

# Blended Finance for Climate Resilience: A Bibliometric Analysis

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## ABSTRACT

Climate change has intensified the need for innovative financing mechanisms capable of supporting resilience-building initiatives and addressing the substantial adaptation financing gap. Among these mechanisms, blended finance has emerged as a strategic approach that combines public, private, and philanthropic capital to mobilize investment for sustainable development and climate-related projects. Despite growing scholarly interest in blended finance and climate resilience, a comprehensive understanding of the intellectual structure and evolution of this research field remains limited. Therefore, this study aims to map the development, knowledge structure, and emerging trends of blended finance for climate resilience through a bibliometric analysis. Data were collected from the Scopus database using relevant search terms related to blended finance and climate resilience. The retrieved bibliographic records were analyzed using VOSviewer to examine publication trends, co-authorship networks, institutional and country collaborations, citation patterns, and keyword co-occurrence relationships. The findings reveal that blended finance, climate change, finance, investments, and climate finance constitute the core themes of the literature. Overlay visualization indicates a recent shift toward research on renewable energy, energy transitions, carbon markets, and decarbonization, reflecting the growing integration of climate resilience and sustainable investment agendas. Collaboration analysis highlights the prominent roles of the United Kingdom and the United States as major contributors to the field, while citation analysis identifies climate finance governance and sustainable transition financing as the most influential research streams. The study concludes that blended finance has evolved into a multidisciplinary research domain that plays a critical role in mobilizing resources for climate resilience and sustainable development. These findings provide valuable insights for researchers, policymakers, and investors seeking to advance innovative financing strategies for climate adaptation and resilience-building initiatives.

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## 1. INTRODUCTION

Climate change has emerged as one of the most pressing global challenges of the twenty-first century, posing substantial

threats to environmental sustainability, economic development, and social well-being [1], [2]. The increasing frequency and intensity of climate-related hazards, including floods, droughts, heatwaves, sea-level rise, and extreme weather events, have significantly heightened the vulnerability of communities, infrastructure, and ecosystems worldwide. While mitigation efforts aimed at reducing greenhouse gas emissions remain essential, growing attention has been directed toward climate resilience, which refers to the capacity of individuals, communities, institutions, and systems to anticipate, withstand, adapt to, and recover from climate-induced shocks and stresses [3]. Building climate resilience requires substantial investments in adaptation infrastructure, disaster risk reduction, sustainable agriculture, resilient water systems, and nature-based solutions [4], [5]. However, despite the increasing recognition of climate resilience as a critical component of sustainable development, the financing required to implement resilience-building initiatives remains insufficient. Reports from international organizations consistently highlight a significant financing gap between available resources and the investments needed to support climate adaptation and resilience, particularly in developing countries that are disproportionately affected by climate change. This financing challenge has stimulated interest in innovative funding mechanisms capable of mobilizing resources from multiple stakeholders and leveraging additional investment flows to address climate resilience needs [6], [7].

Among the emerging financial approaches, blended finance has gained considerable prominence as a strategic mechanism for mobilizing private capital toward sustainable development objectives while reducing investment risks through the participation of public and philanthropic actors [8], [9]. Blended finance generally refers to the deliberate use of concessional or catalytic capital from governments, development finance institutions, and philanthropic organizations to attract additional private sector investment into

projects that generate positive social, environmental, and economic impacts. In the context of climate resilience, blended finance seeks to bridge the gap between public funding limitations and the growing demand for adaptation and resilience investments. By employing instruments such as guarantees, concessional loans, first-loss capital, technical assistance facilities, and risk-sharing arrangements, blended finance can enhance the financial attractiveness of resilience projects that might otherwise be perceived as too risky or insufficiently profitable by private investors [10], [11]. Consequently, blended finance has become increasingly integrated into international climate finance discussions, particularly within frameworks supporting the Sustainable Development Goals (SDGs), the Paris Agreement, and broader global sustainability agendas. The expanding role of blended finance reflects a growing recognition that achieving climate resilience at scale requires collaborative financing models that effectively combine public and private sector resources while promoting long-term sustainability and development outcomes.

