to green finance institute (HIVE) 2022, Green finance, which refers to financing investments that provide environmental benefits, and that this involves both public and private sectors. The roles and contributions of both private and public sector in combating climate change are highlighted below:

Public Green Finance

1. Government Bonds and Grants

Green Bonds: Governments issue green bonds to finance projects that contribute to environmental sustainability, such as renewable energy projects, energy efficiency programs, and climate resilience infrastructure.

Subsidies and Grants: Governments provide financial assistance and subsidies to encourage investments in green technologies and infrastructure.

2. Policy and Regulation

Regulatory Frameworks: Governments create regulations and standards that mandate or encourage sustainable practices. These include carbon pricing, emissions trading systems, and renewable energy mandates.

Incentives: Tax incentives, rebates, and other financial incentives are offered to businesses and individuals to adopt green technologies and practices.

3. Public Investment Funds

Sovereign Wealth Funds: Some countries use their sovereign wealth funds to invest in green projects, focusing on long-term sustainable returns.

Development Banks: Institutions like the World Bank and regional development banks fund large-scale green projects, particularly in developing countries.

4. Research and Development

Governments fund research and development (R&D) to foster innovation in green technologies, ensuring the development of more efficient and cost-effective solutions.

Private Green Finance

Private Equity and Venture Capital

Investment in Green Startups: Private equity and venture capital firms invest in early-stage companies developing innovative green technologies, such as clean energy, sustainable agriculture, and waste management solutions.

Impact Investing: Investors focus on projects and companies that deliver measurable environmental benefits alongside financial returns.

Green Bonds and Loans

Corporate Green Bonds: Corporations issue green bonds to raise capital specifically for environmental projects. These bonds attract investors who are committed to sustainability.

Green Loans: Banks and financial institutions offer loans with favorable terms for projects that have positive environmental impacts.

Sustainable Asset Management

ESG Investing: Asset managers incorporate Environmental, Social, and Governance (ESG) criteria into their investment decisions, directing capital towards sustainable companies and projects.

Green Funds: Mutual funds and ETFs (Exchange-Traded Funds) focused on sustainability and green investments attract individual and institutional investors.

Corporate Social Responsibility (CSR):

Sustainability Initiatives: Companies integrate sustainability into their business strategies, investing in energy-efficient practices, waste reduction, and sustainable supply chains.

Reporting and Transparency: Businesses enhance transparency by reporting on their environmental impact and sustainability efforts, which can attract more investment.

Collaboration Between Public and Private Sectors

1. Public-Private Partnerships (PPPs):

Joint Ventures: Governments and private companies collaborate on large-scale green projects, sharing risks and benefits. Examples include infrastructure projects like renewable energy installations and public transportation systems.

Blended Finance: Combining public and private funds to de-risk investments in green projects, making them more attractive to private investors.

2. Innovation and Scaling

R&D Partnerships: Collaborative efforts in research and innovation, supported by both public funding and private investment, accelerate the development and deployment of green technologies.

Scaling Solutions: Successful pilot projects funded by the public sector can be scaled up with private sector investment, ensuring wider adoption and impact.

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2.1.3. Green washing Concept

According to UN 2022, Greenwashing presents a significant obstacle to tackling climate change. By misleading the public to believe that a company or other entity is doing more to protect the environment than it is, greenwashing promotes false solutions to the climate crisis that distract from and delay concrete and credible action.

Greenwashing manifests itself in several ways – some more obvious than others. Tactics include:

- Claiming to be on track to reduce a company's polluting emissions to net zero when no credible plan is actually in place.
- Being purposely vague or non-specific about a company's operations or materials used.
- Applying intentionally misleading labels such as "green" or "eco-friendly," which do not have standard definitions and can be easily misinterpreted.
- Implying that a minor improvement has a major impact or promoting a product that meets the minimum regulatory requirements as if it is significantly better than the standard.
- Emphasizing a single environmental attribute while ignoring other impacts.
- Claiming to avoid illegal or non-standard practices that are irrelevant to a product.
- Communicating the sustainability attributes of a product in isolation of brand activities (and vice versa) – e.g. a garment made from recycled materials that is produced in a high-emitting factory that pollutes the air and nearby waterways.

Since the adoption of the Paris Agreement in 2015, an increasing number of companies have pledged to reduce their greenhouse gas emissions to net zero - a level where any remaining emissions would be absorbed by forests, the ocean or other "carbon sinks." However, those claims are often based on questionable plans, including emissions offsetting and "insetting" – rather than actual emission cuts. As such, the transparency and integrity of such claims remain critically low and risk creating a failure to deliver urgent climate action.

To limit climate change and preserve a livable planet, emissions need to be cut nearly in half by 2030 and reduced to net zero by 2050. Every fraction of a degree of warming matters and, as put by the former chair of the High-Level Expert Group on the Net-Zero Emissions Commitments of Non-State Entities, "the planet cannot afford delays, excuses, or more greenwashing".

Greenwashing undermines credible efforts to reduce emissions and address the climate crisis. Through deceptive marketing and false claims of sustainability, greenwashing misleads consumers, investors, and the public, hampering the trust, ambition, and action needed to bring about global change and secure a sustainable planet.

Combating Greenwashing

Transparency: Companies should provide clear, specific, and verifiable information about the environmental benefits of their products and practices.

Third-Party Certifications: Using reputable third-party certifications and standards can help validate claims and build consumer trust.

Holistic Approach: Ensuring that sustainability claims are part of a comprehensive, company-wide commitment to environmental responsibility, rather than isolated actions or marketing gimmicks.

2.2. Africa's climate financing and green growth needs

Africa requires approximately USD242.4 billion annually from 2020 to 2030 to fulfill its Nationally Determined Contributions (NDCs) and a minimum of USD1.3 trillion annually to address sustainable development needs, thereby achieving green growth objectives. Based on the latest NDC submissions as of April 2023, the African Development Bank estimates that Africa's total financing requirements to effectively combat climate change amount to roughly USD 2.7 trillion over the period 2020-2030, with a range between USD2.6 trillion and USD2.8 trillion. Annually, this translates to an average of USD242.4 billion, with a lower bound of USD234.5 billion and an upper bound of USD250 billion.

