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SMART FINANCING STRATEGIES FOR RESILIENT WATER AND ENERGY INFRASTRUCTURE

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The increasing effects of climate change, in the form of frequent droughts, extreme flooding, and ever-increasing temperatures, are threatening the working conditions of the world's water and energy infrastructure, as well as its sustainability in the future. Conventional financial tools have not been suitable to meet the scale and urgency of the resilience demand, particularly in areas with limited fiscal power that are the worst hit by climatic perturbations. This review challenges the modern financing principles that combine sustainability requirements, technological advancement, and inclusive governance systems into the investment blueprints. Basing the analysis on the theoretical basis of sustainable finance, resilience economics, and innovation systems, the instruments (green bonds, blended finance vehicles, ESG-grounded capital, and blockchain-enabled transaction platforms) are evaluated in their ability to attract private capital and, at the same time, achieve transparency and accountability. Case studies of the regions, based on the African, Asian, and American continents, shed light on the fact that successful patterns rely on multisectoral collaboration, reorganization of institutions, and the digital revolution. However, the barriers such as poor governance systems, data deficiencies, and deep-seated socio-economic imbalances are still there. The concept of smart financing, therefore, can only be viewed as a framework of governance that combines ethical, financial, and technological principles to foster adaptive, equitable, and performance-based infrastructure. The further development of these strategies will require strengthened policy coordination, harmonized data infrastructures, and inclusive governance to ensure that climate finance towards resilient water and energy systems is adequate, efficient, and fair.

KEYWORDS: ***Smart Financing; Climate Resilience; Water-Energy Nexus; Blended Finance; ESG Investment; Sustainable Infrastructure***

1. INTRODUCTION

The effects of climate risks are increasingly imposing on water and energy infrastructures all over the world, thus threatening their dependability and sustainability. Droughts, floods, and heat waves disrupt supply chains and destroy assets and undermine the quality of service (Ayyub & Hill, 2019). In most developing and climate-prone areas, there is still a lack of the financial and institutional resources required to build adaptive systems (Songwe, Stern, & Bhattacharya, 2022). Due to the significant gap between the investments needed to achieve climate resilience and the means that can be made available by the governmental budgets, innovative financing methods have become essential.

Smart financing is a new generation of processes that unites sustainability, technology, and inclusiveness as part of infrastructure investment (Yasar, 2022). These systems not only combine funding to quantifiable social and environmental results, but also draw in private financing, as well as use digital technologies to improve transparency and performance measurement (Sosa & Ivanova, 2025). The best examples are green bonds, blended finance, and models of impact investment that are based on environmental, social, and governance (ESG) principles (Benedetti et al., 2025).

At that, the global adaptation finance gap is still significant. According to the estimates by the United Nations, the cost of adaptation might not exceed USD 160 billion and USD 340 billion a year by 2030, and the existing financial flows are only a third of these needs. In other parts of the world, like sub-Saharan Africa and South Asia, access to credit and currency volatility, as well as governmental issues, limit capital to resilient infrastructure (Mbiyozo & Monyani, 2024). Another instance is the example of the United States, which showed that integrated policy and finance (public programs and state partnerships) can increase community resilience (Plastrik et al., 2020).

The review is a synthesis of theoretical and practical information regarding the idea of smart financing of resilient water and energy systems. It questions the ability of different financial models to enhance infrastructure adaptation, especially in climate-vulnerable regions. The research has three main objectives: to map current financial mechanisms that

assist in infrastructure adaptation, to find barriers that hinder the mobilization of climate finance, and in order to give evidence-based policy and practice recommendations to policymakers and practitioners. This review advances the idea of finance, technology, and governance convergence to gain insights into ways in which investment structures can be used to achieve long-term sustainability. The experience of African, Asian, and American regions teaches about the importance of cooperation between the governments, investors, and development partners.

2. THEORETICAL AND CONCEPTUAL FRAMEWORK

The idea of smart financing is based on 3 underlying theories, which include sustainable finance, resilience economics, and innovation systems theory. Sustainable finance is focused on aligning the financial choices with the long-term environmental and social goals (Ali & Kamraju, 2025). Resilience economics is concerned with the ability of systems to take in shock, and how these systems continue to perform necessary functions under stress (Meraj & Hashimoto, 2025). The innovation systems theory clarifies the mechanism of interaction between technological change and institutional adaptation to encourage development (Kapilashrami et al., 2024).

