



PALM-TREES

A Pan African And Transdisciplinary Lens On The Margins: Tackling The Risks Of Extreme Events (palm-trees)

SCALING CLIMATE-RESILIENT WATER INFRASTRUCTURE FOR PRODUCTIVE RURAL ECONOMIES IN KWARA STATE

POLICY BRIEF

NO. 3, JUNE, 2026, ISSN 0189-4668

EXECUTIVE SUMMARY

Water insecurity is a critical constraint to climate resilience and rural livelihoods in Kwara State. Evidence from the PALM-TREES study shows that 57.4% of rural households lack access to safe water, significantly limiting both domestic welfare and productive activities such as farming and livestock production. The study further demonstrates that water scarcity is closely linked to drought vulnerability and food insecurity. This deficit directly contributes to reduced agricultural output, income instability, and increased vulnerability to drought and food insecurity. Despite this, current water investments remain largely focused on domestic supply, with limited attention to productive water use systems essential for rural economic growth. This policy brief draws on the PALM-TREES findings and relevant literature to argue for a shift toward climate-resilient, productivity-oriented water infrastructure systems that can support livelihoods, enhance resilience, and drive inclusive rural growth. Without urgent policy action, Kwara State risks continued low agricultural productivity, rising rural poverty, and increased climate vulnerability. This brief recommends

a strategic shift toward climate-resilient, productivity-oriented water systems, including:

- Targeted irrigation expansion
- Scaled solar-powered water systems
- Strengthened governance and financing mechanisms



Methodology

This policy brief is based primarily on findings from the PALM-TREES research project conducted in Kwara State, which applied a mixed-methods and transdisciplinary approach to understanding climate risks and vulnerabilities in rural communities. The study combined methods

from the physical and social sciences. Physical climate analysis included satellite data (e.g., Sentinel-1, Landsat, MODIS), drought indices (SPI, SPEI, SMI), hydrological data, and climate projections to assess patterns of flood and drought risk. On the social science side, the study engaged over 900 participants across more than 500 communities in 94 wards, using quantitative surveys, focus group discussions, community needs assessments, and participatory engagement processes. This policy brief draws directly on these empirical findings.

Policy Context

Water resource management in Kwara State has traditionally focused on providing domestic water supply through boreholes, hand pumps, and community water schemes. While these interventions have improved access in some areas, they have not adequately addressed the broader role of water as a critical input to agricultural production, livestock management, and rural enterprise development.

At the national level, Nigeria's water policies emphasize integrated water resources management (IWRM), which promotes the coordinated development and management of water, land, and related resources (Federal Ministry of Water Resources [FMWR], 2016). However, the implementation of these principles at the state level remains limited. In Kwara State, water governance is fragmented across multiple institutions, including water resources, agriculture, and rural development agencies, with weak coordination mechanisms. Climate change is further exacerbating water-related challenges. Increasing rainfall variability, prolonged dry spells, and rising temperatures are reducing water availability and increasing demand (IPCC, 2022). These changes are particularly significant in rural areas where livelihoods depend heavily on water for agriculture.

The PALM-TREES findings reinforce these structural challenges, highlighting limited access to safe water and the absence of systems that support productive water use. Moreover, existing infrastructure is often not designed to withstand climate variability, and maintenance systems are weak, leading to rapid deterioration. Financing constraints and limited private-sector involvement further limit the scale and sustainability of water investments. To address these challenges, water policy in Kwara State must transition toward a climate-resilient, productivity-oriented approach that integrates water management with agriculture, climate adaptation, and rural development.

