

ROLE OF CAPACITY BUILDING IN ENHANCING WATER SERVICE DELIVERY: A CASE STUDY OF MANDERA COUNTY, KENYA

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ABSTRACT

Purpose of Study: The study was conducted with the aim of evaluating the role of capacity building in enhancing the provision of water services in Mandera County.

Problem Statement: The Kenya National Water Policy 2021 was developed with the aim of ensuring sustainable water resource management and equitable access to clean water across the country. However, there exists gaps in its implementation especially in Mandera County, where water scarcity continues to be a severe and ongoing challenge.

Methodology: The study was informed by pragmatism philosophy and employing a descriptive survey research design. The target population comprised 535 participants drawn from various key stakeholders in Mandera County. The researcher used Slovin's formula to obtain a sample size of 229 respondents.

Result: Analysis yielded a coefficient of determination (R^2) of 0.428, indicating that 42.8% of the variation in the provision of water services in Mandera County is explained by capacity building. The ANOVA results revealed that the overall model was statistically significant ($p = 0.000 < 0.05$). Regression coefficient results indicated that capacity building has a positive but statistically insignificant effect on the provision of water services in Mandera County ($\beta = 0.414$, $p = 0.078 > 0.05$).

Recommendation: Water sector development partners, NGOs, and the Mandera County Public Service Board should work together to reform and scale up capacity-building programs across the water sector workforce.

Keywords: *Capacity Building, Water Service Delivery, Water Management, Service Enhancement, Mandera County*

INTRODUCTION

National water policies typically encompass a wide range of issues, including water supply and sanitation, irrigation, hydropower, environmental conservation, and climate change adaptation. The success of implementing a national water policy largely depends on the creation of robust institutional frameworks and governance structures. According to the United Nations Water (UN-Water), effective water governance requires political, social, economic, and administrative systems that influence water use and management (UN-Water, 2021). Sub-Saharan Africa is considered a water-scarce region in terms of access to clean drinking water. By 2022, nearly 400 million people in the region were without basic drinking water services (WHO, 2023). This acute shortage has profound implications for both public health and economic progress. According to Lee and Schwab (2005), unreliable water supply where residents receive water for only a limited number of hours each day creates conditions that promote stagnation and microbial growth. They further observed that fluctuations in hydraulic pressure can cause contaminants to be drawn into pipelines from surrounding polluted areas. Additionally, factors such as aging infrastructure, corrosion, and leaks within water distribution networks contribute to bacterial proliferation along the supply channels (Bazaanah & Mothapo, 2024).

Water is a valuable resource when it is available in safe and adequate quantities; however, it can also pose significant risks when it is unsafe or insufficient Buser (2024). The availability of clean and secure water is crucial for survival, as life fundamentally depends on it (Bazaanah & Mothapo, 2024; Lebu, Lee, Salzberg & Bauza, 2024). Both the supply and quality of water influence the prevalence or prevention of infectious diarrhea and other severe waterborne diseases, which are among the leading causes of infant mortality and malnutrition (Fardowsa, 2024). Beyond health concerns, water-related challenges also have economic consequences, such as increased absenteeism in schools and lost productivity in workplaces. As a result, ensuring access to water in a sustainable and equitable manner has become a global priority. This raises concerns for communities and nations facing unreliable, inadequate, or unsafe water supplies (WHO, 2022). Implementation of National Water Policy describe the process of translating a country's water-related goals, strategies, and regulations into actionable plans and concrete measures (Magrini & dos Santos, 2024).

In Mexico, the National Water Law, established in 1992, focuses on the integrated management of water resources, promoting a decentralized and participatory approach through river basin councils and water agencies (CONAGUA, 2022). Despite Mexico possessing a significant portion of the world's freshwater resources, its water distribution remains highly uneven, with regions such as the north and northwest facing severe water scarcity (Gleick, 2020). Major urban centers like Mexico City, Guadalajara, and Monterrey are often plagued by water shortages, impacting millions of residents. According to the National Water Commission (CONAGUA, 2022), approximately 17 million Mexicans still lack access to safe drinking water, and over 25 million do not have proper sanitation services. Recent initiatives have aimed at improving water infrastructure and increasing access to clean water, but challenges such as pollution, over-extraction, and climate change continue to exacerbate water availability and quality (Gleick, 2020). Efforts to address these issues include large-scale investments in water conservation and management strategies, as well as policies to mitigate the impacts of climate change on the country's water resources (CONAGUA, 2022).