Altogether, these structures demonstrate the way financial instruments, systems of governance, and technological potential might intersect to create robust results. Sustainable financing encourages efficiency, inclusion, and stable returns in the short-term. The investments emphasize resilience, which is flexible and risk-managed (Chen, 2023), whereas digital transformation increases accountability using real-time monitoring and performance-driven incentives (Sosa & Ivanova, 2025). Smart financing in climate-vulnerable places has to navigate through complex risks such as climate uncertainty, socioeconomic and institutional frailty (Nor, 2025). Diversification and risk-sharing are assisted by such tools as resilience bonds, ESG-related credit, and green investment platforms (Sakyi et al., 2024). In this regard, smart financing is not just a financial instrument but a dynamic governance device that engages parties that have common resilience targets and sustainable development objectives.

3. GLOBAL ENVIRONMENT: CLIMATE CHANGE RISK AND INFRASTRUCTURE PROBLEMS

The effects of climate change are uneven, though it increases the strain on water and energy systems in most of the world. Poor underinvestment is chronic in developing areas and at the same time faces more climate risks that are becoming worse and more frequent (Songwe et al., 2022). This will require an annual investment of USD trillion and above to create universal access to resilient infrastructures, whereas current investments are nowhere near the goal. Climatic variability is known to be very prone to water systems. Increased salinity and droughts, and floods reduce the supply of water and destroy infrastructure (Granata & Di Nunno, 2025). Similarly, numerous energy infrastructure relies on the old grids and fossil-fuel supply networks, which are not designed to withstand extreme weather conditions (Elci et al., 2025). These issues highlight the importance of combining these strategies using financial innovation, sound governance, and advanced technology.

In the United States, a more developed resilience-financing paradigm combines federal funds with the motivation of the business. The Infrastructure Investment and Jobs Act is providing billions of dollars to climate-resilient infrastructure (Plastrik et al., 2020). States such as California and New York use resilience bonds and green banks to attract personal investments to renewable energy and water-efficient projects (Chen, 2023).In Europe, initiatives are undertaken to encourage sustainable transport, renewable energy, and circular economic development. The example of regional governance in terms of scaling up adaptation finance is the European Union structural and green transition funds (Bocaneala et al., 2024).

In Africa and Asia, but more so, funding is still highly dependent on international support, with chronic gaps. In sub-Saharan Africa, less than 12% of overall climate finance goes into infrastructure (Mbiyozo & Monyani, 2024). In South Asia, the process is hindered by a disjointed government and the availability of limited credit (Zen & Saputra, 2023). There are new blended-finance frameworks based on the World Bank, African Development Bank, and Green Climate Fund that are beginning to respond to such problems that focus on local governance and involvement of the private sector (Abdenur, 2026). There are challenges and opportunities in the water-energy nexus. Shared benefits can be generated in projects that increase the efficiency of water management through energy efficiency or through desalination that uses renewable power. However, according to Nor (2025), misaligned policies and financial siloing are a significant challenge. The trend is towards adaptive and performance-based financing globally, with the use of such tools as ESG-linked bonds, digital finance platforms, and AI-driven risk models (Sosa and Ivanova, 2025). However, the lack of data and poor governance remain ongoing problems that can hinder development.

4. FINANCING MECHANISM TYPOLOGY

Developing resilient water and energy systems entails varying financing systems that can raise significant capital while also dealing with climate risk. A study reveals that there are four significant forms of financing, including models of public, private, blended, and digital/ESG-related financing, each presupposing a specific structure, incentives, and design of risk-sharing. The role of financing by the private sector, which finances infrastructure through corporate investments, project finance, and institutional capital, becomes increasingly significant in the context of sustainable infrastructure. Whereas innovation and efficiency are mostly guaranteed by private investors, it needs predictable returns and proper regulatory structures.

Green bonds have been effective, especially among private tools. Such tools appeal to investors who appreciate quantifiable environmental outputs and offer governments with huge-scale resources of capital mobilization. According to Skyaki et al. (2024), green and resilience bonds are on the rise in Asia and Africa, but they are still largely confined to middle-income countries. Impact investing is another upcoming field where investors seek to obtain a combination of financial and beneficial environmental/social impact. The ESG-based funds are now mainstreamed, as they combine ethical principles with high-financial results (Benedetti et al., 2025). Mupa et al. (2024) showed that the inclusion of ESG factors in the decision-

making process of renewable energy investment could improve the performance and resilience of the project.

