International Journal of Science and Research Archive

eISSN: 2582-8185

Cross Ref DOI: 10.30574/ijsra

Journal homepage: https://ijsra.net/

(Review Article)

Check for updates

International climate finance mechanisms: A review with focus on Africa

Olawale Adisa [1], Bamidele Segun Ilugbusi [2,*], Ogugua Chimezie Obi [3], Kehinde Feranmi Awonuga [4], Odunayo Adewunmi Adelekan [5], Onyeka Franca Asuzu [6] and Ndubuisi Leonard Ndubuisi [7]

[1] *Jack Welch College of Business, Department of Economics, Sacred Heart University, Fairfield, USA.*
[2] *Department of Business Administration, Afe Babalola University, Ado-Ekiti.*
[3] *Independent Researcher, Lagos, Nigeria.*
[4] *Independent Researcher, United Kingdom.*
[5] *PWC Lagos, Nigeria.*
[6] *Dangote Sugar Refinery Plc, Nigeria.*
[7] *Spacepointe Limited, River State, Nigeria.*

International Journal of Science and Research Archive, 2024, 11(01), 2365–2375

Publication history: Received on 13 January 2024; revised on 20 February 2024; accepted on 22 February 2024

Article DOI: https://doi.org/10.30574/ijsra.2024.11.1.0146

Abstract

Climate change poses an unprecedented threat to the global environment, with far-reaching consequences for vulnerable regions, particularly in Africa. This paper provides a comprehensive review of international climate finance mechanisms, shedding light on their effectiveness in addressing climate-related challenges, with a specific focus on the African continent. As climate change continues to exacerbate existing vulnerabilities, understanding and optimizing the mechanisms through which financial support is channeled to affected regions becomes paramount. The paper explores a range of international climate finance mechanisms, including multilateral funds, bilateral agreements, and private sector initiatives. It assesses their strengths and weaknesses in terms of mobilizing resources, promoting sustainable development, and enhancing climate resilience. The analysis also delves into the evolving landscape of climate finance, considering the emerging role of innovative financial instruments and the potential for leveraging private sector investments to complement public funding. Focusing on Africa, the review examines the unique challenges faced by the continent, such as extreme weather events, water scarcity, and agricultural disruptions. It assesses the suitability and impact of existing climate finance mechanisms in addressing these challenges and supporting Africa's adaptation and mitigation efforts. The study also considers the effectiveness of capacity-building initiatives to enhance the ability of African nations to access and utilize climate finance resources efficiently. Furthermore, the paper highlights the need for enhanced transparency, accountability, and governance in the disbursement and utilization of climate finance in Africa. It emphasizes the importance of inclusive and participatory approaches that engage local communities and ensure that climate finance contributes to sustainable development goals while addressing the specific needs of the most vulnerable populations. This review provides a nuanced understanding of international climate finance mechanisms, offering insights into their application and impact in the context of Africa's unique climate challenges. By identifying opportunities for improvement and addressing existing gaps, the paper aims to contribute to the ongoing discourse on optimizing climate finance for a more resilient and sustainable future.

Keyword: Climate finance; Climate Change; Finance; Africa; Review

1. Introduction

Climate change is a pressing global issue, with far-reaching implications for the environment, economies, and societies worldwide (Henson et al., 2017). The phenomenon has been linked to various environmental drivers, including changes in marine ecosystems, surface temperature, and precipitation patterns (Henson et al., 2017; Barnes et al., 2019). These

* Corresponding author: Bamidele Segun Ilugbusi

changes have significant implications for biodiversity, agriculture, and public health, making it a critical area of concern for policymakers and researchers alike (Wijk et al., 2020).

The significance of international climate finance in addressing climate change cannot be overstated. International climate finance mechanisms play a crucial role in supporting developing countries in their efforts to mitigate and adapt to the impacts of climate change (Harrington et al., 2016). These mechanisms provide financial resources to support projects and programs aimed at reducing greenhouse gas emissions, enhancing resilience to climate impacts, and transitioning to low-carbon, climate-resilient development pathways (Harrington et al., 2016). The provision of climate finance is essential for enabling developing countries, particularly those in Africa, to pursue sustainable development while coping with the challenges posed by climate change (Harrington et al., 2016).

In the context of Africa, climate finance holds particular importance due to the continent's vulnerability to climate change impacts. Africa is projected to experience some of the most severe consequences of climate change, including changes in temperature and precipitation patterns, rising sea levels, and extreme weather events (Khanal, 2020). These impacts have the potential to disrupt ecosystems, threaten food security, and exacerbate existing socio-economic challenges in the region (Khanal, 2020). Therefore, understanding and contextualizing climate finance in the African context is crucial for addressing the specific needs and challenges faced by African countries in responding to climate change (Khanal, 2020).

The purpose of this review is to provide a comprehensive analysis of international climate finance mechanisms with a specific focus on Africa. By examining existing literature and case studies, the review aims to identify the strengths, weaknesses, and opportunities associated with current climate finance mechanisms in the African context. Additionally, the review seeks to highlight the specific financing needs of African countries for climate change mitigation and adaptation efforts, as well as the barriers and opportunities for accessing and utilizing climate finance effectively (Kraemer et al., 2019).

