International Journal of Social Sciences and Management Review

Volume: 08, Issue: 04 July - August 2025

ISSN 2582-0176

COLLABORATIVE WATER RESOURCES MANAGEMENT IN SUB-SAHARIAN AFRICA: THE CASE OF MAMFE, SOUTHWEST CAMEROON

MARUH OBEN ENOH, CLARKSON WANIE MVO & SOP SOP MATURIN DESIRE

The University of Bamenda, The University of Bamenda & The University of Ebolowa

https://doi.org/10.37602/IJSSMR.2025.8405

ABSTRACT

This study examines collaborative water resources management in Mamfe Sub-division, exploring the complex interplay of stakeholder engagement, collaborative frameworks, and institutional dynamics. Through field research conducted in 2024, including surveys of 210 respondents and field observations, the study analyses existing water resources, stakeholder roles, and collaborative mechanisms. Findings reveal diverse water resources with boreholes (91.7%), wells (75%), and streams (73.3%) being predominant. While 66.7% of respondents confirm active collaboration among stakeholders, significant challenges persist in institutional coordination and information sharing. Traditional institutions demonstrate the highest effectiveness in water resources management (46.7%), while weak policy implementation (63.3%) and inadequate finances (58.3%) emerges as primary barriers to collaboration. The study concludes that successful water management in Mamfe requires integrating traditional practices with modern techniques, supported by adequate financial resources and improved institutional coordination.

Keywords: Water resources management, stakeholder collaboration, institutional coordination, traditional authorities, sustainability

1.0 INTRODUCTION

Collaborative water resources management (CWRM) has emerged as a vital approach to addressing the multifaceted challenges of water scarcity, pollution, and governance. This paradigm emphasizes the collective involvement of diverse stakeholders—including governments, communities, non-governmental organizations (NGOs), and the private sector—in the planning, implementation, and monitoring of water resources. By fostering inclusive participation, CWRM seeks to ensure equitable access to water, enhance sustainability, and mitigate conflicts arising from competing water uses (Galvez & Rojas, 2019).

The principles of Integrated Water Resources Management (IWRM) align closely with CWRM, advocating for the coordinated development and management of water, land, and related resources. This holistic framework aims to maximize economic and social welfare without compromising the sustainability of vital ecosystems. Organizations like the Global Water Partnership (GWP) have been instrumental in promoting IWRM globally, emphasizing the importance of cross-sectorial collaboration to address complex water challenges (Joint Action for Water, n.d.).

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Historical examples underscore the efficacy of collaborative approaches. The Tribunal de la Aguas in Valencia, Spain, is a centuries-old water court that exemplifies democratic and communal water management. Comprising elected local farmers, the tribunal adjudicates water disputes and ensures fair distribution, demonstrating the potential of community-based governance in sustaining water resources (Krznaric, 2024).

Cameroon offers pertinent case studies highlighting both the challenges and potentials of CWRM. In the Mou-Nkier watershed, research revealed limited stakeholder interaction and a general lack of awareness about IWRM principles. However, once informed, local communities recognized the approach's relevance to their water issues, indicating a readiness to engage in collaborative management (Angwafo et al., 2016). Similarly, studies in North-west Cameroon emphasize the role of community-based water management in fostering development and participation, especially in rural areas where centralized systems have often marginalized local voices (South African Geographical Journal, 2016).

The success of CWRM is intrinsically linked to participatory governance structures that empower communities. In Uganda's Albert Water Management Zone, collaborative efforts among government bodies, NGOs, and communities have led to improved coordination and accountability in water management. Such initiatives highlight the transformative potential of inclusive governance in achieving sustainable water solutions (IRC, 2020).

In conclusion, collaborative water resources management stands as a pivotal strategy in addressing the global water crisis. By integrating diverse stakeholders, respecting local knowledge, and fostering inclusive governance, CWRM can lead to more equitable and sustainable water outcomes; As water challenges intensify due to climate change and population growth, embracing collaborative approaches becomes not just beneficial but essential.

