
Climate Finance and Sustainable Development in Nigeria's Lake Chad Basin: A Case Study of Borno State

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Abstract:

The Lake Chad Basin, spanning Cameroon, Chad, Niger, and Nigeria, supports millions of people through fishing, agriculture, and pastoralism. However, the lake has shrunk by about 90% since the 1960s, causing water scarcity, food insecurity, and displacement. These challenges are further intensified by climate change and regional insecurity, making climate finance essential for strengthening resilience and sustainable development. This study aims to analyze climate finance flows, challenges, and impacts in the Lake Chad Basin, focusing on Borno State, Nigeria. The research applies a qualitative case study approach based on literature review, analysis of climate finance project data, and stakeholder insights. The findings show that Nigeria mobilized about \$4.9 billion in climate finance between 2015 and 2021, which remains far below the estimated financing needs. Most funding comes from international sources, while implementation at the local level faces institutional and security constraints. Some programs have improved agricultural productivity and livelihoods, but governance and equity challenges persist. Strengthening local capacity, community participation, and transparent financing mechanisms is essential to ensure climate finance effectively supports resilience and poverty reduction in the region.

Keywords: Climate Finance, Sustainable Development, Lake Chad Basin, Cameroon, Chad.

Abstrak :

Cekungan Danau Chad yang meliputi Kamerun, Chad, Niger, dan Nigeria menopang kehidupan jutaan masyarakat melalui kegiatan perikanan, pertanian, dan peternakan. Namun, luas Danau Chad telah menyusut sekitar 90% sejak tahun 1960-an, yang menyebabkan kelangkaan air, kerawanan pangan, serta perpindahan penduduk. Kondisi ini semakin diperburuk oleh perubahan iklim dan ketidakamanan regional, sehingga pembiayaan iklim menjadi sangat penting untuk memperkuat ketahanan dan pembangunan berkelanjutan. Penelitian ini bertujuan untuk menganalisis aliran pembiayaan iklim, tantangan, serta dampaknya di kawasan Cekungan Danau Chad dengan fokus pada Negara Bagian Borno, Nigeria. Penelitian menggunakan pendekatan studi kasus kualitatif yang didasarkan pada tinjauan literatur, analisis data proyek pembiayaan iklim, serta informasi dari pemangku kepentingan. Hasil penelitian menunjukkan bahwa Nigeria berhasil memobilisasi sekitar \$4,9 miliar pembiayaan iklim selama periode 2015–2021, namun jumlah tersebut masih jauh di bawah kebutuhan pendanaan yang diperkirakan. Sebagian besar pendanaan berasal dari sumber internasional, sementara implementasi di tingkat lokal masih menghadapi kendala kelembagaan dan keamanan. Beberapa program telah meningkatkan produktivitas pertanian dan mata pencaharian masyarakat, namun tantangan tata kelola dan kesetaraan masih tetap ada. Oleh karena itu, penguatan kapasitas lokal, partisipasi masyarakat, serta mekanisme pembiayaan yang transparan diperlukan agar pembiayaan iklim dapat secara efektif mendukung ketahanan dan pengurangan kemiskinan di kawasan tersebut.

Kata Kunci: Pendanaan Iklim, Pembangunan Berkelanjutan, Cekungan Danau Chad, Kamerun, Chad.

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INTRODUCTION

The Lake Chad Basin plays a crucial role in supporting the livelihoods of millions of people across Cameroon, Chad, Niger, and Nigeria. The basin provides essential resources for fishing, agriculture, and pastoral activities that sustain local economies and food security. However, over the past several decades the region has faced severe environmental and socio-economic pressures, including climate change, water scarcity, food insecurity, and increasing poverty. These challenges have significantly affected communities that depend heavily on the lake's natural resources.

Over the past six decades, the size of Lake Chad has declined dramatically. Historically covering approximately 25,000 km², the lake has shrunk by nearly 90 percent due to prolonged droughts, reduced rainfall, rising temperatures, and diversion of water inflows (Kitoto, 2021; Lemenkova, 2023; Magrin, 2016; Mahamat et al., 2021; Mahmood & Jia, 2018; Pham-Duc et al., 2020). Recent studies further show that regional warming in the Lake Chad Basin is occurring at a rate approximately 1.5 times faster than the global average, which significantly contributes to the continued shrinkage of the lake (Irwandi et al., 2023; Mahmood et al., 2019). In addition to climatic factors, human activities such as intensive agricultural water use and upstream dam construction have also accelerated the lake's decline (Fokeng et al., 2024; Okpara et al., 2015).

