

Mainstreaming Indigenous Knowledge Systems into Flood Disaster Management in the Niger Delta, Nigeria: Evidence For A Hybrid Governance Framework

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DOI: <https://doi.org/10.51584/IJRIAS.2026.11080127>

Received: 31 August 2026; Accepted: 04 September 2026; Published: 17 September 2026

ABSTRACT

Flooding is a recurrent hazard in the Niger Delta, where formal disaster-management institutions operate alongside longstanding community knowledge and practices. This study examined the institutional and participatory conditions under which Indigenous Knowledge Systems (IKS) can be mainstreamed into formal flood disaster management in Bayelsa, Delta and Rivers States. A pragmatic, sequential exploratory mixed-methods design was used. The qualitative phase comprised 20 semi-structured interviews with policy implementers, policy formulators, experts/academics and community representatives. Findings from the qualitative phase informed the structured questionnaire used in the quantitative phase. A sample of 384 community respondents was calculated from a target population of 433,988; 384 questionnaires were administered and 280 usable responses were returned, representing a 72.9% response rate. Qualitative data were analysed through thematic analysis supported by NVivo, while quantitative data were analysed using frequencies, percentages and selected inferential procedures in SPSS. Three qualitative themes were identified: hierarchical control and limited formal recognition of indigenous knowledge; low participation and trust across stakeholder groups; and the absence of a definite mechanism for capturing and reusing indigenous knowledge. Quantitatively, 70% of respondents reported no awareness of an existing framework, while resource constraints (52%), lack of government support (48%), insufficient documentation (40%) and limited community engagement (35%) were the most frequently reported implementation barriers. Community engagement (60%), government support (50%) and cultural relevance (45%) were the most frequently identified factors associated with workable frameworks. Respondents prioritised digital knowledge repositories (61%), community advisory boards (61%), statutory mandates (57%) and government–community partnerships (57%) as mechanisms for mainstreaming IKS. The study does not claim to have measured community resilience outcomes directly. Instead, it develops an evidence-based hybrid governance framework intended to create institutional conditions through which local knowledge can be documented, validated, protected and incorporated into flood-risk governance.

Keywords: Indigenous knowledge; flood disaster management; hybrid governance; community participation; Niger Delta; Nigeria.

INTRODUCTION

Flood risk is shaped not only by hydrometeorological processes but also by exposure, vulnerability, infrastructure, governance and the capacity of institutions and communities to anticipate and respond to

hazards. Global evidence shows that flood risk is likely to increase under a warmer climate, while adaptation can reduce vulnerability when it is appropriately designed and implemented (Hirabayashi et al., 2013; Jongman et al., 2015). The Sendai Framework for Disaster Risk Reduction 2015–2030 also places disaster-risk governance, understanding risk, investment in risk reduction and preparedness at the centre of disaster-risk reduction, while recognising that responsibility is shared across state and non-state actors (United Nations Office for Disaster Risk Reduction [UNDRR], 2015). Within this wider governance context, Indigenous Knowledge Systems are relevant because communities develop place-specific observations, practices and social arrangements through long interaction with their environments. Research on local and Indigenous knowledge has demonstrated that such knowledge can complement scientific information, particularly where it contributes to local risk recognition, environmental monitoring, preparedness and culturally appropriate response (Hiwasaki et al., 2014; Mercer et al., 2010). However, integration is not equivalent to accepting every traditional claim uncritically. Indigenous practices vary between communities, may be affected by social change and environmental change, and require context-sensitive validation before incorporation into formal decision-making. The Niger Delta provides an important setting for examining this issue. The region is characterised by extensive rivers, creeks, wetlands and floodplains and experiences recurrent flooding. The study on which this manuscript is based focused empirically on Bomadi in Delta State, Sagbama in Bayelsa State and Akuku-Toru in Rivers State. The thesis identifies a range of local practices, including environmental indicators for flood forecasting, community mobilisation, adaptive settlement practices, vegetation-based measures and other locally transmitted forms of flood knowledge. Previous empirical work in coastal Nigeria has likewise documented multiple indigenous flood-control and management practices and argued for their integration with modern flood-management approaches. The problem, therefore, is not simply that indigenous knowledge exists but that the institutional arrangements for recognising, capturing, validating and using it remain weak. The qualitative evidence in the source thesis identifies hierarchical government control, limited participation and trust deficits, and the absence of a definite knowledge-capture mechanism as central barriers. The quantitative strand provides complementary evidence about the prevalence of these perceptions and the mechanisms respondents consider important. The present manuscript restructures those findings as a coherent mixed-methods study and avoids treating descriptive perceptions as proof of causal effects or demonstrated resilience outcomes. The study addressed four questions: (1) What factors are responsible for the non-inclusion of indigenous knowledge in flood disaster management? (2) What forms of frameworks for incorporating indigenous knowledge are recognised by respondents? (3) What factors are associated with the perceived functioning of such frameworks? and (4) What mechanisms do respondents identify as appropriate for mainstreaming indigenous knowledge into formal flood disaster management? The objective was to use the combined evidence to formulate an empirically grounded hybrid governance framework.