Water resources management presents significant challenges in developing regions, requiring coordinated efforts among diverse stakeholders to ensure sustainability and equitable access. In Mamfe Sub-division, the management of water resources exemplifies a complex interplay of stakeholder engagement, collaborative frameworks, and institutional dynamics that merits systematic investigation.

This study examines the multifaceted nature of water resources management through the lens of collaborative efforts among various stakeholders in Mamfe Sub-division. The analysis delves into the existing water resources, the roles of different actors, their collaborative mechanisms, and the effectiveness of these partnerships in ensuring sustainable water management practices. By understanding these dynamics, this research aims to contribute to improved water governance models that can enhance water security and sustainability in similar contexts.

2.0 METHODS

2.1 Study Area

Mamfe Central Sub Division in Manyu Division, also known as the Mamfe basin found in the northern part of the South West Region of Cameroon. She is the headquarters of the Manyu

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Division being an intracratonic rift in eastern West Africa, and found within the region bounded by Latitude 5o30′ and 6o10′ north of the Equator and Longitude 8o30′ and 9o35′ east of the Greenwich meridian. It is about 74km away from the Cameroon-Nigeria border and has a total surface area of 7044km², Mamfe Council Development Plan (MCDP, 2012). The population of the area as of 2017 estimate was 36,500 inhabitants with a population density of 46 persons / km². Mamfe is bordered to the North by Akwaya Sub Division, to the South and East by Eyumojock subdivision and to the West by Upper Bayang subdivision. Figure: 1.1