The shrinking of Lake Chad has had severe consequences for the more than 30 million people who depend on its resources for their livelihoods (Abu & Ahmed, 2021; Soboyejo et al., 2021). Reduced water availability has disrupted agricultural production, fisheries, and grazing lands, contributing to economic hardship and increased vulnerability in the region (Lenton et al., 2023; Okpara et al., 2016; Sulonov & Pant, 2024). Many communities now experience chronic water shortages and environmental degradation, with water availability in some areas falling below 550 m³ per person annually (Idika-Kalu, 2020; Soboyejo et al., 2021).

In northeastern Nigeria, particularly in Borno, Yobe, and Adamawa states, the impacts of climate variability such as severe floods and droughts have further intensified social and economic instability. Between 2019 and 2023, these climate shocks contributed to large-scale displacement and livelihood disruption (Kamta et al., 2020; Kohnert, 2024; Lasater et al., 2025; Ogunwumi et al., 2022). Combined with the shrinking of Lake Chad, these environmental pressures have displaced millions of people across the basin, with internally displaced persons in the region exceeding three million as of recent estimates (Batault et al., 2024; Kamta & Scheffran, 2021; Sulaiman, 2023).

In response to these challenges, climate finance has become an important mechanism for supporting climate mitigation and adaptation initiatives aimed at strengthening resilience and promoting sustainable development in vulnerable regions. Climate finance mobilizes financial resources from international donors, governments, and private sector actors to support programs that reduce greenhouse gas emissions, enhance climate resilience, and protect ecosystems and livelihoods.

Despite the growing importance of climate finance, limited research has examined how these funding mechanisms operate and contribute to sustainable development outcomes in conflict-affected areas such as Borno State. Issues such as weak institutional capacity, limited stakeholder coordination, and challenges in project implementation often constrain the effectiveness of climate finance initiatives in the region. Therefore, this study examines the role of climate financing and funding mechanisms in supporting sustainable development projects in the Lake Chad Basin region of Borno State, Nigeria, with particular attention to their influence on climate resilience, poverty alleviation, and social equity.

RESEARCH METHODOLOGY

This study employs a qualitative case study approach to examine the role of climate finance in supporting sustainable development in the Lake Chad Basin, with particular focus on Borno

State in northeastern Nigeria. A qualitative research design is appropriate for exploring complex social, institutional, and policy dynamics associated with climate finance and development interventions in fragile and conflict-affected regions. According to Robert K. Yin (2018), the case study method is suitable when researchers aim to investigate contemporary phenomena within their real-life context, especially where the boundaries between the phenomenon and context are not clearly evident. Similarly, John W. Creswell (2014) notes that qualitative research enables an in-depth understanding of social processes, institutional arrangements, and stakeholder perspectives.

Borno State was selected as the focal study area because it represents one of the regions most affected by the shrinking of Lake Chad, climate variability, and socio-economic vulnerability. The state is also a key recipient of climate-related development programs implemented through international organizations and development partners operating in the Lake Chad Basin.

The study relies on multiple sources of qualitative data to enhance reliability and triangulation. First, an extensive review of peer-reviewed academic literature was conducted to examine existing knowledge on climate finance, climate adaptation, and sustainable development in the Lake Chad Basin. Second, the research utilized official policy documents and institutional reports, including those published by the United Nations Framework Convention on Climate Change (UNFCCC), the World Bank, and regional development organizations working in the basin. Climate finance tracking reports produced by the Climate Policy Initiative (CPI) were also examined to identify trends in funding flows and financial instruments supporting climate-related projects.

Additional data were obtained from project documentation and program reports related to climate adaptation initiatives implemented in Nigeria, including climate resilience and environmental restoration programs operating within the Lake Chad region. These documents provided insights into the structure, funding mechanisms, and implementation outcomes of climate finance projects in the study area.