In Rwanda, the National Water Resources Management Policy, established in 2004, focuses on the sustainable management of water resources through integrated approaches and stakeholder

participation. The policy emphasizes the importance of river basin management and the development of water management institutions (Rwanda Water and Sanitation Corporation, 2021). Despite Rwanda having abundant water resources, with over 8,000 lakes and numerous rivers, water distribution remains uneven, with rural areas experiencing more limited access compared to urban regions like Kigali (Nyandwi et al., 2020). According to the Rwanda Water and Sanitation Corporation (2021), approximately 3 million Rwandans still lack access to safe drinking water, and nearly 6 million lack proper sanitation facilities. In recent years, the government has made significant strides in expanding water infrastructure, improving water quality, and increasing access to safe drinking water. However, challenges such as pollution, deforestation, and climate change continue to affect water availability and quality, particularly during dry spells and periods of erratic rainfall (Nyandwi et al., 2020). Efforts to tackle these challenges include investments in watershed protection, water harvesting techniques, and the expansion of rural water supply systems (Rwanda Water and Sanitation Corporation, 2021).

In Kenya, the national water policy outlines clear objectives aimed at enhancing water supply services, ensuring progress toward the realization of water as a fundamental human right (Awandu, Kanda, & Kimokoti, 2024). Its primary goal is to guarantee universal access to safe and clean water for all citizens in Kenya. Additionally, it emphasizes the importance of developing water storage infrastructure, such as reservoirs and dams, to provide a stable water supply, particularly during periods of scarcity. A key focus of the policy is the sustainable management of water resources, ensuring their long-term availability and quality while balancing social, economic, and environmental considerations (Wamucii, Teuling, Ligtenberg, Gathenya, & van Oel, 2023). Moreover, it incorporates climate change adaptation strategies and disaster risk reduction measures within the water sector to enhance resilience and sustainability.

Mandera County, situated in northeastern Kenya, experiences severe water scarcity due to its arid climate, receiving an average annual rainfall of just 255 mm, making it one of the driest areas in the country. As of 2022, only 32% of the county's population had access to safe drinking water, far below the national average of 59% (Water Services Regulatory Board, 2021). The population grew from 867,457 in 2019 to approximately 940,000 in 2023, increasing pressure on the already limited water resources (KNBS, 2022). The county's water supply, primarily reliant on boreholes and shallow wells, remains inadequate, with only 15% of households having piped water connections (Kenya National Bureau of Statistics, 2022; Water Services Regulatory Board, 2023). Development of water infrastructure is hindered by limited finances Mandera requires an estimated KES 5 billion (about \$46 million USD) to achieve universal water access (Mandera County Government, 2023). Additionally, the county's vast, sparsely populated geography and recurring conflict primarily among pastoralist communities over water access further complicate water provision services.

Over the past decade, water provision in Mandera County has deteriorated significantly. Between 2013 and 2023, the number of residents facing acute water scarcity rose by 45%, from 400,000 to 580,000 people (WSRB, 2023). Key water sources, including the Daua River and groundwater aquifers, are depleting groundwater levels have dropped by an average of 2.5 meters annually over the past five years, while the Daua River's flow rate declined by 30% in the same period (WASREB, 2022). The average distance to water points has increased from 5 km in 2015 to 8.7 km in 2023 (Mandera County Government, 2022). Water quality has also worsened, with 68% of sources failing to meet national drinking water standards in 2022, up from 52% in 2018 (Mandera County Government, 2023; Ministry of Water, Sanitation and Irrigation, 2023).