Climate finance in Africa is predominantly sourced from public finance, which exceeds private finance by a factor of six. Climate action financing in Africa reached an average of $29.5 billion in 2019/2020, constituting 4.5 percent of the global climate finance total of $652.6 billion.

The transition to green growth and the implementation of desired climate actions necessitates readiness and adequate financial resources. An assessment of green growth readiness conducted by the African Development Bank and the Global Green Growth Institute (GGGI) across seven African countries—Gabon, Kenya, Morocco, Mozambique, Rwanda, Senegal, and Tunisia—revealed a high level of political commitment to green growth, primarily supported by climate and green growth policies and strategies. However, in several other countries, evidence indicates limited alignment between climate and green growth strategies and sectoral policies, along with incomplete implementation plans, technical capacity and financing gaps, and weak regulations hindering green growth readiness in some nations. The combined macroeconomic impacts of climate change could potentially reduce Africa's GDP by up to 3% by 2050, according to the (OECD,2022).

3. Review of Literature

Emergent literature points to the potential of commercial funding attuning itself to green principles. Heim and Zenklusen (2005) highlights the notion that investors in the stock market have become environmentally conscious and tend to avoid industries that do not adhere to pollution norms. The ability to accurately determine and account for environment related issues is however in question. Wagner and Schaltegger (2006) points to the unresolved issue of the necessity for universally accepted and applicable accounting and reporting standards with indicators for any industry, contending that that social and environmental reporting and accounting should be developed and implemented concurrently.

Weber, Fenchel, and Scholz (2008), based on a survey of UNEP banks and non-UNEP banks, reports that the analysis of environmental risks was integrated only during the due diligence phase at loan application, not throughout the entire life of the loan, especially the monitoring phase. The report indicates that banks lack a complete understanding of the impact of environmental risks on their loan portfolios. Verma et al. (2012) emphasizes that there are obstacles impeding the growth of green financial products.

Green products have not positioned themselves as economically viable options, as many lower-cost alternatives exist in the market. Unlike Europe, where the market for green financial products and services is growing substantially, the global market is in its early stages, lacking clear boundaries and unified characteristics distinguishing it from traditional industries. Financial institutions, particularly banks, play a crucial role in contributing to the creation of a strong and successful low-carbon economy. They should expand the use of environmental information in credit extension and investment decisions, proactively improving their environmental performance and creating long-term value for their business. In the future, businesses with higher carbon footprints may be viewed as riskier, leading banks to favor financing new technology solutions that capture or reduce carbon emissions Höhne et al. (2012).

An empirical study by Jha & Bhome (2013) on steps taken to adopt green banking, assessing the awareness of bank employees, associates, and the general public on green banking issues through primary data collection from 12 bank managers, 50 bank employees, and 50 general customers affirms the potential of green finance by way of the increasing product menu. The research finds that found that online banking, green loans, power-saving equipment, green credit cards, the use of solar and wind energy, and mobile banking were widely adopted banking strategies. Khandewal (2013) suggests tips for green banking, including online banking, waste management, maintaining a clean and hygienic environment, green banking in rural branches, green credit cards, and green loans. Goel (2016) concludes that India has great potential to create the green infrastructure needed for green finance by overcoming barriers and creating awareness among corporate citizens.

IFC (2016) analysis shows that various actors have made significant efforts to gain traction in incentivizing and measuring green finance, demonstrating that it is possible to estimate green finance flows through private financial institutions. Nevertheless, the text also underscores the need for additional efforts to enhance the accountability and visibility of green finance. The bond market stands out with advanced definitions and tracking, serving as a potential model for other sectors.

In banking, IFC (2016) call for refining existing tracking processes for loans, while institutional investors are urged to develop transparent decision-making approaches, transitioning from awareness to practical implementation. A comprehensive understanding of the current state of green finance is crucial for a thorough analysis against policy targets. It can also provide insights for multinational organizations, national governments, regulators, the private financial sector, and data providers and standard setters. China's regulation requiring banks to regularly disclose their green loan data sets an example that other countries contemplating similar regulations could learn from, drawing on both China's policy implementation and insights derived from the collected data.

The outlined next steps offer specific action points for each stakeholder group to enhance tracking and shape the future of green finance by leveraging existing sources of information. Wang and Zhi (2016) conducted a study in Beijing, concluding that green finance represents an innovative financial model aimed at environmental protection and achieving sustainable resource utilization. They argue that, if the market mechanism of green finance is rational, it can guide fund flows, effectively manage environmental risks, and optimize the allocation of environmental and social resources. Effective policy regulation, according to the study, can prevent information asymmetry and address moral hazards.

Based on the available literature on green finance, it is evident that a significant portion of green investment is increasingly being funded through banks. By integrating environmental considerations into their decision-making processes, banks can better handle the risks associated with lending to polluting sectors and contribute to strengthening the financial system's resilience. The Rwandan banking sector stands to play a crucial role in directing the necessary resources for financing the green transformation. However, existing studies suggest that green finance is scarcely prevalent in India. Beyond theoretical considerations, there is limited empirical evidence explaining this underperformance, and there is a lack of comprehensive knowledge about the concept of green finance, green finance products, and their mechanisms.

3.1. Climate Change Mitigation and adaptation

According to IPCC 2022, Mitigation involves efforts to reduce or prevent the emission of greenhouse gases (GHGs) into the atmosphere. The aim is to limit the magnitude and rate of long-term climate change, Adaptation refers to the process of adjusting to actual or expected climate change and its effects. The goal is to reduce vulnerability and enhance resilience to the impacts of climate change.