To complement the documentary evidence, the study conducted semi-structured key informant interviews with relevant stakeholders in late 2025. Approximately 15 participants were interviewed, including state government officials from environmental and planning departments, representatives of local non-governmental organizations involved in climate adaptation and community development, and representatives of international donor agencies supporting climate projects in the Lake Chad Basin. Semi-structured interviews were chosen because they allow researchers to explore participants' experiences and perceptions while maintaining flexibility in the discussion (Bryman, 2016). The interviews focused on key issues such as project implementation processes, barriers to accessing climate finance, institutional coordination, and the perceived impacts of climate-funded projects on local communities.

The collected qualitative data were analyzed using thematic analysis, a widely used method for identifying patterns and themes within qualitative datasets. According to Virginia Braun and Victoria Clarke (2006), thematic analysis provides a systematic framework for organizing and interpreting qualitative information. In this study, the coding process focused on three main analytical themes:

1. Sources and volumes of climate finance received in the region;
2. Types of climate-related projects funded, including adaptation and resilience initiatives; and
3. Institutional, social, and economic factors influencing the effectiveness and accessibility of climate finance.

To strengthen the validity of the findings, the results from interviews were triangulated with documentary evidence and existing literature, allowing for cross-verification of information from

different sources (Yin, 2018). This triangulation approach helps ensure a more comprehensive and reliable understanding of how climate finance operates in the Lake Chad Basin and how it contributes to sustainable development outcomes in Borno State.

DISCUSSION

Table 1 summarizes national climate finance flows and distributions for Nigeria, to provide context. Between 2015 and 2021, Nigeria mobilized roughly USD 4.928 billion for 828 climate-related projects.

Table 1. Climate finance in Nigeria (2015–2021).

Indicator	Value
Total climate finance (2015–2021)	\$4.928 billion
Number of projects (2015–2021)	828
Average annual finance	\$704 million
Adaptation finance (share of total)	\$2.50 billion (52%)
Mitigation finance (share of total)	\$2.09 billion (43%)
Domestic share of climate finance	19%

This corresponds to an average of about \$704 million per year. Of this total, 52% (\$2.5B) went to adaptation efforts, while 43% (\$2.09B) went to mitigation. (The remaining funds were cross-cutting or not classified.) Domestic contributions were minimal – only about 19% of climate finance originated from Nigerian sources, meaning the country has depended heavily on international funding. The largest single donor was the World Bank (\$3.17B, 64% of funding), followed by development partners (France, EU institutions, AfDB). Seventy-five percent of the financing was provided as concessional loans, which adds to Nigeria’s debt burden.

Climate finance programs in Borno: We identified several climate-related projects operating in or affecting Borno State. Notably, the Nigeria Climate Adaptation, Erosion and Watershed Project, financed by a €175 million loan from the European Investment Bank, covers 23 states, including Borno. This program funds infrastructure for watershed protection, gully control, and flood management to improve resilience. Additionally, multilateral donors (World Bank, UNDP) have supported initiatives in the broader Lake Chad area. The World Bank’s Lake Chad Region Recovery and Development Project (PROLAC, US\$170M), launched in 2020 (for Cameroon, Chad, Niger), promotes climate-resilient agriculture and markets, reaching over a million people. (While PROLAC did not directly include Nigeria, a similar World Bank program addresses related needs on the Nigerian side.) International climate funds have accredited Nigeria to receive GCF and GEF grants; however, only a few of these flows have specifically targeted Borno. Local NGO interviewees noted that much of the external aid in Borno has been in humanitarian support and general development, not labeled as “climate finance.”

Challenges in funding access and delivery: Across all sources, a clear pattern emerges: funding shortfalls and governance barriers. The absolute scale of climate finance is small relative to needs; even Nigeria’s entire \$4.9B for 2015–21 represents less than 1% of annual GDP. Interviewees from government and NGOs reported that federal and state budgeting for climate adaptation is negligible. As one local official explained, Borno has virtually no dedicated climate budget, making it dependent on external programs. The preference for loan-based finance has also been criticized, since debt servicing diverts resources from poverty reduction.

Capacity constraints are acute at the state and community level. Officials lamented a lack of technical expertise in proposal writing and project management, resulting in many climate grants going unused. Stakeholders noted fragmentation among agencies: the environmental department often fails to coordinate with the agriculture and water ministries, resulting in overlap or gaps.

