

# Erelu Dam and Livelihood Economies in Oyo State, Nigeria

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*Abstract- Dams constitute critical infrastructure for water security, agricultural productivity, and rural poverty reduction, particularly in regions characterized by seasonal rainfall variability. This study examines the socio-economic contributions and operational constraints of Erelu Dam in Oyo State, Nigeria. A concurrent mixed-methods design anchored in the Sustainable Livelihoods Framework was adopted. Data were collected through household surveys (n = 400), focus group discussions, and key informant interviews. Quantitative data were analysed using descriptive and inferential statistics, while qualitative responses were subjected to thematic content analysis. Triangulation and cross-validation procedures enhanced analytical reliability and minimized interpretive bias. Findings indicate that the dam significantly supports livelihood diversification through irrigation farming, fisheries, and small-scale trading. However, its developmental potential is undermined by interconnected challenges including poor power supply, contamination risks from untreated water sources, inadequate material / equipment for domestic water processing and weak governance structures that generate poor maintenance culture. The study concludes that sustainable outcomes require a shift from centralized management toward participatory water governance supported by periodic technical audits and livelihood-centred planning. This integrated approach is essential for transforming the dam into a resilient socio-economic asset for rural communities.*

*Index Terms Dam Management, Sustainable Livelihoods, Participatory Governance, Rural Development, Water Security, Nigeria*

## Plain Language Summary

This study investigates how Erelu Dam supports the daily livelihoods of communities in Oyo State and why its full benefits are not being realized. The dam helps farmers grow crops throughout the year, supports fishing activities, and provides water for households and small businesses. However, structural leakages, seasonal water shortages, weak management systems, and unsafe use of untreated water limit its effectiveness. The research shows that community involvement in decision-making, better

maintenance, and improved water management policies are necessary to ensure the dam continues to benefit present and future generations.

## I. INTRODUCTION

Water resource infrastructure remains a fundamental driver of socio-economic development, particularly in regions where rainfall patterns are unpredictable and access to potable water is limited. Globally, dam-reservoir systems sustain the livelihoods of nearly two billion people by supporting irrigation, domestic water supply, fisheries, and energy production (World Bank, 2023). In Sub-Saharan Africa, dams are frequently integrated into climate-resilience and poverty-reduction strategies due to their potential to stabilize food production and enhance rural incomes (Adewuyi & Ajibade, 2021).

Nigeria's national water policy reflects this developmental orientation, with more than two hundred medium and large dams constructed for irrigation, hydropower generation, and domestic supply (Federal Ministry of Water Resources, 2023). Erelu Dam in Oyo State was conceived within this framework to stimulate agricultural productivity and local commerce in surrounding communities such as Ikoyi, Sabo, and Oke-Ogun.

Despite this strategic intent, disparities often exist between projected benefits and realized outcomes. Infrastructure deterioration, fragmented institutional responsibilities, and environmental pressures have constrained the performance of several water projects in Nigeria (Ogunleye & Salami, 2020). Preliminary investigations of Erelu Dam acknowledge its income-generating potential (Adepoju et al., 2022), yet technical and environmental assessments reveal

subsurface vulnerabilities and water-quality concerns (Olasunkanmi et al., 2021; Oladejo et al., 2024). While previous studies highlight isolated dimensions, limited empirical synthesis exists on how technical, environmental, and governance factors jointly influence livelihood outcomes. This study addresses this gap by providing a localized, integrative analysis of Erelu Dam's livelihood economy.

## II. LITERATURE REVIEW AND CONCEPTUAL FRAMEWORK

### 2.1 Global and Regional Perspectives on Dam Development

The discourse on dams reflects both developmental optimism and critical caution. Proponents emphasize their contributions to irrigation, food security, and flood control, with global estimates suggesting that a majority of large dams primarily serve agricultural purposes (World Commission on Dams, 2022). Conversely, scholars note that poorly managed dam projects can generate social displacement, ecological degradation, and long-term sustainability challenges (Mekonnen & Tadesse, 2020). The net impact of a dam is therefore determined less by its physical presence and more by the quality of governance, maintenance culture, and community integration.

### 2.2 Institutional and Environmental Realities in Nigeria

In Nigeria, water infrastructure performance is often mediated by policy implementation gaps, inadequate funding, and weak cost-recovery mechanisms (Federal Ministry of Water Resources, 2023). Empirical studies specific to Erelu Dam reveal a dual reality: positive livelihood effects through irrigation expansion (Adepoju et al., 2022) alongside technical weaknesses such as seepage and sedimentation (Olasunkanmi et al., 2021). Water-quality studies further indicate disparities between treated and untreated sources, introducing health and equity concerns (Oladejo et al., 2024). These findings highlight the need for integrated evaluation frameworks that connect physical infrastructure conditions with socio-economic outcomes.