Table 2: Comparison between Adaptation and Mitigation to climate change

Aspect	Adaptation	Mitigation
Objective	Minimize harm from climate impacts	Reduce GHG emissions to slow climate change
Focus	Managing current and future climate risks	Addressing root causes by cutting emissions
Temporal Scope	Short to medium term	Long term
Examples	Building flood defenses, developing drought-resistant crops	Installing solar panels, promoting electric vehicles
Implementation	Often local/regional	Requires global/national coordination
Benefits	Immediate relief, tailored solutions	Long-term stabilization of climate, multiple co-benefits
Challenges	Resource-intensive, sometimes temporary	High initial costs, requires sustained effort

Source: (IPCC, 2022)

Examples of mitigation and adaptation to climate change

IPCC, 2022 highlights the following to be Mitigation examples:

Energy: Transitioning to renewable energy sources like wind, solar, and hydroelectric power to reduce reliance on fossil fuels.

Transportation: Promoting electric vehicles and public transportation to decrease emissions from cars and trucks.

Forestry: Implementing reforestation and afforestation projects to absorb CO2 from the atmosphere.

Industry: Improving energy efficiency and adopting cleaner technologies in manufacturing processes.

IPCC, 2022 highlights the following to be Adaptation examples:

Infrastructure: Building sea walls and flood defenses to protect against rising sea levels and storm surges.

Agriculture: Developing and planting drought-resistant crop varieties to cope with changing precipitation patterns.

Urban Planning: Designing cities with improved drainage systems to handle increased rainfall and prevent flooding.

Public Health: Enhancing healthcare systems to deal with heatwaves and the spread of climate-sensitive diseases like malaria and dengue.

4. Rwanda's green growth and green finance landscape

Rwanda's Vision 2050 articulates the bold long-term ambition of "the Rwanda we want" to be upper middle-income by 2035 and a high-income country by 2050, thereby transforming the economy and modernizing the lives of all Rwandans. Rwanda's Vision 2050 aims at transforming Rwanda into an upper-middle-income by 2035 and a high-income country by 2050 with a carbon-neutral and climate-resilient economy to serve to transform and modernize the economy that aligns with several international treaties committing the country to an ambitious green growth and climate resilient development path. The Vision 2050 and vision for the Green Growth and Climate Resilience Strategy (GGCRS) anchors the economy to be a developed, climate resilient, and carbon neutral economy by 2050.

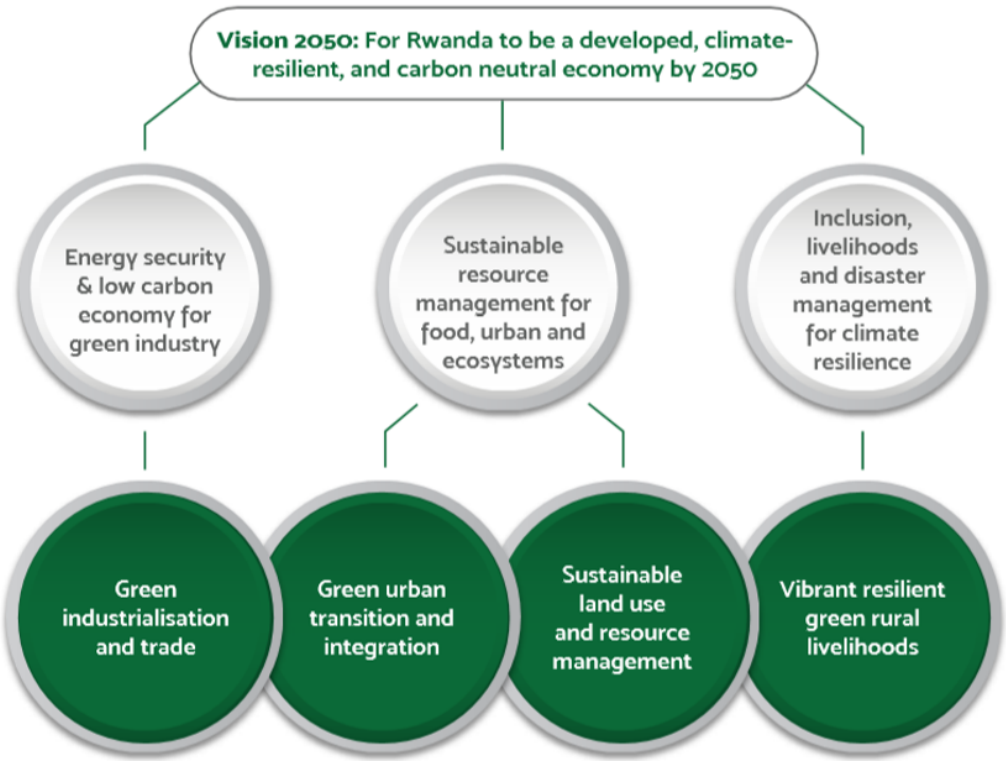
The GGCRS has three Strategic Objectives:

- To achieve Energy Security and Low Carbon Energy Supply that supports the development of Green Industry and Services and avoids deforestation.
- To achieve Sustainable Land Use and Water Resource Management that results in Food Security, appropriate Urban Development and preservation of Biodiversity and Ecosystem Services.
- To ensure Social Protection, Improved Health and Disaster Risk Reduction that reduces vulnerability to climate change impacts.

Together these objectives relate to the elements upon which Vision 2050 are built, namely the infrastructure and systems that enable low-carbon growth and sustainable resource use, the natural capital and associated spatial development that ensure sustainable development, and the human capital development and economic inclusion that will build the resilience of the Rwandan people.

The strategic Framework for Rwanda's Green Growth and Climate Resilience Strategy is encapsulated by Figure 2.