Several interviewees mentioned that project approval cycles (both national and donor) are very slow, causing frustration. These observations echo the Connected Development report's finding of "gaps in ... effective governance at both national and sub-national levels" for climate action.

Security issues in Borno further hamper funding effectiveness. The presence of insurgent groups raises risk perceptions among donors and investors. For instance, planned renewable energy and irrigation projects in rural areas have been delayed or downsized due to safety concerns. Some private-sector actors reportedly avoid Borno altogether, limiting public, private partnership (PPP) opportunities. A few interviewed experts noted that active conflict zones can attract targeted funds (emergency relief), but longer-term climate investment has been sparse where security is unstable. In short, the nexus of climate risk and conflict in Borno complicates the climate finance landscape.

Impacts on resilience, poverty, and equity: Despite the challenges, existing projects demonstrate the potential benefits of climate finance. Where implemented effectively, adaptation investments have increased resilience and productivity. The World Bank feature report highlights that projects in the Lake Chad basin have "facilitated climate-resilient agriculture" and improved livelihoods for over 1.5 million people. In one project area, farmers doubled their harvests over two years due to improved irrigation and inputs[3]. Notably, these programs often include food-security components, such as distributing drought-tolerant seeds, rehabilitating wells, and training farmers in conservation agriculture. Such activities directly bolster climate resilience and also reduce poverty by increasing yields and incomes. As a Borno NGO observed, even small water-harvesting structures or efficient cookstoves can yield big benefits for poor households if scaled across communities.

Regarding poverty alleviation, climate finance projects with livelihoods components have had measurable impacts. PROLAC's labor-intensive works in neighboring Cameroon and Niger, generated over 50,000 workdays for rural residents (many of them youth and women) during drought recovery efforts. Similar principles apply in Nigeria: road repairs, school rebuilding, and market rehabilitation (all eligible under climate adaptation) could provide jobs and market access in Borno. However, our findings suggest that insufficient funding means such "quick-win" interventions rarely reach Borno's vulnerable populations. In interviews, community leaders repeatedly linked lack of climate funding to continuing hunger: families that once grew surplus corn now rely on food aid each season.

On social equity, projects that have explicitly targeted marginalized groups demonstrate the inclusivity potential of climate finance. PROLAC reports that roughly half of its beneficiaries are women, reflecting intentional design to empower female farmers and traders. Likewise, Borno stakeholders emphasized the need for gender-responsive climate programs; for instance, ensuring women obtain both training and credit for agroforestry initiatives. Conversely, several local respondents argued that when planning is top-down, benefits tend to accrue to better-connected elites (commercial ranchers) rather than to landless fishers or subsistence farmers. The consensus is that inclusive governance of climate funds involving village councils, farmer groups, and youth organizations in decision-making is critical to achieving equitable outcomes (echoing the recommendation to strengthen local capacity and participation).

Finally, we observed that the coordination and tracking of climate funding are weak. Interviewees noted a lack of transparent databases on which agencies received which climate grants. This aligns with expert calls for "robust tracking mechanisms to ensure transparency and accountability" in the use of climate finance. In practice, this means some Borno projects may be ongoing without local actors even knowing their funding sources (hence missing opportunities for scale-up or replication).

The analysis reveals a critical mismatch between the climate resilience needs of the Lake Chad region and the scale of funding reaching it. Borno State, with its acute climate vulnerability

and high poverty, is still inadequately served by existing climate finance mechanisms. Two major points emerge: the first is mobilization (how much money is raised), and the second is allocation and effectiveness (how well funds are used).

Mobilization and new instruments: Nationally, Nigeria's climate finance is on a trajectory of modest growth, but still dwarfed by its needs. Encouragingly, government leaders have begun to adopt innovative financing tools. In late 2025, President Tinubu announced a new Nigeria Climate Investment Platform and a National Climate Change Fund (targeting $\$500M$ and $\$2B$, respectively) to leverage more climate-resilient infrastructure and projects. Simultaneously, Nigeria's sovereign green bond issuances have seen strong investor interest (a $\$50B$ bond was 182% subscribed). These developments show an official commitment to diversify climate funding sources – shifting towards blended finance structures that combine public, private and philanthropic capital. Such blending can de-risk projects and make funds go further, if managed properly. For Borno, tapping into these new channels (like the national fund or green bonds) could offer additional project financing beyond traditional aid.

