Enhancing Economic Growth through Climate Finance: Evidence from Ghana

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DOI: https://doi.org/10.51584/IJRIAS.2025.100500076

Received: 11 May 2025; Accepted: 15 May 2025; Published: 14 June 2025

ABSTRACT

This study explores the role of climate finance in fostering economic growth in Ghana, a nation increasingly vulnerable to the adverse effects of climate change despite contributing minimally to global greenhouse gas emissions. Using a case-oriented comparative design and drawing data from 105 key stakeholders across governmental and non-governmental institutions, the research identifies critical factors that can transform climate finance challenges into opportunities. Descriptive and regression analyses reveal that variables such as research and development, forestry and conservation, sustainable tourism, green finance accessibility, and inclusive development significantly influence economic growth. The study proposes the SEIMEF strategic framework—comprising strengthened policy, institutional capacity, access to finance, climate mainstreaming, international partnerships, and public-private collaboration—as a robust solution to enhance Ghana's climate finance portfolio. The findings underscore that targeted climate finance strategies not only mitigate environmental risks but also drive inclusive and sustainable economic development.

Key: Climate Finance, Climate Change, Economic Growth

INTRODUCTION

The contemporary era faces a global challenge in achieving a stable global climate and reducing future emissions, which has hindered the attainment of global development.

It is worth noting that climate change, which has become part of the sustainable development agenda since 2015, is now a topical dialogue globally. Climate change campaign has been intensified in Africa to achieve sustainable development goals and poverty reduction.

Africa is one of the smallest contributors to greenhouse gas emissions but suffers the most from the impacts of climate change. According to the study of Barnard et al., (2014), Sub-Saharan Africa (SSA) accounts for only 4% of annual global greenhouse gas emissions, however, it is the Sub-Sahara Africa region that is widely exposed to the danger of climate change.

Specifically, West Africa has been recognized as a climate-change hotspot due to its rapid population growth (2.8 percent per year) occurring in an environment where natural resources are declining.

Within numerous countries in West Africa, particularly Ghana, food insecurity is being worsened by climate variability and unpredictable weather patterns. These conditions are also impacting the rural economy at various stages along the agriculture value chain, affecting on-farm productivity, as well as off-farm matters like policy and trade.

Multiple research investigations have unveiled that the effects of climate change are increasingly having an impact on Ghana, with the most severe repercussions being felt by the poorest and most vulnerable segments of the population. These consequences encompass land degradation, the depletion of biodiversity, water scarcity, diminished agricultural output, a decrease in economic expansion, heightened food insecurity, health hazards, and a decline in agro-ecological productivity, all stemming from elevated temperatures and shifts in precipitation patterns (World Bank (2021), EPA (2020), GoG (2018))

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

Devis (2012), opined that climate change has made millions of poor people risk their livelihood through tragic crop failures, reduction of agricultural productivity, increase of malnutrition and hunger, scarcity of water, and widespread infectious diseases.Based on the available data, there has been a sea level rise of 2.1 mm annually over the past three decades, projecting an increase of 5.8 cm, 16.5 cm, and 34.5 cm by the years 2020, 2050, and 2080, respectively **(Stark, & Terasawa, 2013)**

According to the Government of Ghana, **(GOG, 2011),** climate change has resulted in a rise in temperatures, a rise in sea levels, increases in rainfalls leading to unpredictable and extreme events, increases in greenhouse gas emissions, and loss of carbon sinks in Ghana.

Ghana is witnessing shifts in temperature, alterations in rainfall patterns, and a rise in the frequency and intensity of extreme weather events like floods, droughts, and storms. These impacts have significant implications for the country's economy, food security, and the livelihoods of its people.

To address the above-mentioned challenges, there is a need for the adoption of an integrated approach to agriculture and environmental management, increase in risk preparedness, promotion of sustainable energy production, modernization of transport systems, and building of resilient infrastructure systems. These interventions can only be taken care of by injecting financial resources. The World Bank estimated that the yearly cost to fund and maintain interventions like the ones mentioned above will be approximately $2 billion a year, **(World Bank Group, 2023).**

Climate change has become a global issue that requires collective resources and actions from all countries to address its impacts. While Ghana has shown a strong commitment to addressing these challenges through policy and action, the country has also conveyed to major donors, the need for additional financial assistance to address this issue. Ghana received $776.5 million from international donors from 2013 to 2017 to address climate change, **(Civic Response, 2020).** Ghana receives its primary climate change funding from three major sources: the European Union (EU), the African Development Bank (AFDB), and the United States Government.

These funds predominantly targeted mitigation activities that originate climate change and were distributed across 405 projects in the country. Around 30 percent of the funds during this period were in the form of loans, while additional financing from the Green Climate Fund supports four projects in Ghana's Northern region. Despite these contributions, these funding sources fall short of meeting all the climate change requirements in the country of Ghana.

Due to the prevailing economic situation in the country, Ghana is unlikely to have the capacity to increase public investment to finance the necessary interventions required to tackle the effects of climate change.

With the current economic recession in Ghana, it is prudent for the government to employ an innovative way to scale up climate finance to reduce climate change. This may need vibrant and innovative strategies to improve the portfolio of climate financing. This study, therefore, explored "**Enhancing Economic Growth through Climate Finance: Evidence from Ghana".** This would help to synthesize improved strategies to enhance climate finance to reduce climate change.

Objectives of the Study

i. To assess practices that can address climate Finance challenges in Ghana
ii. To evaluate the impact of climate finance factors on the economic growth of Ghana.
iii. To synthesize improved strategies to enhance climate finance for climate change mitigation

Developments of Climate Finance in Ghana

Climate finance refers to the financial resources and investments directed toward projects and initiatives that aim to address climate change mitigation and adaptation. It involves the mobilization, allocation, and provision of funds to support activities that reduce greenhouse gas emissions, promote renewable energy, build climate resilience, and foster sustainable development.

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

Climate finance can be sourced through various channels, including public funds, international commitments, private investments, grants, loans, carbon markets, philanthropic contributions, and innovative financial instruments. It plays a crucial role in supporting policy implementation, technology adoption, research and development, capacity building, and infrastructure projects related to climate change.

The funds provided through climate finance are used to support actions such as renewable energy projects, energy efficiency initiatives, sustainable agriculture practices, forest conservation, clean transportation systems, climate resilience strategies, and other activities aimed at reducing the impacts of climate change. The goal is to transition to a low-carbon and climate-resilient economy while ensuring sustainable development for all.

Various international mechanisms, agreements, and institutions, such as the Green Climate Fund (GCF) and the Climate Investment Funds (CIF), have been established to facilitate and coordinate climate finance at a global level. Additionally, many countries, public institutions, and private entities have developed their climate finance strategies and mechanisms to align their financial resources with climate goals.

Climate financing in Ghana has gained significant attention and support over the years. Here is a brief overview of the history of climate financing in the country:

In the early 2000s, Ghana began engaging in international climate negotiations, including the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. During this period, climate financing was primarily provided through Official Development Assistance (ODA) and other bilateral channels, with a focus on sustainable development and poverty reduction.

In 2011, Ghana launched its National Climate Change Policy (NCCP), which aimed to guide climate change interventions across various sectors. The policy recognized the need for financial resources to address climate change and highlighted the importance of climate financing mechanisms.

In 2015, Ghana became one of the first countries to access funding from the Green Climate Fund (GCF), a global fund dedicated to supporting climate action in developing countries. The GCF approved several projects in Ghana, including initiatives focused on renewable energy, climate-smart agriculture, and adaptation measures. In the same 2015, Ghana submitted its Intended Nationally Determined Contributions (INDC) under the Paris Agreement, outlining its climate change mitigation and adaptation commitments. The NDC highlighted the need for financial support from the international community to implement these commitments effectively.