Figure 2: Strategic Framework for Rwanda's Green Growth and Climate Resilience Strategy

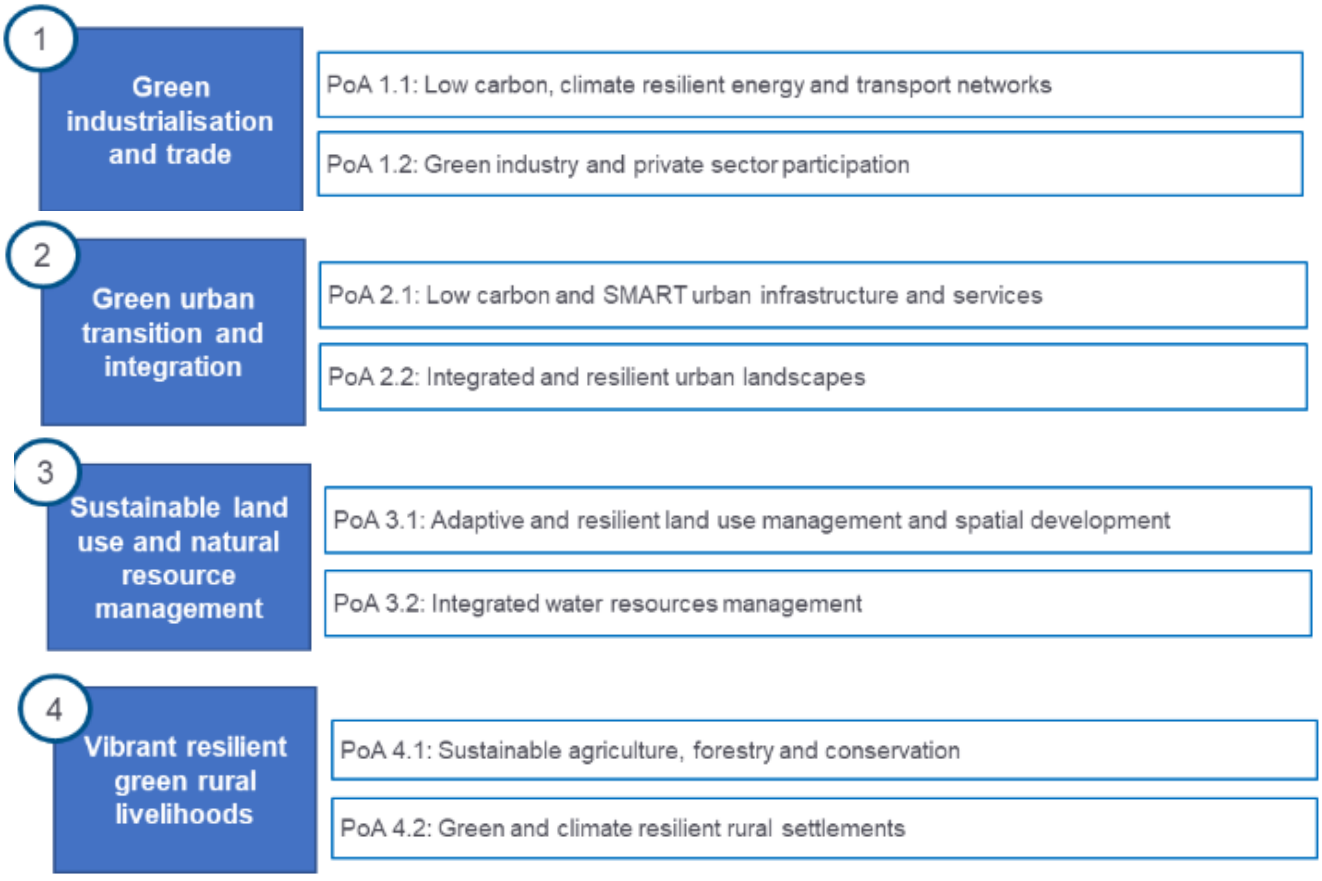


Source: (GGCRS, 2021)

To achieve a climate resilient and green economic future, the GGCRS is built around four Thematic Programme Areas, with each being focused on two Programmes of Action (PoAs) which have been designed to address the most important areas of work required to deliver strategic intent toward the GGCRS objectives and cover a balanced focus between mitigation, adaptation, and green growth:

The four Thematic Programme Areas include: Green industrialization and trade, green carbon transition and integration. Sustainable land use and resource management and vibrant resilient green rural livelihoods.

Programmes of Action (PoAs) for each thematic programme Areas



Rwanda has long been a leader in environmental initiatives within the region. The country took early measures such as banning plastic bags in 2008 and becoming the first African nation to ban single-use plastics in 2019. Despite these efforts, achieving its national plan to reduce emissions by 38% and cut up to 4.6 million tons of carbon dioxide by the end of the decade requires USD11 billion. To drive green growth, Rwanda established FONERWA, the largest green fund in Africa. However, the country heavily relies on foreign aid, with external grants and loans making up 40% to 60% of annual development budgets, posing challenges for the conservation and management of natural resources.

The 2017 Rwanda Green Investment Baseline Study predicts a 20.9% increase in green growth by 2030, with significant investments expected in energy, transport, agriculture, and forest plantations. As a rapidly growing nation undergoing urbanization and economic structural changes, Rwanda is vulnerable to climate change effects, experiencing extremes of flooding and drought that impact agriculture and infrastructure. Climate-related disasters in 2018 cost Rwanda over USD200 million in damages, and the costs have continued to rise since then. (Republic of Rwanda, 2020). In 2011, Rwanda developed its Green Growth and Climate Resilience Strategy to guide the country's response to climate change. The strategy has positioned Rwanda to play its part in the global response and, as a result, the country hosted the 28th Meeting of the Parties to the Montreal Protocol at which the Kigali Amendment was agreed. (Rwanda's updated NDC, 2020)

Rwanda's firm commitment to climate action can be seen in this revised NDC, which increases ambition in all components. It is particularly focused on transparency, clarity and the monitoring of the goals we have set for ourselves. The report demonstrates Rwanda's progress and commitment to identifying targets for reducing emissions across sectors through inter-ministerial cooperation, working with sub-national entities, mobilizing domestic resources, and support from bilateral and multilateral donors. This document, therefore, is a testament to the spirit of community that is needed to address climate change.

