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Livelihood Disruption, Health Risks, and Cultural Transformation: A Holistic Assessment of Kainji Dam's Long-Term Impacts in New Bussa

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Abstract

Large dams are often promoted as engines of national development, yet they frequently impose disproportionate costs on host communities. The Kainji Dam, constructed in the 1960s, remains central to Nigeria's electricity supply but continues to generate unresolved socioeconomic, health, and cultural challenges for resettled populations in New Bussa and its environs. This article investigates this integrated impact. The study is underpinned *by Impoverishment Risks and Reconstruction Model* and the *Sustainable Livelihoods Framework.* A mixed-methods design was adopted and a stratified sample technique was used to collected data from 378 residents through structured questionnaires on household demographics, income levels, livelihood activities, health status, and cultural practices. Qualitative data were collected through focus group discussions and in-depth interviews with community leaders and dam officials. Respondents, largely male (59.8%) with age range of 31–40, predominantly farmers (40.2%), earner below ₦20,000 monthly (42.6%). Analyses show that only 29.6% perceived improvement in income since the dam's construction, while 51.3% reported disrupted livelihoods in farming and fishing. Over 60% observed deforestation, biodiversity loss, and flooding as a problem. Health outcomes worsened, with 67.7% linking malaria and 63.5% cholera outbreaks to dam-related conditions, and only 48.7% rated health facilities adequate. Culturally, 67.2% reported weakened bonds and 65.1% noted disrupted traditions. The study concludes that while the dam delivers national electricity benefits, its host communities bear long-term livelihood, health, and cultural costs. The study recommends targeted livelihood restoration, improved health infrastructure, and participatory governance to mitigate displacement-induced inequalities and foster inclusive development.

Keywords

Kainji Dam, integrated impact**, disrupted traditions,** Cultural disintegration, Socio-economic impacts, Environmental degradation

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1. Introduction

The construction of large-scale hydroelectric dams has historically been celebrated as a cornerstone of national development, with governments and international agencies promoting such projects for their potential to drive economic growth, ensure energy security, and provide flood control (World Commission on Dams [WCD], 2000; Tilt, Braun, & He, 2009). Globally, dams have enabled irrigation, urban water supply, and industrialization, yet they are also among the most contested infrastructures due to their far-reaching social and environmental consequences (Scudder, 2012; Li, Yu, & Tilt, 2013).

In sub-Saharan Africa, dams are particularly framed as solutions to chronic electricity shortages and food insecurity (Ansar et al., 2014). Nigeria's Kainji Dam, completed in 1968, was the country's first major hydroelectric project and remains central to national electricity generation, contributing significantly to the grid operated by the National Electric Power Authority (NEPA) and its successors (Gimba, Adeyemi, & Sanni, 2015). The dam also created Lake Kainji, one of Africa's largest man-made reservoirs, with major implications for fisheries, agriculture, and settlement patterns (Aworawo, 2000).

However, large-scale dams are increasingly criticized for producing disproportionate costs for host communities while delivering benefits nationally and internationally (Cernea, 2000; Bui, Schreinemachers, & Berger, 2013). The construction of the Kainji Dam displaced approximately 44,000 people, leading to the resettlement of communities such as New Bussa, where residents lost ancestral land, farmland, and cultural ties (Akinyele, 1998; Scudder, 2012). Studies of dam-induced displacement globally suggest that such projects often lead to impoverishment, manifested in landlessness, joblessness, food insecurity, and social disarticulation (Cernea, 2000).

Despite the prominence of Kainji Dam in Nigeria's development history, its long-term socio-economic, health, and cultural impacts on host communities remain under-documented compared to the technical and economic narratives surrounding energy production. Earlier studies have highlighted declines in artisanal fisheries, rising prevalence of waterborne diseases, and loss of forest resources around the Kainji basin (Umaru, 2013; Oyebande, 2001). Yet, there is limited integrated research that simultaneously considers how livelihoods, health, and cultural practices have evolved over decades in resettled communities such as New Bussa.

This study addresses that gap by providing a holistic assessment of the dam's enduring consequences. It moves beyond narrow cost-benefit evaluations to explore the nuanced, lived realities of displacement-affected residents, situating their experiences within broader debates on development-induced displacement, environmental change, and social justice. By applying the Impoverishment Risks and Reconstruction Model

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(Cernea, 2000) and the Sustainable Livelihoods Framework (Scoones, 1998; DFID, 1999), the study seeks to illuminate both the risks and potential pathways to recovery, offering critical insights for dam governance and resettlement policy in Nigeria and beyond.