However, resilience-based financing by the private sector remains limited due to the perceived risk and lack of reliable project data. Guarantees and insurance products are other instruments that can mitigate these issues and bring in institutional investors (Ali & Kamraju, 2025). Blended finance combines both the resources of the government and the private sector and is equal in risk and ease of scale. It best applies when social returns are high and commercial returns are unknown. Project risk can be mitigated with concessional donor or government financing in order to attract greater amounts of private capital.

Public-private partnerships (PPPs) are a typical blended model whereby governments and the private entities share their roles and risks (Owotemu, 2025). PPPs, when properly organized, enhance efficiency and innovativeness. India and some of the countries in sub-Saharan Africa have introduced PPPs in renewable energy, water, and transport (Akanbi, 2025). Blended finance forms are also used by the Green Climate Fund and multilateral development banks, which provide concessional loans and equity co-investments to lure institutional investors (Songwe et al., 2022). But poorly designed PPPs may transfer an excessive risk to governments and leave them with long-term liabilities (Akomea-Frimpong et al., 2024). This is to be avoided through transparency in governance and performance-based contracts.

The advantages of each model are that the public finance is equitable, but constrained by the financial limit. The issue of private finance is that it brings in innovation but requires powerful institutions. Blended finance represents an intermediate between the two, where public resources are used to unlock private ones. The mechanisms increase transparency and monitoring, which are technology-driven. It is a merging of these models, and it is a global trend to hybrid financing that is a combination of financial innovation, good governance, and equity. Mohieldin et al. (2026) state that climate finance should be sufficient, efficient, and just, a balance between profit, inclusion, and sustainability.

5. INTELLIGENT FINANCING INNOVATIONS

The development of smart financing is a sign of the shift to systems that combine digital technology, sustainability requirements, and performance-based accountability. These strategies aid capital flows, climate resilience, and inclusive development, as well as enhancing transparency. There is an ever-growing number of mechanisms that utilize AI, blockchain, and ESG metrics to make investment decisions that can be measured to have an impact (Sosa & Ivanova, 2025).

5.1 Blockchain and Digital Finance

Blockchain is also making changes in the way money is being monitored and verified, and providing both decentralized and uncensored evidence that minimizes instances of misallocation. According to Sosa and Ivanova (2025), blockchain has the potential to facilitate the process of verification of green bonds or resilience-linked loans because it automatically documents environmental performance. Decentralized finance (DeFi) systems and payment systems allow communities and small investors to finance infrastructure projects. Mobile payment systems are also useful in Africa and Southeast Asia to finance renewable energy and water initiatives through crowdfunding (Chilambe et al., 2024). Smart contracts based on blockchain are being used in the United States to release funds automatically after resilience criteria are achieved to enhance efficiency and accountability (Nsama, 2025).

5.2 ESG Metrics and Impact

The concept of ESG integration is now established as a pillar of modern-day investment. The integration of environmental, social, and governance priorities into financial decision-making is a strategy that allows investors to make sure that infrastructure helps to achieve more sustainable objectives (Mupa et al., 2024). Portfolios are now analyzed using standardized ESG indicators. An example of rating can be seen in the case of energy projects; it is rated based on carbon intensity, labor practices, and governance standards. The implementation of ESG principles into a circular economy framework can balance growth with resource efficiency (Kandpal et al., 2024). Finance initiated by ESG is also directed at the investment in climate adaptation in vulnerable regions (Benedetti et al., 2025). However, irregular resilience indicators are a problem, and this explains the importance of worldwide harmonization in ESG reporting.

5.3 Digital Innovation in Finance

Digital tools increase financial inclusion so that small businesses and marginalised communities are able to get funds to adapt. According to Nor (2025), digital finance will be able to decrease the inequality in rural-urban areas and empower communities to invest in the local climate projects. There is also the direct financing of solar installations and community-owned water systems, which are now possible on mobile platforms (Mbiyozo, 2022). Such decentralised processes promote joint ownership and local empowerment. Smart financing illustrates the coming together of technology, governance, and finance. AI helps to improve monitoring, blockchain helps to promote transparency, ESG metrics help to be accountable, and the use of digital tools helps to expand participation. However, according to Mohieldin et al. (2026), technology should be accompanied by an effective and inclusive government to avoid inequality.

