COMMUNITY PERCEPTIONS AND SOCIAL ACCEPTANCE OF HYDROPOWER PROJECTS: A REVIEW

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ABSTRACT

Hydropower remains the world's largest renewable energy source and a cornerstone of low-carbon development and energy security. Yet, host communities' attitudes and acceptance are decisive to project success, often more so than technical efficiency or economic viability. This article presents a systematic review of the factors shaping community perceptions and social acceptance of hydropower projects, focusing on economic advantages, environmental effects, and sociocultural dynamics. Methodologically, this study adopts a structured narrative review design: peer-reviewed literature and institutional reports were identified through keyword searches of reputable sources. Sources were screened for relevance to community acceptance and organized thematically, and evidence was synthesized through a comparative, cross-case analysis of documented cases from Chile, China, India, Zambia, Cameroon, and Nigeria. The findings, drawn from these cases, show that: (i) economic incentives alone are insufficient to secure community acceptance, as demonstrated by the Chilan discrete choice experiment, which found that tariff discounts did not change community attitudes even in communities without prior dam experience; (ii) benefit-sharing and participation, institutionalised from the outset can produce measurable acceptance, as illustrated by Zambia's Ngonye Falls project which secured a Community Participation Agreement with traditional authorities, reduced physical relocation to 71 of 419 affected households, indexed compensation to inflation, and became Africa's first hydropower project to achieve Gold certification under the Hydropower Sustainability Standard; (iii) procedural exclusion generates durable conflict, as evidenced by Cameroon's Nachtigal dam, despite supplying 30% of national electricity, prompted ten affected communities to file complaints with the World Bank Inspection Panel and the African Development Bank's Independent Review Mechanism over inadequate compensation of approximately US$4,460 per fisher, demolished sacred sites, and limited local subcontracting opportunities; (iv) sociocultural disruption from resettlement can outweigh material compensation as demonstrated by China's Ludila station, where 44% of productive land was lost and only about 16% replaced, while 90% of flooded irrigated land required substitution through the development of a new reservoir; and (v) demand-side evidence from Nigeria's Taraba State shows 96% of respondents ranked off-grid electricity as their top need and 94% expressed willingness to help maintain a community-based system, indicating that acceptance is latent where investment and political will are absent. The review concludes that acceptance is best treated as an integrated outcome of economic, environmental, and sociocultural variables rather than as three separate assessments. The practical implications are that developers and policymakers should mandate early, binding community participation agreements with grievance mechanisms; index compensation and guarantee ongoing livelihood restoration rather than one-off payments; embed environmental mitigation as a trust-building measure rather than a compliance box; and adopt the integrated Community Acceptance Index proposed here as a screening and monitoring tool for evidence-based decision-making by policymakers, developers, and host communities.

***Keywords**: benefit sharing, community acceptance, environmental impact, hydropower, sustainable development*

I. INTRODUCTION

A. Context and Problem Statement

Hydropower is a well-established renewable technology that helps nations meet energy targets and reduce emissions. However, large dams also disrupt lives and landscapes in ways that engineers and energy planners frequently underestimate [1], [2]. A dam may function flawlessly from a technical perspective and still fail if the local population feels ignored, displaced, or cheated. Hydropower development is therefore not merely a technical or engineering challenge: even technically sound projects may fail if they lack social acceptance. Social acceptance, the degree of support or tolerance for a project and community perception of how locals regard a project have emerged as crucial factors in determining its success [3].

B. Literature Review and Gap Analysis

Research consistently identifies environmental deterioration, displacement, and unfair benefit distribution as common causes of opposition to hydropower [2]. Mayeda and Boyd [4], in a systematic review of 41 studies, found three main reasons for opposition: environmental harm, lack of consultation, and unfair distribution of costs and benefits, with locals in 32 of the 41 studies believing benefits were distributed unfairly and the poorest receiving the least. Zaharuddin *et al*. [3] similarly catalogue economic, environmental, and sociocultural determinants of local acceptance of renewable energy projects. However, three gaps remain. First, most studies examine social, environmental, and economic acceptance criteria independently rather than as interrelated elements, whereas communities experience all three simultaneously. Second, the evidence base is

fragmented geographically: global systematic reviews rarely incorporate African or Nigerian primary evidence, and African case documentation is largely grey literature. Third, few studies translate findings into operational tools that developers and regulators can use to predict acceptance beforehand. Fourth, much of the African literature is descriptive, documenting grievances without comparative synthesis across cases.