The growing importance of blended finance for climate resilience has stimulated a rapidly expanding body of academic literature spanning multiple disciplines, including finance, economics, environmental studies, sustainability science, development studies, public policy, and climate governance. Existing studies have examined various aspects of blended finance, including its conceptual foundations, financial instruments, investment structures, governance mechanisms, effectiveness in mobilizing capital, risk mitigation strategies, and contributions to sustainable development objectives. Other research has focused specifically on climate adaptation finance, resilience-building investments, infrastructure financing, public-private partnerships, and the role of multilateral development institutions in facilitating climate-related investment flows. Additionally, increasing attention has been devoted to emerging themes such as green finance, environmental, social, and

governance (ESG) investing, nature-based solutions, impact investing, and resilience measurement frameworks. While this growing body of literature provides valuable insights into the evolving role of blended finance within climate resilience initiatives, the field remains fragmented across diverse research domains and disciplinary perspectives. As a result, scholars and practitioners face challenges in identifying the intellectual structure, dominant research themes, influential contributors, collaborative networks, and emerging trends that characterize the development of this research area.

Despite the increasing scholarly interest in blended finance and climate resilience, there remains a notable lack of comprehensive bibliometric studies that systematically map the evolution and knowledge structure of this field. Most existing reviews focus primarily on climate finance, sustainable finance, adaptation finance, or broader sustainability-related investment mechanisms without specifically examining the intersection between blended finance and climate resilience. Furthermore, traditional literature reviews often rely on qualitative synthesis approaches that may not fully capture the complex relationships among authors, institutions, countries, journals, and research themes within an expanding scientific domain. Bibliometric analysis offers a robust methodological approach for addressing these limitations by applying quantitative techniques to evaluate publication patterns, citation structures, co-authorship networks, co-citation relationships, and keyword co-occurrence patterns across large collections of scientific literature. Through bibliometric mapping and science visualization tools such as VOSviewer and Bibliometrix, researchers can identify influential publications, leading research clusters, emerging topics, and collaborative networks that shape the intellectual development of a particular field. Such analyses not only provide a comprehensive overview of existing knowledge but also facilitate the identification of research gaps and future directions that can support both

academic advancement and policy development.

Given the increasing urgency of climate resilience challenges and the growing importance of innovative financing mechanisms, a systematic bibliometric assessment of blended finance research is both timely and necessary. Understanding how scholarly attention toward blended finance for climate resilience has evolved over time can provide valuable insights into the maturity of the field, the distribution of research activities across geographical regions, and the emergence of new conceptual and practical approaches to resilience financing. Therefore, this study aims to conduct a comprehensive bibliometric analysis of global scientific publications related to blended finance for climate resilience indexed in the Scopus database. Specifically, the study seeks to examine publication trends, identify the most influential authors, journals, institutions, and countries, explore collaboration networks, analyze thematic structures through keyword co-occurrence mapping, and uncover emerging research directions within the field. By providing a systematic overview of the intellectual landscape of blended finance for climate resilience, this study contributes to the growing literature on climate finance and sustainable development while offering practical insights for policymakers, development practitioners, investors, and researchers seeking to advance effective financing strategies for climate adaptation and resilience-building initiatives worldwide.

## 2. METHODS

The methodology of this study consists of a bibliometric analysis that aimed at investigating the evolution, intellectual structure, and trends of the literature on blended finance for climate resilience. The term bibliometric analysis refers to a quantitative technique that helps researchers analyze scientific publications, assess their impact, identify the most influential authors, and visualize topic interrelationships within a certain scientific domain. For this research,



In the green cluster, the prominent terms include climate change, climate finance, risk assessment, developing countries, and innovation. Such keywords clearly indicate the concentration of research on overcoming the challenges posed by climate risks and investing in the development of climate adaptation strategies in highly exposed regions. The connection between climate finance and developing countries shows that there is a growing need to address the inequitable effects of climate change and find novel means of financing for the purposes of building resilience. Risk assessment is another important topic that proves that many researchers today are interested in learning about potential risks that may arise from climate investments.