2.0 Conceptual Framework and Literature Review

This study is guided by two complementary frameworks: the Impoverishment Risks and Reconstruction (IRR) model and the Sustainable Livelihoods Framework.

2.1 Conceptual Framework

2.1.1 Impoverishment Risks and Reconstruction (IRR)

The Impoverishment Risks and Reconstruction (**IRR Model)** was developed to explain the risks faced by populations displaced by large development projects such as dams. Cernea (2000) identifies eight core impoverishment risks: landlessness, joblessness, homelessness, marginalization, food insecurity, increased morbidity, loss of access to common property resources, and community disarticulation. These risks highlight the multi-dimensional vulnerabilities of displaced populations and provide a diagnostic tool for assessing the social and economic consequences of resettlement. Importantly, the model also emphasizes *reconstruction pathways*—including land-based resettlement, employment generation, and community rebuilding—that can transform displacement from a process of impoverishment into one of recovery.

2.1.2 The Sustainable Livelihoods Framework (SLF)

Sustainable Livelihoods Framework offers a complementary lens by focusing on people's assets and strategies for sustaining well-being in the face of shocks and stresses. It identifies five forms of capital—human, natural, financial, social, and physical—that interact to determine livelihood outcomes (Scoones, 1998; DFID, 1999). Displacement and environmental degradation associated with dam construction erode these capitals, thereby undermining long-term livelihood sustainability.

Integrating the IRR Model with the SLF provides a robust framework for this study. While the IRR Model diagnoses the specific risks of dam-induced displacement, the SLF situates these risks within a broader livelihood system, highlighting how asset erosion affects household strategies and community resilience. This dual approach allows for a comprehensive analysis of the Kainji Dam's impacts on livelihoods, health, and culture in New Bussa, linking immediate risks to long-term developmental outcomes.

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2.2 Literature Review

The literature on large dams highlights a persistent tension: while dams can generate macro-level benefits (energy, irrigation, flood control), they commonly produce concentrated social, economic and ecological burdens at the local level (World Commission on Dams, 2000; Ansar et al., 2014). Resettlement and displacement associated with dam construction have been widely shown to produce long-term impoverishment unless carefully mitigated (Cernea, 2000; Scudder, 2012). The following review synthesises three interlinked strands of scholarship - livelihood disruption, health & environmental impacts, and cultural/social disintegration—drawing on both global syntheses and Kainji-specific studies.

1.2.2 2.2.1 Livelihood disruption

A robust literature documents how dam reservoirs alter aquatic and terrestrial ecologies in ways that reduce traditional livelihood returns for fishing and farming households (Li, Yu, & Tilt, 2013; Tilt, Braun, & He, 2009). In the Kainji context, empirical surveys show clear declines in artisanal fisheries yields after reservoir filling. For example, a field study of artisanal fishermen in the Yauri Emirate reported that fish catch per unit effort fell from over 8 kg pre-dam to under 2 kg post-dam, with respondents attributing declines to changed water regimes, habitat loss and harmful fishing practices that emerged after displacement (Umar & Illo, 2013). The establishment of the National Institute for Freshwater Fisheries Research (originally the Kainji Lake Research Project) in 1968 attests to the region's fisheries importance and the long-standing policy concern about sustaining fisheries livelihoods around Lake Kainji (National Institute for Freshwater Fisheries Research, n.d.). Other recent studies of fishing communities around Kainji indicate that fish landings and livelihood sustainability remain fragile, shaped by regulation gaps, gear overuse and market changes (Alhassan, 2021; Ibrahim & Ifejika, 2019).

Resettlement also disrupted agriculture and access to land. Early FAO working papers and the contemporaneous ("Kainji Lake") research programme documented how relocation shortened seasonal labour cycles, reduced access to floodplain cultivation, and required farming system adjustments, often to the detriment of household food production (Jenness, 1969; FAO, 1969). More recent reviews of Kainji resettlement observe that many displaced households did not regain pre-project asset endowments, leaving them dependent on low-return activities and petty trade (Adalemo, 1968; "Kainji resettlement housing: 40 years later," studies).