C. Novelty and Research Objectives

This article fills these gaps by: (i) synthesising global, African, and Nigerian evidence within a single integrated analytical framework; (ii) incorporating recently documented cases, including Inspection Panel proceedings in Cameroon and Gold-certified practice in Zambia, that postdate existing reviews; and (iii) proposing a unified Community Acceptance Index that integrates economic, environmental, and sociocultural variables for evaluation and prediction. The specific objectives are to:

1. Synthesise the factors that influence communities' acceptance or rejection of hydropower projects;
2. Examine documented cases from the global arena, Africa, and Nigeria through comparative cross-case analysis; and
3. Identify the practices that foster trust and propose an integrated model for assessing and predicting community acceptance.

D. Scope and Structure of the Paper

The review adopts a three-tier geographic focus. First, global cases from Chile, China, and India that establish broader patterns and insights into community acceptance of hydropower development. Second, African cases from Zambia and Cameroon that examine those patterns within comparable developmental contexts. Third, Nigerian case studies, focusing on Taraba State and the Mambilla region, that provide a context-specific analysis of community acceptance in the country with the continent's largest unmet hydropower potential.

The remainder of the paper is organised as follows. Section II examines the key factors influencing community acceptance, including economic benefits, infrastructure development, environmental concerns, and social and cultural considerations. Section III presents the selected case studies and provides a comparative cross-case synthesis. Section IV identifies and discuses best practices for enhancing community acceptance. Section V synthesises the findings into an integrates conceptual model, and Section VI presents the conclusions highlighting policy and practical implications, acknowledging the limitations and directions for future research.

II. Factors That Shape Community Acceptance

A. Economic Benefits

Hydropower projects generate economic benefits in two phases: during construction, through employment in engineering, transportation, and labour-intensive activities that provide short-term local income; and during operation, through maintenance and facility management roles, with secondary economic activity emerging around project sites in local markets and service provision. However, the benefits too often flow upward: local communities receive little power while national grids receive the electricity [2], [4].

Mayeda and Boyd [4] discovered that in 32 of the 41 studies reviewed, locals believed benefits were distributed unfairly, with the poorest members of the community receiving the least. Acceptance increases when local hiring, training, and transparent income sharing are prioritized and when compensation is structured as an ongoing, indexed entitlement rather than a one-off payment [2], [4].

B. Infrastructure development benefit

Roads, bridges, electricity networks, and communication systems constructed for hydropower projects can improve access to services like healthcare, education, and trade with potentially significant gains in living standards in areas such as the Niger River basin. Yet, the distribution of these benefits is frequently unequal; many communities report that while hydropower contributes to the national electricity supply, local populations receive limited long-term benefits; employment opportunities are frequently temporary; and skilled positions are frequently filled by outsiders. This imbalance causes dissatisfaction and resistance.

C. Environmental Concerns

The creation of reservoirs inundates forests, farmland, and habitats, causing biodiversity loss and reduced access to natural resources; changes in sediment flow can affect downstream agriculture and riverbank stability; and water quality may decline due to altered temperature and oxygen levels. Because river communities depend on these systems for transportation, agriculture, fishing, and cultural customs, they often perceive environmental changes as direct threats to their livelihoods and blame the dam when they observe altered flood patterns or declining fish stocks [2].

Research indicates that environmental concerns can outweigh economic incentives. For instance, studies conducted in Chile show that even financial benefits, like lower electricity tariffs, are insufficient to offset concerns about ecological damage [5]. When communities see that environmental risks are being actively managed, trust and acceptance improve.

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D. Social and Cultural Factors

Large dams create reservoirs that often force communities to relocate, resulting in agricultural loss, livelihood disturbance, and the breakdown of social networks; cultural heritage sites and ancestral lands may also be lost, affecting community identity and emotional well-being [6]. The Ludila Hydropower Station in China's Jinsha River Basin flooded 37 km^2 of land, including 21.6 km^2 of good farmland. This resulted in a 44% loss of productive land for the people who lived there [7]. Only about 16% of the lost cropland was replaced by compensation; residents adapted by switching to cash crops and rebuilding their homes, but the process is time-consuming and traumatic.