Blue cluster revolves around themes such as finance, blended finance, SDG, ecosystem, and agriculture, signifying the connection between financial strategies and sustainable development goals. Blended finance and SDG share close ties in the literature, implying that scholars perceive blended finance as an essential tool through which funding can be channeled towards more holistic goals. Additionally, the tie-up with themes such as agriculture and ecosystem is indicative of increasing scholarly interest in financing nature-based projects and sustainable agriculture and ecosystem restoration projects. It may be concluded from the findings that scholars in the area acknowledge the significance of channeling funding towards resilient sectors that have positive social and economic impacts.

The red cluster contains terminology such as investments, renewable energy, energy policy, carbon markets, energy transitions, and decarbonisation. The red cluster symbolizes the investment-driven nature of the blended finance concept as far as transitioning towards low-carbon societies is concerned. The association between renewable energy, carbon markets, and energy transitions proves that a substantial part of scholarly publications addresses the

use of financial resources for climate change mitigation strategies. Since the terminology related to the financial aspects of blended financing appears in the list, it can be argued that the concept of blended financing is often regarded as a way to involve investors in developing renewable energy and sustainable infrastructure.

The yellow cluster highlights the connection between sustainable development goals, green finance, public-private partnership, funding, and financing mechanisms, thus showing the governance and implementation aspect of the topic. The use of public-private partnership and financing mechanisms shows that researchers now pay increasing attention to developing institutional frameworks that will enable the mobilization of a variety of sources of funding. From the above cluster, one can conclude that, for a successful implementation of climate resilience programs, it is necessary not only to obtain sufficient funding, but also to create such governance frameworks that will allow for the coordination of actions between governments, development institutions, private investors, and civil society organizations.

From Figure 2, one gains a deeper understanding of the chronological emergence of themes in the research on blended finance in climate resilience by plotting keywords based on their average publication years. Keywords depicted in dark blue and purple colors denote early research themes, whereas green and yellow colors depict current research themes. From the plot, one can observe that early key research themes in the field include concepts such as blended finance, finance, climate finance, SDGs, and innovation. Such themes are indicative of early researcher interest in comprehending the financial architecture and mechanisms involved in mobilizing finance. The centrality of these concepts is a clear indicator of their continued relevance even in current research.

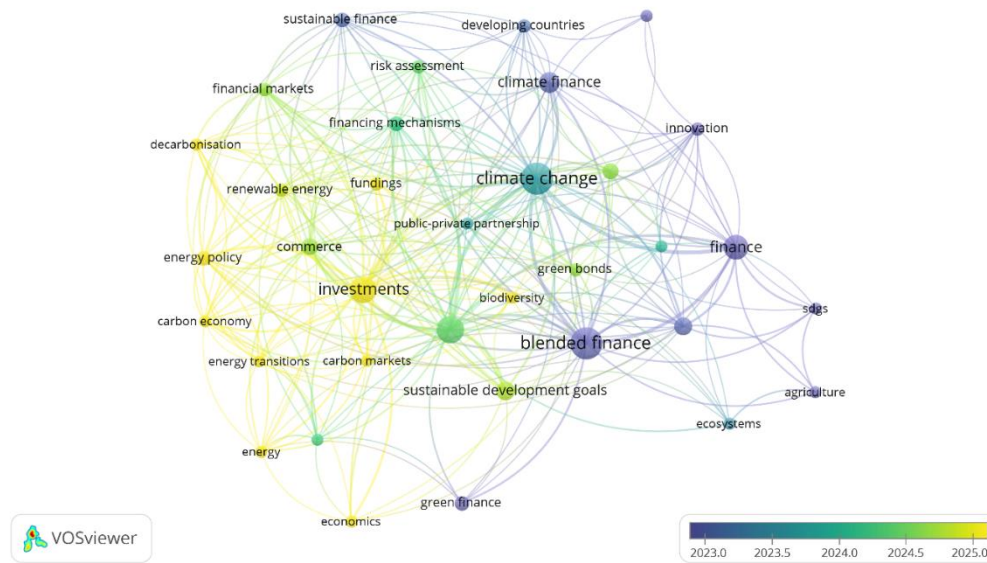


Figure 2. Overlay Visualization

Source: Data Analysis Result, 2026

Another point worth mentioning is the development of themes related to climate change and governance, which became important starting with 2024. Such keywords as climate change, public-private partnership, risk management, funding, green bond, and developing countries are marked in green and turquoise colors. Thus, the increasing scholarly interest in ways of leveraging climate change finance through practical means could be noted. The focus of research on the topic has moved from blended finance to financial instruments that may assist in creating resilient investments related to climate change. Moreover, the emphasis on developing countries reveals the concern over the issue.

