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Assessment Of Climate Finance Flows for Developed to Developing Countries

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Abstract:

Climate finance is one of those key tools that countries use to help places that are still developing deal with cutting down greenhouse gases and getting ready for the bad effects of climate change. I mean, there's this big promise from richer countries to get 100 billion dollars every year going, but it just doesn't seem like enough, or maybe not reliable, and people keep talking about how transparent it really is, or if its adding new money that wouldn't have been there otherwise. All that makes you wonder if the whole setup for this funding actually works well or if its trustworthy.

In this paper, I'm looking closely at some of the big problems built into how climate finance runs right now, like how they measure the funds differently across the board, or the way reporting hides stuff sometimes, and what additionality even means when its so fuzzy. Plus, there's all these inefficiencies in how the money moves through different channels. It also checks if the money going out is really hitting the spots that need it most, you know, those vulnerable areas in developing countries or the least developed ones. And then there's this part about how ready a country is nationally, or the middleman groups that help get the finance, but they often don't have the capacity to make it work smoothly, which holds back using the funds properly.

Keywords: Climate Finance, Developing Countries, Adaptation Finance, Readiness, Systemic Reforms, Sustainable Development.

1. INTRODUCTION

Developing countries get hit harder by climate change because they do not have much capacity to adapt, plus they face all these hazards and have money and setup problems that just stick around. Climate finance came about as this big part of how the world handles climate stuff, trying to get money flowing to help with cutting emissions and adapting in places that need it most. Things like the UNFCCC and Paris Agreement push this idea of common but different responsibilities, so richer countries are supposed to lead by giving financial help to the ones that are developing. It seems like even with pledges getting bigger and these special funds set up, like multilateral ones or development mechanisms, there are still a lot of worries about how well it all works, if its transparent, and if the money goes where its fair. Developing places keep running into walls when trying to get the funding they need on time and in a reliable way, stuff like complicated approvals, tough rules to qualify, and not being ready at home. That slows down projects and messes with planning for the long haul, building resilience I mean.

2. REVIEW OF LITERATURE

- **Valerio Micale, Bella Tonkonogy, Federico Mazza (2018):** This CPI Report addresses the urgent need to increase investment in climate adaptation in developing countries. It details barriers like context, business model, and internal capacity constraining scalable investment. Current investment (140–300 billion by 2030). Solutions proposed focus on increasing demand, supporting suppliers, and using mechanisms to de-risk adaptation funding.
- **Jale Samuwai and Jeremy Maxwell Hills (2018):** This study uses a 3-dimensional framework (Policies & Institutions, Knowledge Management & Learning, Fiscal Policy Environment) to appraise climate finance readiness. It identified a massive readiness gap between Asian countries and Pacific Small Island Developing States (PSIDS). Readiness showed a small positive impact on the magnitude of accessed climate finance, suggesting access is determined by other factors. The authors propose PSIDS should shift readiness efforts to bilateral support and remittances, which flow regardless of readiness status.
- **Mohamed Ibrahim Nor and Abdinur Ali Mohamed (2024):** This study uses econometric modeling (ARIMA models) to analyze the adequacy and predictability of climate finance in LDCs. It reveals a massive funding gap: LDCs require $93.7 billion annually but average only $14.8 billion since 2015. The funding suffers from unpredictability due to volatility influenced by economic and political factors, hindering long-term planning. It urges systemic reforms toward robust, fair, and needs-based approaches to climate financing for these vulnerable nations.
- **María José Valverde, Luis H. Zamarioli (2024):** This paper analyses criteria for broadening the UNFCCC's Annex II climate finance provider base, arguing the 1992 list is outdated due to shifting emissions and economies. Analysis identifies Eastern European countries, Russia, South Korea, and Gulf States as potential candidates based on responsibility, capability, affiliation, and willingness. The authors recommend establishing "net recipients" as a third category to increase the total pool of resources and move beyond the rigid provider/recipient dichotomy.
- **Neil Bird and Jessica Brown (c. 2010):** This paper proposes a framework of principles for European public climate finance delivery across mobilization, administration, and disbursement phases. Mobilization principles include the polluter pays, respective capability, additionality, adequacy, and predictability. The EU's contribution was estimated between €3 to €15 billion by 2020, derived from combining GHG emissions and GDP criteria. The review suggests European initiatives lack coherence and advocates for adopting clear, assessable principles, similar to the Paris Declaration on Aid Effectiveness.
- **Shristi Tandukar, Tek Maraseni, Tapan Sarker (2025):** This systematic review analyzes 311 articles (2005–2023) on climate finance, finding exponential growth in publications since the Paris Agreement in 2015. Quantitative and econometric methods dominate research methodology in this field. The findings indicate that climate finance is significantly constrained in vulnerable regions including SIDS, deserts, and low-lying coastal areas. The authors emphasize the necessity for innovative funding strategies focused on renewable energy, energy efficiency, and infrastructure to aid vulnerable communities.
- **Willem te Velde (2010):** This paper explores the overlaps between Official Development Assistance (ODA) and climate finance, focusing on the highly debated concept of additionality.