Resettlement is not a one-time event but rather a continuous process of adaptation. Rebuilding homes, modifying livelihoods, and re-establishing social institutions are all necessary. Dissatisfaction lasts for decades when participation is restricted or pay is insufficient [8]. Projects that involve local populations in decision-making processes, provide transparent information, and respect cultural values achieve higher acceptance; whereas, lack of consultation frequently results in mistrust, protests, and long-term conflict [9].

III. Case Studies

A. Global Cases

1. Chile: Discounts Are Not Enough

Campos-Requena *et al.* [5] conducted a discrete choice experiment with 340 participants in two zones, one with existing dams and one without. The results were clear: the tariff discount did not change people's minds. Economic incentives alone could not overcome negative perceptions even in places with no prior experience of hydropower. The lesson is that genuine engagement and environmental protection are required in addition to money [10].

2. China: Learning to Live with a Dam

The Ludila Hydropower Station case is instructive because researchers used satellite data, census records, and compensation files to track post-resettlement outcomes. They discovered that 65.8% of the original village houses were traditional timber-earth buildings, while the remainder were rebuilt by the residents themselves, averaging 230 m^2 of renovated space; only 15.8% of the lost farmland was replaced by annual compensation, so farmers switched to high-value cash crops to survive; and 90% of the flooded irrigated land was replaced by a new reservoir [11]. The key finding is that resettlement is a continuous process of adaptation in housing, agricultural, and cultural life.

3. India: Manufacturing Consent

The Lower Subansiri project in Northeast India is the nation's largest hydropower dam. According to fieldwork conducted in 2024 in Dhemaji, Lakhimpur, and Gerukamukh [12], the state shifted from evicting people to convincing them, providing corporate social responsibility initiatives, livelihood plans, and infrastructural "gifts". Open dissent replaced cautious engagement by civil society organisations and communities alternated between symbolic rejection and gradual acceptance. Deeper ecological and social issues remained unsolved, leading to uneven and brittle consent [13].

B. African Cases

1. Zambia: Getting It Right at Ngonye Falls

The Ngonye Falls project on the Zambezi River is a rare example of good practice. Before construction, the Barotse Royal Establishment, the traditional authority in the area, and the developers signed a Community Participation Agreement. Locals were employed as community liaisons; project redesign reduced physical relocation to only 71 of the 419 affected households; pay was adjusted for inflation; livelihood restoration and in-kind support were provided; and a grievance procedure has been in place since 2016. The project became the first in Africa to receive gold certification under the Hydropower Sustainability Standard [14], demonstrating that doing the right thing for communities is feasible, but requires conscious effort from the outset [2].

2. Cameroon: The Nachtigal Disaster

Ten impacted communities, assisted by Green Development Advocates, complained to the World Bank Inspection Panel and the AfDB Independent Review Mechanism. Nachtigal, a 420 MW dam on the Sanaga River, came online in March 2025 and currently provides 30% of Cameroon's electricity for US$1.3 billion. However, the nearby communities are furious: fishermen's compensation of roughly US$4,460 per person is regarded as minuscule and a "dupery" given the dam's 35-year operating life [15]; Sand miners report that of 22 pre-project quarries, no locals were hired as subcontractors during construction; sacred places were demolished and water sources and medicinal plants have disappeared; and social problems such as thievery, juvenile delinquency, and commercial sex work have worsened [15],[16].

In October 2022, the Inspection Panel decided to conduct an investigation [17] and in May 2024, a Dispute Resolution Agreement was signed [17]. However, individuals still claim that there are insufficient fish in the pond managed by the operator, and new compensation requests are being planned [18]. The case demonstrates that, legal action, while important, does not always or quickly resolve issues [18].

C. Nigerian Cases

1. Taraba State: People Want Micro-Hydropower

Taraba State has the lowest electricity access rate in Nigeria. Agwu *et al*. [19] surveyed three rural communities and found that 53% of the population lacked formal education, and nearly 98% used firewood for cooking. Low-cost off-grid electricity was cited by 96% of respondents as their top need, ahead of health clinics (84%) and agricultural inputs (83%). As many as 94%

stated they would assist in maintaining such a system, and more than 90% believed water wheel generators could address their energy problems. Respondents also identified risks: 77% recognised corruption as a significant threat to sustainability, and 58% supported community vigilantes to stop vandalism. Communities are prepared and willing; the technology exists, but investment and political will are lacking [19], [20].