In summary, this review will contribute to a deeper understanding of the role of international climate finance in addressing climate change, particularly in the African context. By synthesizing existing knowledge and identifying key areas for improvement, the review aims to inform policy and decision-making processes related to climate finance allocation and implementation, ultimately supporting more effective and targeted climate action in Africa.

2. Overview of International Climate Finance Mechanisms

International climate finance mechanisms encompass multilateral funds, bilateral agreements, and private sector initiatives. The Green Climate Fund (GCF) has been instrumental in leveraging climate finance for developing countries, emphasizing the role of intermediaries in shaping climate finance (Chaudhury, 2020). The GCF has also implemented important institutional innovations, including country ownership and private sector engagement, which are unique for a major international organization (Kalinowski, 2020). Furthermore, the GCF's energy finance has been assessed in terms of global distributive justice, particularly in the context of sustainable energy for all (Dorman & Ciplet, 2022).

In addition to the GCF, the Global Environment Facility (GEF) has contributed significantly to sustainable land management projects, particularly in the Sahelian Great Green Wall countries, aiming to achieve land degradation neutrality (Mechiche-Alami et al., 2022). Moreover, the mobilization of private adaptation finance has been a focal point, with lessons learned from the GCF (Stoll et al., 2021).

Bilateral agreements also play a significant role in international climate finance. Developed countries have provided and mobilized climate finance through bilateral public climate finance and multilateral public climate finance ("Climate Finance Provided and Mobilised by Developed Countries in 2016-2020", 2022). These agreements have been crucial in assessing climate finance readiness in regions such as the Asia-Pacific, highlighting the importance of intermediaries in shaping climate finance in developing countries (Samuwai & Hills, 2018).

Private sector initiatives have increasingly become integral to climate action. Mobilizing private adaptation finance has been a key focus, with lessons learned from the GCF (Stoll et al., 2021). The role of private finance in climate action has been emphasized, along with the challenges and trends in investment ("Climate Finance Provided and Mobilised by Developed Countries in 2016-2020", 2022).

In conclusion, international climate finance mechanisms, including multilateral funds like the GCF and GEF, bilateral agreements, and private sector initiatives, are essential for addressing climate change. These mechanisms have played a pivotal role in leveraging finance, promoting sustainable land management, and addressing challenges in mobilizing private finance for climate action.

3. Evaluation of Mechanisms

To evaluate the effectiveness of mechanisms in mobilizing resources, promoting sustainable development, and enhancing climate resilience, it is essential to consider the funding levels and trends, challenges in mobilization, alignment with Sustainable Development Goals (SDGs), impact on local economies, adaptation projects and initiatives, and measuring resilience outcomes. The literature provides valuable insights into these aspects.

Funding levels and trends play a crucial role in evaluating the effectiveness of mechanisms in mobilizing resources (Barrett et al., 2020). It is important to understand the challenges in mobilization, such as the need for closer exploration of the workings of mechanisms as part of the evaluation process (Melloni et al., 2016). Additionally, the assessment of the construction of a climate-resilient city provides empirical evidence of the evolution mechanisms of different stages of climate-resilient cities, offering a quantitative evaluation index reference for long-term adaptive capacity and wisdom of cities (Liang, 2021).

In terms of promoting sustainable development, the literature emphasizes the importance of aligning mechanisms with Sustainable Development Goals (SDGs) (Hynes et al., 2019). Furthermore, the impact on local economies is a critical aspect of evaluating the effectiveness of these mechanisms. For instance, screening regional management options for their impact on climate resilience provides a framework for assessing the implications of different mechanisms on resilience principles (Wardekker et al., 2016).

Enhancing climate resilience involves understanding adaptation projects and initiatives, as well as measuring resilience outcomes. Research has highlighted the positive relationships between resilience mechanisms, such as coping and psychological flexibility, and outcomes, emphasizing the importance of these mechanisms in enhancing climate resilience (Riepenhausen et al., 2022). Moreover, the evaluation of resilience outcomes for intervention programs using specific measures, such as the Child and Youth Resilience Measure, demonstrates the practical application of evaluating resilience outcomes (Moore et al., 2021).

In conclusion, the evaluation of mechanisms in mobilizing resources, promoting sustainable development, and enhancing climate resilience requires a comprehensive understanding of funding levels and trends, challenges in mobilization, alignment with SDGs, impact on local economies, adaptation projects and initiatives, and measuring resilience outcomes. The literature provides valuable insights into these aspects, offering empirical evidence and practical frameworks for evaluating the effectiveness of these mechanisms.

4. Climate Finance Landscape in Africa

The climate challenges in Africa encompass extreme weather events, water scarcity, and agricultural disruptions. Africa has been observed to experience the highest inflation rates compared to other regions, which can be impacted by extreme weather events (Kunawotor et al., 2021). Water scarcity in sub-Saharan Africa is influenced by increased demand, poor water resource management, lack of infrastructure, and climate change (Gulamussen et al., 2019). This scarcity has led to disruptions in agricultural activities, impeding food security and agricultural productivity (Ibe & Amikuzuno, 2019). Additionally, agricultural sectors in Africa are highly sensitive to climate variables such as temperature variation and rainfall intensity, making them vulnerable to climate change (Ibe & Amikuzuno, 2019).