Ghana was selected as one of the pilot countries for the Scaling-Up Renewable Energy Program (SREP) under the Climate Investment Funds (CIF). SREP provided concessional financing to support the development of renewable energy projects in Ghana, such as the BUI Hydroelectric Power Project.

Ghana has been actively working to enhance its readiness and capacity to access climate finance effectively. The country has participated in readiness programs and received support from organizations such as the GCF Readiness Program, which helps strengthen national institutions and frameworks for climate finance. Ghana has also been exploring avenues to mobilize private sector investments for climate projects. The government has encouraged public-private partnerships and created a favorable investment climate for renewable energy and climate-resilient initiatives.

Throughout this period, Ghana has made progress in accessing and utilizing climate finance to address climate change challenges. The country continues to work on strengthening its institutional frameworks, accessing international climate funds, and developing projects that prioritize climate resilience and sustainable development. Despite all these efforts, Ghana has not reached its intended purpose regarding climate change.

How Climate Change is Financed in Ghana

Climate change activities in Ghana are financed through a combination of sources, including domestic funds,

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

international support, private investments, and innovative financial mechanisms. Here are some key ways in which climate change is being financed in Ghana:

International Climate Finance: Ghana receives financial support from various international climate finance mechanisms and institutions. For example, the Green Climate Fund (GCF) has provided funding for projects in Ghana, including renewable energy, climate-smart agriculture, and climate resilience initiatives. The Climate Investment Funds (CIF) are also supporting Ghana's efforts to scale up renewable energy and promote sustainable forestry and climate-resilient development.

Bilateral and Multilateral Partnerships: Ghana collaborates with bilateral and multilateral partners to secure climate finance. Through partnerships with countries like Germany, the UK, and the Netherlands, funds are allocated for specific climate projects. Moreover, partnerships with international organizations such as the World Bank, United Nations Development Program (UNDP), and African Development Bank (AFDB) provide financial support for climate-related initiatives.

Domestic Resources: Ghana utilizes its domestic budgetary allocations and resources to fund climate change activities. This includes funding from the national treasury, revenue generated from environmental levies and taxes, and contributions from private entities and individuals. The government allocates funds for climate resilience projects, research and development, capacity building, and policy implementation.

Private Sector Investments: The private sector plays an important role in financing climate change initiatives in Ghana. Private entities invest in renewable energy projects, energy-efficient technologies, and climate-smart agriculture. Public-private partnerships are encouraged to attract investments in climate-friendly businesses and infrastructure development.

Innovative Financial Mechanisms: To mobilize additional climate finance, Ghana explores innovative financial mechanisms. This includes the use of climate bonds, green bonds, and other innovative financing instruments to attract investments for climate-related projects. These mechanisms help raise funds from both domestic and international sources by connecting investors interested in supporting sustainable and climate-resilient initiatives.

Efforts are also made to strengthen financial management systems, transparency, and accountability in climate finance to ensure the effective utilization of funds and track their impact. Ghana's climate finance strategies align with its National Climate Change Policy Framework and focus on addressing the country's specific climate change vulnerabilities and priorities.

The Challenges of Climate Finance in Ghana

Climate finance refers to the funding and investment needed to support projects and initiatives that aim to address climate change, reduce greenhouse gas emissions, and adapt to the impacts of global warming. While climate finance plays a crucial role in combating climate change, it also faces several significant challenges. Some of these challenges include:

Insufficient funding: One of the most significant challenges in climate finance is the lack of sufficient funding to meet the ambitious targets and goals set by the international community. Many developing countries, in particular, struggle to secure the necessary financial resources to implement climate actions effectively.

Uncertain and unstable funding streams: Climate finance often relies on a mix of public and private funding sources. However, the availability of these funds can be unpredictable and subject to changes in government policies, economic conditions, and global financial markets, making it challenging to plan and execute long-term climate projects.

High costs of climate projects: Many climate projects, such as renewable energy installations and climate resilience initiatives, require substantial upfront investments. The high costs associated with these projects can

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

deter potential investors and make it difficult to attract sufficient funding.

Limited access to finance: Developing countries, particularly the least developed ones, face difficulties in accessing climate finance due to limited financial infrastructure, weaker institutional capacity, and higher perceived risks for investors.

Capacity constraints: Implementing climate projects effectively requires technical expertise and local knowledge. In many cases, there may be a lack of skilled personnel and institutional capacity in the recipient country of Ghana to design and manage climate finance projects.

Political and policy barriers: Political instability and inconsistency in climate policies can create uncertainty for investors and hinder the flow of climate finance. Additionally, disagreements between donor and recipient country of Ghana on climate priorities and responsibilities can lead to delays in funding allocation and disbursement.

Complex financial instruments: Climate finance often involves the use of complex financial instruments, such as carbon credits and green bonds. Understanding and effectively using these instruments can be challenging for developing countries like Ghana and private-sector investors alike.

Mitigation vs. adaptation balance: Balancing investments between mitigation (reducing emissions) and adaptation (building resilience to climate impacts) is a challenge. While both are essential, the allocation of funds needs to be well-balanced to address both short-term and long-term climate challenges.

Addressing vulnerable populations: Climate finance must also ensure that vulnerable populations, such as those in low-income communities or remote areas, are not left behind and have access to the necessary resources to adapt to climate change. However, this is not the case in Ghana.

Accountability and transparency: Ensuring accountability and transparency in climate finance is crucial to maintaining trust among stakeholders. Tracking and verifying the use of funds and measuring the impact of climate projects had been complex, requiring robust monitoring and reporting mechanisms.

Addressing these challenges will require a collaborative effort from governments, international organizations, the private sector, and civil society to mobilize the necessary financial resources and implement effective climate finance mechanisms

LITERATURE REVIEW

Climate Finance

While there is no universally accepted definition of climate finance, it is commonly understood to encompass financial resources allocated toward both mitigation and adaptation measures **(Weikmans & Roberts, 2017).**

Climate finance refers to the financial resources, investments, and funding mechanisms aimed at supporting activities and projects that address climate change mitigation and adaptation. It involves mobilizing funds to facilitate the transition to a low-carbon and climate-resilient economy. The main goal of climate finance is to provide financial support to developing countries, which are disproportionately affected by climate change but often lack the resources to address its impacts effectively. These funds help these countries adopt sustainable practices, reduce greenhouse gas emissions, build resilience to climate change, and adapt to its adverse effects.

The International Panel on Climate Change (IPCC), along with scientists and practitioners, concurred that financial instruments can significantly contribute to climate change adaptation **(Linnerooth-Bayer & Hochrainer-Stigler, 2015).** The researchers emphasized that these tools play a crucial role in mobilizing finance and facilitating risk sharing and transfer, particularly in addressing the impacts of climate change, especially in vulnerable developing countries. Financial products designed for climate risk management can include green bonds, catastrophe bonds, insurance, and weather derivatives. The choice of the most appropriate product depends on the type of risk

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The Investments in global climate finance have seen a rise from $359 billion in 2012 to $530 billion in 2017, with a peak investment of $472 billion recorded in 2015. The study by **Buchner et al., (2017)** indicates that the majority of these investments were allocated to East Asia & Pacific, comprising 32% of the total, followed by Western Europe, which accounted for 26%. Sub-Saharan Africa (SSA) held a share of the investment at 3%. The study of **Woodward et al., (2014),** depicted that, although industrialized countries have been responsible for the majority of Greenhouse Gas (GHG) emissions, developing countries face heightened vulnerability to the consequences of climate change resulting from these emissions **(Woodward et al., 2014).** Surprisingly, **Althor, Watson, & Fuller, (2016),** opined that 11 out of the 17 countries with low or moderate GHG emissions are severely vulnerable to the negative impacts of climate change, while 20 out of the 36 highest emitting countries experience relatively less vulnerability. The researchers stressed that the majority of these vulnerable nations are situated in Africa and the islands found in the Atlantic, Pacific, and Indian oceans.