6. COMBINED FINANCING SOLUTIONS

Projects financed through integrated finance led to the creation of resilience benefits in multiple sectors. Blended finance and PPPs are some of the mechanisms that promote cross-sector cooperation. In Europe, the European Green Deal is an initiative that fosters the co-finance of hydropower and wastewater energy recovery (Bocaneala et al., 2024). In the developing world, the projects that are decentralized, like solar-powered irrigation in East Africa, may connect energy access to agricultural productivity to be financed by green bonds and climate funds (Chilambe et al., 2024).

In this section, the analysis of various institutions involved in the project will be carried out using a framework that examines the connection between the state and market (Vygotsky, 2005). The connection between the state and the market (Vygotsky, 2005) will be used in this section to analyze various institutions involved in the project. Integrated financing is successful when

there is coordination between ministries and agencies. The prevailing nature of siloed institutions and hindering the collaboration of initiatives is observed in many countries (Meraj & Hashimoto, 2025). The Nexus Project Framework (Rhouma et al., 2025) is one of the frameworks that promotes collaboration and efficiency via alignment of policies, shared measures, and shared responsibility.

6.1 Nexus Financing and Equity

There is also a need to promote social equity through the financing models. The rural and peri-urban population usually does not have access to clean water and stable energy. Combining the different sectors contributes to curbing inequality and building livelihoods (Nor, 2025). Ownership and sustainability are built through communal involvement, either by cooperatives or revolving funds (Mbiyozo, 2022). With smart grids and IoT systems, performance-based financing is supported by the possibility of monitoring water and energy consumption in real-time (Sosa & Ivanova, 2025). Data-sharing platforms enhance coordination across ministries and investors, as well as local actors, which form adaptive, cross-sector ecosystems.

7. REGIONAL CASE STUDIES

In the experience of the region, it is clear that approaches differ, yet innovation, good governance, and inclusiveness lead to success. Long-term tendencies of chronic vulnerabilities of Sub-Saharan Africa droughts, floods, and energy deficits have been met with ingenuity in community-based models and blended models. Solar irrigation projects like the Green Climate Fund initiatives in Kenya are the projects that connect food security to solar irrigation (Chilambe et al., 2024). Adaptation finance is now introduced alongside livelihood protection as part of regional programs via considering migration as a resilience strategy (Mbiyozo & Monyani, 2024).

The banks and investors are interested in off-grid solar in PPPs in Nigeria and Ghana (Owotemu, 2025). Nevertheless, institutional flaws and a lack of insurance cover are a hindrance. In Latin America, the threats posed by climate include drought and floods. The green bond programs and ESG-related governance reforms have been implemented in countries (Bocaneala et al., 2024). Blended finance has been implemented in Brazil and Mexico in renewable and water projects (Songwe, Stern, & Bhattacharya, 2022).

The cities, including Bogotá and São Paulo, have been issuing bonds pegged on resilience to finance flood management and transport systems. Political turnover and fiscal instability do pose a threat to continuity, however. Pacific Islands and Small Island developing states (SIDS) experience financing gaps owing to their small size and isolation. The concessional funding is being invested in renewable energy in Seychelles and other islands (Elci, Galindo & Sarcina, 2025). Fiji and Samoa have established climate trust funds that are a mix of donor and domestic funds (Abdenur, 2026). The Pacific Islands Forum enhances regional collaboration in terms of sharing funds and knowledge.

8. BARRIERS AND CHALLENGES

There are still major limitations to innovation. There are four categories of barriers, which include institutional, technological, socioeconomic, and political. The progress is undermined by weak governance, inconsistency in regulations, and the absence of data (Meraj & Hashimoto, 2025; Chen, 2023). The lack of data constrains the economic capacity of investors to price risk (Muthio Muoki et al., 2025), and digital divides rule out poorer areas (Nor, 2025). Long-term investment is deterring political instability and corruption (Zen & Saputra, 2023). The other barriers to equitable financing include gender and social inequality (Mbiyozo, 2022). In general, smart financing needs structural transformation in the form of robust institutions, sound data, and decentralized governance to attain sufficiency, efficiency, and justice (Mohieldin et al., 2026).