1.2.2 2.2.2 Health and environmental impacts

Reservoir creation commonly modifies vector habitats and water quality, increasing the risk of malaria, schistosomiasis and other water-related diseases (Kibret et al., 2017; Ramamurthy, Singh, & Choudhury, 2009). Surveys of communities around Kainji and Jebba have reported elevated incidence of water-related illnesses. A multi-community epidemiological survey reported malaria prevalence across communities near Kainji and Jebba (overall ~19.1% in the sampled communities, with variation by state) and documented other water-related disease concerns (Annals of Clinical Pathology/related survey reports). More focused studies among schoolchildren around Kainji have recorded urinary schistosomiasis (Schistosoma haematobium) prevalence, indicating ongoing transmission in shoreline communities (status

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studies of *S. haematobium* around Kainji). Such findings align with global evidence linking reservoirs to increased vector-borne and water-borne disease burdens unless mitigated by public health measures and environmental management (Kibret et al., 2017; Li et al., 2013).

Environmentally, the creation of Lake Kainji altered local land cover, hydrology and biodiversity. Researchers have documented deforestation, soil erosion and biodiversity pressures in the Kainji Lake National Park and surrounding zones, driven by increased grazing, poaching and fuelwood demand among resettled communities (Meduna, Ogunjinmi, & Onadeko, n.d.; Gimba, Adeyemi, & Sanni, 2015). These environmental changes not only reduce ecosystem services (e.g., fish breeding, soil fertility) but also feed back into livelihood vulnerability and food insecurity (Li et al., 2013).

1.2.2 2.2.3 Cultural and social disintegration

A body of literature shows that forced relocation severs place-based cultural ties and undermines social networks that underpin resilience (Scudder, 2012; Cernea, 2000). The Kainji resettlement—one of the largest in Nigeria's history—resulted in the relocation of tens of thousands into purpose-built New Bussa and other settlements, with numerous studies documenting how resettlement housing, altered settlement patterns, and changes in labour regimes disrupted traditional seasonal rituals, kinship reciprocity and communal institutions (Archnet/architectural accounts on New Bussa; Jenness, 1969; Adalemo, 1968). Scholars of displacement emphasize that such cultural losses are not merely symbolic but have tangible economic and psychological consequences—eroding social capital that would otherwise support recovery and adaptation (Cernea, 2000; Adugbila, 2020).

While the Kainji basin has attracted multidisciplinary attention (fisheries, epidemiology, conservation, resettlement design), existing studies often treat ecological, health and socio-cultural dimensions separately. The literature therefore calls for integrated, longitudinal assessments that link livelihood change, disease patterns and cultural transformation to provide a holistic picture of dam impacts (Scudder, 2012; Tilt et al., 2009). This study responds to that call by integrating household survey data, health and environmental indicators, and qualitative narratives to capture the multi-scalar effects of the Kainji Dam on New Bussa residents, thereby contributing an empirically grounded, cross-disciplinary perspective to dam resettlement scholarship.

1.2.2 3.0 Study Area

The study was conducted in **New Bussa and adjoining communities** located in Borgu Local Government Area of Niger State, north-central Nigeria (Figures 1 and 2). New Bussa was established in the 1960s as the main resettlement site for populations displaced by the construction of the Kainji Dam, which submerged the old town of Bussa and several surrounding villages (Akinyele, 1998). The area lies within the Guinea Savannah ecological zone, characterized by a wet season from April to October and a dry season from November to March, with mean annual rainfall of 1,100–1,300 mm (Oyebande, 2001). Lake Kainji, created by the dam, is one of Africa's largest man-made reservoirs, covering approximately 1,270 km² and extending over 130 km in length (Aworawo, 2000). Geographically, it lies between latitudes 9°50′N and 10°30′N and longitudes 4°25′E and

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4°40′E. The area is situated within the Northern Guinea Savannah zone and features a mix of savannah vegetation.

The population of New Bussa and surrounding settlements is multi-ethnic, including Hausa, Yoruba, Nupe, and Borgu peoples, with livelihoods primarily based on **farming, fishing, and petty trading** (Umaru, 2013). In addition to agriculture, the presence of the **Kainji Lake National Park** and fishing activities around the lake remain central to the local economy and food security (Meduna, Ogunjinmi, & Onadeko, n.d.). The resettlement has, however, been marked by significant socio-economic and cultural adjustments as households adapted to new ecological and institutional contexts (Scudder, 2012).