In the report of the **World Bank, (2010),** it was said that the amount of climate finance needed to achieve low-carbon and climate-resilient growth in developing countries is enormous. Approximately $70-$100 billion is estimated to be needed annually from 2010 to 2050 to meet the adaptation needs in developing countries (**World Bank, 2010).** At the same time, approximately $140-$175 billion is needed annually from 2010 to 2030 to meet the mitigation needs in developing countries

Nevertheless, the overall climate finance transferred from developed to developing countries varies between US$ 40 to US$ 175 billion annually, encompassing yearly contributions of up to US$ 50 billion through public institutions and up to US$ 125 billion from private finance **(Newell & Bulkley, 2017).**

The funds required to address adaptation and mitigation far exceed the currently mobilized finances. As a result, there is a pressing need to secure additional funding to meet the climate investment requirements.

Sources of Climate Finance

A significant portion of climate finance literature has been centered on assessing the required funding needs for endeavors related to mitigation, adaptation, and building resilience, as evidenced by the work of scholars such as **Flåm and Skjaerseth (2009), IPCC (2018), McKinsey & Company (2009), UNCTAD (2014)**

Climate finance is mobilized and channeled through a range of public and private intermediaries **(Hall & Lindsay, 2018).** Over the years spanning from 2012 to 2016, the private sector has been a consistent major contributor, accounting for more than 55% of climate financing. The highest contribution, reaching 73%, was recorded in 2012.

The sources of private climate finance encompass corporations, project developers, commercial financial institutions, institutional investors, households, and other providers. Among these, project developers stand out as the primary contributors to climate finance, particularly due to their involvement in the renewable energy sector, which has attracted a significant portion of funding **(Hall & Lindsay, 2018).** In the period from 2015 to 2016, around 93% of climate finance was allocated to mitigation activities, with renewable energy generation receiving the lion's share of that investment, accounting for 74% of the total **(Buchner et al., 2017).**

Climate finance can come from various sources, including Public Finance; Multilateral Climate Funds; Private Finance; Climate Bonds; International Climate Finance; Carbon Markets; Philanthropic Contributions; Public-Private Partnerships (PPPs); Climate Insurance; and International Aid and Development Assistance.

Public Finance: Governments allocate funds from their budgets to support climate-related projects and policies. This can include national climate funds, climate-related grants, and subsidies for renewable energy projects. According to **Waissbein et al. (2013),** governments should use scarce public funds to reduce and mitigate climate risks (e.g., loan guarantees) rather than paying for electricity tariffs. On the contrary, public sector climate finance primarily originates from donor governments and their agencies, multilateral climate funds, and Development Finance Institutions (DFI). Within the public sector, DFI play a significant role, channeling their financial resources through National, Bilateral, and Multilateral agencies, as well as climate funds. Notably, the multilateral DFI flows in 2016 reached 78% of their annual targets set to be achieved by 2020 **(Buchner et al., 2017).** Given this trajectory, it is projected that these intermediaries will successfully

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meet their finance mobilization target by the year 2030.

Multilateral Climate Funds: Multilateral development banks and climate funds, such as the Green Climate Fund (GCF), the Global Environment Facility (GEF), and the Adaptation Fund, provide financial support to developing countries for climate projects and programs. According to the Green Climate Fund's annual report, multilateral climate funds play a vital role in mobilizing resources for climate projects **(Green Climate Fund, 2021).** This was highlighted by **Smith et al. (2020),** the importance of multilateral climate funds in supporting climate resilience initiatives in vulnerable countries. **Johnson. (2018),** in his study, stated that multilateral climate funds, such as the Green Climate Fund and the Adaptation Fund, play a critical role in providing financial support to climate projects in developing countries.

Private Finance: Private sector investment plays a significant role in climate finance. Companies and investors may finance renewable energy projects, climate-resilient infrastructure, and other climate-related initiatives. The sources of private climate finance encompass corporations, project developers, commercial financial institutions, institutional investors, households, and other providers. Among these, project developers stand out as the primary contributors to climate finance, particularly due to their involvement in the renewable energy sector, which has attracted a significant portion of funding **(Hall & Lindsay, 2018).** In the period from 2015 to 2016, around 93% of climate finance was allocated to mitigation activities, with renewable energy generation receiving the lion's share of that investment, accounting for 74% of the total **(Buchner et al., 2017).**

Climate Bonds: Green bonds and climate bonds are financial instruments specifically designed to raise capital for climate and environmental projects. According to **Meng, Lau, and Boulle (2018),** climate bonds primarily finance climate change mitigation and adaptation. Bond instruments are believed to be useful for addressing access to finance and providing cheaper and longer-term finance for green projects **(Agarwal and Singh 2017; Ng and Tao 2016; Wang and Zhang 2017).**

As a result of this, the local government successfully raised funds for a renewable energy project through the issuance of climate bonds **(Green & Brown, 2019).** These bonds are issued by governments, municipalities, or corporations and are used to finance initiatives with positive environmental impacts. The **Climate Bonds Initiative (2021)** reported a significant increase in the issuance of climate bonds in the past year, and now Climate bonds have become a popular means of attracting private sector investment for climate-related initiatives**.**

International Climate Finance: Developed countries may provide financial assistance to developing nations to help them address climate change and adapt to its impacts. This financial support is often part of climate-related commitments made under international agreements like the Paris Agreement. International climate finance helps address the financial needs of countries in their efforts to tackle climate change and implement sustainable development projects **(Johnson, 2018).** According to a report by the International Institute for Sustainable Development **(IISD, 2021),** international climate finance plays a crucial role in supporting climate actions in developing countries. The Green Climate Fund (GCF) is a key mechanism for channeling international climate finance to projects in developing countries **(Green & Brown, 2019).** A comprehensive analysis of international climate finance flows and their impact on climate projects was conducted to ascertain the real effects **(Smith et al. (2020).**

Carbon Markets: Carbon markets allow the buying and selling of carbon credits or emissions allowances. Carbon markets provide a market-based approach to reducing greenhouse gas emissions and mobilizing climate finance **(Johnson, 2018).** Companies can buy carbon credits from projects that reduce greenhouse gas emissions, and these funds are then used to finance additional climate projects. According to a study by **Smith et al. (2020),** carbon markets have the potential to attract private sector investments for climate projects. The European Union Emissions Trading System (EU ETS) has been one of the largest and most significant carbon markets, facilitating emissions reductions across various industries **(Green & Brown, 2019).** The World Bank's report highlighted the role of carbon markets in incentivizing emissions reductions and mobilizing climate finance **(World Bank, 2021).**

Philanthropic Contributions: Foundations and philanthropic organizations may contribute funds to support climate initiatives and research on climate change. Private philanthropies also play a meaningful role in the

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

international effort to address global challenges, including climate change adaptation, mitigation, and pandemic preparedness. In particular, philanthropic action to address climate change has significantly increased in recent years, rising to an estimated $1.5 billion in 2021 **(OECD, 2022).** According to a report by the **Climate Philanthropy Action Tracker (2021),** philanthropic contributions have played a crucial role in supporting climate initiatives. The impact of these philanthropic contributions in funding climate-related projects and programs was analyzed by **Smith et al. (2020).**