STATEMENT OF THE PROBLEM

The Kenya National Water Policy 2021 was designed to ensure sustainable water resource management and equitable access to clean water. However, key gaps exist in its implementation in Mandera County, where water scarcity remains a persistent challenge (Suda, Sušnik, Masia & Jewitt, 2024). The policy outlines strategies such as decentralized water governance, increased infrastructure investment, stakeholder collaboration, and climate resilience integration, yet these have not been fully realized (Eweet & Muna, 2022). Weak institutional capacity, inadequate funding, and ineffective enforcement mechanisms hinder progress, leaving many communities reliant on unsafe or distant water sources. In Mandera, harsh climatic conditions, coupled with poor water infrastructure and resource mismanagement, makes the crisis worse. Similar challenges are observed in Turkana, Marsabit, and Ethiopia's Afar region, where fragmented policy execution leads to unreliable water access (Hassan, 2025).

Ideally, effective implementation of national water policies is expected to enhance the provision of water services by enabling improved water resource management, increased access to clean water, development of water infrastructure, protection of water sources, and enhanced water governance. However, evidence from existing empirical studies suggests that the implementation of national water policies provides mixed results with regard to their effect on water service provision. For instance, there is extensive evidence indicating a positive and significant relationship between national water policy implementation and improved water service provision in Tanzania (Nganyanyuka et al. (2018); Marks and Kumpel (2018) in Kenya; Liddle and Fenner (2017) in Uganda; Koehler et al. (2020) in Kenya, Uganda, and Ethiopia; Oates et al. (2019) in Ethiopia).

The majority of these studies were carried out in diverse geographic locations under different conditions, utilizing distinct methodologies and variables. As a result, this creates contextual, methodological, and conceptual gaps. The current study sought to fill these knowledge gaps by using specific proxies tailored to Mandera's unique challenges, such as the availability and functionality of water infrastructure, stakeholder partnerships, climate change integration, water catmint protection and capacity building. This study therefore sought to assess the effect of capacity building on the provision of water services in Mandera County.

RESEARCH OBJECTIVE

To assess the effect of capacity building on the provision of water services in Mandera County, Kenya.

RESEARCH HYPOTHESIS

H₀: There is no significant statistical association between capacity building and provision of water services in Mandera County, Kenya.

EMPIRICAL REVIEW

Khan (2021) examined the role of capacity building in water governance and focuses on understanding the factors that shape risk interpretation and decision-making processes in the provision of water services in Delhi, India. As part of the book "Resource Management, Sustainable Development and Governance: Indian and International Perspectives," the study's objective is to identify the key factors influencing risk interpretation and decision-making and to emphasize the importance of capacity building in improving water governance. While the specific methodology is not mentioned, it likely involves qualitative research methods such as interviews,

surveys, and document analysis. The findings are expected to highlight the significance of capacity building, including the need to enhance the knowledge and skills of water governance stakeholders, strengthen institutions, improve communication and collaboration, and enhance the understanding and interpretation of risks associated with water provision. However, without access to the full article, this overview provides a general understanding of the topic based on the available information.

Pagdee and Kawasaki (2021) conducted a study to examine the role of community perceptions and capacity building in enhancing the provision of water services through PES programs in Thailand. Using qualitative research methods, including in-depth interviews and focus group discussions, the researchers gathered insights from local farmers, water users, and stakeholders involved in the PES program. The findings emphasize that community perceptions significantly impact the success and sustainability of PES initiatives, with positive perceptions fostering greater community participation and support. Trust, communication, and awareness of the program's benefits were identified as key factors influencing community perceptions. Furthermore, capacity-building initiatives were found to be vital in promoting community engagement, as they provide training, knowledge-sharing, and skill development opportunities. The study highlights the need for tailored capacity-building approaches that address the specific needs and challenges of the community. By understanding and addressing community perceptions and investing in capacity building, PES programs can achieve higher acceptance, participation, and effectiveness in sustaining ecosystem services, specifically in the context of water service provision in Phu Kao, Thailand.