### 2.3 Sustainable Livelihoods Framework (SLF)

This study adopts the Sustainable Livelihoods Framework as its conceptual anchor. The SLF posits that household well-being depends on access to five capital assets: natural, human, financial, social, and physical capital (Chambers & Conway, 2019). Infrastructure such as dams enhances natural and physical capital by providing water resources and built facilities. However, the conversion of these assets into sustainable livelihood gains is shaped by transforming structures and processes policies, institutions, and socio-cultural norms. Applying the SLF enables a holistic assessment of how technical inefficiencies and governance gaps influence livelihood resilience in communities surrounding Erelu Dam.

## III. METHODOLOGY

The study area is Erelu Dam in Oyo State, southwestern Nigeria (Latitude 7°24'N; Longitude 3°54'E). Constructed in the early 1990s, the dam supports an estimated population of over 700,000 people in adjoining communities. The region experiences a tropical climate with average annual rainfall of approximately 1,200 mm, and the local economy is predominantly agrarian.

A concurrent mixed-methods design was employed to obtain both numerical trends and contextual insights. This approach allowed quantitative and qualitative data to be collected simultaneously and merged during interpretation for comprehensive understanding.

### 3.1 Sampling Procedure

A multi-stage sampling strategy was utilized:

- Stage 1 (Purposive): Four dam-dependent communities were selected.
- Stage 2 (Systematic Random): 400 household heads were drawn from community listings using Yamane's (1967) formula at a 95% confidence level.

- Stage 3 (Purposive): Twenty key informants, including dam officials and community leaders, were interviewed.

### 3.2 Data Collection and Analysis

Structured questionnaires captured demographic characteristics, livelihood activities, income patterns, and perceptions of dam performance. Focus group discussions and semi-structured interviews explored governance and maintenance issues.

Quantitative data were analysed using SPSS (Version 27) through descriptive statistics and inferential tests such as Chi-square and ANOVA. Qualitative data were transcribed and analysed using thematic content analysis. Triangulation, member-checking, and cross-source validation enhanced credibility and minimized bias.

## IV. RESULTS AND DISCUSSION

### 4.1 Socio-Economic Profile

The survey revealed that farming (58%), fishing (21%), and trading (15.5%) constitute the dominant occupations, underscoring the dam's centrality to local livelihood systems. Over 40% of respondents engaged in secondary occupations, indicating diversification strategies aimed at income stability but also reflecting dependence on dam-related activities.

### 4.2 Contributions to Livelihood Capital

#### Natural and Financial Capital:

Approximately 65% of farmers reported increased yields due to year-round irrigation, confirming the dam's role in stabilizing agricultural income.

#### Human and Physical Capital:

Improved access to treated water reduced time spent fetching water and potentially lowered water-borne disease risks, thereby strengthening human capital.

### 4.3 Constraints and Interlinkages

#### Infrastructure Vulnerability:

More than 60% of respondents expressed dissatisfaction with maintenance, corroborated by geophysical evidence of water-works complex, outdated equipment and poor power supply.

#### Water Quantity and Quality Challenges:

Seasonal scarcity and reliance on untreated sources expose communities to health risks, creating unequal access patterns.

#### Environmental Feedback:

Unregulated farming activities accelerate siltation and chemical runoff, gradually diminishing water quality.

Overall, the findings depict Erelu Dam as a valuable yet fragile asset whose effectiveness is constrained more by governance and maintenance lapses than by absence of community need.

## V. CONCLUSION AND RECOMMENDATIONS

Erelu Dam remains a pivotal but vulnerable infrastructure supporting rural livelihoods in Oyo State. Its socio-economic contributions are substantial, yet infrastructural decay, environmental stress, and weak institutional coordination undermine sustainability. The study contributes to development scholarship by demonstrating how technical conditions and governance systems jointly shape livelihood outcomes within a single socio-ecological system.

## VI. RECOMMENDATIONS

1. Comprehensive Technical Audits: Conduct periodic geophysical and structural assessments to guide rehabilitation.
2. Climate-Smart Irrigation Support: Promote efficient technologies such as drip irrigation to reduce water wastage.

3. Water User Association (WUA): Establish a legally recognized community-based management body.
4. Policy Revision: Align state water policies with participatory governance models and equitable tariff systems.
5. Environmental Protection Measures: Enforce vegetative buffer zones and community monitoring to curb siltation and pollution.

Transforming Erelu Dam into a resilient development asset requires a coordinated approach that integrates technical maintenance, participatory governance, and livelihood-centred planning.

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