It distinguishes between additionality in terms of instruments (donors) and resources (recipients). Analysis shows that diverting ODA to adaptation needs would shift resources away from Africa and sectors like education/health, toward Asia/Latin America and the water sector. The central conclusion is that achieving explicit additionality is crucial to prevent climate finance activities from undermining traditional development goals.

- **Francois Bourguignon (2025):** This policy note critically analyzes the fundamental flaws in climate finance management, particularly noting the ambiguous merging of mitigation and adaptation goals. The reported $100 billion goal is likely overestimated because substantial portions consist of non-concessional loans counted at face value and ODA projects misclassified as climate finance. The author advocates for radical reform, including establishing separate targets for mitigation and adaptation, and strictly valuing loans based on their grant equivalent. This aims to improve efficiency, accuracy, and the additionality of climate finance relative to ODA.
- **Tek Jung Mahat, Luděk Bláha, Batu Uprety, Michal Bittner (2019):** This review examines climate finance status and priorities in Nepal, one of the world's most vulnerable countries. Nepal has established strong policy frameworks (like the NAP and CCBC) and attracted short-term adaptation funding, largely supported by EU partners. However, long-term sustainability requires diversifying the funding base beyond traditional ODA due to insufficient international support and a small share of UNFCCC funding flows. The suggested pathway is a public-private partnership-driven green economy focused on exploiting Nepal's vast renewable energy potential and climate-smart infrastructure.
- **Subhi Shama (2017):** This presentation sets the context of the global challenge, requiring approximately $5.7 trillion annually by 2020 for green infrastructure investments. It systematically details various climate finance instruments for green banking, categorized as capital/debt/equity facilitation and risk-sharing. These instruments include seed capital, grants, concessional/non-concessional lending, securitization (green bonds), microfinance, equity, guarantees, and insurance. Case studies provide examples, such as the IFC issuing a green Masala bond to attract international investment for climate change projects in India.
- **Arjun Dutt, Gagan Sidhu, Dishant Rathee, and Charmi Mehta (2024):** This brief focuses on developing country perspectives regarding the NCQG target, following the alleged failure of the $100 billion target. Developed nations are noted for having disproportionately occupied the carbon space (57% of cumulative emissions 1850-2019). The recommendations stress defining climate finance strictly as disbursals of new, additional public grant capital/grant-equivalent components, along with catalyzed private capital. It highlights that external financing needed for developing countries (excluding China) is about USD 1 trillion per year by 2030, a figure suggested as the credible basis for the NCQG.
- **Roy Kouwenberg and Chenglong Zheng (2023**): This bibliometric review analyzes 1347 climate finance journal articles (1991–2021), confirming exponential growth in publications since 2015's Paris Agreement. The field is confirmed as highly multidisciplinary, involving environmental science, energy, economics, and finance journals. Key research themes include financing renewable energy, climate change risks' impact on the financial sector, investor preferences for green investments, and pricing/hedging climate risk. The thematic focus shifted post-2015 from "carbon finance" to "green finance" and "green bonds".