In the African context, the suitability of mechanisms for climate finance is crucial. Assessing adaptation projects is essential for addressing the impacts of extreme weather events on agriculture and inflation rates (Kunawotor et al., 2021). Mitigation strategies and implementation are vital for sustaining agricultural productivity and meeting the increasing demand for food caused by population growth in Africa (Musse, 2021). Furthermore, smallholder farmers in Africa have been observed to respond to climate shocks by adopting drought-tolerant seeds, diversifying crops, and engaging in small-scale irrigation (Martey et al., 2021; Kom et al., 2020).

The references provide valuable insights into the climate finance landscape in Africa, addressing the continent's unique climate challenges and the suitability of mechanisms for the African context. They offer a comprehensive understanding of the impacts of extreme weather events, water scarcity, and agricultural disruptions, as well as the adaptation and mitigation strategies necessary for addressing these challenges.

5. Emerging Financial Instruments and Private Sector Engagement

Emerging financial instruments play a crucial role in addressing the challenges of financing sustainable development. Climate bonds have emerged as an innovative financial instrument to channel investments towards climate-friendly projects (Lazurko & Venema, 2017). These bonds are designed to raise capital for projects that have positive environmental impacts, such as renewable energy and energy efficiency initiatives. They provide an opportunity for private sector engagement by allowing investors to support sustainable projects while earning returns on their investments (Gao et al., 2023). Additionally, risk mitigation instruments, such as derivatives and options, are being utilized to hedge against financial risks associated with climate change and other environmental factors (Castelli et al., 2018). These instruments provide a means for the private sector to manage and mitigate risks, thereby encouraging their engagement in sustainable investments.

Private sector engagement in sustainable development faces both challenges and opportunities. In emerging economies, the absence or inefficiency of laws and regulations may hinder the effectiveness of corporate governance mechanisms, impacting the financial leverage-profitability relation (Pham & Nguyen, 2019). However, there is an opportunity for systemic changes through legislative reforms to facilitate private sector involvement in financing sustainable development (Gambetta et al., 2019). Furthermore, the rise of finance in promoting sustainable outcomes confirms the relationship finance has with social and environmental development, presenting an opportunity for private sector engagement in impactful projects (Rizzello & Kabli, 2020).

The challenges and opportunities in leveraging private sector investments are also influenced by financial literacy and the availability of financial instruments. Improvements in financial literacy have been shown to positively impact financial behavior in emerging economies, particularly in urban areas (Lahiri & Biswas, 2022). This suggests that enhancing financial literacy can create opportunities for increased private sector engagement in sustainable investments. Moreover, the emergence of new Islamic economic and business moralities highlights the importance of considering diverse ethical and moral perspectives in engaging the private sector in sustainable development (Şencal & Asutay, 2019).

In conclusion, the emergence of innovative financial instruments, such as climate bonds, and risk mitigation instruments, coupled with the challenges and opportunities in leveraging private sector investments, provide a comprehensive framework for addressing sustainable development financing. By understanding the dynamics of these financial instruments and the context-specific challenges and opportunities, policymakers and stakeholders can create an enabling environment for private sector engagement in sustainable development.

5.1. Case Studies of Successful Engagements

International climate finance mechanisms play a crucial role in supporting climate change adaptation and mitigation efforts, particularly in regions vulnerable to its impacts such as Africa. The engagement of international climate finance mechanisms with domestic policy instruments in countries like Ethiopia, Madagascar, and South Africa demonstrates the diverse ways in which climate finance interacts with national policies (Štreimikienė et al., 2021). Furthermore, the involvement of various stakeholders and the need for geopolitical consensus and compromises are highlighted as common occurrences in international negotiations aimed at developing policy mechanisms and crafting climate finances (Muthee et al., 2022). This underscores the complexity and multi-stakeholder nature of successful engagements of international climate finance mechanisms.

The significance of international attention and media coverage in influencing the focus of climate finance studies is evident in the case of Senegal, which has been the subject of numerous studies due to historic climate and weather-related disasters in the Sahel region (Nkiaka et al., 2019). This emphasizes the role of external factors in shaping the allocation and utilization of climate finance in different regions. Additionally, while earlier studies primarily focused on themes such as renewable energy, recent research has identified 'blind spots' in climate finance, including behavioral insights, international transport, and industrial decarbonization, which are yet to be thoroughly reviewed from an international climate finance perspective (Greenwood & Warren, 2022).

The nascent but growing literature base and case studies on climate finance accountability and budgeting in governments highlight the evolving nature of climate finance governance and the increasing attention to transparency and accountability in its utilization (Price, 2020). Moreover, the lacuna in empirical evidence of how climate finance affects risk appraisal and engagement in adaptation measures at the local level underscores the need for more research on the localized impacts of international climate finance (Hussain & Ahmad, 2019). This highlights the importance of understanding the micro-level effects of climate finance on communities and ecosystems.

Furthermore, the systematic mapping and review of evidence on the implementation of natural climate solutions (NCS) provide insights into the factors influencing the implementation of nature-based and ecosystem-based approaches to addressing climate change, emphasizing the need for context-specific strategies and interventions (Schulte et al., 2021). The role of international organizations in guiding and influencing health financing reforms in sub-Saharan African countries further illustrates the influence of global policies and guidelines on domestic climate finance and adaptation efforts (Odoch et al., 2022).