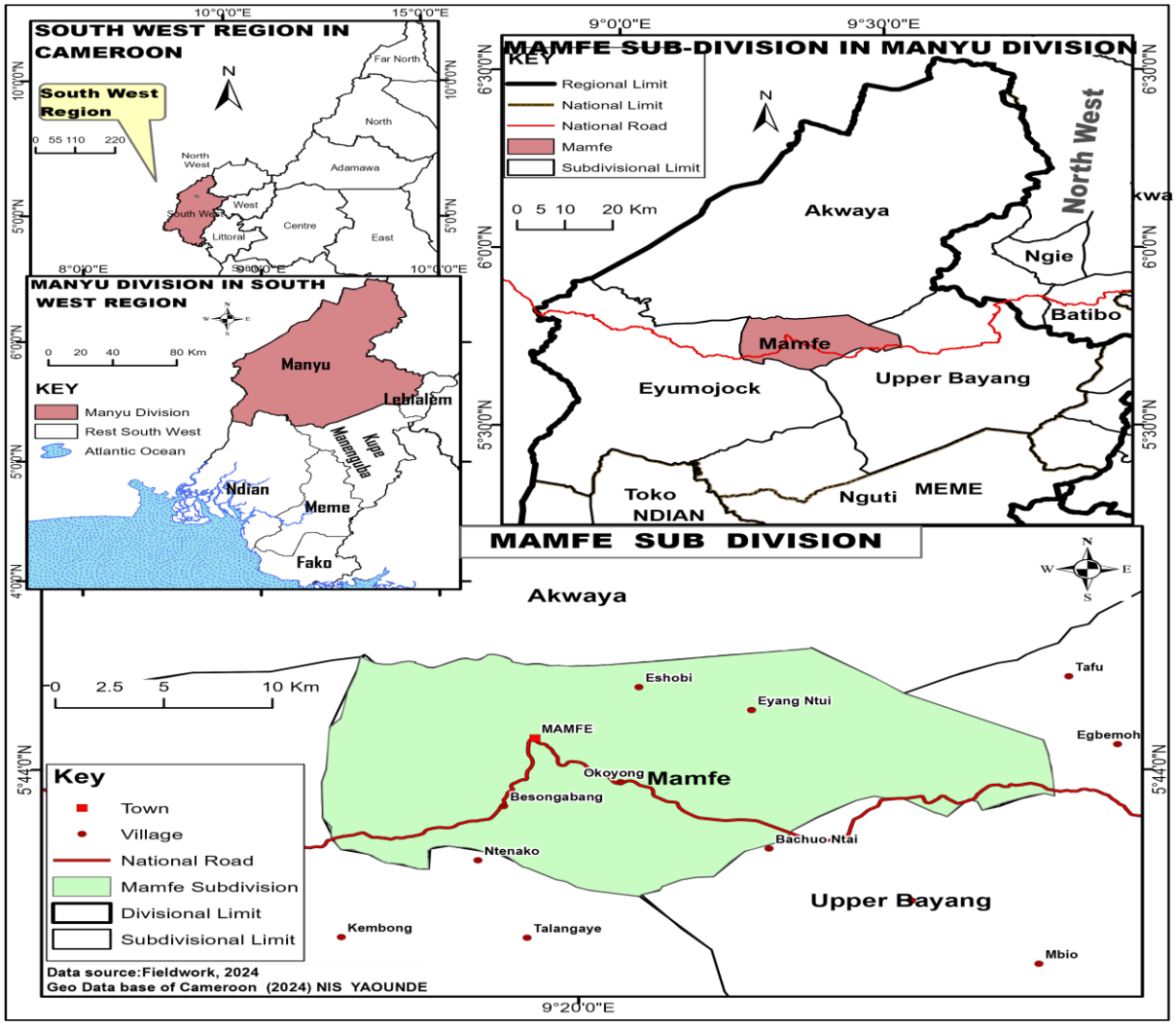

Figure1.1: Shows the location map of Mamfe

This research was conducted in Mamfe Sub-division, located in the Southwest Region of Cameroon. The area is characterized by diverse water resources including rivers, streams, springs, and groundwater sources. The sub-division encompasses both urban settlements like Mamfe town and rural communities such as Bessongabang, Egbekaw, Bachuo-Ntai, and Nchang, providing a representative spectrum of water management challenges and practices.

2.2 Research Design

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The study employed a mixed-methods research design, combining quantitative surveys with qualitative observations to comprehensively examine collaborative water resources management. This approach enabled the collection of both statistical data and contextual information, providing a holistic understanding of collaborative dynamics in water management.

Primary data collection involved structured surveys administered to 210 respondents across the sub-division. The survey instrument included questions about water resources, stakeholder involvement, collaboration activities, objectives, dimensions, and effectiveness. The Like scale was used to measure respondents' perceptions regarding stakeholder engagement and collaborative effectiveness, with options ranging from "Strongly Agree" to "Strongly Disagree" and "Excellent" to "Unsatisfactory" for effectiveness measures. Additionally, field observations documented water infrastructure, management practices, and collaborative activities across different communities. These observations provided contextual understanding of the survey data and captured practical manifestations of collaboration in various settlements.

2.4 Sampling Technique

The study utilized a stratified random sampling technique to ensure representation of diverse stakeholders and geographic areas within Mamfe Sub-division. Respondents included representatives from household users, traditional authorities, village development associations, government agencies, CAMWATER (the national water utility company), NGOs, and farmer associations. This diverse sample ensured that perspectives from all relevant water management stakeholders were captured.

2.5 Data Analysis

Quantitative data were analysed using descriptive statistics, including frequency distributions and percentages, to identify patterns and trends in collaborative water management. Data were organized into tables to facilitate clear presentation and interpretation of findings. Qualitative observations were systematically analysed to provide contextual interpretation of statistical findings and illustrate practical manifestations of collaboration in different communities.

3.0 RESULTS

3.1 Water Resources Present

The research identified diverse water resources serving Mamfe Sub-division's population across various sectors. Table 1 presents the distribution of these resources based on survey responses.