Key Issues and Evidence

The PALM-TREES study highlights significant gaps in water access and utilization in Kwara State. Approximately 57.4% of respondents reported lacking access to safe or improved drinking water and instead relying on rivers, streams, and other unimproved sources. This lack of access has direct implications for both household welfare and economic productivity. In many communities, water scarcity limits agricultural production, particularly during dry seasons. Farmers are unable to irrigate their crops, resulting in reduced yields and unstable income. Water scarcity also affects livestock production, agro-processing activities, and other rural enterprises. The burden of water collection often falls disproportionately on women and children, reducing time available for education and income-generating activities. The study further shows that where water infrastructure interventions—such as solar-powered boreholes and irrigation systems—were introduced, there were significant improvements in resilience and productivity. This demonstrates the potential impact of scaling climate-resilient water technologies. These findings are consistent with broader evidence indicating that access to water is a critical determinant of agricultural productivity and climate resilience in sub-Saharan Africa (World Bank, 2021).



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Policy Implications

The findings suggest that water must be repositioned as a central pillar of climate resilience and rural economic development. First, the current focus on domestic water supply is insufficient in a climate-constrained environment. Policy must expand to include productive water use, enabling agriculture, livestock, and small-scale enterprises.

Second, the strong linkage between water access and climate vulnerability implies that water infrastructure should be treated as a climate adaptation investment. This

aligns with global frameworks that emphasize water management as a key adaptation strategy (IPCC, 2022).

Third, the success of pilot interventions highlights the importance of scaling proven technologies, particularly solar-powered irrigation systems. However, scaling will require addressing governance, financing, and maintenance challenges.

Fourth, the gendered dimension of water access underscores the need for inclusive policy design. Ensuring equitable access to water resources will enhance both social

and economic outcomes. Finally, improving institutional coordination is critical for effective water governance. Integrated planning across sectors will enhance efficiency and maximize impact.

Priority Policy Recommendations

1. Develop a State Productive Water Infrastructure Strategy

a. Integrate Water, Agriculture, and Climate Resilience Planning

Kwara State should develop a State Productive Water Infrastructure Strategy (SPWIS) that positions water not only as a basic service but as a driver of agricultural productivity, income generation, and climate resilience. This strategy should integrate water resource planning with agriculture, climate adaptation, and rural development policies, link irrigation expansion with crop planning and value chain development and incorporate climate projections into water infrastructure design and investment decisions. The strategy should be coordinated by a central body (e.g., Ministry of Water Resources or Planning) and aligned with broader state development frameworks.

2. Scale Climate-Resilient Water Technologies

a. Invest in Solar-Powered Boreholes and Irrigation Systems

Kwara State should prioritize **solar-powered water systems** as a sustainable solution for rural areas. These systems reduce reliance on diesel and erratic electricity supply, lower operational and maintenance costs, and enable year-round irrigation and water access.

b. Promote Small-Scale Water Storage and Harvesting Systems

To address rainfall variability, the State should support decentralized water storage systems, including Farm ponds and small reservoirs, rainwater-harvesting structures, and water-retention and recharge systems.

3. Strengthen Community-Based Water Governance

a. Establish Water User Associations (WUAs)

The State should promote the formation of **Water User Associations (WUAs)** at the community level to manage shared water resources. WUAs should oversee water allocation and usage, manage infrastructure operation and maintenance, and serve as a platform for conflict resolution

4. Promote Public-Private Partnerships (PPPs)

a. Engage the Private Sector in Financing and Service Delivery

Kwara State should create an enabling environment for private sector participation in water infrastructure by offering incentives (tax breaks, guarantees), developing PPP frameworks and guidelines, and reducing regulatory barriers.

5. Integrate Gender and Social Inclusion into Water Policy

a. Ensure Women's Participation in Water Governance

Women are primary users of water

but often excluded from decision-making. The State should mandate women's representation in WUAs, promote women's leadership roles, and ensure gender-sensitive planning processes.

b. Target Women Farmers for Irrigation Support

Women farmers should be prioritized in access to irrigation systems and inputs through targeted subsidy programmes, Women-focused farmer groups, and tailored extension services.

6. Strengthen Institutional Coordination

a. Improve Collaboration Across Ministries

Water governance requires coordination across multiple sectors. The State should establish inter-ministerial coordination committees, align policies and programmes across water, agriculture, and environment, and conduct joint planning and budgeting.

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