9. POLICYMAKING AND GOVERNING CONSEQUENCES

Good governance and proper policy are critical to translating smart financing into actual resilience outcomes. Constant regulation encourages investor confidence. The governments are to issue foreseeable regulations on tariffs, subsidies, and compliance (Owotemu, 2025). Green investments have national taxonomies that bring about clarifications (Ali & Kamraju, 2025). Duplication is minimized through institutional reforms, which include the merging of energy and water ministries and finance ministries (Meraj & Hashimoto, 2025). The tracking system is based on blockchains and can improve accountability (Sosa & Ivanova, 2025).

9.1 Fiscal Innovation and Incentives

Performance-based budgeting is a fiscal policy that is linked to resilience performance (Chen, 2023). Adaptation benefits are granted through tax incentives and resilience bonds to verified beneficiaries (Songwe, Stern, and Bhattacharya, 2022). The public investment bank can offer guarantees and concessional loans, which can trigger private capital (Zen & Saputra, 2023).

9.2The International and Regional Cooperation

The resilience financing gap can be resolved through global and regional cooperation (Abdenur, 2026). Risk and resources are pooled in regional coalitions like the Green Infrastructure Investment Coalition in Africa. The harmonization of reporting standards enhances the coordination between the recipient and donors (Mohieldin, Elbahtimy, & Shehata, 2026). Good policy implies matching the financial systems with the adaptation objectives. Open establishments, organized chiefship, and creative financial instruments promote responsibility and stability.

10. LIMITATIONS OF DATA AND MEASUREMENTS

Absence of standard data is one of the greatest bottlenecks. The restrictive nature of most financial reporting is based on the reduction of emissions as opposed to adaptive capacity (Chen, 2023). AI applications have the potential to improve risk modelling, although they demand a lot of data (Muthio Muoki et al., 2025). Research in the future needs to focus on harmonized resilience measures, such as social equity and ecosystem benefits. There is minimal research evaluating the adaptation finance beneficiary. There are no gender-sensitive frameworks in particular (Mbiyozo, 2022; Mbiyozo & Monyani, 2024).

Inclusive credit systems and participatory budgeting are some of the tools that can be used to encourage fairness (Nor, 2025). There is a lack of evidence regarding the impact of governance

reforms on financial performance (Akomea-Frimpong et al., 2024). Longitudinal and comparative studies would help to make clear the systems that would best meet resilience objectives. Work Integration of the Water-Energy Nexus in Research. The water-energy nexus has scarce research into financing. The economic and environmental benefits of integrated projects need to be measured in future work (Granata & Di ñunno, 2025; Rhouma et al., 2025). To fill these research gaps, it is important that interdisciplinary approaches that include finance, data science, and social policy are used. More effective and inclusive climate finance will be achieved through the availability of stronger data and equity frameworks.

11. CONCLUSION

One of the most urgent issues in the century is financing climate-resilient water and energy systems. Conventional processes cannot be effective because climate risks are increasing. Innovation, digital tools, and governance reform are the drivers of Smart financing that provide a way forward. This review has reviewed four pillars of financing, which include the public, the private, the blended, and the technology-driven pillars of financing. The public money guarantees equity; personal capital is associated with efficiency. Blended models provide the balance between, whereas emerging technologies like AI, blockchain, and ESG systems increase transparency.

The examples of Africa, with its blended models, and the models of Latin America, with their municipal bonds and their Pacific Island trust funds, prove that success depends on the context. The existing obstacles, including governance, insufficient data, and inequality, remain to deter gains. Fiscal policies, as well as transparency and inclusion, need systemic reforms. Finally, the idea of smart financing is not only a technical innovation but a process of transformation that involves ethics and finance, as well as governance. The future of climate finance should be adequate, effective, and equitable through cooperation between governments, investors, and communities.