Table 1: Water Resources Present in Mamfe Sub-division

Water Sources	Percentage (%)
Boreholes	91.7
Wells	75.0
Streams	73.3
Pipe-borne water	71.7
Rainwater harvesting	70.0

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Rivers	66.7
Springs	51.7
Lakes	13.3
Others	5.0

Source: Fieldwork, 2024

Boreholes represented the most prevalent water source at 91.7%, serving as primary water sources in areas like Small Mamfe and Bessongabang. These boreholes typically reached depths of 40-60 meters and utilized hand pumps or electric pumps for water extraction. Wells constituted 75% of water sources, commonly found in household compounds throughout Mamfe, particularly in Egbekaw and Bachou villages. Streams (73.3%) from Manyu River tributaries served communities like Nchang and Okoyong for activities such as washing, irrigation, and drinking when treated. Pipe-borne water systems (71.7%) managed by CAMWATER delivered treated water to various quarters in Mamfe town.

The distribution demonstrates a balanced reliance on both groundwater sources (boreholes and wells) and surface water sources (streams and rivers), reflecting the community's adaptation to both traditional and modern water supply systems.

3.2 Actors Involved in Water Resources Management

The research identified multiple stakeholders involved in water resources management, with varying degrees of engagement. Table 2 presents respondents' perceptions regarding stakeholder involvement.

Table 2: Actors Involved in Water Resources Management

Stakeholder	Strongly Agree (%)	Agree (%)	Indifferent (%)	Strongly Disagree (%)	Disagree (%)
CAMWATER	48.3	26.7	8.3	10.0	6.7
The council	21.7	45.0	10.0	15.0	8.3
Village Water Development Authorities	30.0	35.0	10.0	20.0	5.0
Households	40.0	25.0	8.3	23.3	3.3
The state across different ministries	25.0	28.3	5.0	26.7	15.0
The population	16.7	38.3	6.7	33.3	5.0
NGOs	25.0	10.0	6.7	43.3	15.0
Village Development Associations	15.0	26.7	21.7	21.7	15.0
Traditional authorities	18.3	16.7	8.3	45.0	11.7
Farmers Association	10.0	10.0	6.7	53.3	20.0
Water Catchment Authority	11.7	13.3	10.0	48.3	16.7
Others	16.7	15.0	10.0	40.0	18.3

Source: Fieldwork, 2024

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CAMWATER emerged as the dominant actor with 75% combined positive responses (Strongly Agree and Agree). As the national water utility company, it managed urban water supply systems, maintained water treatment facilities, and ensured water quality standards. The council demonstrated strong involvement with 66.7% positive responses, coordinating water development projects and facilitating collaboration between stakeholders.

Households played a fundamental role in grassroots water management with 65% positive responses, participating through financial contributions, and labour during construction, and decision-making processes. Village Water Development Authorities also showed strong engagement (65%), overseeing community water systems, collecting user fees, and ensuring equitable distribution.

Lower positive response rates for Farmers Associations (20%), Water Catchment Authority (25%), and Traditional authorities (35%) suggested these stakeholders had less recognized involvement in water management activities despite their potential importance.

3.3 Collaboration Activities between Actors

The research examined the existence and extent of collaboration between water management stakeholders. Table 3 presents findings on collaborative engagement.

Table 3: Collaboration Activities between Actors

Variable	Frequency	Percent
Yes	140	66.7
No	70	33.3
Total	210	100.0

Source: Fieldwork, 2024

A significant majority (66.7%) of respondents confirmed active collaboration among water management stakeholders. This collaboration manifested in joint water project implementations, shared resources management, coordinated maintenance activities, and collective decision-making processes. In communities like Small Mamfe, Bessongabang, and Egbekaw, collaboration took the form of regular stakeholder meetings where CAMWATER, Village Water Development Authorities, and community representatives coordinated activities.

The 33.3% indicating no collaboration highlighted areas needing improvement in stakeholder engagement and coordination, particularly in more remote communities with limited institutional presence.