The most recent trends in research are illustrated through keywords colored in yellow, such as investments, renewable energy, energy transitions, carbon markets, carbon economy, decarbonisation, and energy policy. These keywords signal that modern research has become increasingly focused on the connection between blended finance and the transition of the world to the new reality where carbon-neutral and climate-resilient economies prevail. Academics have stopped researching blended finance simply as an

instrument for financing development projects and started looking into ways of using blended finance in order to facilitate substantial investments in renewables and carbon reductions programs. The above trend shows that research in the area of blended finance is moving towards greater attention paid to investment generation, energy transition, and market mechanisms.

Figure 3 shows the most widely studied subjects from among those explored by researchers on blended finance for climate resilience. In the density maps of VOSviewer, highly frequented and strongly linked keywords are displayed in bright yellow, whereas green and blue zones represent those subjects which have received relatively less attention from researchers. Figure 3 reveals that blended finance, climate change, finance, and investments are depicted in the bright yellow zone. This means that these subjects are in the center of the subject of research in the literature under consideration. These subjects are in the middle of attention, and their highly dense cluster around them indicates that the literature aims at studying the role of blended finance mechanisms in financing climate change problems.



Figure 3. Density Visualization  
 Source: Data Analysis Result, 2026

Outside the dominant issues discussed, other secondary dense clusters arise with regard to the terms "climate finance," "green bonds," "sustainable development goals," "public-private partnership," "renewable energy," and "developing countries." These are some of the key aspects that help to link financial instruments to the issues of climate change

adaptation and sustainability. However, unlike those above-mentioned terms, agriculture, ecosystems, innovation, carbon economy, energy transition, and risk assessment have less dense clusters of articles. This is indicative of the fact that there may be future avenues for exploration with respect to how blended finance could enable resilience building in these sectors.

### 3.2 Co-Authorship Analysis

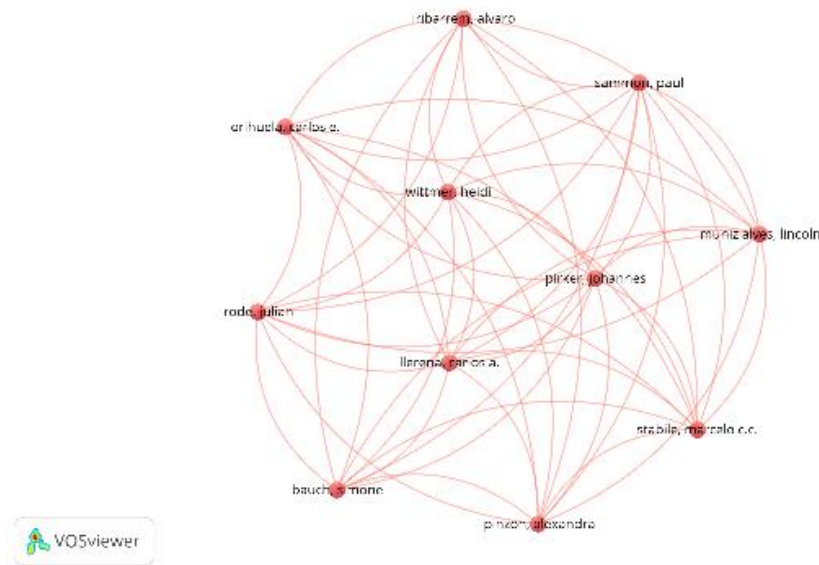


Figure 5. Author Visualization  
 Source: Data Analysis Result, 2026

Figure 5 highlights the collaborative interactions between researchers involved in the study of blended finance and climate resilience. This network seems highly interconnected, whereby almost all authors are connected by more than one tie, implying a certain cohesiveness in the research network. Samman, Paul, Munir, Lincoln, Stabile, Marcelo C.C., Pinzón, Alexandra, and Walker, Heidi are key individuals in the network who appear to be central. This

suggests their pivotal role in fostering collaboration and knowledge sharing. Indeed, the high number of ties reveals the fact that most publications in this research area have been developed collaboratively rather than individually. Collaborative work is typical of multi-disciplinary studies such as those involving climate finance, where skills from different disciplines including finance, environmental sciences, economics, and public policy are necessary.