Public-Private Partnerships (PPPs): Public-private partnerships involve collaboration between governments and private sector entities to fund and implement climate projects, sharing the risks and benefits. Public-private partnerships offer a collaborative approach to addressing climate challenges, leveraging resources from both the public and private sectors **(Johnson, 2018).** The partnership between the government and a consortium of private investors successfully financed a large-scale solar energy project **(Green & Brown, 2019).** According to a report by the **World Bank (2021),** public-private partnerships (PPPs) have been instrumental in mobilizing climate finance for infrastructure projects. **Smith et al. (2020)** examined the role of public-private partnerships in funding renewable energy initiatives and climate-resilient infrastructure

Climate Insurance: Climate risk insurance mechanisms provide financial protection against climate-related losses, allowing vulnerable communities and countries to recover from climate impacts. According to a report by the **World Bank (2021),** climate insurance mechanisms can play a critical role in providing financial protection against climate-related risks. The effectiveness of climate insurance in helping vulnerable communities to cope with climate impacts was emphasized in the study by **Smith et al. (2020).** Climate insurance offers a risk-transfer mechanism that can help individuals and communities manage climate-related uncertainties **(Johnson, 2018)** because of this the Climate Risk Insurance Initiative (CRII) has been successful in providing timely financial support to farmers affected by extreme weather events **(Green & Brown, 2019).**

International Aid and Development Assistance: Development assistance from donor countries or international organizations may include climate-related funding to help countries integrate climate considerations into their development projects. According to a report by the United Nations Development Program **(UNDP, 2021),** international aid and development assistance have been instrumental in supporting climate projects in developing countries. This report was confirmed by the study of **Johnson, (2018),** who revealed that international aid and development assistance contribute significant resources to help developing nations address climate change and its impacts. Financial support from the European Union (EU) has been critical in helping least-developed countries implement climate adaptation measures **(Green & Brown, 2019).** The study by **Smith (2020),** emphasized the overall impact of international aid and development assistance in financing climate resilience initiatives in vulnerable regions.

These sources of climate finance work together to mobilize financial resources and address the challenges posed by climate change on a global scale. The mix of financing mechanisms can vary based on the specific needs and priorities of different countries and projects.

Related Theories and Concepts

Sustainable Development: Sustainable development is a guiding principle in climate finance, emphasizing the integration of economic, social, and environmental considerations. The Green Climate Fund emphasizes the integration of sustainable development principles in its funding allocation process **(Green Climate Fund, 2020).** This was confirmed by **Smith, (2018),** who opined that sustainable development is a crucial guiding principle in climate finance. Climate finance initiatives should support projects and policies that not only mitigate climate change but also promote economic growth, poverty reduction, and social well-being. The importance of this theory to this study emanates from the fact that the various institutions would be guided by common principles to manage climate finance to address climate change.

Polluter Pays Principle: According to **Smith, (2019),** the application of the "Polluter Pays Principle" in climate finance requires a clear mechanism for attributing responsibility and determining financial contributions. The Polluter Pays Principle is a concept that holds those responsible for environmental degradation or greenhouse gas emissions accountable for the associated costs. In the context of climate finance, this principle implies that countries or entities historically responsible for higher emissions should

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contribute more to climate finance efforts. The **World Bank report (2022),** on climate finance emphasized that the Polluter Pays Principle serves as an essential guiding principle in efforts to mobilize funding for climate-related actions. This theory reminds those agencies responsible for various adverse climate changes that they are responsible for any associated costs.

Common But Differentiated Responsibilities (CBDR): CBDR is a principle enshrined in international climate agreements, such as the United Nations Framework Convention on Climate Change (UNFCCC). It recognizes that all countries have a shared responsibility to address climate change, but acknowledges that developed and developing countries have different capacities and historical contributions to the problem. The United Nations Framework Convention on Climate Change (UNFCCC) emphasizes the principle of "Common but Differentiated Responsibilities" (CBDR) as a basis for climate finance mechanisms **(UNFCCC, 2021)**. Also, the report by the Intergovernmental Panel on Climate Change **(IPCC, 2020)** emphasizes the importance of CBDR in the allocation of climate finance to address global climate challenges. Therefore, climate finance efforts should consider the specific needs and circumstances of each country. This theory is useful in explaining the need for every country to recognize its role in combating climate change for economic change.

Additionality: The concept of additionality is crucial in climate finance mechanisms like the Green Climate Fund (GCF). It refers to the condition that financial resources provided for climate projects should be "additional" to existing development funding, meaning that they are specifically allocated for climate-related actions beyond what would have happened otherwise. According to **Smith (2018),** the principle of additionality is essential in climate finance, ensuring that funds are allocated to projects that result in verifiable emissions reductions beyond business-as-usual scenarios. Smith in his study of climate finance in 2018, further stressed that the additionality concept plays a crucial role in understanding the impact of climate finance on environmental projects. This concept is important to this study as it educates the stakeholders to look elsewhere for additional funds to augment the existing one to fight climate change for economic growth.

Climate Justice: Climate justice is a framework that advocates for addressing climate change in a way that considers historical responsibility, equity, and the rights of vulnerable communities. In the context of climate finance, climate justice emphasizes the need to support projects that benefit and empower marginalized and disadvantaged populations. The principle of "Climate Justice" emphasizes the need to ensure that climate finance initiatives benefit and empower vulnerable communities **(Jones, 2020).** The report by the Climate Justice Organization **(CJO, 2021)** highlights the importance of incorporating Climate Justice principles into climate finance mechanisms to address the needs of marginalized populations.

Conceptual Framework

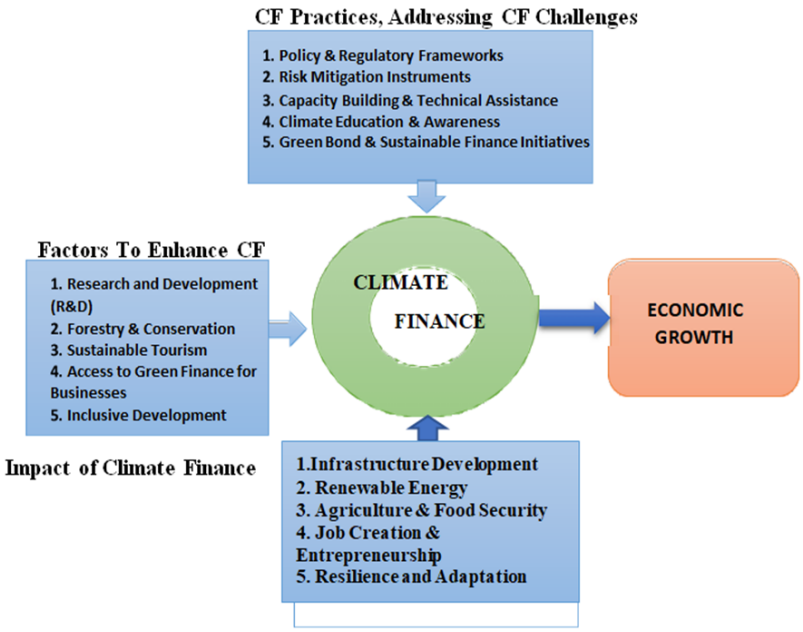

Figure 2.1: Conceptual Framework; Source: Isaac Adom Boachie

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Addressing Climate Finance Challenges

Overcoming climate finance challenges requires coordinated efforts from governments, financial institutions, private sector players, and international organizations. Some key practices that can be used to facilitate this transformation include:

Policy and Regulatory Frameworks: Establishing clear and supportive policies and regulations that encourage climate-friendly investments and incentivize private sector participation in climate- related projects.