3.4 Objectives of Collaboration

The research identified various objectives driving collaborative efforts in water resources management. Table 4 presents these objectives and their relative importance based on respondent perceptions.

Table 4: Objectives of Collaboration in Water Resources Management

Objectives	Frequencies	Percentages
Ensure integrated water resources management	91	43.3
Reduce water contamination and disease spread	91	43.3
Ensure continuous water availability for varied uses	74	35.0
Reduce watershed degradation	53	25.0
Ensure equity in water distribution	49	23.3
Meet sustainable development goals and policy reforms	28	13.3
Ensure gender equity in water management	21	10.0
Combat climate change and ensure water security	21	10.0
Others	4	1.7

Source: Fieldwork, 2024

Integrated water resource management and disease prevention both emerged as primary objectives (43.3% each). In practice, integrated management involved coordinated efforts across different sectors, while disease prevention focused on water quality monitoring, treatment system maintenance, and public health campaigns.

Ensuring continuous water availability (35%) drove collaborative infrastructure development and maintenance, while reducing watershed degradation (25%) involved activities like catchment area protection and reforestation projects. Lower percentages for gender equity and climate change adaptation (10% each) suggested these were less prioritized objectives despite their importance for sustainable water management.

3.5 Dimensions of Collaboration

The research examined how different aspects of collaboration function in practice. Table 5 presents respondent evaluations of various collaboration dimensions.

Table 5: Dimensions of Collaboration in Water Management

Dimension of Collaboration	Excellent (%)	Very Good (%)	Good (%)	Very Poor (%)	Poor (%)	Unsatisfactory (%)
All stakeholders aim to ensure water availability and quality	11.7	15.0	40.0	13.3	16.7	3.3
Stakeholders contribute to water infrastructure provision	0	11.7	36.7	26.7	16.7	8.3
All stakeholders collaborate in planning	3.3	8.3	31.7	25.0	26.7	5.0
All stakeholders are involved in developing water resources	0	15.0	31.7	25.0	23.3	5.0
Information system collaboration	3.3	6.7	20.0	23.3	36.7	10.0
All institutions involved in support activities	0	5.0	21.7	26.7	36.7	10.0
Others	8.3	21.7	38.3	11.7	13.3	6.7

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Source: Fieldwork, 2024

Water availability and quality assurance emerged as the strongest dimension with 66.7% positive ratings (Excellent, Very Good, and Good combined). This indicated relatively successful collaboration in ensuring water access and quality through joint monitoring programs and coordinated maintenance of treatment systems.

Infrastructural provision collaboration showed moderate success with 48.4% positive ratings, evident in joint infrastructure projects where multiple stakeholders contributed resources. However, information system collaboration (30% positive) and institutional involvement in support activities (26.7% positive); revealed weak performance, indicating challenges in information sharing and institutional coordination.

These patterns suggested that collaboration was more effective in direct service delivery and quality assurance, while systemic and institutional aspects showed substantial room for improvement.

3.6 Effectiveness of Collaboration

The research identified key factors contributing to effective collaboration between stakeholders. Table 6 presents findings on elements enhancing collaborative success.

Table 6: Effectiveness of Collaboration between Stakeholders

Elements	Frequencies	Percentages
The role of traditional institutions	98	46.7
The presence of institutions and available resources	77	36.7
The availability of water management infrastructures	56	26.7
All of the above	46	21.7
Capacity building in water management institutions	17	8.3

Source: Fieldwork, 2024

Traditional institutions demonstrated the highest effectiveness at 46.7%. In Mamfe, these institutions effectively managed water resources through customary laws and practices, enforcing community participation, resolving conflicts, and protecting water sources.

The presence of institutions and available resources showed 36.7% effectiveness, manifested through the active presence of CAMWATER and government ministries that provided technical oversight and resource allocation. Water management infrastructure availability registered 26.7% effectiveness, providing essential services where present.