4.1. Sector wise Climate Change Vulnerability and Risk for Rwanda

While the enablers of climate finance are still finding their footing, the financial industry grapples with limited knowledge and information architecture regarding climate change. The emerging frameworks and contextualized approaches, coupled with the sector's immaturity in embracing green finance, create knowledge gaps among financial institutions. Nonetheless, these players are beginning to acknowledge the threats posed by climate change to their businesses and the growing emergence of climate-related risks. Recognizing the need to respond to climate risks and capitalize on related opportunities, financial institutions are yearning for a paradigm shift.

According to (GGCRS, 2021), Climate change poses a threat to all sectors of the Rwandan economy, and efforts towards preparedness are necessary in every sector. However, the nature of some sectors (their raw materials, inputs, systems and processes, and the outputs or contributions) is such that certain sectors are substantially more at-risk to climate change than others.

In Rwanda, the sectors that are most vulnerable, and therefore must place a considerable emphasis on building adaptive capacity, are Water, Sanitation and Hygiene (WASH) and Waste, agriculture, and natural resources management (land and water resources, including forestry). Urban settlements and energy also require adaptation. In relative terms, transport and industries and mining have less of an imperative in the near future to focus heavily on adaptation.

WASH and Waste

Water is the principal channel through which climate change impacts are manifested. This makes water access and supply the most vulnerable of Rwanda's sectors, with significant implications for water services and sanitation. Climate change is expected to create greater variability in water availability, including shifts in seasonality and distribution of rainfall. With rising temperatures and increased evapotranspiration, this is also expected to lead to greater aridity in dry areas.

At the same time, warmer temperatures are likely to increase the demand for water (for consumption and cooling) as well as exacerbate public health challenges if solid waste cannot be effectively managed. This coupled with demographic and economic factors (rising population and economic growth) can lead to operational challenges for cities and settlements relating to WASH and Waste.

Agriculture

Climate change is a threat-multiplier to agriculture, enhancing risks already felt from climate variability, particularly through changes in the availability of water, and through temperature shifts that affect crop growing patterns. Rwanda is starting to experience more extremes, with the dry regions in the east and south becoming more arid (and projected to see more droughts), and wet regions in the north and west becoming more humid and moist (and projected to see more floods and landslides) (PSTA 4, Republic of Rwanda, 2018).

A number of assessments suggest that climate impacts in Rwanda such as higher temperatures, increased dryness (in some regions), and higher evapotranspiration, may alter the extent of areas suitable for agriculture and the length of growing seasons, affecting crop yields (e.g., for tea, coffee, maize, beans, wheat, fruit, and groundnuts) as well as hunger and nutrition (PSTA 4, USAID, 2019).

Furthermore, there is a higher risk of soil erosion due to more extreme rainfall events in certain regions. In addition, climate change may alter the occurrence and distribution of pests that harm or damage crops and livestock, such as the berry borer beetle and rift valley fever (USAID, 2012).

Natural Resources (Land, Forestry and Water Resources Management)

Rwanda's land is vulnerable to climate change from the increased risk of natural hazards (floods, droughts, landslides), particularly as land use changes cause slope destabilization and soil erosion. Loss of biodiversity may impact nature based tourism. Climate change is expected to create greater variability in water availability, including through shifts in seasonality and distribution of rainfall. With rising temperatures and increased evapotranspiration, this is also expected to lead to greater aridity in dry areas (USAID, 2012). The changing hydrological cycle also has implications for groundwater availability, indirectly through extreme weather events; increases in rainfall can lead to rapid runoff and flooding, which reduces groundwater recharge because too much rain at one time exceeds soil absorption capacity. Heavy rainfall also increases siltation of rivers and lakes (USAID, 2019; Rwanda Water Resources Board, 2019).

Urbanization and Settlements

Climate change poses a threat to cities and human settlements in Rwanda in a number of ways. Temperature rise may affect population health in the form of heat stress and heat exhaustion (or, in severe forms, heat strokes), given that the urban heat island effect exacerbates rising temperatures significantly in built-up areas. Rising temperatures also increase demand for cooling and water usage, leading to pressure on essential services.

Most acutely, urban settings are at risk from extreme weather occurrences such as intense rainfall events, due to changes in drainage patterns in built areas. Kigali, for instance, has suffered highly damaging floods annually for the last several years, compounded by issues of waterlogging. Given the density of many of Rwanda's cities and its hilly, uneven topography, extreme rain events also bring an elevated risk of landslides (Republic of Rwanda, 2018). Cities and urban infrastructure in Rwanda are vulnerable to both chronic and acute climate change impacts. Disaster risk reduction and disaster management, as well as urban drainage and storm water management are pressing adaptation needs.

Energy

The energy sector in Rwanda is vulnerable to climate change impacts in two principal ways. Firstly, given the large share of hydropower in the country's electricity mix, increased variability in rainfall (including more frequent drought conditions in eastern and southern Rwanda) poses a risk to the reliability and availability of hydropower. Alongside this, an increase in rainfall intensity which leads to landslides and sedimentation of water bodies affects key infrastructure.

Secondly, for thermal power facilities there may be increased requirements for cooling systems, due to an anticipated rise in average ambient temperature due to climate change. Beyond these two factors, other potential challenges to the power sector from climate change include an increase in demand for residential and commercial cooling (in response to higher temperatures), which creates pressure on power supply, and extreme weather events, which could damage power sector assets or temporarily disrupt fuel supply chains due to localized disasters such as floods and landslides. While Rwanda's current Nationally Determined Contributions (NDC) does not include adaptation actions related to the energy sector, it may be prudent for the sector to assess its vulnerability more robustly to climate change related trends in power consumption, as well as disruption from extreme weather events. (Republic of Rwanda, 2018).

Transport

The transport sector faces several of the risks faced by the urban sector and the industry sector in terms of infrastructure damage, loss, and depreciation. Higher temperatures are known to cause tarmacs at airports to melt, and temperature variability (extreme highs and lows) are known to cause roads to buckle and crack (IPCC, 2014; Ministry of Infrastructure, 2021).