- **Abrar Chaudhury (2020):** This study investigates the Accredited Entities (AEs) within the Green Climate Fund (GCF) as intermediaries shaping climate finance delivery. It found a significant dominance of international AEs, which received 94% of committed funding, contradicting the GCF's core objective of country ownership. The imbalance also widens the capacity gap among national AEs and skews funding toward mitigation projects. The author proposes moving towards a network learning model to mandate collaboration and empower national AEs, thereby building local capacity and ownership.

STATEMENT OF THE PROBLEM

Although certain commitments have been made globally, developing countries continue to lack adequate and translucent funding for climate change. The lack of clarity with regard to measurement, reporting, and additionality with regard to development assistance makes it necessary to systematically evaluate the existing mechanisms for financing climate change.

RESEARCH GAP

1. Lack of Standardized Measurement and Reporting
2. Inefficient Allocation between Mitigation and Adaptation
3. Deficiency in Understanding Local Capacity and Access
4. Limited Tracking of Non-Traditional and Domestic Flows

OBJECTIVES

1.In order to critically assess and make systemic overhauls of climate finances with a focus on operational weaknesses, inaccuracies of measurement, and additionality vis-à-vis development assistances.

2. To examine the current status, sufficiency, and predictability of climate finance flows, particularly focusing on the distinct challenges and needs for the adaptation and sustainable development of vulnerable regions

3. To formulate and utilize analytical tools to evaluate the readiness of financial reception countries and the institutions supporting the roles of the major funds in the delivery of financial flows.

4. To analyse the number of publications, distribution of publications, and important knowledge gaps in the area of climate finance in the field of climate change through the lens of knowledge management and the knowledge pyramid

HYPOTHESES OF THE STUDY

Hypothesis 1: Systemic Reforms in Climate Finance

• H_0: There are no significant operational flaws, measurement inaccuracies, or additionality issues in existing climate finance mechanisms relative to development assistance.

• H_1: Existing climate finance mechanisms have several operational flaws, measurement inaccuracies, and undefined additionality with regard to development assistance, which is an indication of the systemic reforms required.

Hypothesis 2 - Sufficiency and Predictability of Climate Finance Flows

• H_0: Climate finance flows to vulnerable regions are sufficient, predictable, and aligned enough with adaptation and viable development.

• H_1: Current finance flows to vulnerable regions are too small, unpredictable, and poorly aligned with needs for adaptation and sustainable development.

Hypothesis 3: Climate finance readiness and institutional mechanisms

• H_0: Access to and the effectiveness of climate finance flows are not significantly influenced by the readiness of recipient countries to access climate finance and institutional intermediary mechanisms.

• H_1: Access and effectiveness of climate finance flows depend a lot on the preparedness of climate finance recipients and institutional intermediary mechanisms.

Hypothesis 4: Identification of Trends and Gaps in the Literature on Climate Finance

• H_0: There are no major trends, patterns of concentrations, or knowledge gaps that come out from the academic literature on climate finance.

• H_1: The academic literature on climate finance reflects significant growth patterns, thematic concentrations, and identifiable knowledge gaps.

Research Design

The report applies a quantitative research paradigm to conduct an objective investigation on mechanisms used in climate finance. The report is also descriptive in aspects of presenting existing trends, beliefs, and elements within existing flows of climate finance. The study applies a cross-sectional study paradigm to carry out an investigation based on information required at a particular instance in time. The study will provide effective comparison of opinions held among respondents based on various elements.