CONCEPTUAL AND THEORETICAL ORIENTATION

The study is informed by three complementary ideas. First, the integration of Indigenous and scientific knowledge requires deliberate processes through which knowledge holders, practitioners and institutions interact, compare evidence and develop usable forms of knowledge (Mercer et al., 2010; Hiwasaki et al., 2014). Second, disaster-risk governance requires vertical and horizontal collaboration among public institutions, communities, civil society and knowledge actors. Evidence from coastal disaster governance shows that local institutions and community participation can be important components of effective risk management when linked to formal governance structures (Quader et al., 2023). Third, the study adopts a knowledge-management perspective in which knowledge must be identified, captured, documented, validated, stored, shared and periodically reviewed before it can become an institutional resource. These perspectives are used as analytical lenses rather than as claims that the developed framework has already

been experimentally validated. The framework proposed below is therefore a research-derived governance model. Its effectiveness requires future field implementation and outcome evaluation.

METHODOLOGY

Research Design

The study used a pragmatic sequential exploratory mixed-methods design. The qualitative strand was conducted first to explore how stakeholders understand Indigenous Knowledge Systems, the barriers to their inclusion and the institutional conditions required for mainstreaming. The quantitative strand followed and used a structured questionnaire informed by the qualitative findings. This sequence provides a defensible connection between the two strands: qualitative evidence generated contextual categories, while the survey assessed how frequently selected issues and proposed mechanisms were reported among community respondents. Mixed-methods design guidance supports such sequencing where qualitative exploration is used to inform a subsequent quantitative instrument (Creswell & Plano Clark, 2018).

Area and Population of the Study

The empirical study covered three flood-prone Local Government Areas: Bomadi in Delta State, Sagbama in Bayelsa State and Akuku-Toru in Rivers State. The qualitative population comprised policy implementers, policy formulators, experts and academics, and community representatives with relevant experience of flood management or Indigenous Knowledge Systems. Twenty participants were purposively selected: four policy implementers, four policy formulators, six experts/academics and six community representatives. Purposive sampling was appropriate because the qualitative phase required information-rich participants with direct experience of the phenomenon. For the quantitative phase, the source thesis reports a combined population of 433,988 for the selected communities and a calculated sample size of 384 using a 95% confidence level, 5% margin of error and $p = 0.5$. The allocation was 77 respondents for Bomadi, 165 for Sagbama and 142 for Akuku-Toru. All 384 questionnaires were administered, and 280 were completed and returned. The response rate was therefore 72.9% ($280/384 \times 100$). The quantitative analysis in this study is consequently based on $n = 280$ rather than the planned sample of 384.

Instrument Development, Reliability and Validity

The semi-structured interview guide was developed from the study objectives, literature and expert consultation. Questions addressed Indigenous Knowledge practices, barriers to integration, stakeholder relationships, and mechanisms for capture and reuse. Interviews lasted approximately 60–90 minutes, were recorded with consent, transcribed verbatim and analysed using NVivo. The quantitative questionnaire was developed after the qualitative phase so that survey items reflected issues emerging from stakeholder accounts. Content and face validity were established through expert review. A 50-person pretest was conducted among respondents within the study area who were not included in the final sample. The pretest led to adjustments to wording and cultural clarity. Internal consistency was acceptable to good across the four principal constructs, with Cronbach's alpha values ranging from 0.75 to 0.82.