Edokpayi, et al., (2020) as part of the book "Water Conservation and wastewater treatment in BRICS Nations" explores the capacity-building efforts of water service provision in South Africa. The objective of the study is to examine the effectiveness of recent trends and national policies in improving water provision and wastewater treatment, with a specific focus on capacity-building initiatives. Through a literature review approach, the authors analyse relevant literature, reports, and policies to highlight the significance of capacity-building programs in addressing the challenges faced by the water sector. They discuss the various national policies and strategies implemented by the South African government and examine stakeholder involvement, including collaboration among government agencies, non-governmental organizations, and the private sector, in enhancing water service provision and wastewater treatment. The findings emphasize the importance of capacity building, recommend improved funding, governance structures, technical expertise, and knowledge sharing, and provide insights into the challenges faced and recommendations for effective capacity building in South Africa's water sector.

Howlett and Ramesh (2017) emphasize the importance of establishing effective regulatory frameworks and institutions at the national level to oversee water and sanitation services. These structures are crucial for implementing national policies, safeguarding property rights, and ensuring fair returns on private investments through well-regulated tariffs, service quality standards, and infrastructure expansion goals. When service provision is decentralized to local authorities, it is essential to clearly define the roles and responsibilities between national and local governments to ensure efficiency. A major challenge in public service delivery is the lack of accountability, insufficient performance incentives, and inadequate monitoring (Lunduka et al., 2012). In response, non-state actors have increasingly played a vital role in supporting state institutions and intergovernmental organizations. The term "non-state actors" refers to a fluid and evolving concept that represents social groups operating between communities and regulatory

bodies. These actors do not seek profit or political dominance but rather engage in collective action driven by shared concerns and interests.

Ensuring the long-term sustainability of water, sanitation, and hygiene initiatives remains a persistent challenge for governments in the Global South and development stakeholders. Chowns (2015) highlights that institutions and regulatory bodies responsible for water resource management operate across multiple levels, including local, basin, national, and international frameworks. Governments at various levels international, regional, national, and county develop and implement water supply projects aimed at improving existing conditions and achieving developmental goals. Chan and Effah (2013) note that policies guiding water supply services in many countries are outlined in official documents, such as regulations governing water service licensing and standards for minimum service levels. Herrera and Post (2014) argue that good governance in water management is characterized by transparency, accountability, fairness, responsibility, efficiency, and responsiveness to local contexts, ensuring that decision-making processes align with the principle of subsidiarity.

Obando, Luwesi, Förch, Shisanya, and Förch (2018) presents a case study on the successful implementation of participatory capacity building in integrated watershed management in Kenya, specifically focusing on the provision of water services. The objective of the study is to showcase how capacity-building initiatives can enhance water service provision and contribute to sustainable water resource management in arid and semi-arid lands. Through a case study approach, combining primary and secondary data sources, the authors highlight key findings. These include the importance of a participatory approach in decision-making processes to promote community ownership and collaboration among stakeholders, the significance of integrated watershed management in addressing water-related challenges by considering multiple disciplines and sectors, the value of local knowledge and empowerment in tailoring water services to specific regional needs, and the importance of institutional strengthening to enhance efficiency, transparency, and accountability in water resources management. The article underscores the successful application of participatory capacity building in integrated watershed management in Kenya and emphasizes the need for a holistic approach involving multiple stakeholders and dimensions to achieve sustainable and effective water service provision in arid and semi-arid lands.

THEORETICAL FRAMEWORK

The study was underpinned by Resource-Based View (RBV). The theory was introduced by Barney (1991). RBV states that an organization's ability to achieve and sustain a competitive advantage depends on how effectively it acquires, develops, and utilizes its resources. For a resource to contribute to long-term success, it must meet four key criteria: it must be valuable, rare, difficult to imitate, and non-substitutable (VRIN). This view underscores the significance of internal resources in driving superior organizational performance. This resource heterogeneity serves as a foundation for sustained competitive advantage, provided the resources fulfill specific conditions. Barney (1991) introduced the VRIN framework to describe these conditions, which was later refined into the VRIO model, replacing "non-substitutable" with "organized to capture value" (Barney & Wright, 1998; Barney, 1995; Kraaijenbrink et al., 2010).