Moreover, transport systems and networks can face disruption from extreme weather events such as floods or landslides, causing supply chain interruptions (IPCC, 2014). In the context of adaptation, transport systems such as roads and bridges have an important role to play in strengthening resilience; if designed and constructed with adequate roadside drainage and higher permeability, they can alleviate some of the risks of flooding in certain areas (IPCC, 2014; Ministry of Infrastructure, 2021). Transport infrastructure is vulnerable to damage from climatic hazards, and can also play a more proactive role in enhancing a region's resilience through more climate-responsive design.

Industries and Mining

No major climate change study or instrument in Rwanda has examined the vulnerability of the industry, manufacturing, and mining sector to climate change. This is because the sector is typically focused on as a target for mitigation. However, climate change impacts do have implications for the sector and decision-makers and planners in the sector would be well advised to interrogate the need for adaptation action.

Chief amongst these concerns is supply-chain disruptions to key industries and manufacturing units due to climate change, both as a result of rapid-onset events (extreme weather disasters such as floods and landslides) and slow-onset events (droughts and shifts in agricultural growing regions). Acute climate hazards can also pose a risk of physical damage and depreciation to capital assets. Given the key role of agro-based industries in Rwanda, and the vulnerability of crops and livestock to climate change, disruptions to the value-chains of agribusiness ought to receive attention. Industry is not regarded as a highly climate-vulnerable sector. However, disruptions to supply chains and damage to physical assets are a reason for the sector to examine adaptation options as needed.

4.2. Green finance opportunities

For Rwanda to achieve its ambitious goals of Vision 2050, its financial institutions, like their global counterparts, need confidence in investing in pioneering green projects. Despite the evolving frameworks and approaches in climate finance, the financial industry grapples with limited knowledge and information architecture related to climate change. Financial institutions are beginning to recognize the threats posed by climate change to their businesses and the associated risks, prompting a growing awareness and desire for a paradigm shift.

The Green Climate Fund (GCF) and the International Union for Conservation of Nature (IUCN) have signed a funding agreement for the "Transforming Eastern Province through adaptation" (TREPA) project, with co-financing from the Government of Rwanda and other Project Executing Entities. The six-year investment project is a collaborative effort involving IUCN, the Government of Rwanda through Rwanda Forestry Authority (RFA), Cordaid, CIFOR-ICRAF, Enabel, and World Vision. The TREPA project aims to restore over 60,000 hectares of drought-degraded landscapes in the Eastern Province of Rwanda through activities such as reforestation, agroforestry, pastureland restoration, and erosion control in seven districts. (IUCN, 2023)

Cordaid, as part of the TREPA project, is actively engaging microfinance institutions (MFIs) in the Eastern Province to promote Green Finance. Through partnerships with four selected MFIs, namely RIM Ltd, Duterimbere IMF, Umutanguha Finance PLC, and Goshen Finance Company, Cordaid is focusing on enhancing financial inclusion, particularly among women and youth, and encouraging investments in climate-resilient agriculture and tree products. (IUCN, 2023)

Cordaid facilitates capacity-building and knowledge-exchange sessions for partner MFIs to deepen their understanding of climate financing and the business prospects tied to the TREPA project. The collaboration aims to reshape the policies and strategies of MFIs, aligning them with a green orientation. (IUCN, 2023)

Additionally, Cordaid has partnered with Umurenge SACCOs (Savings and Credit Cooperative Organizations) in the Eastern Province, recognizing their role as the financial backbone of the region. The collaboration aims to leverage the influence of SACCOs to drive climate adaptation efforts, providing knowledge and skills to offer loans for climate-adaptive ventures and extending credits to farmer groups engaged in climate adaptation activities. (IUCN, 2023)

The partnership between Cordaid, MFIs, and SACCOs aims to make a significant impact on financial inclusion for the initially targeted 250,000 individuals. By promoting climate-resilient businesses, the collaboration seeks to exceed the project targets and contribute to building climate resilience in the Eastern Province. (IUCN, 2023)

On a global scale, climate finance research is limited, with the study highlighting the scarcity of academic discussions and research on the topic in Rwanda. The study emphasizes the unique contribution of analyzing the association between climate finance and climate risks, providing empirical evidence for the impact of climate finance on climate risk. The collaboration between Cordaid, MFIs, and SACCOs in the Eastern Province is positioned to create a powerful synergy for building climate resilience and promoting sustainable growth. The partnership is expected to unlock new opportunities and innovative solutions, fostering a more sustainable and climate-resilient Eastern Province. (IUCN, 2023)

Furthermore, the launch of Ireme Invest, a green investment facility, represents a groundbreaking initiative by the Government of Rwanda through the Rwanda Green Fund and the Development Bank of Rwanda. With an initial capitalization of over USD100 million, Ireme Invest aims to strengthen Rwanda's ownership of climate finance, offering various financial instruments tailored to meet the private sector's needs. The facility includes a Project Preparation Facility providing grants for early-stage project activities and a Credit Facility offering credit guarantees and concessional loans through the Development Bank of Rwanda. Ireme Invest is designed to catalyze green and low-carbon private investment in Rwanda, focusing on blended finance and creating a more resilient and sustainable society. (IUCN, 2023)

Partners

Ireme Invest has launched with its first capitalization round of USD 104 million expected from:

Table 2: Financing Partners

Institutions	Nature	Amount
European Investment Bank	A credit line	Euro 20 million
Agence Française de Développement	A credit line	Euro 20 million
Foreign, Commonwealth and Development Office of the Government of the United Kingdom	A grant	GBP 7 million
Global Climate Partnership Fund	A credit line	USD 15 million
Development Bank of Rwanda	A capitalization fund	USD 22 million

Source: (IUCN, 2023)

4.2.1. The additionality of banks

The societal benefits of green finance are eloquently articulated in Emeritus, Preethi Thomas et al., (2021). Banks are therefore seized on the strategic benefits of mainstreaming green finance in their operations. The commercial imperatives of such mainstreaming and underpinned by the following:

Mitigating Climate Change Risks: Green finance initiatives help mitigate the risks associated with climate change by supporting environmentally sustainable projects and investments. By financing renewable energy, energy efficiency, and other green projects, banks contribute to reducing greenhouse gas emissions and combating climate change.