Data Analysis and Integration

Qualitative transcripts were analysed through familiarisation, first-cycle coding, second-cycle/focused coding, theme development and iterative comparison of coded extracts with the emerging themes (Table 4.2). The analysis generated three principal themes. Representative quotations are retained in the results

because they demonstrate how the themes were grounded in participant accounts. Thematic analysis is a flexible method for identifying patterned meaning in qualitative data (Braun & Clarke, 2006). Quantitative data were analysed in SPSS using frequencies and percentages for the descriptive results and selected inferential procedures reported in the thesis, including chi-square and regression procedures. Because the manuscript is based primarily on the reported survey tables, interpretations of the descriptive findings are presented as perceptions, reported associations or priorities rather than causal effects. No causal inference is made from the cross-sectional survey. Integration occurred at the interpretation stage. Qualitative themes were used to explain the institutional and relational meaning behind the survey patterns, while quantitative frequencies were used to show the distribution of perceptions across the 280 respondents.

RESULTS

Table 4.1 Socioeconomic Characteristics of Respondents

Variable	Category	Number	Percentage (%)
Gender	Male	189	67.5
	Female	91	32.5
Age	18–24	17	6.0
	25–34	31	11.0
	35–44	87	31.0
	45+	145	52.0
Education	No education	17	6.0
	Informal	131	47.0
	Secondary level	62	22.0
	Diploma/post-secondary below degree	34	12.0
	Degree and above	36	13.0
Employment	Unemployed	26	9.3
	Artisan	206	73.6
	Government official	24	8.6
	NGO staff	15	5.3
	Academia	9	3.2
Residence	0–5 years	3	1.1
	6–10 years	7	2.5
	11–15 years	18	6.4
	16–20 years	47	16.8
	Above 20 years	205	73.2

Table 4.1 presents the socioeconomic characteristics of the 280 respondents included in the study. The findings show that male respondents constituted the majority (67.5%), while females accounted for 32.5%, indicating a male-dominated sample. In terms of age, respondents aged 45 years and above were the largest group (52.0%), followed by those aged 35–44 years (31.0%), while respondents aged 25–34 years and 18–24 years accounted for 11.0% and 6.0%, respectively. Regarding educational attainment, 47.0% had informal education, 22.0% had secondary education, 13.0% possessed a degree or higher qualification, 12.0% had diploma/post-secondary qualifications below degree level, while 6.0% had no formal education. With respect to employment, artisans constituted the largest occupational group (73.6%), followed by unemployed respondents (9.3%), government officials (8.6%), NGO staff (5.3%), and academics (3.2%). Concerning length of residence, the majority of respondents (73.2%) had lived in the study area for more than 20 years, while 16.8% had resided there for 16–20 years, 6.4% for 11–15 years, 2.5% for 6–10 years, and only 1.1% for 0–5 years. Overall, the distribution indicates that the respondents were predominantly male, older adults, artisans, and long-term residents, suggesting that a substantial proportion had considerable experience and familiarity with the socioeconomic and environmental conditions of the study area.

Table 4.2: Qualitative transcript coding with meanings

Theme	Key Codes	Illustrative Evidence	Interpretative Meaning
Hierarchical control and limited recognition	Government attitude; face-off between government and stakeholders; knowledge known locally but not formally recognized	“We never know what plans the government has...” (P9)	Limited inclusion in planning and decision-making is perceived as an institutional barrier.
Low participation and trust	Lack of trust; unclear roles/responsibilities; differing perceptions of scientific and local knowledge	NEMA and academic accounts describe difficulties in reconciling prescribed and locally trusted approaches.	Trust and role clarity are necessary conditions for sustained collaboration.
No definite capture/reuse mechanism	Interest of knowledge holders; orientation; documentation; historical transmission	NGO participant described local knowledge as potentially useful but not formally recognised.	Mainstreaming requires institutional procedures for capture, validation, protection and reuse.