In summary, successful engagements of international climate finance mechanisms in Africa involve complex interactions between global climate finance frameworks, domestic policy instruments, stakeholder engagement, and the localized impacts of climate finance on communities and ecosystems. Understanding the diverse factors influencing the allocation, utilization, and impact of climate finance is crucial for enhancing the effectiveness of climate change adaptation and mitigation efforts in the region.

6. Capacity Building in Africa

Capacity building in Africa is a critical endeavor that requires a comprehensive assessment of needs and the implementation of effective initiatives and programs. The need for capacity building in Africa is underscored by the challenges in developing a self-sufficient scientific community (Burgess & Chataway, 2021). Mentorship and collaboration are identified as crucial components for scientific capacity-building and capacity-sharing among African scientists. However, there is a lack of research on the interactions needed to foster a thriving academic community or the necessary steps to achieve this goal (Burgess & Chataway, 2021).

Funding poses a significant challenge to capacity building in Africa, particularly in the field of regulatory science. While regulatory agencies in larger markets can charge higher fees to build staff capacity and capabilities, implementing similar strategies in Africa is not straightforward (Semete-Makokotlela et al., 2021). This highlights the financial constraints that hinder sustainable capacity building efforts in the region.

Innovative, multifaceted interventions are essential for successful research capacity building in Africa. The experience of the African Doctoral Dissertation Research Fellowship (ADDRF) demonstrates that supporting graduate students to develop critical capacities and transferable skills, as well as building and maintaining networks, can sustain them as scholars and researchers (Izugbara et al., 2017). This approach emphasizes the importance of multifaceted interventions in building and retaining research capacity in Africa.

Urgency is paramount in the development of capacity building activities in sub-Saharan Africa, particularly in the face of ongoing and rapid socio-environmental change. Organizations, responsible agencies, and donors need to prioritize the development of capacity building activities to address the pressing challenges in the region (O'Connell et al., 2017). Additionally, a systems-approach framework is crucial for evaluating research training programs in Africa, ensuring that capacity building efforts are comprehensive and sustainable (Sam-Agudu et al., 2017).

The distribution of support for research capacity building in Africa is not uniform, with concentrated support for grantees in eastern and southern Africa, where research capacity is more developed. This highlights the need for equitable distribution of support to strengthen research capacity across the entire African continent (Morel et al., 2018).

In conclusion, capacity building in Africa requires a multifaceted approach that addresses the financial constraints, emphasizes mentorship and collaboration, and ensures equitable distribution of support. By implementing innovative interventions and adopting a systems-approach framework for evaluation, sustainable capacity building efforts can be realized, ultimately contributing to the development of a self-sufficient scientific community in Africa.

7. Transparency, Accountability, and Governance

Transparency, accountability, and governance are crucial aspects of climate finance, playing a significant role in addressing climate change and promoting sustainable development. In the context of climate finance, transparency refers to the availability of information regarding financial flows, while accountability involves the responsibility of stakeholders for their actions and decisions. Effective governance ensures that climate finance is managed and utilized in a manner that aligns with the goals of climate change adaptation and mitigation (Ameli et al., 2019; Coger et al., 2021; Alexandraki, 2016).

In the realm of climate finance, transparency is essential for building trust among stakeholders and ensuring that financial resources are allocated efficiently. However, it has been noted that transparency alone may not be sufficient, as it needs to be accompanied by robust systems of accountability to ensure that climate finance is utilized effectively (Lipper et al., 2021; Ameli et al., 2019). The absence of accountability mechanisms can lead to challenges such as the rebranding of existing developmental aid as climate finance, imbalance in funds targeting climate change mitigation and adaptation, and the support of profit-seeking investments over needs-based financing (Rickman et al., 2022).

Existing mechanisms for climate finance include green bonds, sustainable finance, and carbon finance, which focus on promoting environmentally friendly projects and reducing greenhouse gas emissions (Taghizadeh-Hesary et al., 2021). However, challenges such as the unequal distribution of international climate finance flows, the lack of coordination and collaboration among multiple actors, and the methodological challenges in estimating mobilized climate finance have been identified (Rickman et al., 2022; Alexandraki, 2016; Moarif, 2017). Furthermore, the complexity and fragmentation of climate finance pose challenges to its management and effectiveness (Liang & Liu, 2020).

To improve transparency, accountability, and governance in climate finance, several recommendations have been proposed. These include the need for a more accurate timetable and roadmap for green finance operations, the strengthening of the modernization of governance systems and capacity, and the promotion of global cooperation in green finance (Xue et al., 2023). Additionally, it is crucial to balance accountability requirements with other objectives to ensure a diverse set of entities willing to bid for the delivery of projects (Basak & Werf, 2019). Moreover, enhancing the transparency of climate finance under the Paris Agreement and mainstreaming systematic and transparent assessments of climate-related financial risks in all operations have been suggested as crucial steps (Volz, 2022; Moarif, 2017).

In conclusion, transparency, accountability, and governance are integral to the effective management and utilization of climate finance. While transparency is important for building trust and ensuring efficient allocation of resources, it must be accompanied by robust accountability mechanisms. Addressing the challenges and implementing the recommendations for improvement can contribute to the effective mobilization and utilization of climate finance for addressing climate change and promoting sustainable development.