Risk Mitigation Instruments: Developing and implementing risk mitigation instruments, such as insurance mechanisms or guarantees, to reduce the perceived risks associated with climate-related investments.

Capacity Building and Technical Assistance: Strengthening the capacity of institutions and individuals involved in climate finance, including financial institutions, to better understand and manage climate-related risks and opportunities.

Green Bonds and Sustainable Finance Initiatives: Promoting the issuance of green bonds and supporting sustainable finance initiatives to raise funds for climate projects and attract responsible investors.

National Climate Investment Plans: Developing comprehensive and prioritized climate investment plans at the national level to guide the allocation of funds and resources to climate- resilient and low-carbon projects.

Inclusive Finance: Ensuring that climate finance reaches vulnerable populations and developing mechanisms to support small-scale and community-based climate projects.

Climate Education and Awareness: Raising awareness and educating stakeholders about the importance of climate finance and its potential benefits for sustainable development.

By addressing these factors and implementing a combination of strategies, countries, and organizations can overcome climate financing challenges and unlock the potential of climate finance to support climate resilience, adaptation, and mitigation efforts.

How Climate Finance Enhance Economic Growth in Ghana?

Climate finance refers to the financial resources, investments, and support provided to address climate change and promote sustainable development. It can play a significant role in enhancing economic growth while also addressing environmental challenges. Numerous factors related to climate financing have the potential to bolster economic growth. While the researcher can identify a minimum of fourteen such factors, certain factors are not widely recognized by the public as substantial contributors to economic growth due to their less direct impact on the economy. Among these factors, five are chosen for closer examination and are elaborated upon below:

Research and Development (R&D): Climate finance can support R&D efforts to develop new technologies, processes, and products that reduce greenhouse gas emissions and environmental impacts. These innovations can lead to new industries and economic growth. Research and Development (R&D) has been noted as a significant climate finance factor that positively influences economic growth **(Smith, 2020; Johnson & Brown, 2019).**

Forestry and Conservation: Investments in forest conservation, reforestation, and sustainable land management not only help mitigate climate change but also provide economic benefits through ecosystem services, timber production, and ecotourism. According **Jones et al. (2022) and Martinez & Lee (2018),** forestry and conservation have been recognized as crucial climate finance factors that can foster economic growth of a country.

Sustainable Tourism: Climate finance can support sustainable tourism initiatives that protect natural resources and cultural heritage, leading to economic growth in tourist destinations. Sustainable Tourism has

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

been acknowledged as a climate finance factor with the potential to bolster economic growth **(Adams, 2021; Robinson & Smith, 2019).**

Access to Green Finance for Businesses: Providing businesses with access to green financing options encourages them to adopt sustainable practices, leading to cost savings, improved market positioning, and long-term growth. Access to Green Finance for Businesses is considered a significant climate finance factor that can contribute to enhancing economic growth **(Williams & Lee, 2022; Miller, 2019).**

Inclusive Development: Ensuring that climate finance reaches vulnerable and marginalized populations can promote social equity and reduce poverty, contributing to more inclusive economic growth. Inclusive Development is recognized as a climate finance factor that can enhance economic growth **(Garcia, 2023; Patel & Johnson, 2020).**

It's important to note that the successful implementation of climate finance strategies requires effective governance, transparent financial mechanisms, and coordination among various stakeholders. Additionally, considering the social, environmental, and economic aspects holistically is crucial for maximizing the positive impacts of climate finance on economic growth.

The impact of climate finance on economic growth in Ghana

The impact of climate finance on economic growth in Ghana can be analyzed from multiple perspectives. Climate finance refers to financial resources provided by various sources, including developed countries, multilateral institutions, and private entities, to support climate change mitigation and adaptation efforts. Here are a few potential ways in which climate finance can contribute to economic growth in Ghana:

Infrastructure Development: Climate finance can support the development of climate-resilient infrastructure, such as renewable energy projects, water management systems, and sustainable transport networks. These investments can enhance the country's infrastructure base, improve productivity, and create employment opportunities, leading to economic growth.

Renewable Energy Sector: Climate finance can enable the expansion of Ghana's renewable energy sector, including investments in solar, wind, hydro, and biomass projects. Developing renewable energy capacity can reduce dependence on fossil fuels, enhance energy security, and stimulate economic activities related to the construction, operation, and maintenance of renewable energy infrastructure. Several studies in the literature have explored numerous alternative technologies that could potentially serve as a viable replacement for fossil fuels as the primary energy source **(Hoffert et al., 1998, 2002; Pacala and Socolow, 2004).** Similarly, **Jennison (2014)** asserts that Renewable energy generation will become more attractive to businesses looking to increase their energy security

Agriculture and Food Security: Climate finance can be channeled into agricultural practices that enhance resilience to climate change, such as climate-smart farming techniques, improved irrigation systems, and crop diversification. These investments can increase agricultural productivity, improve food security, and contribute to rural development and poverty reduction. **Khan et al. (2009)** concur that the climate change agenda has subsumed agricultural production as both a contributor to climate change and, through adjustment in practices, a potential mitigating force

Job Creation and Entrepreneurship: Climate finance can support the growth of green industries and sustainable enterprises. Investments in sectors like renewable energy, eco-tourism, waste management, and sustainable forestry can create new employment opportunities, promote entrepreneurship, and foster innovation, thereby driving economic growth.

Resilience and Adaptation: Climate finance can help Ghana build resilience to climate change impacts, such as sea-level rise, extreme weather events, and changing rainfall patterns. Investments in climate adaptation measures, including infrastructure upgrades, early warning systems, and community-based resilience initiatives, can protect vulnerable populations, reduce economic losses, and safeguard livelihoods. **Adger et**

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

al., (2003), note that adaptation is the adjustment of a system to moderate the impacts of climate change, to take advantage of new opportunities, or to cope with the consequences. The Stern Review **(Stern, 2006)** relates adaptation to building resilience and recognizes that it will be a key response to reduce vulnerability to climate change.

It is important to note that the effectiveness of climate finance in driving economic growth depends on various factors, including the design and implementation of projects, governance mechanisms, capacity building, and coordination among stakeholders. Additionally, the mobilization and effective utilization of climate finance requires strong institutional frameworks, policies, and regulatory frameworks to ensure transparency, accountability, and efficient resource allocation.

To access specific studies or reports that examine the impact of climate finance on economic growth in Ghana, I recommend searching academic databases, research institutions, international organizations like the World Bank or United Nations, and government sources. These platforms often provide valuable insights and analysis on the topic

METHODS

Research Design: This research study was conducted using Case-Oriented Comparative Design: This design involves comparing and contrasting multiple cases or contexts to gain a deeper understanding of similarities, differences, and underlying patterns.

Population: This study's population comprised key stakeholders from both various governmental and non-governmental bodies, such as the Ministry of Environment Science and Innovation, Ministry of Lands and Forestry, Ministry of Agriculture, Environmental Protection Agency, Ministry of Finance, Private Enterprise Federation, Association of Ghana Industries, Ghana Chamber of Commerce and Industry, Atlas and Business Energy Systems, International Centre for Sustainable Development, Ghana Investment Promotion Centre, Development Planning Commission, Energy Commission, Forestry Commission, Minerals Commission. The above institutions were carefully chosen because of their significant contribution to climate change policy formulation, implementation, and monitoring.

Sample Size: In this study, one hundred and five (105) respondents were selected and responded to the questionnaire. They were selected from the governmental and non-governmental bodies mentioned in the above paragraph, using purposive sampling.