Table 4.2 presents the qualitative coding and interpretation of participants’ views regarding institutional and governance factors influencing the recognition and integration of local knowledge into planning and decision-making. The findings reveal that hierarchical control and limited recognition constitute important institutional barriers, as participants perceived government processes as largely top-down, with local stakeholders having limited knowledge of or influence over government plans. This is reflected in P9’s statement, “We never know what plans the government has...”, which suggests inadequate transparency and communication between government institutions and local communities. The theme of low participation and trust further indicates that unclear institutional roles, limited confidence in government processes, and differences between scientific and locally trusted knowledge constrain effective collaboration among stakeholders. The coding also shows that although local knowledge holders possess valuable knowledge

transmitted through historical and community practices, there is no definite mechanism for systematically capturing, documenting, validating, protecting, and reusing such knowledge within formal planning institutions. Overall, the findings suggest that effective mainstreaming of local knowledge requires more inclusive and transparent governance arrangements, stronger stakeholder participation, clearly defined institutional responsibilities, trust-building mechanisms, and formal procedures for the systematic incorporation of locally generated knowledge into planning and decision-making.

Table 4.3: Quantitative Evidence on Awareness, Framework Knowledge, Perception and Barriers

Indicator	Response	Number	Percentage (%)
Awareness of existing frameworks	Yes	84	30
	No	196	70
Framework type recognised	Community-based models	42	15
	Government-led initiatives	28	10
	Hybrid models	14	5
	International NGO programmes	6	2
	None identified	188	67
Perceived effectiveness	Very effective	14	5
	Effective	28	10
	Neutral	42	15
	Ineffective	84	30
	Very ineffective	112	40
Implementation barrier	Resource constraints	146	52
	Lack of government support	134	48
	Insufficient documentation/preservation	112	40
	Limited community engagement	98	35
	Inadequate training/capacity	90	32
	Resistance to change	70	25

Table 4.3 presents the quantitative evidence on respondents' awareness of existing frameworks, knowledge of framework types, perceptions of their effectiveness, and barriers to implementation. The findings indicate a low level of awareness, as only 30% of respondents reported being aware of existing frameworks, while a substantial 70% were unaware. Among the frameworks recognised, community-based models were the most identified (15%), followed by government-led initiatives (10%), hybrid models (5%), and international NGO programmes (2%), while 67% could not identify any framework. This limited knowledge is consistent with the respondents' assessment of framework effectiveness, where only 5% considered the frameworks very effective and 10% effective, compared with 30% who considered them ineffective and 40% very ineffective; 15% remained neutral. The major implementation barriers identified were resource constraints (52%), lack of government support (48%), insufficient documentation and preservation of local knowledge (40%), limited community engagement (35%), inadequate training and institutional capacity (32%), and resistance

to change (25%). Overall, the results suggest that the poor integration of local knowledge into formal planning is associated not only with inadequate awareness and limited recognition of existing frameworks but also with weak institutional support, insufficient resources, poor documentation, inadequate capacity, and limited community participation. These findings reinforce the qualitative evidence in Table 4.2 that meaningful mainstreaming requires stronger institutional commitment, systematic documentation, capacity building, adequate resources, and more inclusive community engagement.

Table 4.4 Important Factors for Framework Implementation and Mainstreaming Mechanisms Prioritised

Reported For	Number	Percentage (%)
Community engagement	168	60
Government support	140	50
Cultural relevance	126	45
Resource availability	112	40
Knowledge and skills of practitioners	98	35
External NGO/international support	84	30
Other	14	5
Mechanism	Number	Percentage
Digital databases for Indigenous Knowledge	170	61
Community advisory boards	170	61
Government–Indigenous community partnerships	160	57
Regular community consultations	160	57
National legislation mandating integration	160	57
Community workshops	150	54
Regular impact assessments	150	54
Joint NGO projects	140	50
Community meetings/forums	140	50
Written records/publications	140	50
Local ordinances	140	50
Community feedback mechanisms	140	50
Funding/resource allocation	130	46
Media campaigns	130	46
Legal recognition/protection	120	43