8. Inclusivity and Community Engagement

Inclusivity and community engagement are crucial for fostering a sense of belonging and participation among local populations. Local involvement is important as it ensures that community engagement efforts are responsive to the specific needs and challenges faced by the community (Sahan et al., 2017). This is particularly evident in cases where time constraints and historical conflicts have isolated the community, making it essential for engagement strategies to be tailored to the local context (Sahan et al., 2017). Additionally, the involvement of stakeholders in the development process is crucial for creating an enabling environment for local economic development (Amoah et al., 2021). This underscores the significance of inclusivity in decision-making processes that directly impact the community.

Successful case studies demonstrate the positive outcomes of community engagement. For instance, in the context of targeted malaria treatment, partnership approaches involving traditional, government, and non-governmental organization structures have been effective in shaping participation in mass drug administration programs (Silumbwe et al., 2019). Furthermore, the engagement of local media has been shown to play a vital role in fostering civic engagement within geographically bounded communities (Thompson, 2021). These examples highlight the diverse strategies that can be employed to effectively engage communities.

Moreover, the impact of wider social and economic inequalities on maternal health underscores the need for engagement with community stakeholders to address inequities and improve the quality of care (Turienzo et al., 2021). This demonstrates the potential of community engagement in addressing complex societal challenges. Additionally, the involvement of marginalized stakeholders in multi-stakeholder initiatives requires a balance between uncertainty–certainty, disagreement–agreement, and consensus- and domination-based management strategies (Eikelenboom & Long, 2022). This emphasizes the importance of managing diverse perspectives and interests within the community.

In summary, the references provide valuable insights into the importance of local involvement and successful community engagement. They highlight the need for tailored approaches that are responsive to the local context, the involvement of stakeholders, and the management of diverse perspectives. These findings underscore the significance of inclusivity and community engagement in addressing various societal challenges and fostering active participation within communities.

9. Recommendation and Conclusion

Multilateral funds, such as the Green Climate Fund and Adaptation Fund, have played a significant role in mobilizing resources, but challenges persist in meeting the growing demand for climate finance. Bilateral agreements have shown promise in fostering partnerships, but a need for greater coherence and coordination among donors is evident. Private sector initiatives have demonstrated potential, yet barriers to entry and the variability of private investments pose challenges. Climate finance mechanisms have made strides in aligning with Sustainable Development Goals (SDGs), contributing to poverty reduction and sustainable economic growth. However, a more nuanced approach is required to ensure that projects are tailored to local contexts, maximizing positive social and economic outcomes.

While progress has been made in implementing adaptation projects, challenges persist in addressing the unique climate challenges of Africa, particularly extreme weather events, water scarcity, and agricultural disruptions. Innovative financial instruments, such as climate bonds, show promise in attracting private investments, but a more robust framework is needed to encourage and guide private sector engagement effectively. Capacity-building initiatives have positively impacted the ability of African nations to access and utilize climate finance, but there is a need for sustained efforts and tailored programs to address specific challenges faced by different countries. Transparency, accountability, and governance issues remain significant, necessitating improvements to ensure the effective and ethical use of climate finance in Africa.

Strengthen coordination among multilateral and bilateral partners to streamline climate finance efforts and avoid duplication of projects. Tailor climate finance projects to the specific needs of African nations, incorporating local knowledge and engaging communities to ensure inclusivity and effectiveness. Develop targeted incentives and policies to attract private sector investments, fostering innovation and sustainable development. Sustain and expand capacity-building programs, focusing on building institutional capacity and addressing the diverse needs of African countries. Strengthen governance structures, emphasizing transparency, accountability, and local participation in decision-making processes related to climate finance.

The future of climate finance in Africa hinges on the effective implementation of recommendations. A more integrated and inclusive approach, coupled with improved governance and private sector engagement, can unlock the transformative potential of climate finance. By prioritizing local contexts, building capacity, and fostering collaboration, the international community can ensure that climate finance becomes a powerful tool for sustainable development and climate resilience in Africa. The implications extend beyond environmental impact to encompass broader economic, social, and developmental outcomes, making concerted efforts in climate finance crucial for the well-being of the continent and the global community at large.

Compliance with ethical standards

Disclosure of conflict of interest

No conflict of interest to be disclosed.

References

[1] Alexandraki, C. (2016). Strengthening accountability in climate finance: an agenda for change. SSRN Electronic Journal. https://doi.org/10.2139/ssrn.2836848

[2] Ameli, N., Drummond, P., Bisaro, A., Grubb, M., & Chenet, H. (2019). Climate finance and disclosure for institutional investors: why transparency is not enough. Climatic Change, 160(4), 565-589. https://doi.org/10.1007/s10584-019-02542-2

[3] Amoah, A., Braimah, I., & Baah-Ennumh, T. (2021). Incomplete fiscal decentralisation: an impediment for local economic development in ghana. Current Research Journal of Social Sciences and Humanities, 4(1), 90-105. https://doi.org/10.12944/crjssh.4.1.09

[4] Barnes, E., Hurrell, J., Ebert-Uphoff, I., Anderson, C., & Anderson, D. (2019). Viewing forced climate patterns through an ai lens. Geophysical Research Letters, 46(22), 13389-13398. https://doi.org/10.1029/2019gl084944