The RBV challenges the traditional structure-conduct-performance paradigm of industrial organization economics, which focused primarily on external factors determining firm performance. Instead, the RBV emphasizes the importance of firm-specific factors in explaining performance differences among firms in the same industry (Peteraf & Barney, 2003; Lockett et al.,

2009; Newbert, 2007). This change in focus from industry structure to firm resources marked a significant change in the field of strategic management. Resources in the RBV are broadly defined to include tangible and intangible assets, as well as capabilities. Critics of the RBV have pointed out several limitations of the theory. These include its tautological nature, the difficulty in empirically testing its propositions, and its limited applicability in dynamic environments (Priem & Butler, 2001; Kraaijenbrink et al., 2010; Foss & Knudsen, 2003). However, proponents have responded to these criticisms by refining the theory and developing more sophisticated methodologies for empirical testing (Barney, 2001; Peteraf & Barney, 2003; Armstrong & Shimizu, 2007).

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The RBV has been extended to include the concept of dynamic capabilities, which refers to the firm's ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environments (Teece et al., 1997; Eisenhardt & Martin, 2000; Helfat & Peteraf, 2003). This extension addresses critiques that the original RBV was too static and failed to explain how firms maintain competitive advantage in dynamic markets.

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In the context of this study, the RBV was adapted to understand how public organizations leverage their unique resources and capabilities to achieve policy goals (Bryson et al., 2007; Matthews & Shulman, 2005; Hansen, 2007). This theory provides a framework for understanding how Mandera County can develop and leverage its unique resources - such as local knowledge, community

networks, and environmental assets - to improve water service provision (Wachira, 2014; Ogendi & Ong'oa, 2009; Nyanchaga, 2016). Moreover, the concept of dynamic capabilities is particularly relevant in addressing challenges related to climate change integration and adapting water management practices to changing environmental conditions.

CONCEPTUAL FRAMEWORK

A conceptual framework serves as a theoretical model that defines and categorizes the key constructs of a study while illustrating their relationships. Figure 1 shows the conceptual framework.

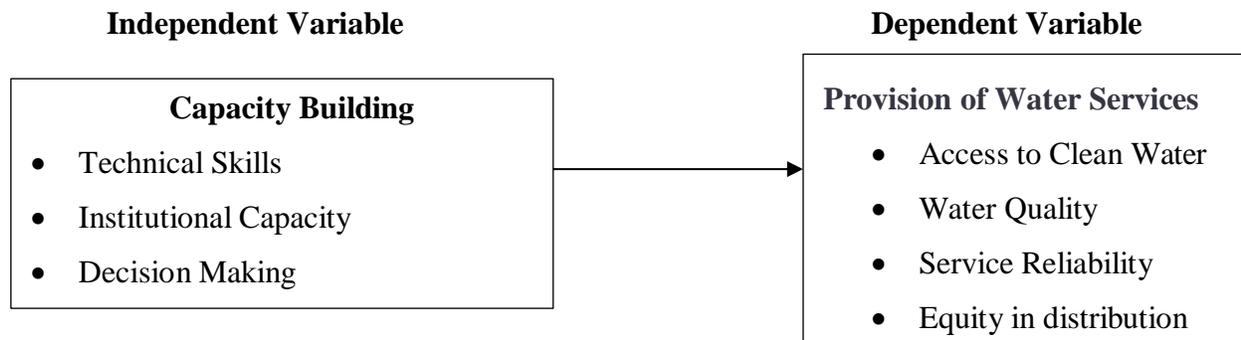


Figure 1: Conceptual Framework

Source: Author (2025)

METHODOLOGY

The study adopted the pragmatism philosophy due to the nature of the research questions. The study investigated climate change integration. This required methodological approach to thoroughly understand their impact on water provision. Applying a pragmatic approach allows the researcher to employ both qualitative and quantitative methods, thereby leveraging the strengths of each (Crossan, 2003). This mixed- method approach is important in providing a comprehensive understanding of the relationship between the independent variables and the dependent variable of water provision. According to assertions by Goldkuhl (2012), the flexibility of pragmatism philosophy emphasizes practical solutions and the usefulness of findings, bridging the gap between positivism and interpretivism. Pragmatism philosophy acknowledges the value of both objective, measurable data (consistent with positivism) and subjective information (in line with interpretivism).