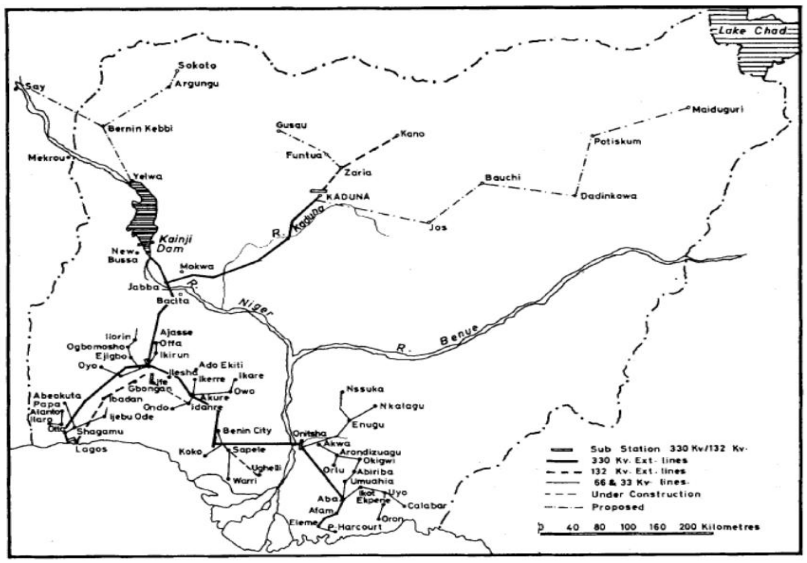

Figure 1: Kainji and Adjoining Settlement

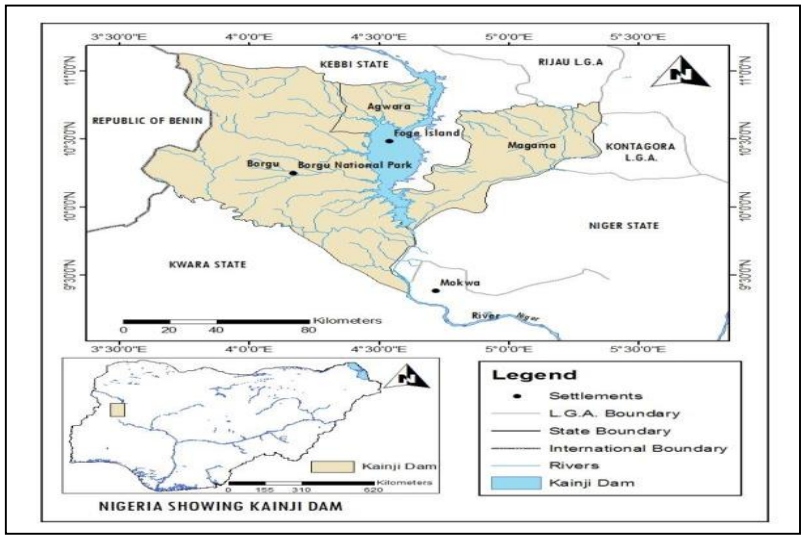

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Figure 2: Kainji Dam in National Context Source: Munachimso

4. Methodology

4.1 Study Area

This study adopted a **mixed-methods design**, combining quantitative household surveys with qualitative approaches, including in-depth interviews, focus group discussions (FGDs), and participant observation. The rationale for this approach was to capture both measurable socio-economic and health outcomes as well as the lived experiences and perceptions of affected communities, thereby ensuring a comprehensive understanding of the integrated impacts of the Kainji Dam. The research was conducted in **New Bussa** and surrounding resettled communities in Niger State, Nigeria. The study population comprised household heads, community elders, women, youth representatives, health workers, and dam management officials, ensuring inclusion of multiple perspectives.

4.2 Sampling Technique and Sample Size

A **stratified random sampling technique** was employed to ensure representation across gender, age groups, and occupational categories. Out of the estimated resettled households in New Bussa, **378 respondents** were selected for the survey. This sample size was determined using standard social science sampling guidelines to ensure statistical reliability while being logistically feasible. For the qualitative component, **12 key informant interviews** (with chiefs, elders, health workers, and dam officials) and **6 focus group discussions** (segmented by gender and age) were conducted to provide deeper contextual insights.

4.3 Data Collection Instruments

The study utilised questionnaire, which comprised both closed- and open-ended questions designed, to capture **socio-economic indicators**, such as changes in livelihood sources, income levels, employment status, access to new economic opportunities, and household expenditure, **health and well-being**, prevalence of diseases (malaria, schistosomiasis, cholera, typhoid), access to healthcare facilities, nutritional status, how perceptions of environmental changes affect health, culture and **social transformation. In-depth Interviews** were conducted with community leaders, health officials, and dam management representatives to provide authoritative insights on displacement, compensation, and institutional responses. With F**ocus Group Discussions (FGDs), information on** community-level perceptions, and adaptation strategies.