Table 4.4 presents the factors considered important for framework implementation and the mechanisms prioritised for mainstreaming Indigenous knowledge into formal planning and decision-making. The findings show that community engagement was the most highly reported implementation factor (60%),

followed by government support (50%), cultural relevance (45%), resource availability (40%), knowledge and skills of practitioners (35%), and external NGO/international support (30%). Regarding preferred mainstreaming mechanisms, digital databases for Indigenous Knowledge and community advisory boards ranked highest, each with 61%, suggesting strong support for both systematic knowledge documentation and direct community representation in governance processes. Government–Indigenous community partnerships, regular community consultations, and national legislation mandating integration were each identified by 57% of respondents, highlighting the importance of institutional collaboration, continuous participation, and legal backing. Community workshops and regular impact assessments followed at 54%, while joint NGO projects, community meetings/forums, written records/publications, local ordinances, and community feedback mechanisms each recorded 50%. Funding/resource allocation and media campaigns were identified by 46% each, while legal recognition and protection recorded 43%. Overall, the results indicate that respondents favour a multi-dimensional mainstreaming approach that combines community participation, institutional partnerships, legal and policy support, systematic documentation, capacity development, resource provision, and continuous consultation and feedback. This suggests that integrating Indigenous knowledge effectively requires moving beyond informal recognition toward structured, participatory, legally supported, and adequately resourced mechanisms that allow local knowledge to be documented, protected, validated, and incorporated into planning practice.

Mixed-Methods Integration

Integrated Issue	Qualitative Evidence	Quantitative Evidence	Integrated Interpretation
Institutional recognition	Participants described limited formal recognition and top-down decision-making.	70% reported no awareness of existing frameworks; 48% identified lack of government support as a barrier.	Formal recognition and communication are central institutional gaps.
Participation and trust	Interviews identified low participation, distrust and unclear stakeholder roles.	Community engagement was the most frequently reported enabling factor (60%).	Participation should be institutionalised rather than treated as occasional consultation.
Knowledge documentation	Participants described absence of a definite capture/reuse mechanism.	40% identified insufficient documentation; 61% prioritised digital databases.	A structured, community-controlled knowledge repository is warranted.
Legal/institutional support	Stakeholders described weak integration into formal agencies.	57% prioritised national legislative mandates and government–community partnerships.	Mainstreaming requires institutional rules, not only voluntary projects.
Scientific–local complementarity	Participants described Indigenous Knowledge as potentially complementary to scientific practice.	20% recognised integration with modern scientific methods as a framework component; 45% identified cultural relevance as important.	Integration should use transparent validation and context-specific co-production.

Table 4.5 integrates the qualitative and quantitative findings and demonstrates a strong convergence of evidence regarding the institutional conditions required for mainstreaming Indigenous Knowledge into formal planning and decision-making. The qualitative findings indicate that limited institutional recognition, top-down decision-making, low participation, distrust, unclear stakeholder roles, and the absence of mechanisms for documenting and reusing Indigenous Knowledge are major constraints, while the quantitative results reinforce these concerns, with 70% of respondents reporting no awareness of existing frameworks, 48% identifying lack of government support as a barrier, and 40% reporting insufficient documentation. At the same time, 60% identified community engagement as an important enabling factor, confirming the qualitative emphasis on participation and trust. The findings also demonstrate strong support for formal mechanisms, as 61% prioritised digital knowledge databases, while 57% supported national legislative mandates and government–community partnerships, indicating that mainstreaming requires more than informal or project-based recognition. Furthermore, the qualitative evidence that Indigenous Knowledge can complement scientific practice is supported by the quantitative finding that 45% considered cultural relevance important, although only 20% recognised integration with modern scientific methods as a framework component. Overall, the mixed-methods evidence suggests that effective mainstreaming should be based on formal institutional recognition, sustained community participation, systematic and community-sensitive documentation, legal and governmental support, and transparent integration of Indigenous and scientific knowledge through context-specific co-production.