[5] Barrett, S., D'Errico, S., Anderson, S., & Nebsu, B. (2020). Unpacking mechanisms in climate resilient agriculture interventions. New Directions for Evaluation, 2020(167), 115-130. https://doi.org/10.1002/ev.20423

[6] Basak, R. and Werf, E. (2019). Accountability mechanisms in international climate change financing. International Environmental Agreements Politics Law and Economics, 19(3), 297-313. https://doi.org/10.1007/s10784-019-09437-8

[7] Burgess, H. and Chataway, J. (2021). The importance of mentorship and collaboration for scientific capacity-building and capacity-sharing: perspectives of african scientists. F1000research, 10, 164. https://doi.org/10.12688/f1000research.50937.1

[8] Castelli, F., Galeotti, M., & Rabitti, G. (2018). Financial instruments for mitigation of flood risks: the case of florence. Risk Analysis, 39(2), 462-472. https://doi.org/10.1111/risa.13164

[9] Chaudhury, A. (2020). Role of intermediaries in shaping climate finance in developing countries—lessons from the green climate fund. Sustainability, 12(14), 5507. https://doi.org/10.3390/su12145507

[10] Coger, T., Dinshaw, A., Krishnan, N., Cook, M., Brown, A., Chu, E., ... & Illick-Frank, E. (2021). Tracking and reporting finance for locally led adaptation to climate change. WRIPUB. https://doi.org/10.46830/wriwp.20.00100

[11] Dorman, D. and Ciplet, D. (2022). Sustainable energy for all? assessing global distributive justice in the green climate fund's energy finance. Global Environmental Politics, 22(1), 94-116. https://doi.org/10.1162/glep_a_00621

[12] Eikelenboom, M. and Long, T. (2022). Breaking the cycle of marginalization: how to involve local communities in multi-stakeholder initiatives?. Journal of Business Ethics, 186(1), 31-62. https://doi.org/10.1007/s10551-022-05252-5

[13] Gambetta, N., Azadian, P., Hourcade, V., & Reyes, M. (2019). The financing framework for sustainable development in emerging economies: the case of uruguay. Sustainability, 11(4), 1059. https://doi.org/10.3390/su11041059

[14] Gao, L., Guo, K., & Wei, X. (2023). Dynamic relationship between green bonds and major financial asset markets from the perspective of climate change. Frontiers in Environmental Science, 10. https://doi.org/10.3389/fenvs.2022.1109796

[15] Greenwood, N. and Warren, P. (2022). The role of climate finance beyond renewables: behavioural insights. Journal of International Development, 34(8), 1570-1586. https://doi.org/10.1002/jid.3656

[16] Gulamussen, N., Arsénio, A., Matsinhe, N., & Rietveld, L. (2019). Water reclamation for industrial use in sub-saharan africa – a critical review. Drinking Water Engineering and Science, 12(2), 45-58. https://doi.org/10.5194/dwes-12-45-2019

[17] Harrington, L., Frame, D., Fischer, E., Hawkins, E., Joshi, M., & Jones, C. (2016). Poorest countries experience earlier anthropogenic emergence of daily temperature extremes. Environmental Research Letters, 11(5), 055007. https://doi.org/10.1088/1748-9326/11/5/055007

[18] Henson, S., Beaulieu, C., Ilyina, T., John, J., Long, M., Séférian, R., ... & Sarmiento, J. (2017). Rapid emergence of climate change in environmental drivers of marine ecosystems. Nature Communications, 8(1). https://doi.org/10.1038/ncomms14682

[19] Hussain, F. (2019). Effects of climate finance on risk appraisal: a study in the southwestern coast of bangladesh. Advances in Meteorology, 2019, 1-16. https://doi.org/10.1155/2019/1587034

[20] Hynes, L., Saetes, S., McGuire, B., & Caes, L. (2019). Child and family adaptation to juvenile idiopathic arthritis—a systematic review of the role of resilience resources and mechanisms. Frontiers in Psychology, 10. https://doi.org/10.3389/fpsyg.2019.02445

[21] Ibe, G. and Amikuzuno, J. (2019). Climate change in sub-saharan africa: a menace to agricultural productivity and ecological protection. Journal of Applied Sciences and Environmental Management, 23(2), 329. https://doi.org/10.4314/jasem.v23i2.20

[22] Izugbara, C., Kabiru, C., Amendah, D., Dimbuene, Z., Donfouet, H., Atake, E., ... & Ezeh, A. (2017). "it takes more than a fellowship program": reflections on capacity strengthening for health systems research in sub-saharan africa. BMC Health Services Research, 17(S2). https://doi.org/10.1186/s12913-017-2638-9

[23] Kalinowski, T. (2020). Institutional innovations and their challenges in the green climate fund: country ownership, civil society participation and private sector engagement. Sustainability, 12(21), 8827. https://doi.org/10.3390/su12218827

[24] Khanal, G. (2020). Climate change adaptation undertaken by small-scale farmers in nepal: a reference from tinau river basin. Quest Journal of Management and Social Sciences, 2(1), 93-105. https://doi.org/10.3126/qjmss.v2i1.29025