Capacity building in water management institutions showed the lowest effectiveness at 8.3%, reflecting limited training programs, insufficient technical expertise, and inadequate skill development opportunities.

3.7 Barriers to Collaboration

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The research identified multiple challenges hindering effective partnership between stakeholders. Table 7 presents key barriers affecting collaborative water management initiatives.

Table 7: Reasons for Absence of Collaboration

Reasons	Frequencies	Percentages
Weak policy implementation	133	63.3
Inadequate finances	123	58.3
Socio-political crisis impact	109	51.7
Inadequate personnel	105	50.0
Absence of water management stakeholders	42	20.0
Ignorance between actors	28	13.3
Others	11	5.0

Source: Fieldwork, 2024

Weak policy implementation emerged as the primary barrier at 63.3%, manifesting in poor enforcement of regulations, limited coordination between agencies, and inadequate monitoring of water resource utilization. Inadequate finances significantly impacted collaboration (58.3%), limiting infrastructure maintenance, water quality monitoring, and system improvements.

The socio-political crisis had substantial influence (51.7%), causing displacement of stakeholders, disruption of activities, and breakdown of collaborative networks. Inadequate personnel affected collaboration at 50%, with shortages of trained technicians and management professionals impacting system maintenance and implementation capacity.

Lower percentages for stakeholder absence (20%) and ignorance between actors (13.3%) suggested these were less significant but still notable barriers to effective collaboration.

4.0 DISCUSSION

4.1 Water Resources Diversity and Management Implications

The findings reveal a diverse array of water resources in Mamfe Sub-division, with significant reliance on groundwater sources (boreholes and wells) alongside traditional surface water sources. This diversity presents both opportunities and challenges for collaborative management. The high prevalence of boreholes (91.7%) indicates substantial investment in this technology, reflecting adaptation to water access challenges in the region. However, as noted by Tortajada (2010), such technological solutions require appropriate institutional arrangements for sustainable management.

The balanced utilization of different water sources demonstrates community resilience and adaptability, corroborating Reed's (2008) observation that water management strategies in developing regions often combine traditional and modern approaches. This diversity necessitates collaborative frameworks that acknowledge and integrate various water sources into cohesive management systems, supporting Pahl-Wostl et al.'s (2007) argument for integrated approaches that recognize system complexity.

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4.2 Stakeholder Dynamics and Collaborative Effectiveness

The research identifies multiple stakeholders with varying degrees of involvement and influence in water management. CAMWATER's dominant role (75% positive response) reflects the importance of formal institutions in urban water supply systems. However, the significant role of households (65%) and Village Water Development Authorities (65%) underscores the importance of community-level stakeholders in actual implementation and management, supporting Lautze et al.'s (2011) assertion that effective water governance requires multi-level engagement.

The moderate involvement of traditional authorities (35%) despite their high effectiveness rating (46.7%) suggests a disconnection between formal recognition and practical influence. This finding aligns with scholarly observations about the persistent importance of traditional governance systems in resource management, even when not formally acknowledged in policy frameworks (Cleaver & de Koning, 2015).

The 66.7% confirmation of active collaboration among stakeholders indicates substantial progress toward coordinated water management. However, the dimensional analysis reveals that collaboration is stronger in direct service delivery (water availability and quality assurance) than in systemic aspects like information sharing and institutional coordination. This pattern suggests what Pahl-Wostl (2009) describes as "fragmented collaboration," where practical cooperation exists without comprehensive institutional integration.

4.3 Barriers to Effective Collaboration

Weak policy implementation emerged as the primary barrier to collaboration (63.3%), pointing to the critical gap between policy formulation and execution. This finding supports Biswas' (2008) argument that water governance challenges often stem not from policy absence but from implementation failures. The identification of inadequate finances (58.3%) as a major barrier highlights resource constraints that limit collaborative capacity, particularly for infrastructure maintenance and system improvements.