4.4 Data Analysis

Quantitative data were entered and analyzed using **SPSS (version 25).** Descriptive statistics (frequencies, percentages, means) were employed to summarize household characteristics, socio-economic trends, and health outcomes. Cross-tabulations were used to examine relationships between demographic variables and livelihood/health impacts.

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Qualitative data from interviews and FGDs were transcribed verbatim and analyzed thematically using **NVivo software**. Recurring themes were coded under categories such as "livelihood disruption," "health risks," "cultural change," and "perceptions of resettlement." Triangulation of quantitative and qualitative findings enhanced the robustness of interpretations.

4.5 Validity and Reliability

The questionnaire was pre-tested in a nearby community for clarity and reliability before full-scale administration. Triangulation of data sources (survey, interviews, FGDs, observation) minimized bias and strengthened validity. Inter-coder checks were used in thematic analysis to ensure consistency.

4.6 Ethical Considerations

Ethical clearance was obtained from the relevant institutional review board. Verbal informed consent was secured from all participants prior to data collection. Participation was voluntary, confidentiality was assured, and respondents were free to withdraw at any stage. Sensitive questions, especially regarding compensation and displacement grievances, were handled with care to avoid re-traumatization.

5.0 Results

5.1 Findings

Table 1, depicts the socio-economic status of respondents of this study. Respondents were mostly male (59.8%), middle-aged (32.5% aged 31–40), and farmers (40.2%). Income levels were low, with 42.6% earning below ₦20,000 monthly. Socio-economic impacts: Only 29.6% agreed that the dam improved income, 37% reported new job opportunities, while 51.3% identified farming and fishing as negatively affected. Electricity remained unreliable (42.9% disagreement), and access to clean water was poor (39.4% disagreement).

On environmental impact,67.7% reported land-use changes, 65.2% deforestation, 65% biodiversity loss, and 55.8% flooding (Table 2). A limited proportion (50.6%) acknowledged irrigation potential. For health impacts, 67.7% cited rising malaria cases, 63.5% waterborne diseases (cholera, typhoid), and only 48.7% judged health facilities adequate.

A total of 67.2% reported weakened community bonds as cultural impacts, 65.1% disrupted cultural practices, and 54% reduced youth involvement. Perceptions of displacement and compensation: Only 43.4% perceived compensation as fair, while 57.2% expressed dissatisfaction with resettlement facilities.

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Table 1: Respondents' Socio-Demographic Information

Variable	Category	Frequency	Percentage (%)
Sex	Male	226	59.8
	Female	152	40.2
Age	18–30	95	25.1
	31–40	123	32.5
	41–50	85	22.5
	51–60	47	12.4
	61 and above	28	7.4
Marital Status	Single	80	21.2
	Married	255	67.5
	Widowed	28	7.4
	Divorced	15	4
Educational Level	No Formal Education	47	12.4
	Primary School	114	30.2
	Secondary School	142	37.6
	Tertiary Education	75	19.8
Occupation	Farming	152	40.2
	Trading	85	22.5
	Civil Service	38	10.1
	Artisan	47	12.4
	Unemployed	56	14.8
Monthly Income	Below ₦20,000	161	42.6
	₦20,000–₦49,999	114	30.2
	₦50,000–₦99,999	67	17.7
	₦100,000+	36	9.5
Length of Residence	<5 years	57	15.1
	5–10 years	95	25.1
	11–20 years	113	29.9
	Over 20 years	113	29.9

Source: Field Survey, 2025

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Table 2: Composite Data on Socio-Economic, Health, Environmental, and Cultural Impacts of Kainji Dam on New Bussa Communities

Socio-Economic and Livelihood Impacts of Kainji Dam on Respondents

Impact Indicator	Frequency (%)	Observation
Improved income since dam construction	29.60%	Only a minority perceived economic benefits
New job opportunities created	37.00%	Mostly in trading and small-scale services
Disruption of farming and fishing	51.30%	Core livelihood sectors most negatively affected
Dissatisfaction with electricity supply	42.90%	Unreliable access despite living near dam
Limited access to clean water	39.40%	Residents rely on untreated sources

Cultural and Social Impacts of Displacement

Indicator	Frequency (%)	Interpretation
Weakened community bonds	67.20%	Decline in social cohesion post-resettlement
Disrupted cultural practices	65.10%	Reduced festivals and rituals tied to old Bussa
Reduced youth involvement in traditions	54.00%	Younger generations less engaged in heritage
Perceived fairness of compensation	43.40%	Majority dissatisfied with resettlement packages
Dissatisfaction with resettlement facilities	57.20%	Housing and infrastructure seen as inadequate