Meeting Regulatory Requirements: Many governments are implementing regulations and policies to encourage or mandate financial institutions to adopt sustainable practices. Participating in green finance can help banks comply with these regulations, avoid penalties, and maintain their operating licenses.

Managing Reputation and Stakeholder Expectations: Consumers, investors, and other stakeholders increasingly expect businesses, including banks, to demonstrate their commitment to environmental sustainability. Participating in green finance allows banks to enhance their reputation as responsible corporate citizens and attract socially conscious customers and investors.

Seizing Business Opportunities: Green finance presents significant business opportunities for banks. By financing green projects and investments, banks can tap into growing markets for renewable energy, sustainable infrastructure, and environmentally friendly technologies. This can diversify their revenue streams and contribute to long-term profitability.

Reducing Financial Risks: Investing in environmentally sustainable projects can help banks reduce their exposure to certain financial risks, such as those associated with fossil fuel assets or industries vulnerable to climate-related disruptions. Green finance offers opportunities for banks to allocate capital towards more resilient and future-proof investments.

Innovation and Differentiation: Participating in green finance encourages banks to innovate and develop new financial products and services tailored to the needs of environmentally conscious customers and businesses. This can help banks differentiate themselves in a competitive market and stay ahead of evolving regulatory and consumer trends.

Long-Term Value Creation: By integrating environmental considerations into their lending and investment decisions, banks can contribute to the long-term sustainability and resilience of the economy. Green finance initiatives support the transition to a low carbon and environmentally sustainable future, fostering economic growth and stability over the long term.

4.2.2. ChallengesRwanda

The aforementioned opportunities for banks listed have to confront a number of challenges if the full potential of green finance is to be realized. These challenges include the following:

- Absence of an Integrated Green Financial System: There is a pressing need for a standardized and adaptable green financial framework to ensure alignment with sustainable growth goals. This system must distinguish genuine environmentally beneficial projects from those lacking tangible green impact. It should update guidelines for the issuance of green bonds, ensuring projects contribute to environmental objectives. Moreover, a comprehensive evaluation mechanism based on carbon emissions rates should be implemented to guide businesses towards greener practices.
- Information Asymmetry in Green Finance: Integrating Environmental, Social, and Governance (ESG) criteria into corporate disclosures is vital to enhance transparency and promote responsible investment practices. Rwanda faces a lack of awareness regarding ESG principles among market entities, necessitating the adoption of a model that combines willingness and reporting. Strengthening ESG ratings and investment mechanisms through external evaluations and incentives for self-disclosure can further bolster green finance credibility.
- Insufficient Incentives for Eco-Friendly Consumption: To stimulate green finance and achieve carbon reduction goals, a comprehensive policy framework with market-driven incentives is essential. Targeted subsidies for eco-friendly projects, especially in underdeveloped regions, along with tax incentives for companies implementing green initiatives, can encourage broader participation in carbon reduction efforts. Additionally, establishing a tiered tax system and facilitating access to financing through grant programs can incentivize green investment.
- Lack of Policy and Standards Coordination: Incoherent policies and standards, coupled with a limited variety of green financial products, pose significant challenges. Establishing consistent and internationally aligned green financial standards is crucial, along with diversifying financial instruments beyond traditional green credit. This includes developing products like green stocks, bonds, and insurance to encompass various sectors, ensuring a comprehensive approach to low-carbon transformation. (Zhou 2022).

4.2.3. Expert perspectives on the challenges

Acknowledging that the challenges outlined above are binding in the case of Rwanda, this paper reports perspectives of expert interview with senior credit analysts from top 5 banks in Rwanda. The key informant interviews reveal that implementing green finance in Rwanda confronts challenges unique to the country's economic, social, and environmental context. The challenges include the following:

- Limited Awareness and Demand: Rwanda have limited awareness among both banks and consumers regarding the importance and benefits of green finance. Educating the population about the advantages of sustainable investment and green projects could be a challenge.
- Lack of Regulatory Framework: The regulatory framework for green finance in Rwanda is in in its nascent stages, making it challenging for banks to navigate the regulatory landscape and comply with any existing or forthcoming regulations related to sustainable finance.
- Access to Data and Information: Access to reliable environmental data and information related to potential green projects is limited in Rwanda. Banks face difficulties in assessing the environmental impact and risks associated with such projects due to data gaps.
- Capacity Building: Building internal capacity within banks to assess, manage, and finance green projects is a challenge. Training staff and developing expertise in areas such as environmental risk assessment and sustainable finance might be necessary. This comes with a cost and getting appropriate trainers in a bit challenging.

- Financial Viability of Green Projects: Green projects face financial viability challenges, especially in the early stages of development. Banks might be hesitant to finance such projects due to concerns about profitability, particularly due to uncertainties regarding revenue streams or cost-effectiveness.
- Access to Funding: Banks in Rwanda face challenges in accessing funding sources specifically earmarked for green finance initiatives. Limited availability of green finance instruments or funding mechanisms could hinder banks' ability to scale up their green finance activities.
- Infrastructure and Technology: Infrastructure limitations and technological constraints pose challenges for implementing green projects in Rwanda. For instance, the lack of renewable energy infrastructure or sustainable transportation systems which could impede the development of green projects in these sectors.
- Partnerships and Collaboration: Building partnerships and collaboration with relevant stakeholders, including government agencies, non-governmental organizations, and the private sector, is crucial for the successful implementation of green finance initiatives. However, establishing effective partnerships requires significant effort and coordination.

Addressing these challenges would require a concerted effort from various stakeholders, including banks, government institutions, international organizations, and civil society, to create an enabling environment for green finance in Rwanda. This might involve policy interventions, capacity-building initiatives, awareness campaigns, and the development of supportive infrastructure and regulatory frameworks tailored to the country's specific context.