REFERENCES

1. *Abdenur, A. E. (2026). The Role of Multilateral Development Banks in Climate Adaptation. In Policy-Driven Climate and Development Finance: Strategies for Equitable Solutions (p. 215).*
2. *Akanbi, A. A. Public-Private Partnerships (PPP) in Sustainable Infrastructure: Strategies for Accelerating Affordable, Low-Carbon Urban Development.*
3. *Alabi, M. (2024). Sustainable infrastructure and climate change resilience. ResearchGate.*
4. *Ali, M. A., & Kamraju, M. (2025). Financial Imperatives and Innovations for Climate Resilience. In Global Climate Governance: Strategies for Effective Management (pp. 89-122). Singapore: Springer Nature Singapore.*
5. *Ambrosio, N., Kim, Y. H., Swann, S., & Wang, Z. (2020). Addressing climate risk in financial decision making. In Optimizing community infrastructure (pp. 123-142). Butterworth-Heinemann.*
6. *Anjanappa, J., Samant, S., & Thakur, B. (2024). Bridging the gap: Addressing the unequal allocation of climate adaptation finance in the Global South. Available at SSRN 4985851.*
7. *Ayyub, B. M., & Hill, A. C. (2019). Climate-resilient infrastructure: Engineering and policy perspectives.The Bridge, 49(2).*
8. *Baskaran, G., Ekeruche, A., Heitzig, C., Ordu, A. U., & Senbet, L. W. (2023). Financing climate-resilient infrastructure in Africa.T20 Policy Brief in Purpose & Performance: Reassessing the Global Financial Order.*
9. *Benedetti, H., Ross, S., Sarkar, S., & Spieler, A. C. (2025). Variations of a Social Finance Theme: Socially Responsible Investing, ESG, Sustainable Investing, and Impact Investing. In The Palgrave Handbook of Social Finance (pp. 35-54). Cham: Springer Nature Switzerland.*
10. *BHAT, A. (2025). Energy & Sustainability in Developing Countries: India with J & K Perspective.From Resources to Growth, 31.*
11. *Bocaneala, A. M., Manole, D. S., Gherasim, E. A., Motorga, B., & Iliescu, L. C. (2024). European Funding for Sustainable Transport Systems – Influencing Factor of Regional Economic Development in Romania.Economies, 12(3), 51.*
12. *Chen, C. (2023). New insights for managing the public finance aspects of climate-resilient infrastructure systems. In Research Handbook on Public Financial Management (pp. 385-401). Edward Elgar Publishing.*
13. *Chilambe, P., Nguvi, C., Zulu, M., Jalango, D., & Mundia, C. (2024). Navigating the climate-finance landscape in Eastern Africa: An exploration of climate and agriculture finance instruments.*
14. *Chong, B., & Yip, E. (2025). The climate science, engineering and finance landscape.*
15. *Coffee, J. (2020). Financing Resilient Infrastructure. In Optimizing community infrastructure (pp. 101-121). Butterworth-Heinemann.*
16. *Dupir, M. (2025). Exploring investment mechanisms and long-term resilience in the face of climate change.Revista de Stiinte Politice, (87), 150-159.*
17. *Elci, S., Galindo, M., & Sarcina, A. (2025). Mobilising Science, Technology and Innovation to enhance energy efficiency and renewable energy application in Seychelles.*
18. *FRANCZAK, M., & WARNER, K. Innovative Finance to Ensure Stability in the Face of Adverse Climate Change Impacts.*
19. *Granata, F., & Di Nunno, F. (2025). Financing the Future of Water: Unlocking Investment, Innovation, and Governance for Resilient Infrastructure in a Changing Climate.Earth Systems and Environment, 1-25.*
20. *Jena, L. P. (2021). Financing climate-resilient infrastructure in cities.Emerging Economy Studies, 7(2), 107-114.*
21. *Kandpal, V., Jaswal, A., Santibanez Gonzalez, E. D., & Agarwal, N. (2024). Sustainable energy transition, circular economy, and ESG practices. In Sustainable Energy Transition: Circular Economy and Sustainable Financing for Environmental, Social and Governance (ESG) Practices (pp. 1-51). Cham: Springer Nature Switzerland.*
22. *Kapilashrami, M., Saltzberg, E., Gopal, S., Choi, Y. H., Min, J., Jeong, Y., ... & Song, Y. (2024). Developing a National Digitalization Readiness Index for Developing Countries.*
23. *Le, T. M., Leow, W. J., & Seiderer, F. (2020). Building resilience in infrastructure to climate change. In Well spent: How strong infrastructure governance can end waste in public investment (pp. 282-300).*
24. *Mbiyozo, A. N. (2022). Climate change, migration and gender: Seeking solutions. Institute for Security Studies.*
25. *Mbiyozo, A. N., & Monyani, M. Climate-linked mobility.*
26. *Meraj, G., & Hashimoto, S. (2025). Bridging the adaptation finance gap: The role of nature-based solutions for climate resilience.Sustainability Science, 1-15.*
27. *Mhaka, T. W. Regional Climate Compacts: Governance Frameworks for Cross-Border Climate Adaptation in Vulnerable Regions.*