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Table 2: Reported Health and Environmental Impacts

Indicator	Frequency (%)	Key Findings
Increase in malaria prevalence	67.70%	Linked to stagnant reservoir water
Cholera and other waterborne diseases	63.50%	Due to poor water quality
Adequate health facilities	48.70%	Less than half rated facilities as sufficient
Land-use changes observed	67.70%	Farmlands lost to waterlogging
Deforestation and biodiversity loss	65.2% & 65%	Reported by majority of respondents
Flooding incidents	55.80%	Seasonal displacements and farm damage

Source: **Field Survey, 2025**

5.2 Thematic Findings

Institutional narratives: Dam management emphasized electricity generation and CSR projects, while communities reported that such efforts were insufficient. Livelihoods: Decline in fishing and farming emerged as dominant themes; women relied increasingly on petty trading.

Environmental stress: Community leaders cited worsening flooding, soil erosion, and deforestation, contrasting with management's "technical monitoring" narrative. Health: High prevalence of malaria and waterborne diseases was reported; limited health access forced reliance on traditional medicine.

Cultural disruption: Resettlement fractured ancestral ties, eroded festivals, and weakened intergenerational cultural continuity. Compensation: Leaders emphasized inadequate and unfair compensation, echoing broader literature on displacement injustices (Cernea, 2000; Bui et al., 2013). Engagement gaps: Stakeholder meetings were perceived as symbolic rather than participatory, reinforcing community distrust.

5.3 Discussion

The findings highlight the paradox of large-scale dams: while the Kainji Dam contributes to Nigeria's electricity supply, it imposes disproportionate socio-economic and cultural burdens on host communities. The decline in farming and fishing parallels evidence from dam-affected areas in Nigeria and Asia where livelihoods deteriorated despite promises of development (Adamu & Emigilati, 2021; Tilt et al., 2009). The findings corroborate prior studies that large dams often generate "winners and losers" at different scales (Scudder, 2012; Li, Yu, & Tilt, 2013). The decline in farming and fishing

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aligns with Adamu and Emigilati's (2021) findings on Niger State, while comparable results were documented in Vietnam (Bui, Schreinemachers, & Berger, 2013).
Environmental degradation, including flooding, deforestation, and biodiversity loss, supports research showing that large dams destabilize ecosystems (Li et al., 2013; Gimba et al., 2015). The health results, particularly increased malaria and cholera, reflect global findings that reservoirs create breeding sites for disease vectors (Kibret et al., 2017; Ramamurthy et al., 2009).
Cultural disruption, including weakened communal bonds and loss of traditions, confirms scholarship that displacement leads to long-term cultural disintegration (Scudder, 2012; Adugbila, 2020). Dissatisfaction with compensation also mirrors other displacement cases in Africa and Asia, where resettlement processes were marked by unfairness and lack of transparency (Cernea, 2000; Bui et al., 2013).

Overall, the study illustrates a misalignment: dam authorities frame interventions in terms of CSR and technical performance, while communities emphasize lived experiences of livelihood loss, environmental decline, and cultural erosion. This disconnect underscores the need for participatory approaches and restorative justice in infrastructure governance.

Collectively, these corroborations situate the Kainji experience within a broader global pattern, underscoring the urgency of participatory governance and rights-based resettlement frameworks.

6. Conclusion

The Kainji Dam provides national benefits in electricity generation but leaves host communities struggling with livelihood disruption, ecological degradation, health risks, and cultural disintegration. Dissatisfaction with compensation and resettlement remains widespread, perpetuating grievances. Unless addressed through participatory governance, fair compensation, and culturally sensitive development, dam-induced displacement will continue to entrench inequality in Nigeria's development trajectory.

7. Recommendations

- Livelihood restoration: Support sustainable farming, fishing cooperatives, and microenterprise training.
- Environmental safeguards: Implement reforestation, erosion control, and participatory flood management.
- Health interventions: Establish accessible clinics and malaria/cholera prevention programmes.
- Cultural revitalisation: Fund heritage initiatives, festivals, and youth engagement in traditions.
- Compensation reform: Ensure transparent, fair, and adequate resettlement mechanisms.

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- Inclusive governance: Institutionalise community involvement in planning, monitoring, and evaluation.
- CSR realignment: Align dam management's CSR with actual community needs via co-created frameworks.

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