This study employed a descriptive survey research design. This design was suitable because it allowed for the systematic collection of data from key stakeholders involved in water services, providing required information regarding the influence of climate change integration (Aquino Lee, Spawn & Bishop-Royse, 2018). The study was carried out in Mandera County, located in the northeastern part of Kenya. The county experiences low and erratic rainfall, with an average annual precipitation of only 255mm, making it one of the driest regions in Kenya (Mandera County Government, 2018). This scarcity of water resources has a profound impact on the lives of its approximately 867,457 residents (Kenya National Bureau of Statistics, 2019).

The study targeted 535 participants drawn from various key stakeholders in Mandera County, including the Water Resources Authority (WRA) Mandera Office, Mandera County Companies, community leaders, representatives from the Non- Governmental Organization (WESCOORD),

County Government of Mandera Water Department, and the National Drought Management Authority (NDMA). The study, however excluded the general citizenry of the county as direct respondents, as it focused on policy implementation and institutional effectiveness, which required input from key stakeholders directly involved in water governance and service provision.

The study used Slovin's formula to estimate the sample size (Slovin, 1960) as shown below:

$$n = N / (1 + Ne^2).$$

Whereas:

n = no. of samples N = total population

e = error margin/margin of error which is approximated at $\alpha=0.05$ $n = 535 / [1 + 535 (0.05^2)]$

$n = 535 / [1 + 535 (0.0025)]$

$n = 535 / [1 + 1.335]$

$n = 535 / 2.335$

$n = 228.877 \sim 229$

To select the study sample, the researcher utilized a probability sampling technique. This method guaranteed each member of the population an equal chance of being selected (Quatember, 2019). Questionnaires and key informant interviews were adopted as a means of collecting data from the study participants. Semi-structured questionnaire allowed for both standardized data collection and flexibility, enabling respondents to provide more useful information on specific water policy implementation issues in Mandera County. This approach ensured that important topics are covered while allowing for in-depth responses on complex challenges. Further, they can be administered directly or through representatives where people can read and write (Pandey & Pandey, 2021).

Primary data was collected through the administering of structured questionnaires to the selected officers. The questionnaire was self-administered but in cases where clarification was needed the researcher or research assistants assisted. The researcher obtained a letter of introduction from the Department of Development Studies at Kenyatta University and sought a research permit from the National Commission for Science, Technology, and Innovation of the Republic of Kenya (NACOSTI). Two research assistants were recruited and trained and participated in the pretesting before commencing the data collection exercise. The questionnaires was administered from respective offices on a face-to-face survey and drop- and-pick approach. The study conducted diagnostic tests including multicollinearity, normality, heteroscedasticity, and linearity tests before performing regression analysis. These tests ensured the validity and accuracy of the model assumptions.

Upon collecting the questionnaires, the researcher reviewed them for completeness, accuracy, and consistency. Responses from structured questions were coded and entered into SPSS, a statistical software chosen for its flexibility in handling diverse data formats. Descriptive statistics such as mean, variance, and standard deviation summarized the dataset, while qualitative data was coded and analyzed using the same software. The study applied both Pearson's correlation and linear regression analyses to examine relationships between independent variables and water service provision. Correlation analysis assessed the direction and strength of associations, while regression analysis evaluated the combined influence of stakeholder partnerships, watershed protection, and

climate change integration. This approach allowed for controlling external factors and determining the collective and individual effects of each independent variable on the dependent variable.

This study used simple linear regression models to link the independent variable to the dependent variable. The statistical model was structured as follows:

$$Y = \beta_0 + \beta X + \epsilon$$

Whereby Y = Provision of Water Services in Mandera County

X= Capacity Building, β_0 =Constant, β = Coefficient.

ϵ = Error Term.

Ethical integrity was maintained through adherence to confidentiality, anonymity, and the exclusive academic use of collected data. Respondents' identities were protected, and findings would be shared with relevant stakeholders to promote transparency. Data collection occurred in safe, accessible areas with the support of local authorities, and participation was voluntary, with the option to withdraw at any time. Sensitive data to be securely stored and encrypted, and all safety protocols including travel precautions were followed due to Mandera County's security context.