2. Mambilla: Forty Years of Broken Promises

The proposed 3,050 MW proposed Mambilla Hydropower Project in Taraba would power all of northern Nigeria. The contract was signed at US$5.7 billion, with 85% financing from the Chinese Export-Import Bank. Yet nothing has been built in forty years, across multiple military and civilian governments.

The Gembu community is resentful; one resident told BusinessDay [21] that "if the government had lived up to its commitment, our electricity problem would have become a real source of employment for thousands of youths." The Mambilla case is a warning that in the absence of political will, technical viability is meaningless [22].

D. Comparative Cross-Case Synthesis

Table I synthesises the cases against the analytical dimensions developed in Section II. Three patterns emerge. First, procedural justice is the strongest single predictor of acceptance across all six cases: where participation was institutionalised before construction (Zambia), acceptance was high; where it was absent or reactive (Cameroon, China), conflict persisted even where material compensation was paid. Second, monetary compensation is necessary but not sufficient: Chile shows that price incentives fail without environmental assurance, and Cameroon shows that lump-sum payments perceived as derisory actively inflame opposition. Third, the Nigerian cases reveal a distinctive demand-side pattern: unlike the supply-driven conflicts elsewhere, Taraba communities actively request small-scale, locally managed hydropower, indicating that acceptance is latent and constrained by investment and governance rather than by community attitudes. These cross-case findings directly inform the integrated model proposed in Section V.

TABEL I
COMPARATIVE CROSS-CASE SYNTHESIS OF HYDROPOWER ACCEPTANCE OUTCOMES

Case study	Status/Scale	Dominant acceptance factor	Participation quality	Compensation adequacy	outcome
Chile [5], [10]	Operating; discrete choice experiment (n=340)	Environmental concern outweighs tariff discount Low	Low–moderate	Financial incentives insufficient to offset environmental concerns	Negative perception persists
China - Ldila [7], [11]	Operating	Sociocultural/resettlement disruption	Limited	Partial (≈16% cropland replaced)	Long-term adaptation, enduring dissatisfaction
India – Lower subansiri [12], [13]	Operating/large	Procedural (manufactured consent)	Contested	corporate social responsibility and livelihood packages	Uneven, brittle consent
Zambia – Ngonye Falls [2], [14]	Operating; Gold certified	Participation and benefit-sharing	High (pre-construction agreement)	Indexed, ongoing, livelihood restoration	High acceptance
Cameroon – Nachtigal [15]-[18]	Operating; 420 MW	Procedural and compensation grievances	Low (post-hoc complaints)	Perceived as derisory	Conflict; Inspection Panel investigation; ongoing claims
Nigeria – Taraba [19]	Proposed micro-hydro	Demand-side willingness	Community self-organised	organised N/A (no project)	Latent acceptance; constrained by investment
Nigeria – Mambilla [21], [22]	Proposed; 3,050 MW	Political will and delivery credibility	Absent (no construction)	N/A	Resentment; project failure

IV. WHAT WORKS: BEST PRACTICES

The most crucial element in attaining acceptance, according to research, is local involvement [23]. Advantages should be distributed equitably through community development funds, training initiatives, and local hiring mandates rather than through a one-time payment that vanishes, and compensation should be actual and ongoing.

However, as Cameroon and Chile demonstrate, money is insufficient on its own; people must also be respected and granted genuine decision-making authority [24]. A comprehensive environmental impact assessment is more than a compliance exercise: It is a tool to prevent foreseeable harm, and watershed management, fish passageways, and continuous monitoring are important because no amount of money can convince people that a project is not harming the river they rely on [25]. Table II summarises the best practices for improving community acceptance of hydropower projects.