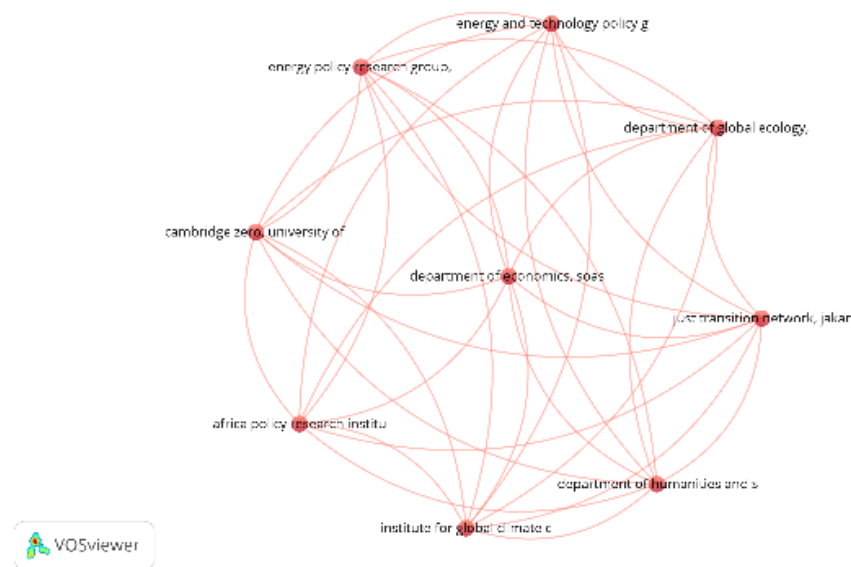


Figure 4. Institution Visualization

Source: Data Analysis Result, 2026

As depicted in Figure 4, there exists a highly interrelated structure between the organizations engaged in researching issues associated with blended finance and climate resilience. Based on the presented visualization, it can be stated that institutions like Department of Economics, SOAS, Department of Global Ecology, Energy and Technology Policy Group, and the Just Transition Network Jakarta possess central positions within the network, implying their high level of involvement in facilitating collaborative research work. Given the density of connections in the provided network, one may conclude that the field of

research under discussion features intense cooperation between various institutions due to its multi-disciplinary nature, which involves such spheres as economics, environmental science, public policy, sustainability studies, and development research. In addition, the participation of organizations that operate on different continents and in different academic areas, such as the University of Cambridge, Africa Policy Research Institute, and the Institute for Global Climate Change, proves the international dimension of blended finance research.