28. *Mohieldin, M., Elbahtimy, M., & Shehata, M. (2026). Towards Sufficient, Efficient, and Just Climate and Development Finance. In Policy-Driven Climate and Development Finance: Strategies for Equitable Solutions (p. 321).*
29. *Mupa, M. N., Pamful, E. E., Nnaji, J. C., & Adu-Boahen, J. O. A. N. N. A. (2024). Integrating ESG factors in investment decision-making for renewable energy projects.IRE Journals, 8(2), 273-293.*
30. *Mures, A., Rothballer, B. R. C., & Zaballa, I. C. (2025). Practical Implementation Guide: Resilient Urban Energy Systems.*
31. *Muthio Muoki, N., Hauke, D., & Peterson, N. R. (2025). Climate and Finance Risk Assessments of Five Agribusinesses Using AI-Tools.*
32. *Nor, M. I. (2025). Exploring the nexus between climate finance, rural–urban disparities, and rural brain drain in Somalia: The mediating role of climate resilience.Frontiers in Sociology, 10, 1702333.*
33. *Nsama, F. (2025). Development of Sustainable Finance Strategies for Climate-Resilient Infrastructure Investments Across US States.Communication in Physical Sciences, 12(6), 1785-1813.*
34. *Owotemu, A. E. (2025). Public-Private Partnerships as a Catalyst for Sustainability and Decarbonisation of Infrastructure.Journal of Service Science and Management, 18(3), 177-203.*
35. *Plastrik, P., Coffee, J., Bernstein, S., & Cleveland, J. (2020). How state governments can help communities invest in climate resilience. Innovation Network for Communities, Climate Resilience Consulting, & The Summit Foundation.*
36. *Sakyi, J. K., Eboseremen, B. O., Adebayo, A. O., Essien, I. A., Okojie, J. S., & Soneye, O. M. (2024). Designing a sustainable financing model for emerging economies: Addressing climate goals through green bonds and ESG investments.International Journal of Multidisciplinary Futuristic Development, 5(1), 20-33.*
37. *Schiliuk, G., Miernik, D., Lapointe-Rohde, J., Attia, H., Durrani, A., Hinojales, M. M., ... & Giraldo, I. (2023). Global efforts to fight the consequences of climate change: The role of Regional Financing Arrangements. Luxembourg: Publications Office of the European Union.*
38. *Songwe, V., Stern, N., & Bhattacharya, A. (2022). Finance for climate action: Scaling up investment for climate and development. London: Grantham Research Institute on Climate Change and the Environment, London School of Economics and Political Science.*
39. *Sosa, M., & Ivanova, A. (2025). Innovation and Disruptive Technologies for Sustainable and Climate Finance.*
40. *Udohaya, N. (2025). Current Trends in Impact Investing. In Impact Investing and Financial Inclusion: Examining the Innovations that Empower the Underserved (pp. 291-322).*
41. *Varanasi, S. S. (2025). Climate-Resilient Urban Infrastructure in Emerging Economies: Policy and Technology Pathways for a Low-Carbon Future. Available at SSRN 5834203.*
42. *Yasar, S. (2022). Sustainable financing of smart cities. In Artificial Intelligence Perspective for Smart Cities (pp. 155-184). CRC Press.*
43. *Zen, F., & Saputra, W. (2023). Enhancing climate-resilient infrastructure development in Indonesia.Infrastructure for Inclusive Economic Development, 1, 193-215.*
44. *Zimmerman, R. (2017). Financing Sustainable Infrastructure: Reconciling Disaster and Traditional Financial Resources. In International Conference on Sustainable Infrastructure 2017 (pp. 176-187).*
45. *Zoya, B., Natalia, E., & Yusup, I. (2025). Investments in Sustainable Development: Assessing Economic Efficiency and Social Benefits.Reliability: Theory & Applications, 20(SI 9 (87)), 361-368.*