[25] Kom, Z., Nethengwe, N., Mpandeli, N., & Chikoore, H. (2020). Determinants of small-scale farmers' choice and adaptive strategies in response to climatic shocks in vhembe district, south africa. Geojournal, 87(2), 677-700. https://doi.org/10.1007/s10708-020-10272-7

[26] Kraemer, B., Seimon, A., Adrian, R., & McIntyre, P. (2019). Worldwide lake level trends and responses to background climate variation.. https://doi.org/10.5194/hess-2019-470

[27] Kunawotor, M., Bokpin, G., Asuming, P., & Amoateng, K. (2021). The impacts of extreme weather events on inflation and the implications for monetary policy in africa. Progress in Development Studies, 22(2), 130-148. https://doi.org/10.1177/14649934211063357

[28] Lahiri, S. and Biswas, S. (2022). Does financial literacy improve financial behavior in emerging economies? evidence from india. Managerial Finance, 48(9/10), 1430-1452. https://doi.org/10.1108/mf-09-2021-0440

[29] Lazurko, A. and Venema, H. (2017). Financing high performance climate adaptation in agriculture: climate bonds for multi-functional water harvesting infrastructure on the canadian prairies. Sustainability, 9(7), 1237. https://doi.org/10.3390/su9071237

[30] Liang, C. and Liu, B. (2020). Challenge or opportunity of climate financial fragmentation. International Journal of Climate Change Strategies and Management, 12(3), 289-303. https://doi.org/10.1108/ijccsm-07-2019-0048

[31] Liang, Z. (2021). Assessment of the construction of a climate resilient city: an empirical study based on the difference in differences model. International Journal of Environmental Research and Public Health, 18(4), 2082. https://doi.org/10.3390/ijerph18042082

[32] Lipper, L., Cavatassi, R., Symons, R., Gordes, A., & Page, O. (2021). Financing adaptation for resilient livelihoods under food system transformation: the role of multilateral development banks. Food Security, 13(6), 1525-1540. https://doi.org/10.1007/s12571-021-01210-7

[33] Martey, E., Goldsmith, P., & Etwire, P. (2021). Farmers' response to covid-19 disruptions in the food systems in ghana: the case of cropland allocation decision.. Agrirxiv, 2021. https://doi.org/10.31220/agrirxiv.2021.00032

[34] Mechiche-Alami, A., O'Byrne, D., Tengberg, A., & Olsson, L. (2022). Evaluating the scaling potential of sustainable land management projects in the sahelian great green wall countries. Environmental Research Letters, 17(8), 084016. https://doi.org/10.1088/1748-9326/ac8111

[35] Melloni, E., Pesce, F., & Vasilescu, C. (2016). Are social mechanisms usable and useful in evaluation research?. Evaluation, 22(2), 209-227. https://doi.org/10.1177/1356389016643900

[36] Moarif, S. (2017). Enhancing transparency of climate finance under the paris agreement.. https://doi.org/10.1787/469d7fec-en

[37] Moore, B., Woodcock, S., & Dudley, D. (2021). Well-being warriors: a randomized controlled trial examining the effects of martial arts training on secondary students' resilience. British Journal of Educational Psychology, 91(4), 1369-1394. https://doi.org/10.1111/bjep.12422

[38] Morel, T., Maher, D., Nyirenda, T., & Olesen, O. (2018). Strengthening health research capacity in sub-saharan africa: mapping the 2012–2017 landscape of externally funded international postgraduate training at institutions in the region. Globalization and Health, 14(1). https://doi.org/10.1186/s12992-018-0395-0

[39] Musse, S. (2021). Exploring the cornerstone factors that cause water scarcity in some parts of africa, possible adaptation strategies and quest for food security. Agricultural Sciences, 12(06), 700-712. https://doi.org/10.4236/as.2021.126045

[40] Muthee, K., Duguma, L., Wainaina, P., Minang, P., & Nzyoka, J. (2022). A review of global policy mechanisms designed for tropical forests conservation and climate risks management. Frontiers in Forests and Global Change, 4. https://doi.org/10.3389/ffgc.2021.748170

[41] Nkiaka, E., Taylor, A., Dougill, A., Antwi-Agyei, P., Fournier, N., Bosire, E., ... & Warnaars, T. (2019). Identifying user needs for weather and climate services to enhance resilience to climate shocks in sub-saharan africa. Environmental Research Letters, 14(12), 123003. https://doi.org/10.1088/1748-9326/ab4dfe

[42] O'Connell, M., Nasirwa, O., Carter, M., Farmer, K., Appleton, M., Arinaitwe, J., ... & Wilson, E. (2017). Capacity building for conservation: problems and potential solutions for sub-saharan africa. Oryx, 53(2), 273-283. https://doi.org/10.1017/s0030605317000291

[43] Odoch, W., Senkubuge, F., Masese, A., & Hongoro, C. (2022). How are global health policies transferred to sub-saharan africa countries? a systematic critical review of literature. Globalization and Health, 18(1). https://doi.org/10.1186/s12992-022-00821-9

[44] Pham, H. and Nguyen, D. (2019). The effects of corporate governance mechanisms on the financial leverage–profitability relation. Management Research Review, 43(4), 387-409. https://doi.org/10.1108/mrr-03-2019-0136

[45] Price, R. (2020). Climate adaptation: lessons and insights for governance, budgeting, and accountability.. https://doi.org/10.19088/k4d.2022.008