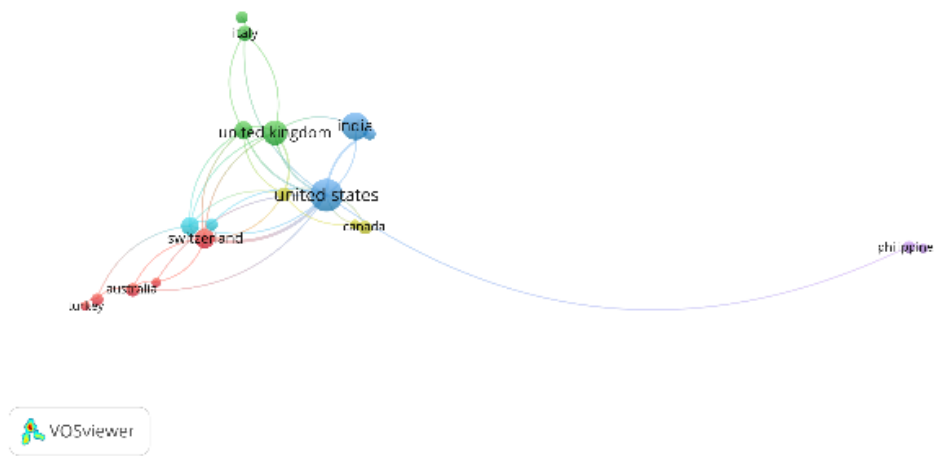


Figure 6. Country Visualization  
 Source: Data Analysis Result, 2026

As illustrated in Figure 6 below, research into the area of blended finance and climate resilience is limited to few nations, whereby the UK and US have emerged at the center of the network, owing to their high number of collaborative ties. They represent nations with the highest degree of engagement in conducting and coordinating international research in this area. Other nations, such as India, China, Switzerland, Australia, and Tuvalu, have links to this network via different collaborative ties, illustrating the international and multi-disciplinary aspect of research concerning the finance aspect of climate change. From the map, it is clear that there exist robust

collaborations among developed nations, which implies that most intellectual capital and research in this field comes from those with advanced financial markets and established climate policies. The inclusion of nations such as Tuvalu and the Philippines further indicates the emerging global interests in overcoming the resilience issues of areas facing severe impacts of climate change. Nonetheless, the peripheral position of nations such as Germany demonstrates unequal participation globally in such research, offering an opportunity for expanding international cooperation and involvement of researchers from developing economies.

### 3.3 Citation Analysis

Table 1. Top Cited Research

Citations	Authors and year	Title
137	[12]	Climate finance governance: Fit for purpose?
63	[13]	Financing for water-Water for financing: A global review of policy and practice
62	[14]	Financing renewable energy: policy insights from Brazil and Nigeria
56	[15]	Blended finance for agriculture: exploring the constraints and possibilities of combining financial instruments for sustainable transitions
54	[16]	An integrative framework for sustainable coral reef restoration

Citations	Authors and year	Title
44	[17]	Why 'blended finance' could help transitions to sustainable landscapes: Lessons from the Unlocking Forest Finance project
35	[18]	Barriers and opportunities facing the UK Peatland Code: A case-study of blended green finance
30	[19]	Just transition transaction in South Africa: an innovative way to finance accelerated phase out of coal and fund social justice
24	[15]	Blended finance for agriculture: Exploring the constraints and possibilities of combining financial instruments for sustainable transitions
24	[20]	A review of innovative bond instruments for sustainable development in Asia

Source: Scopus, 2026

As shown in Table 1, research in climate finance is the most popular topic among all other researches with studies focused on governance in climate finance, blended finance, sustainable agriculture, renewable energy, financing water, and sustainable landscape transition dominating the citations list. Studies of [12] were most cited for 137 times, which suggests that governance continues to be the core topic in climate finance studies. Some highly cited articles deal directly with blended finance such as those written by [15], [17] that talk about the role of blended finance in agriculture and sustainable landscape transition.

#### 4. CONCLUSION

This bibliometric analysis provides a comprehensive overview of the intellectual landscape of research on blended finance for climate resilience. The findings reveal that the field has evolved into an interdisciplinary area that integrates climate finance, sustainable development, investment mobilization, energy transition, and environmental governance. Keyword network analysis identified blended finance, climate change, finance, investments, and climate finance as the dominant themes, while overlay visualization demonstrated a recent shift toward topics such as renewable energy,

carbon markets, decarbonization, and energy transitions. The density analysis further confirmed that financial mobilization for climate resilience remains the core focus of the literature, whereas areas such as agriculture, ecosystems, innovation, and risk management offer promising opportunities for future investigation. Collaboration analyses showed that research activities are concentrated among a relatively small group of authors, institutions, and countries, with the United Kingdom and the United States serving as key hubs within the global knowledge network. Citation analysis highlighted the strong influence of studies related to climate finance governance, sustainable agriculture, renewable energy financing, and blended finance mechanisms for landscape and ecosystem transitions. The results indicate that blended finance has become an increasingly important mechanism for addressing climate resilience challenges by leveraging public and private capital to support sustainable development objectives. Future research should focus on expanding empirical evidence from developing countries, evaluating the effectiveness of blended finance instruments in resilience outcomes, and exploring innovative financing models that can accelerate climate adaptation and support a just transition toward sustainable and resilient economies.

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