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TABLE II
BEST PRACTICES FOR IMPROVING COMMUNITY ACCEPTANCE OF HYDROPOWER PROJECTS

Strategy	Core Components	Expected Outcome
Stakeholder Engagement	Early consultation; transparent communication; grievance mechanisms	Builds trust, reduces misinformation, enables early identification of community concerns
Benefit Sharing	Fair compensation; community development funds; local employment; revenue-sharing	Ensures equitable distribution of economic gains and strengthens community ownership
Environmental Mitigation	Environmental Impact Assessments (EIAs); fish passage systems; watershed management; biodiversity conservation and monitoring	Minimises ecological disruption and protects livelihoods tied to fisheries, agriculture, and water resources

V. TOWARDS AN INTEGRATED COMMUNITY ACCEPTANCE MODEL

The comparative synthesis in Table I confirms that economic, environmental, and sociocultural variables interact rather than operate independently. Figure 1 presents a proposed conceptual model that integrates these three variable sets into a unified community acceptance assessment. The model proceeds in three stages: (i) economic, environmental, and sociocultural variables are measured through combined quantitative and qualitative analysis; (ii) these inputs generate a Community Acceptance Index that serves both evaluative and predictive functions; and (iii) the index supports evidence-based decision-making by policymakers, developers, and host communities. The index is intended for use at project screening, during environmental and social impact assessment, and as a monitoring instrument through construction and operation.

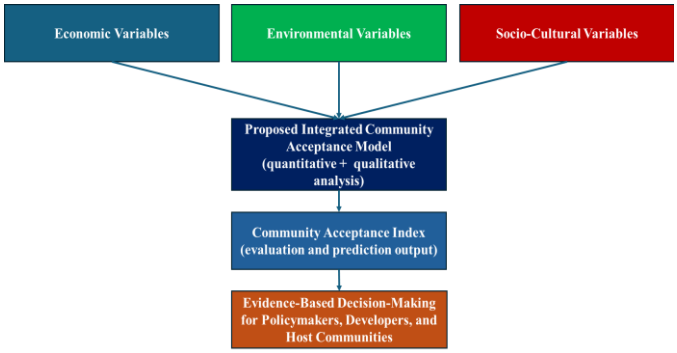

Figure 1. Proposed conceptual model for unified community acceptance assessment.

VI. CONCLUSION

This review has shown that community acceptance of hydropower projects is decisive to their success and that, while economic benefits matter, environmental and sociocultural concerns frequently matter more. The cases examined in this paper demonstrate what works and what does not: Zambia's Ngonye Falls is a true success story built on a pre-construction participation agreement and indexed, ongoing compensation; Chile's equity tariff scheme is a well-meaning but unfinished effort because price signals cannot substitute for environmental assurance; Cameroon's Nachtigal serves as a warning that legal remedies are slow and do not by themselves resolve distributive grievances; China's Ludila illustrates the decades-long adaptation burden of resettlement; India's Lower Subansiri shows that manufactured consent is brittle; and Nigeria's Taraba's and Mambilla cases reveal, respectively, latent community willingness constrained by investment and the cost of absent political will.

A. Policy and Practical Implications

The findings have several implications for policymakers, project developers, host communities, and financiers. Policymakers should strengthen regulator frameworks by requiring meaningful community participation before financial close establishing accessible and enforceable grievance mechanisms, and ensure that compensation arrangements account for inflation and long-term livelihood restoration. Requirement for transparent reporting of local employment and subcontracting could further improve accountability. An integrated community acceptance index tool could also support project screening and monitoring, subject to empirical validation.

Project developers should budget for livelihood restoration as a recurrent operational cost rather than a one-off settlement; treat environmental mitigation (EIAs, fish passage, watershed management) as trust-building rather than compliance; and institutionalise community liaison and grievance procedures from project inception, as at Ngonye Falls. Host communities, in turn, should organise early engagement through traditional and civil society structures, as in Zambia and Cameroon. For financiers, linking disbursement and continued project oversight to independent monitoring of social performance, compensation, and community acceptance could help identify and address emerging grievances.

B. Limitations of the Study

This review has limitations. It relies on secondary sources and documented cases rather than primary fieldwork; case selection is purposive rather than exhaustive, and publication and language biases may over-represent documented conflicts; Nigerian evidence is drawn largely from a single survey and media reporting; and the proposed index has not yet been empirically validated.

C. Future Research

Future research should examine the interdependence of economic, environmental, social, and institutional factors rather than treating them as separate determinants of community acceptance. Particular attention should be given to developing and validating predictive

models that not only characterise but also predict whether a community will approve of a hydropower project. Priority directions include: empirical validation of the proposed Community Acceptance Index across multiple projects; longitudinal panel studies tracking acceptance before, during, and after resettlement; and mixed-methods investigation in Nigerian host communities, where the evidence base remains limited.

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