However, scaling up resources is only half the solution. Governance and allocation must be addressed in parallel. Our findings echo other research that underscores the importance of strong institutions and policies to make climate finance effective. In Nigeria and Borno, weak coordination has meant that finance can bypass vulnerable communities. To improve this, several actions are needed:

1. **Strengthening local institutions:** State and local governments should be empowered with clear mandates and technical capacity to manage climate projects. Some analysts argue that climate adaptation works best when sub-national bodies can directly access and disburse funds. Borno could establish a dedicated climate adaptation unit with specialists in agriculture, water and energy. Training programs (supported by donors) could build skills in project appraisal and climate science among officials. This would reduce delays and leakage, ensuring a larger share of climate finance is absorbed at the community level.
2. **Inclusive stakeholder engagement:** Effective climate action requires collaboration among government, NGOs, the private sector and local communities. Our interviews highlighted that past projects sometimes failed because they did not involve farmers or fishers in planning. By contrast, programs that give communities a voice – involving fishing cooperatives in lake management projects – tend to be more successful. Policies should mandate participatory approaches and gender mainstreaming in project design. Donors can support this by requiring evidence of local consultation and benefit-sharing when approving grants.
3. **Targeting poverty and equity:** Climate finance should explicitly link to poverty reduction goals. Given the Lake Chad Basin's food insecurity, investments in climate-smart agriculture (drought-tolerant seeds, small-scale irrigation) are promising. These also generate livelihoods, addressing social equity. For instance, hiring and training women as extension agents or canal laborers can empower the most marginalized. Results from PROLAC show that combining resilience-building with employment (50k jobs in Chad project) had immediate poverty alleviation effects. Borno could adapt such models at smaller scale – labor-for-work programs to rehabilitate watersheds. Aligning climate projects with Nigeria's poverty alleviation schemes (like the social safety nets) could also co-finance adaptation at the community level.

Finally, international donors and development banks have key roles to play. They should continue supporting the Lake Chad Basin – now recognized as a nexus of climate and conflict – with flexible, long-term programs. The World Bank's broad, multi-country approach (PROLAC)

is one model; another is the UN's Lake Chad Recovery strategy. Donors can coordinate through the Lake Chad Basin Commission to align resources. They should also heed calls from local leaders: the Borno government and civil society have urged all levels of government to allocate climate budgets and integrate agroecology and resilience into planning. By doing so, climate finance can truly become a tool of climate justice – protecting people on the frontlines of climate change and fragility.

CONCLUSION

The Lake Chad Basin faces an urgent test of climate resilience and sustainable development. This study's review and field inquiry indicate that climate finance is indispensable but currently inadequate for addressing the region's needs. In Borno State, Nigeria, the combination of a vastly shrunken lake, frequent droughts/floods, and armed conflict has heightened vulnerability. Climate funds (global or national) offer pathways to adapt and grow, but only if deployed effectively. We found that existing programs (from GCF/GEF grants to EIB loans) have begun to support climate-resilient farming, water management, and job creation. However, chronic funding gaps, institutional weaknesses, and social barriers remain. Without tackling these, climate finance risks falling short of its promise.

For policymakers and practitioners, the implications are clear. First, mobilization of new finance, including innovative instruments like green bonds and blended funds, should continue as planned. Second, reforms are needed to channel that finance to the state and community levels, where it can strengthen livelihoods. This means building the capacity of local governments, ensuring inclusive project design, and improving governance to reduce corruption and inefficiency. Third, climate projects must explicitly integrate poverty and equity objectives: targeting smallholder agriculture, creating jobs (especially for women and youth), and safeguarding vulnerable groups aligns adaptation with development.

In conclusion, bridging the climate finance divide in Borno requires both scale and focus. Climate-resilient agriculture, renewable energy, and ecosystem restoration can only reach their full impact if backed by sufficient resources and by participatory institutions. By strengthening these financial mechanisms and governance structures, Nigeria and its partners can help the Lake Chad Basin recover, turning a story of loss into one of adaptation, justice, and shared prosperity.

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