Sampling Techniques: The study used the non-probability sampling technique to choose the sample. Under this technique, purposive sampling was employed. According to **Maxwell (2007),** purposive sampling involves deliberately choosing specific settings, individuals, or events to obtain vital information that cannot be obtained as effectively from other alternatives. Key respondents for this study were selected using purposive sampling to gather crucial insights into the existing study on enhancing economic growth through climate finance in Ghana. The selection of respondents was based on their expertise and involvement in climate change activities/programs in the country

Data Collection: The study used both primary and secondary data. Primary data was collected through the use of questionnaire administration, using a structured questionnaire. Secondary Data were collected from reports, published and unpublished articles, publications, peer-reviewed journals, newspapers, and periodicals on climate finance, climate change, and economic growth.

Data Analysis: The study used both Descriptive and Inferential statistics.

i. Descriptive Statistics: It was employed to describe the general state of the factors that can address climate finance challenges to enhance climate finance. A Cronbach's Alpha test was conducted to test the internal consistency of the multi-item scales employed in this study.
ii. Inferential Statistics: Inferential statistics in the form of Regression Analysis was employed to establish the effect of climate finance factors on economic growth. The regression equation used was in the

form: $\mathbf{y = a + \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \beta x_5 + u}$, where **y** = Economic Growth; **a** = intercept parameter; **β** = regression coefficients; $\mathbf{x_1}$ to $\mathbf{x_5}$ = climate finance factors (Research & Development, Forestry and Conservation, Sustainable Tourism, Green Finance Accessibility**,** and Inclusive Development); and u = stochastic error term.

RESULTS AND DISCUSSION

The study discusses the research results in line with the three main objectives: 1) To assess factors that can be used to address climate Finance challenges to enhance climate finance in Ghana; 2) To evaluate the impact of climate finance factors on economic growth in Ghana; 3) To synthesize improved strategies to improve climate finance in Ghana.

Factors That Can Address Climate Finance Challenges in Ghana

This study aims to investigate the factors that can address climate finance challenges to enhance opportunities for bolstering climate finance and enhance economic growth in Ghana. The research is based on the insights and experiences of stakeholders from governmental and non-governmental organizations. To gather relevant data, a survey was conducted to gather respondents' perceptions of various factors believed to have contributed to the conversion of climate finance challenges into successful climate finance initiatives in Ghana

In this study, a descriptive statistics model was applied to analyze five metric variables. These five key variables are endogenous, meaning they are under the government's control. To gauge respondents' perceptions, a 10-point interval ratio scale ranging from 0 to 10 was utilized.

Table 9.1 below presents the summary of the descriptive statistics meant to give general descriptions of the key variables. Consequently, the mean, median, maximum, minimum, and standard deviation values of each variable were discussed here to demonstrate the nature and the trend of the data used for detailed analysis. This was supported by Cronbach Alpha.

Descriptive Statistics

Based on the data presented in Table 4.1 below, it is evident that the participants gave relatively high ratings to several factors.

Table 4.1: Descriptive Statistics

Variables	N	Mean	Std. Deviation	Min.	Max.
Policy & Regulatory Framework	105	4.2270	0.76905	2.89	5.22
Risk Mitigation Instruments	105	3.7630	0.96536	1.99	5.11
Capacity Building & Tech. Assistance	105	4.6080	0.69129	3.47	5.42
Climate Education & Awareness	105	4.6430	0.59253	3.74	5.49
Green Bond & Sustainable Finance Initiative	105	4.2150	0.81250	2.85	5.61
Cronbach’s Alpha		0.984			

The mean score of each of the factors is Climate Education and awareness - 4.64, Capacity Building & Technical Assistance - 4.61, Policy & Regulatory Framework - 4.23, and Green Bond & Sustainable Finance Initiatives - 4.22. Conversely, the other variable, which received relatively low scores, is Risk Mitigation Instruments - 3.76. As per the findings of this study, the identified endogenous factors play a crucial role in addressing climate finance challenges and facilitating the enhancement of climate finance in Ghana to combat climate change effectively. All variables have average means of **4.29**, suggesting that respondents **generally agree** that all the listed factors are important in addressing climate finance challenges in Ghana.

The Cronbach's Alpha for the factors is 0.984, which is **very high**, indicating **excellent internal consistency**

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

among the survey items. This suggests that the variables measured are highly reliable and coherent as a group.

Consequently, it can be concluded that these endogenous factors listed above are key determinants in addressing climate finance challenges to enhance climate finance resilient opportunities.

The Impact of Climate Finance Factors on the Economic Growth of Ghana

The second specific objective of the study is to evaluate the impact of climate finance on the economic growth of Ghana. The research sought to examine the effects of climate finance on the economic growth of Ghana. The regression analysis was used to determine the effects of climate finance on economic growth. Table 4.2 below presents the results:

Regression Model Summary

According to Table 4.2 below, the coefficient of determination (R^2) is 0.779. This indicates that the predictor variables (Research & Development, Forestry and Conservation, Sustainable Tourism, Green Finance Accessibility, and Inclusive Development) used in the study can be relied on to explain 77.9% of the variability of the economic growth. Thus, based on the findings, it is clear that holding other factors constant, Research & Development; Forestry and Conservation; Sustainable Tourism; Green Finance Accessibility; and Inclusive Development contribute to a 77.9% increase in the Economic Growth. From the table 4.2, the adjusted R square is 0.770 which measures the reliability of the results. This signifies that the study results are 77% reliable and therefore the model results are significant and reliable in explaining the influence of the independent variables on the dependent variable.

In the case correlation coefficient, the R-value of 0.883 shown in Table 4.2 below suggests strong positive correlation between predictor variables and Economic Growth. This indicates that as one variable increases, the other tends to increase proportionally, and vice versa

F-Statistics

From Table 4.2 below, the F-value is 83.872 with a distribution of F(5,119) and F(Critical) equal 2.29. Also, the probability of observing a value greater than or equal to 83.872 is less than 0.05 as indicated by the significance value of 0.000 testing at a 5% level of significance. Since the F-statistics of 83.872 is greater than the critical value of 2.29, it is strong evidence that the regression model developed is statistically significant.

Table 4.2: Regression Results

Variables	**Coefficients**	**Std. Error**	**t-test**	**Sig.**
(Constant)	2.501	0.531	4.713	0.009
Research & Development	0.614	0.100	6.161	0.004
Forestry and Conservation	0.114	0.087	1.991	0.026
Sustainable Tourism	0.335	0.128	2.622	0.049
Green Finance Accessibility	0.432	0.092	4.722	0.009
Inclusive Development	0.072	0.160	0.450	0.167
F-Statistics	83.872			0.000
F (Critical Value)	2.29			
T (Critical Value)	± 1.980			
R	0.883			
R^2	0.779			
Adjusted R^2	0.770			

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From the findings in Table 4.2 above, the model elucidates that the factors, including research & development, forestry and conservation, sustainable tourism, and green finance accessibility variables, have a direct impact on Ghana's economic growth, as all the factors are associated with positive coefficients. The detailed findings of each independent variable of the study are discussed below:

Research & Development

The regression analysis results reveal a direct relationship between research & development and economic growth. This indicates a positive and statistically significant effect of **research & development** on the growth of Ghana's economy (p-value = 0.004). Specifically, an increase in **research & development** leads to a 0.614 unit increase in economic growth in Ghana, while a decrease in **research & development** results in a 0.614 unit decrease in economic growth. Also, the regression model demonstrates that **research & development** is statistically significant with economic growth at p-value = 0.004.

Furthermore, the t-value = 6.161 falls within the critical region of ±1.980 with a df of 9 and a p-value of 0.004, which is less than a 0.05 significant level, signifying that **research & development** influences the economic growth of Ghana during the test period. This finding is consistent with the study of Smith (2020) and Johnson & Brown (2019). The study by Smith (2020) and Johnson & Brown (2019) noted research & development as a significant climate finance factor that positively influences economic growth.