5. Conclusion and Recommendations

5.1. Conclusion

In this study, we conducted a comprehensive assessment of the impact of green finance in combating climate related risks in Rwanda. Climate risks pose significant challenges to the global economy and the stability of financial markets. However, they also present opportunities for sustainable investments and the development of green finance. By integrating climate risk analysis into financial decision-making processes, investors can identify risks, enhance risk management, and support climate-resilient assets. Green finance plays a crucial role in mobilizing capital towards sustainable projects and fostering innovation. As the world strives to mitigate the impacts of climate change, the integration of climate risks into green finance will continue to shape the future of the financial sector.

At economic growth rate of 10% in Q4,2023, Rwanda's speedy expansion of industrialization and modernization has resulted in environmental challenges such as pollution and excessive energy consumption. To address this, the concept of green finance has to be given a special attention, with the objective of promoting sustainable development by supporting financial events, environmental protection, and green stability. Green finance aims to promote the harmonious development of financial activities, environmental protection, and sustainable development. It is no longer just a global trend, but an essential component for both developed and developing countries to achieve sustainable growth.

In Africa, Rwanda is leading the way in researching and implementing green financial policies, which have the potential to reduce credit risk, increase financial transparency, and promote sustainable growth. Rwanda's financial authorities are exploring the inclusion of green financial products in macro-prudential policy research, National Bank of Rwanda has set climate risk guidelines to guide the banking industry in transition to green financial system. It also is imperative to develop diversified new green financial products that will accelerate the transition to a green financial system in Rwanda.

The Rwandan government's efforts in promoting green economy have been substantial, with constant efforts to implement climate change policies and guidelines as well as aligning these policies to conversional national short, medium and long-term programs. Nevertheless, we suggest that establishing a unified green financial system, mandatory green financial disclosures, and promoting green consumption incentive mechanisms could help the Rwandan green financial system achieve even greater success in the future.

5.2. Study Recommendations

Policy recommendations on the impact of green finance on climate-related risks in Rwanda should focus on both incentivizing and regulating sustainable financial practices while also building resilience to climate change. The study suggests the following recommendations:

Firstly, there is a need for a collective effort to enhance sustainable finance's impact on addressing climate change. The public sector can support riskier yet crucial projects, while the private sector can fund the transition to lower carbon emissions and accurately assess risks in the market.

Central to emission reduction efforts should be the implementation of higher carbon prices. This approach encourages mitigation actions, generates revenue for necessary investments, and assists those most severely affected by climate change.

Additionally, data transparency, disclosures, and standardized classifications. Addressing data gaps and enhancing disclosures are vital for attracting financial resources to support climate-friendly investments. Consistent and accessible climate-related data can facilitate informed decision-making and encourage investment in sustainable projects across different economic structures.

The establishment of robust regulatory frameworks for green finance initiatives is crucial for ensuring transparency, accountability, and credibility in investment practices.

This involves defining clear criteria for green projects, establishing targets for green financing, and implementing reporting requirements for financial institutions. Central banks play a vital role in assessing risks and managing governance challenges to effectively integrate climate considerations into their strategies. Regulatory evolution is necessary to ensure that sustainable financial products contribute meaningfully to climate action, prevent greenwashing, and uphold quality standards. A unified global regulatory approach, along with collaboration on standards and oversight, can enhance the credibility and effectiveness of sustainable finance efforts.

Incentivize Green Investments: Provide financial incentives such as tax breaks, subsidies, or low-interest loans for green projects and investments. This can encourage financial institutions and investors to prioritize climate-friendly initiatives and allocate more resources towards renewable energy, energy efficiency, sustainable agriculture, and other environmentally beneficial projects.

Capacity Building and Awareness: Invest in capacity building programs to enhance the knowledge and skills of financial institutions, regulators, and stakeholders on green finance principles and practices. Additionally, raise awareness among businesses, investors, and the general public about the importance and benefits of investing in climate-resilient projects.

Integration of Climate Risk Management: Integrate climate risk assessment and management into financial decision-making processes. Encourage financial institutions to conduct climate risk assessments of their portfolios and incorporate climate-related factors into their risk management frameworks to mitigate potential losses associated with climate change impacts.

Collaboration and Partnerships: Foster collaboration among government agencies, financial institutions, development partners, and civil society organizations to facilitate the mobilization of green finance and support the implementation of climate-resilient projects. Public-private partnerships can leverage resources, expertise, and networks to scale up investments in sustainable development.

Green Bond Market Development: Promote the development of a domestic green bond market to facilitate the issuance of green bonds by public and private entities. This can attract international investors interested in environmentally sustainable investments while providing a new source of financing for climate-related projects in Rwanda.

Inclusive and Equitable Access: Ensure that green finance initiatives prioritize the needs of vulnerable communities and promote inclusive and equitable access to financing for climate adaptation and mitigation projects. This may involve targeted support for smallholder farmers, women entrepreneurs, and marginalized groups to participate in green investment opportunities.

Rwanda governments should develop country architecture to mobilize private financing for climate action and green growth, including domestic financial institutions. It should also strengthen governance and accountability systems to ensure that proceeds from private finance generate the expected and maximum impact for green growth.

Monitoring and Evaluation: Establish robust monitoring and evaluation mechanisms to track the effectiveness and impact of green finance initiatives on climate resilience and sustainable development goals. Regular assessments can inform policy adjustments and identify areas for improvement in promoting green finance in Rwanda.

This study is subject to certain limitations which need consideration. Firstly, it exclusively examines the impact of green finance on climate risks in Rwanda, without conducting a comprehensive analysis of its effects on the country's sustainable green development. It is advisable for future research to undertake a detailed examination of individual green financial instruments such as green credit, green bonds, and green credit cards to ascertain their role in promoting green economic growth and to identify any constraints they may encounter in Rwanda. Secondly, data availability posed challenges during the study, especially concerning Rwanda, where minimal research exists on green finance and climate risks. Nevertheless, we anticipate that this study will establish a solid foundation for future researchers.

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