DISCUSSION OF FINDINGS

The findings show that the respondents were largely drawn from groups with substantial experience of the study area, particularly older adults, artisans, and long-term residents. More than half of the respondents (52.0%) were aged 45 years and above, 73.6% were artisans, and 73.2% had lived in the area for more than 20 years. This profile is important because Indigenous and local knowledge is often embedded in long-term observation, livelihood practices, social relationships, and repeated interaction with the local environment. The dominance of older and long-term residents therefore provides a useful basis for understanding locally accumulated knowledge and perceptions of environmental and planning processes. This is consistent with the works of Leal Filho et al., (2022) and Zougmore et al., (2023) that Indigenous and local knowledge is developed through long-term interaction with local environmental conditions and remains important for adaptation and resource management. Also, Zvobgo et al. (2023) found that the use of Indigenous and local knowledge among farmers in Zimbabwe was associated with age and with practical adaptation decisions. The socioeconomic characteristics of the present respondents therefore provide an appropriate social context for examining the recognition and mainstreaming of locally held knowledge. However, the predominance of older respondents and artisans also suggests that the transmission of such knowledge to younger and more formally educated groups requires deliberate attention if its continuity is to be maintained.

The qualitative findings reveal that the major challenge is not necessarily the absence of Indigenous knowledge, but its limited institutional recognition and weak incorporation into formal decision-making. Participants described government processes as largely hierarchical and top-down, while the statement by P9, *“We never know what plans the government has...”*, reflects a perceived communication and participation gap between institutions and local stakeholders. This finding is consistent with recent evidence showing that Indigenous and local knowledge is frequently overlooked when formal environmental and climate policies are designed and implemented. See et al. (2024), for example, found that mainstream adaptation approaches in several Global South contexts tend to privilege technocratic approaches while marginalising place-based knowledge. Similarly, Arkhurst et al. (2022) reported in Ghana that national coastal resilience strategies were not always consistent with local adaptation practices and recommended

stronger collaboration between communities and government institutions. The present finding therefore suggests that institutional mainstreaming requires more than acknowledging that Indigenous knowledge exists; it requires changing the way institutions communicate with, involve, and share decision-making power with local knowledge holders. The reported lack of trust and unclear stakeholder roles further indicate that participation must involve meaningful influence over decisions rather than occasional consultation. This position is supported by Cunningham and Mercury (2023), who argue that genuine collaboration with Indigenous communities requires shared control rather than treating communities merely as sources of information.

The quantitative findings reinforce the qualitative evidence by demonstrating substantial weaknesses in awareness, institutional support, and implementation. Only 30% of respondents were aware of existing frameworks, while 70% were not, and 67% could not identify any specific framework for integrating Indigenous knowledge. Moreover, only 15% identified community-based models, while government-led, hybrid, and NGO approaches were recognised by relatively small proportions of respondents. Perceptions of effectiveness were similarly weak, with 70% describing existing frameworks as either ineffective (30%) or very ineffective (40%). Resource constraints (52%) and lack of government support (48%) emerged as the leading implementation barriers, followed by inadequate documentation (40%), limited community engagement (35%), inadequate training and capacity (32%), and resistance to change (25%). These results are consistent with the Zougmore et al., 2023 findings, which identifies institutional marginalisation, weak policy integration, inadequate resources, and limited recognition as important barriers to the effective use of Indigenous and local knowledge. The findings also support the argument that knowledge cannot influence planning simply because it is available within communities. There must be institutional structures capable of recognising, documenting, validating, communicating, and applying that knowledge. Thus, the low awareness and poor perceived effectiveness reported by respondents point to a significant implementation gap between the existence of local knowledge and its formal use in planning and governance.