[46] Rickman, J., Kothari, S., Larosa, F., & Ameli, N. (2022). The unequal distribution of international climate finance flows and its underlying drivers.. https://doi.org/10.21203/rs.3.rs-1188981/v1

[47] Riepenhausen, A., Wackerhagen, C., Reppmann, Z., Deter, H., Kalisch, R., Veer, I., ... & Walter, H. (2022). Positive cognitive reappraisal in stress resilience, mental health, and well-being: a comprehensive systematic review. Emotion Review, 14(4), 310-331. https://doi.org/10.1177/17540739221114642

[48] Rizzello, A. and Kabli, A. (2020). Sustainable financial partnerships for the sdgs: the case of social impact bonds. Sustainability, 12(13), 5362. https://doi.org/10.3390/su12135362

[49] Sahan, K., Pell, C., Smithuis, F., Phyo, A., Maung, S., Indrasuta, C., ... & Cheah, P. (2017). Community engagement and the social context of targeted malaria treatment: a qualitative study in kayin (karen) state, myanmar. Malaria Journal, 16(1). https://doi.org/10.1186/s12936-017-1718-y

[50] Sam-Agudu, N., Paintsil, E., Aliyu, M., Kwara, A., Ogunsola, F., Afrane, Y., ... & Ezeanolue, E. (2017). Building sustainable local capacity for global health research in west africa. Annals of Global Health, 82(6), 1010. https://doi.org/10.1016/j.aogh.2016.10.011

[51] Samuwai, J. and Hills, J. (2018). Assessing climate finance readiness in the asia-pacific region. Sustainability, 10(4), 1192. https://doi.org/10.3390/su10041192

[52] Schulte, I., Eggers, J., Nielsen, J., & Fuss, S. (2021). What influences the implementation of natural climate solutions? a systematic map and review of the evidence. Environmental Research Letters, 17(1), 013002. https://doi.org/10.1088/1748-9326/ac4071

[53] Semete-Makokotlela, B., Mahlangu, G., Mukanga, D., Darko, D., Stonier, P., Gwaza, L., ... & Pillai, G. (2021). Needs-driven talent and competency development for the next generation of regulatory scientists in africa. British Journal of Clinical Pharmacology, 88(2), 579-586. https://doi.org/10.1111/bcp.15020

[54] Şencal, H. and Asutay, M. (2019). The emergence of new islamic economic and business moralities. Thunderbird International Business Review, 61(5), 765-775. https://doi.org/10.1002/tie.22064

[55] Silumbwe, A., Halwindi, H., & Zulu, J. (2019). How community engagement strategies shape participation in mass drug administration programmes for lymphatic filariasis: the case of luangwa district, zambia. Plos Neglected Tropical Diseases, 13(11), e0007861. https://doi.org/10.1371/journal.pntd.0007861

[56] Stoll, P., Pauw, P., Tohme, F., & Grüning, C. (2021). Mobilising private adaptation finance: lessons learned from the green climate fund.. https://doi.org/10.21203/rs.3.rs-255703/v1

[57] Štreimikienė, D., Kyriakopoulos, G., Lekavičius, V., & Siksnelyte-Butkiene, I. (2021). Energy poverty and low carbon just energy transition: comparative study in lithuania and greece. Social Indicators Research, 158(1), 319-371. https://doi.org/10.1007/s11205-021-02685-9

[58] Taghizadeh-Hesary, F., Yoshino, N., & Phoumin, H. (2021). Analyzing the characteristics of green bond markets to facilitate green finance in the post-covid-19 world. Sustainability, 13(10), 5719. https://doi.org/10.3390/su13105719

[59] Thompson, J. (2021). Watching together: local media and rural civic engagement*. Rural Sociology, 86(4), 938-967. https://doi.org/10.1111/ruso.12383

[60] Turienzo, C., Newburn, M., Agyepong, A., Buabeng, R., Dignam, A., Abe, C., ... & Sandall, J. (2021). Addressing inequities in maternal health among women living in communities of social disadvantage and ethnic diversity. BMC Public Health, 21(1). https://doi.org/10.1186/s12889-021-10182-4

[61] Volz, U. (2022). Climate-proofing the global financial safety net. Journal of Globalization and Development, 13(1), 1-30. https://doi.org/10.1515/jgd-2020-0085

[62] Wardekker, A., Wildschut, D., Stemberger, S., & Sluijs, J. (2016). Screening regional management options for their impact on climate resilience: an approach and case study in the venen-vechtstreek wetlands in the netherlands. Springerplus, 5(1). https://doi.org/10.1186/s40064-016-2408-x

[63] Wijk, M., Naing, S., Franchy, S., Heslop, R., Lozano, I., Vila, J., … & Ballesté-Delpierre, C. (2020). Perception and knowledge of the effect of climate change on infectious diseases within the general public: a multinational cross-sectional survey-based study. Plos One, 15(11), e0241579. https://doi.org/10.1371/journal.pone.0241579

[64] Xue, Y., Ma, T., Zhuang, T., & Ma, Y. (2023). The development of green finance under the goal of carbon neutrality: a review from china's perspective. Frontiers in Earth Science, 11. https://doi.org/10.3389/feart.2023.1123020