Forestry and Conservation

Furthermore, as indicated by the model, **forestry and conservation** exert a positive and noteworthy influence on Ghana's economic growth, with a p-value of 0.026, which falls below the significance threshold of 0.05. Drawing from the beta coefficient, a one-unit rise in financing **forestry and conservation** corresponds to a 0.114-unit increase in the level of economic growth in Ghana, and conversely. This relationship is attributed to its dual role of mitigating climate finance challenges while concurrently generating economic advantages via ecosystem services, timber yield, and ecotourism. This finding is consistent with the study of Jones et al. (2022) and Martinez & Lee (2018) who found forestry and conservation as crucial climate finance factors that can foster economic growth.

Sustainable Tourism

Sustained Tourism as a factor of climate finance has a direct and significant impact on economic growth, with a p-value of 0.049 which is less than 5% significant level. When the **sustainable tourism** level increases by one unit, it would impact a rise in economic growth by 0.335 units and vice versa, therefore it is a determining factor.

Green Finance Accessibility

Regarding the aspect of **green finance accessibility** for individuals, businesses, and general public the study's outcomes establish that it holds a favorable and substantial impact on Ghana's economic growth, signified by a p-value of 0.009, which falls below the critical 0.05 threshold. This implies that a single-unit elevation in **green finance accessibility** for individuals, businesses, and general public in Ghana would correspond to a 0.432-unit increase in the country's economic growth, and the inverse holds true. This observation aligns with the conclusions drawn by **Williams & Lee (2022) and Miller (2019),** whose research concurred that a rise in access to green finance for businesses stands as a significant climate finance factor capable of enhancing economic growth in Ghana

Inclusive Development

Furthermore, the regression model presented above reveals that **inclusive development** has a positive impact on economic growth in Ghana, but it is statistically insignificant, as indicated by the p-value of 0.167. This implies that there exists a favorable correlation between **inclusive development** and economic growth, suggesting that an increase in **inclusive development** by a certain factor results in a corresponding rise of

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0.072 units in economic growth, and vice versa.

Nevertheless, the lack of significance is underscored by the fact that the p-value of 0.167 surpasses the stablished significance threshold of 0.05, thereby rendering inclusive development insufficient in explicating the variations in economic growth in Ghana.

This finding is not consistent with **Garcia, (2023); and Patel & Johnson, (2020),** whose research recognized Inclusive Development as a climate finance factor that can enhance economic growth significantly.

Based on the model, even in the absence of climate finance factors analyzed above, the economy would still experience an average growth of 2.501 units.

The implication is that the factors including research & development, forestry and conservation, sustainable tourism, green finance accessibility, and inclusive development need considerable attention and focus, if Ghana has a desire to enhance the country's economic growth.

This finding is consistent with the study of **Smith et al. (2018); World Bank, (2021), Johnson (2019); Brown and Colleagues (2022);** and **(García-Sánchez et al., 2020).**

The study by Smith et al. (2018) found evidence supporting the positive impact of climate finance on economic growth in developing countries. The **World Bank's report (2021)** indicates that increased investments in climate finance are linked to improved economic resilience and sustainable development. Additionally, **Johnson (2019)** emphasizes the crucial role of climate finance in promoting green technologies and fostering economic innovation. Furthermore, the study by **Brown et al. (2022)** highlights how climate finance initiatives have led to job creation and stimulated economic growth across multiple sectors.

The Synthesis of Improved Strategies to Improve Climate Finance in Ghana

By comparing and reviewing various case studies, articles, and other publications on climate finance, the researcher was able to gather and synthesize six (6) improved strategic pillars to complement the existing strategies Ghana is using to enhance climate finance. These strategic pillars are in the form of acronyms called **SEIMEF. S** stands for 'Strengthen Policy and Regulatory Frameworks", **E** for "Enhance Institutional Capacity"; **I** for "Improve Access to Climate Finance"; **M** for "Mainstream Climate Considerations"; **E** for "Engage International Partnership**";** and **F** for "Foster Public-Private Partnership**.**

Strengthen Policy and Regulatory Frameworks: Develop and enforce policies, laws, and regulations that promote climate finance and create an enabling environment for investment in climate-friendly projects. This includes setting clear targets, establishing carbon pricing mechanisms, and providing incentives for private sector engagement.

According to **Bhandari, Gallagher, & Zhang, (2019),** the most effective climate finance policies are characterized by their ability to maintain stability and predictability; offer clarity, transparency, and comprehensibility to stakeholders, exhibit consistency and alignment with other pertinent climate and financial policies, remain safeguarded against undue political influence, and display adaptability and dynamism, enabling them to exert influence on the market when necessary and phase out appropriately to encourage private finance while optimizing public resources.

The foundation for developing Ghana's climate change policy lies in its Constitution, which grants powers to the government and the Ghanaian population. Article 36 (9) of Chapter Six in the constitution emphasizes the state's responsibility to protect and preserve the national environment and cooperate with other states for the broader international environment's safeguarding.

In line with internalizing international agreements, Ghana has implemented various national legislations, including the Control and Prevention of Bushfires Act (1990), the Energy Efficiency Acts, the Environmental Protection Agency Act (1994), Forest Plantation Development Fund Act (2000), Management of Ozone

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Depleting Substances and Products Regulations (2005), Minerals and Mining Act (2006), Pesticides Control and Management Act (1996), Renewable Energy Act (2011), Revised Forest and Wildlife Policy (2012), Science, Technology, and Innovation Policy (2010), Industrial Policy (2011), and Timber Resource Management Act (1998). These legislative and policy frameworks showcase Ghana's commitment to allocating financial resources to combat climate change.

However, the question remains: Are these policies and regulatory frameworks effectively achieving their intended outcomes? To address this question, the Ghanaian government must reinforce and strengthen these policies and regulatory frameworks to optimize climate financing.

Enhance Institutional Capacity: Strengthen the capacity of government agencies, financial institutions, and other stakeholders involved in climate finance. This includes providing training, technical assistance, and knowledge-sharing platforms to enhance their understanding of climate finance instruments, project appraisal, risk management, and monitoring. Ghana has made efforts to address its national capacity gaps; however, it still encounters challenges related to institutional capacity, strengths, and interactions. The country requires skilled climate scientists to provide valuable insights for development planning, and capacity-building at the district level is essential for the successful implementation of local initiatives. Effective international engagement necessitates negotiation skills and resource mobilization, while simultaneously enhancing national capacity to efficiently utilize such resources. Although, the Government and civil society have extended their support for capacity-building on climate change, focusing on parliamentarians and the media, much of the previous work has been targeted at individuals already involved in climate-related sectors. As government agencies meet the required skills, knowledge, and necessary qualifications on climate finance, they can recognize the importance of supporting climate finance initiatives to combat climate change.

Improve Access to Climate Finance: Facilitate access to climate finance for diverse actors, including small and medium-sized enterprises (SMEs), local communities, and vulnerable groups. Simplify application procedures, develop tailored financial products, and establish dedicated funds that target these entities, ensuring inclusivity and equitable distribution of resources.

According to available reports, climate finance has not reached the local level as expected. Additionally, there remains a lack of understanding regarding the varying impacts of climate change on different vulnerable groups and their available adaptation options. Furthermore, climate information and capacity development, including education and early warning systems, are insufficient in adequately reaching vulnerable groups and enhancing their ability to cope and adapt their livelihoods (**Jaka, H. and E. Shava, 2018**). Gender and other social and cultural factors' role in vulnerability analysis are poorly understood, impeding a comprehensive understanding of the differentiated impacts of climate change and the interaction of adaptive strategies, particularly for women (EPA and MESTI, 2021). Moreover, there is limited comprehension of the mediating factors, such as lack of access to assets and social networks, which hinder locally driven or autonomous adaptation and limit potential benefits from planned adaptation actions.