Sample Size & Sampling Technique

The sample size is 201 respondents, representing stakeholders knowledgeable about climate finance. A convenience sampling technique was used because of accessibility and due to time constraints. In this method, the researcher can collect data from willing participants with ease. Although non-probabilistic in nature, it is an appropriate sampling technique in exploratory and perception-based studies. The sample size is sufficient for statistical analysis, as performed by SPSS.

Data Collection Method

The study will combine both primary and secondary data sources. Primary data were collected by administering a structured questionnaire to respondents. The questionnaire captured perceptions on the systems and flows of climate finance. Secondary data were obtained from journals, published reports

from institutions, and policy documents. This puts together comprehensive and reliable data support for the study**.**

Instrument Design

The structured questionnaire was the research instrument developed to measure the study variables appropriately. It was developed using a five-point Likert scale ranging from strongly disagree to strongly agree. Each construct had multiple items to ensure adequate coverage of the concept. Such a scale design helps capture the accurate perceptions of the respondents. This approach enhances the reliability and validity of the collected data**.**

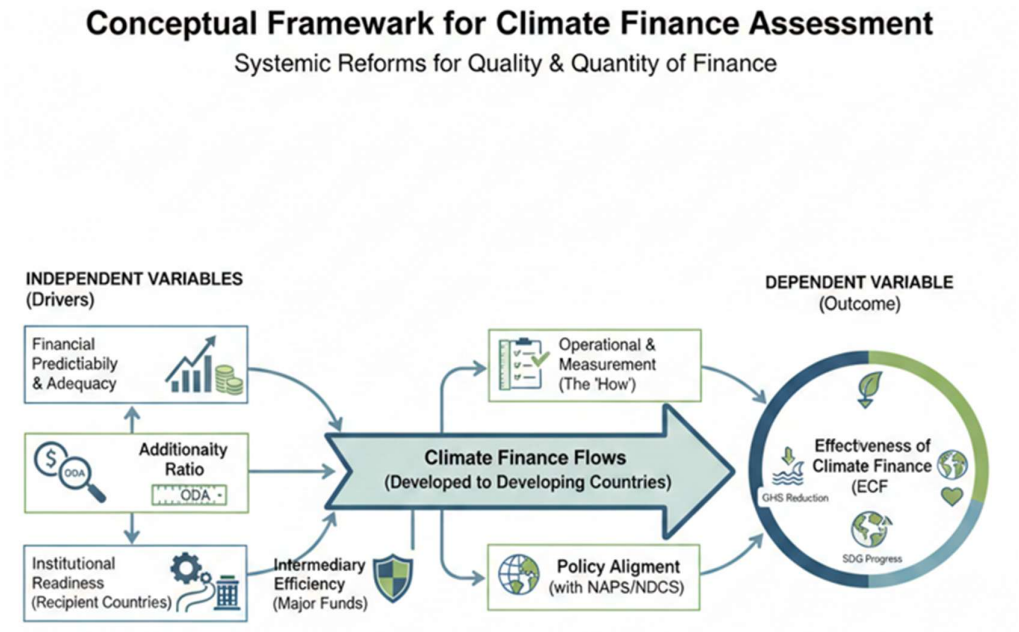
Statistical Tools Used

The data gathered were analysed using SPSS software. Descriptive statistics were used to summarize respondent characteristics and variable distributions. Frequency analysis was used to understand response patterns. The correlation analysis will show the relationship between variables, while the regression analysis will test if the independent variables can significantly predict any of the dependent variables**.**

Ethical Considerations

The research was thus in complete compliance with ethical research standards. Participation in the survey was, therefore, purely voluntary. Potential respondents were informed about the purpose of the study. Confidentiality and anonymity of all responses were assured in order to protect participant identity. Data collected were used exclusively for academic research. This, therefore, guarantees the provision of transparency and ethical integrity within the study.