The findings on factors and mechanisms for implementation provide important evidence on how this gap can be addressed. Community engagement (60%) was the most frequently identified factor, followed by government support (50%), cultural relevance (45%), resource availability (40%), practitioner knowledge and skills (35%), and external NGO or international support (30%). Similarly, digital databases for Indigenous Knowledge and community advisory boards were the most prioritised mechanisms, each receiving 61% support. Government–Indigenous community partnerships, regular consultations, and national legislation mandating integration each recorded 57%. These results indicate that respondents favour an approach that combines community participation with institutional and technological mechanisms. The emphasis on documentation is particularly important because the qualitative interviews identified the absence of a definite mechanism for capturing and reusing local knowledge. However, documentation should not mean extracting knowledge from communities and placing it entirely under external institutional control. Knowledge documentation needs to respect ownership, consent, cultural sensitivity, and community authority over what can be recorded and shared. This is consistent with recent scholarship arguing for knowledge systems that recognise Indigenous peoples as active partners and knowledge holders rather than passive sources of data (Cunningham & Mercury, 2023; See et al., 2024). The findings also agree with Zvobgo et al. (2023), who emphasised the importance of recognition, inclusion, and preservation of Indigenous and local knowledge in strengthening its continued contribution to adaptation.

The mixed-methods findings ultimately demonstrate that mainstreaming Indigenous knowledge requires institutional transformation rather than isolated projects or informal consultation. The convergence between the qualitative and quantitative evidence is particularly strong: participants reported limited recognition and weak participation; 70% of respondents reported no awareness of existing frameworks; 48% identified

inadequate government support; and 60% regarded community engagement as an important implementation factor. Similarly, the qualitative finding that there was no clear mechanism for capturing and reusing knowledge corresponds with the quantitative finding that 40% identified inadequate documentation as a barrier and 61% prioritised digital knowledge databases. The 57% support for government–community partnerships and legislative mandates further indicates a demand for institutionalised arrangements. At the same time, the finding that Indigenous knowledge can complement scientific knowledge is supported by recent research showing that combining knowledge systems can improve the relevance and legitimacy of environmental decision-making when the process is genuinely collaborative (Miner et al., 2023). However, integration should not involve simply subjecting Indigenous knowledge to external scientific approval. It should involve transparent validation, respect for different knowledge systems, and joint production of solutions. Overall, the evidence from this study supports a participatory, legally supported, adequately resourced, culturally relevant, and community-controlled framework in which Indigenous knowledge holders participate meaningfully in planning, documentation, validation, implementation, and monitoring. Such an approach would move Indigenous knowledge from its current peripheral position toward a more legitimate and practical role in formal environmental and development decision-making.

CONCLUSION

This study concludes that mainstreaming Indigenous Knowledge Systems into flood disaster management in the Niger Delta requires a deliberate shift from predominantly hierarchical and institutionally controlled approaches towards a more inclusive hybrid governance system that recognises communities as important knowledge holders and active partners in disaster risk management. The findings demonstrate that limited institutional recognition, weak community participation, inadequate trust, poor documentation, insufficient government support, and the absence of clear mechanisms for capturing, validating, protecting, and reusing Indigenous knowledge continue to constrain its incorporation into formal flood management practices. The quantitative findings further indicate that respondents generally perceive existing arrangements as weak or ineffective, while community engagement, government support, cultural relevance, adequate resources, and appropriate knowledge and skills are considered important conditions for successful integration. The strong convergence between the qualitative and quantitative findings suggests that Indigenous knowledge should not be treated as an alternative to scientific knowledge but as a complementary source of locally grounded information that can strengthen early warning, preparedness, response, and adaptive decision-making when appropriately documented and validated. Accordingly, the study recommends a hybrid governance framework based on institutional recognition, sustained community representation, systematic knowledge documentation, participatory validation, integration into formal disaster management procedures, capacity building, legal and financial support, and continuous monitoring and learning. The framework would provide an institutional pathway for moving Indigenous knowledge from informal community practice into recognised and usable components of flood disaster governance while maintaining respect for community ownership, cultural values, participation, and knowledge protection. Overall, effective mainstreaming will depend not merely on recognising the value of Indigenous knowledge, but on establishing durable institutional arrangements through which communities, government agencies, researchers, and other stakeholders can jointly produce, manage, apply, and continually improve knowledge for flood risk reduction in the Niger Delta.

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