Fostering easy access to climate finance at the grassroots level by the Ghana government could serve as a robust strategy to improve climate financing.

Mainstream Climate Considerations: Integrate climate considerations into national and sectoral development planning processes, including budgeting, to ensure that climate finance is mainstreamed across various sectors. This involves conducting climate risk assessments, aligning sectoral policies with climate goals, and incorporating climate change considerations into investment decision-making. In Ghana, tracking climate finance poses challenges for three main reasons. Firstly, multiple organizations in the country receive climate funding from various sources, and these funds often bypass centralized entities like the Ministry of Finance. Moreover, many NGOs and civil society organizations receiving funding do not disclose this information to public agencies. Secondly, the coordination between the government, donors, and other civil society groups is generally lacking, leading to duplicated climate change interventions. Lastly, monitoring and reporting non-monetary support adds to the complexity.

However, the Government of Ghana (2021) and evidence from public documents on climate finance in the last

ISSN No. 2454-6194 | DOI: 10.51584/IJRIAS |Volume X Issue V May 2025

decade indicate that financing in Ghana has been increasing. Nevertheless, it remains unevenly distributed across different climate change actions (**MESTI, 2013, 2015**).

When this strategy is implemented, government will be able to track all climate finance across sectors, entities, NGOs, and other non-governmental bodies for better investment decision-making.

Engage International Partnerships: Collaborate with international partners, development agencies, and climate funds to access additional sources of climate finance. Engaging in partnerships can provide technical support, financial resources, and knowledge sharing to enhance Ghana's climate finance efforts. In recent times, multilateral development banks (MDBs) have raised their commitments to climate finance. However, there is a general agreement that their investment portfolios, criteria, and priorities should be more closely aligned with overarching climate finance objectives. Strengthening international partnerships can enable Ghana to leverage multilateral institutions and international development banks like the World Bank, International Finance Corporation, and Africa Development Bank, among others, with a renewed focus on prioritizing cost-effective climate finance solutions for the country

Foster Public-Private Partnerships: Encourage collaboration between the public and private sectors to leverage private capital and expertise for climate projects. This can be achieved through mechanisms such as public-private partnerships (PPPs), blended finance models, and risk-sharing arrangements that attract private investment while aligning with national climate goals. Ghana possesses a credible Public Financial Management system and valuable experience in effectively blending donor support with national resources to address its priorities, making it well-suited to optimize climate finance. To achieve this, Ghana will tap into a mix of public and private, international and domestic sources, ensuring a coordinated approach that aligns with existing practices in national planning and public financial management, in accordance with the principles of Ghana's Aid Policy for Development. The government plays a pivotal role in mobilizing and allocating funding, as well as monitoring progress to ensure proper accounting and efficient utilization of resources. There are promising opportunities within the private sector, and the government is exploring ways to strengthen private sector involvement in climate change responses.

To cater to various themes, such as renewable energy or gender issues, the government contemplates establishing a national financing mechanism or facility that avoids excessive fragmentation of funds and procedures. Central to this effort is enhancing the capacity of various stakeholders to secure and utilize funding effectively – their absorptive capacity

SUMMARY OF FINDINGS

The first objective of the study is to assess factors that can address climate Finance challenges in Ghana.

Based on the overall descriptive statistics in Table 4.1 above, the combined average mean score of Policy & Regulatory Framework, Risk Mitigation Instruments, Capacity Building & Technical Assistance, Climate Education & Awareness, and Green Bonds & Sustainable Finance Initiatives stood at 4.29, which demonstrate that all the listed factors are important in addressing climate finance challenges in Ghana.

The second objective of the study is to evaluate the impact of climate finance on the economic growth of Ghana.

From the result of the regression analysis in Table 4.4 above, the findings were that, ***Research & Development, Forestry and Conservation, Sustainable Tourism, and Green Finance Accessibility*** variables have direct and significant influence on economic growth, as all the factors are associated with positive coefficients of 0.614, 0.114, 0.335, and 0.432, respectively, and their p-values are less than 0.05 significant level. Therefore, they are determining factors of the economic growth of Ghana.

The third objective of the study is to synthesize improved strategies to enhance climate finance for climate change mitigation.

Based on the rationalization, the synergetic combination of **SEIMEF** ***(Strengthen Policy and Regulatory***

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Frameworks; Enhance Institutional Capacity; Improve Access to Climate Finance; Mainstream Climate Considerations; Engage International Partnership; and Foster Public-Private Partnership) proposed by the researcher to enhance climate financing would have a strong, positive, and significant influence to improve climate finance for climate change mitigation.

CONCLUSION

In relation to the first objective of the study and in consideration of its summary of findings, the study concludes that:

The key factors, including ***Policy & Regulatory Framework; Risk Mitigation Instruments; Capacity Building & Technical Assistance; Climate Education & Awareness; Inclusive Finance; National Climate Investment Plans; and Green Bonds & Sustainable Finance Initiatives***, are pivotal factors that play a crucial role in addressing climate finance challenges and facilitating the enhancement of climate finance in Ghana for economic growth.

Flowing from the summary of findings of specific objective two, the study concludes that:

Research & Development (R&D), Forestry & Conservation, Sustainable Tourism, and Access to Green Finance for Business are key factors having a direct and significant impact on Ghana's Economic Growth.

Relating to the summary of findings of the third specific objective, the study concludes that:

The **SEIMEF** strategic pillars ***(Strengthen Policy and Regulatory Frameworks; Enhance Institutional Capacity; Improve Access to Climate Finance; Mainstream Climate Considerations; Engage International Partnership; and Foster Public-Private Partnership)*** brought on board through rationalization of the researcher to complement the existing strategies Ghana is using would have strong, positive, and significant influence to improve the **Climate Finance Portfolio in Ghana** to improve economic growth.

RECOMMENDATIONS

a. The government should promote financial inclusion by creating opportunities for a wide range of individuals and businesses to access climate finance, allocating resources for training and capacity-building programs to enhance the knowledge and skills of relevant stakeholders, and implementing public awareness campaigns and educational programs to inform citizens and businesses about the importance of climate change mitigation and the available finance options.

b. Policymakers should focus on developing and implementing robust policies and regulations that support climate finance initiatives. This may include creating incentives for clean energy projects and environmentally sustainable practices. And also encourages the development and utilization of risk mitigation instruments, such as insurance mechanisms, to attract investment in climate-resilient projects and reduce the perceived risks for investors.

c. Government should allocate resources and incentives to encourage private and public investments in research & development activities and support research institutions and universities to collaborate with businesses to drive innovation and technological advancement. Holding research & development as a primary driver of technological progress would:

- Strengthen forest preservation and conservation policies to combat deforestation and promote sustainable land use practices,
- Develop and enforce sustainable tourism policies and guidelines to protect natural resources and cultural heritage,
- Create a conducive environment for businesses to access green finance through incentives,

subsidies, and reduced interest rates for sustainable projects,

- Prioritize policies that reduce income inequality and ensure equitable access to resources and opportunities for all segments of society,
- Encourage partnerships between the government, private sector, and civil society to leverage resources and expertise in promoting sustainable economic growth.

d. All the above recommendations can effectively and efficiently become successful if the government implements SEIMEF strategic pillars to improve the above factors analyzed and climate finance portfolio.

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