Conceptual model



ANALYSIS

Statistical Analysis

Statement	Key Statistical Results	Frequency Pattern
Lack of transparency in climate finance allocation	Mean = 1.93, SD = 0.781	78.1% Agree/Strongly Agree
Measurement and reporting of climate finance are inaccurate	Mean = 1.84, SD = 0.662	90.0% Agree/Strongly Agree
Existing climate finance mechanisms require major systemic reforms	Mean = 1.69, SD = 0.712	91.5% Agree/Strongly Agree
Additionality beyond development assistance is unclear	Mean = 1.84, SD = 0.703	86.6% Agree/Strongly Agree
Current climate finance systems have significant operational flaws	Mean = 1.57, SD = 0.726	91.0% Agree/Strongly Agree

Interpretation:

Frequency analysis shows that there is very strong consensus among respondents that climate finance systems at present are afflicted with gaps in transparency, inaccuracies in measurement, unclear additionally, and serious operational flaws. The low mean values and high levels of agreement on all statements clearly support the fact that existing mechanisms of climate finance need urgent systemic and operational reforms to enhance accountability, effectiveness, and credibility.

Frequency Analysis

Statement	Key Statistics (Mean, Skewness)	Frequency Results
Climate finance flows to vulnerable regions are currently inadequate	Mean = **1.55**, Skewness = **1.587**	93.0% agree/strongly agree

Funding received by developing countries is predictable and timely	Mean = **1.82**, Skewness = **0.843**	82.1% agree/strongly agree
Current climate finance is aligned with sustainable development needs	Mean = **1.67**, Skewness = **1.402**	92.0% agree/strongly agree
Adaptation finance receives less priority than mitigation finance	Mean = **1.77**, Skewness = **1.179**	91.5% agree/strongly agree
There is a significant financing gap in achieving climate-resilient development	Mean = **1.66**, Skewness = **1.593**	92.0% agree/strongly agree

Interpretation

According to findings, though predictable, climate finance is seen as development-aligned, yet grossly inadequate in quantity, unequally distributed, and totally insufficient to meet the needs for adaptation and resilience of vulnerable regions.

Regression Analysis

Aspect	Result	Interpretation
Dependent Variable	AGE	AGE is the outcome variable being predicted.
Independent Variable	Readiness	Readiness is used as the predictor variable.
Correlation (r)	−0.186 (p = 0.004)	There is a weak but significant negative relationship between readiness and AGE.
Model Fit (R^2)	0.035	Readiness explains 3.5% of the variation in AGE.
ANOVA (F-value)	7.170 (p = 0.008)	The regression model is statistically significant.
Regression Coefficient (B)	−0.262 (p = 0.008)	An increase in readiness leads to a decrease in AGE.
Multicollinearity	VIF = 1.000	No multicollinearity issue exists.

Interpretation

Based on the regression results, readiness is inversely and significantly related to AGE. The significance of the overall model also testifies that readiness significantly explains the variation in AGE. However, the model has low explanatory power since readiness explains only 3.5% in variation of AGE. According to the regression coefficient, a higher readiness is significantly associated with a decrease in AGE. On the whole, though readiness influences AGE, other factors play a more important role.

FINDINGS

• There is strong consensus on systemic flaws in climate finance mechanisms

• Climate finance remains inadequate and biased toward mitigation.

• Adaptation and resilience financing gaps are large

• Readiness is a significant determinant of outcomes but has limited explanatory power.

4. CONCLUSION

The research confirms that existing climate finance mechanisms suffer from transparency gaps, measurement misestimation, additionality uncertainty, and operational inefficiencies. On the one hand, climate finance is fully aligned with the objectives of sustainable development. Inadequate and poorly distributed resources compromise effectiveness. The findings support accepting alternative hypotheses and comprehensive reforms toward accountability and equity

LIMITATIONS OF THE STUDY

- Cross-sectional design
- Convenience sampling
- Self-reported responses
- Limited explanatory power of regression model

FUTURE SCOPE OF THE STUDY

- Longitudinal analysis of climate finance flows
- Qualitative assessment of institutional capacity
- Comparative regional studies
- Integration of macroeconomic and political variables

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