The impact of the socio-political crisis (51.7%) represents a contextual challenge that disrupts established collaborative networks and displaces key stakeholders. This finding underscores the vulnerability of water governance systems to broader socio-political dynamics, supporting arguments for building resilience into collaborative frameworks (Pahl-Wostl et al., 2013).

The low effectiveness rating for capacity building (8.3%) coupled with inadequate personnel (50%) as a significant barrier point to critical human resource challenges in water management. This aligns with global observations about skills gaps in the water sector, particularly in developing regions (IWA, 2014).

4.4 Integration of Traditional and Modern Management Approaches

The high effectiveness rating for traditional institutions (46.7%) suggests their continued relevance in water governance despite modernization trends. This finding supports scholarly arguments for hybrid governance models that integrate traditional and modern management approaches (Meinzen-Dick, 2007). The effectiveness of traditional institutions likely stems

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from their embedded legitimacy, local knowledge, and established enforcement mechanisms for water management rules.

The challenges in institutional coordination and information sharing highlight the need for bridging mechanisms between traditional and formal governance systems. This aligns with current thinking in adaptive water governance that emphasizes creating interfaces between different knowledge systems and institutional arrangements (Pahl-Wostl, 2009).

4.5 Policy Implications

The findings have several implications for water governance policy and practice in Mamfe Sub-division and similar contexts. First, they suggest the need for implementation-focused policy reforms that address the gap between policy formulation and execution. Second, they highlight the importance of resource mobilization strategies to address financial constraints limiting collaborative effectiveness.

Third, the findings point to the value of formally recognizing and integrating traditional institutions into water governance frameworks, leveraging their effectiveness while addressing their limitations. Fourth, they underscore the need for capacity building programs that strengthen human resources for water management across different stakeholder groups.

Finally, the results suggest that enhancing information sharing systems and coordination mechanisms could significantly improve collaborative effectiveness, particularly in bridging the gap between direct service delivery and systemic governance aspects.

5.0 CONCLUSION

This study of collaborative water resources management in Mamfe Sub-division reveals a complex landscape characterized by both achievements and persistent challenges. The findings demonstrate diverse water resources availability, with significant reliance on boreholes, wells, and streams, indicating adaptability in water access strategies. However, the effectiveness of management efforts varies considerably across different dimensions of collaboration.

The study identifies critical gaps in stakeholder coordination, particularly between formal institutions and community-based organizations. While traditional institutions demonstrate strong effectiveness in water resources management, challenges persist in policy implementation, financial resources, and technical capacity. The impact of the socio-political crisis emerges as a significant factor affecting collaboration and resource management effectiveness.

The findings suggest that successful water resources management in Mamfe Sub-division requires a balanced strategy that integrates traditional practices with modern management techniques, supported by adequate financial resources and technical expertise. Future research should explore specific mechanisms for enhancing institutional coordination and addressing implementation gaps in water governance policies.

5.1 Limitations

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This study has several limitations that should be considered when interpreting its findings. First, the research relied primarily on perceptual data from stakeholders, which may not fully capture objective measures of collaborative effectiveness. Second, the cross-sectional nature of the study provided a snapshot of collaboration at one point in time, limiting insights into evolutionary dynamics of collaborative processes. Finally, the geographic focus on Mamfe Sub-division may limit generalizability to other contexts with different socio-political and environmental conditions.

5.2 Recommendations

Based on the findings, this study recommends:

1. Developing formal mechanisms for integrating traditional water management practices into modern governance frameworks
2. Establishing multi-stakeholder platforms that enhance information sharing and coordination between different actors
3. Implementing capacity building programs targeting technical and managerial skills for water resources management
4. Developing innovative financing mechanisms to address resource constraints in water infrastructure development and maintenance
5. Strengthening policy implementation through improved monitoring and accountability mechanisms
6. Conducting longitudinal studies to better understand the evolutionary dynamics of collaborative water governance

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