FINDINGS AND DISCUSSION

The study administered structured questionnaires to 229 participants drawn from a population comprising staff from Water Resources Authority (WRA) Mandera Office, Mandera County Companies, community leaders, Non-Governmental Organization (WESCOORD), County Government of Mandera Water Department, and National Drought Management Authority (NDMA). Out of the 229 distributed questionnaires, 211 were successfully filled, representing a response rate of 92.1 percent. Therefore, the data collected was considered representative and reliable for drawing valid conclusions on the effect of National Water Policy 2021 implementation in Mandera County.

Demographic results revealed that study sample was predominantly male (66.8%) and largely composed of young to mid-career professionals aged between 31 and 45 years. Most respondents possessed college or bachelor's qualifications, with a few holding master's or PhD degrees, indicating strong educational diversity. The majority had 6–10 years of work experience in Mandera's water sector and had lived in the county for a similar period, reflecting both institutional familiarity and local insight. Overall, the demographic profile suggests a knowledgeable and experienced group well-positioned to inform climate-integrated water policy implementation in Mandera County.

Descriptive Statistics

Capacity Building

The study examined the role of capacity building on the provision of water services in Mandera County. This objective evaluated how training, skill improvement, institutional development, and knowledge transfer programs have contributed to improving the efficiency, quality, and sustainability of water service delivery in the county. To collect relevant data, ten statements were presented to respondents, addressing various aspects of institutional and community capacity development. These included the effectiveness of staff training, leadership development, infrastructure maintenance skills, water quality monitoring, and knowledge dissemination.

Descriptive analysis was performed using mean and standard deviation to capture the central tendency and variability of responses. The mean values helped to summarize the overall level of agreement for each statement, while the standard deviation indicated how consistent or varied the responses were across different respondents. These findings offer insights into how well capacity-building efforts are consistent with the operational needs of water service institutions in Mandera County. Table 1 presents the descriptive statistics results for the capacity building variable.

Table 1: Descriptive Statistics on Capacity Building

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Std. Dev.
There is improvement in the technical skills of water management staff in Mandera County.	3.6	6.9	21.4	44.7	23.4	3.78	1.04
Capacity building efforts have strengthened institutional capacity for water management.	2.7	5.3	18.5	46.8	26.7	3.89	0.98
Training programs have enhanced decision-making in water resource management.	4.1	7.0	20.6	43.5	24.8	3.78	1.07
Capacity building has improved water infrastructure maintenance.	5.2	8.4	17.3	41.2	27.9	3.78	1.10
Our organization effectively builds local leadership in water resource management.	3.0	7.1	19.8	47.5	22.6	3.80	1.02
Capacity building has improved water policy implementation.	4.6	6.5	21.0	42.9	25.0	3.77	1.08
Training programs have enhanced water quality monitoring capabilities.	4.3	7.8	23.1	39.7	25.1	3.73	1.09
Capacity building has improved community water management skills.	3.8	6.7	20.5	45.1	23.9	3.79	1.03
Our organization effectively transfers knowledge to local communities.	5.0	7.9	19.2	43.3	24.6	3.74	1.10
Capacity building efforts have improved overall water service delivery efficiency.	2.5	6.4	18.7	48.0	24.4	3.85	0.97
Overall Mean						3.79	

Source: Field Data, 2025

The descriptive statistics in Table 1 shows that the overall mean score for capacity building across all indicators was 3.79, suggesting a generally favorable perception among respondents. The results indicate that capacity-building efforts are positively influencing various aspects of water service provision in Mandera County, though some variation exists in how these efforts are experienced across institutions and communities. The statement “Capacity building efforts have strengthened institutional capacity for water management” received the highest agreement level, with 73.5 percent of respondents agreeing with it. This statement recorded a mean of 3.89 and a standard deviation of 0.98, indicating a strong consensus on the role of capacity building in

institutional strengthening. This finding is significant as it underscores the contribution of capacity-building efforts in equipping institutions with the structures, personnel, and systems necessary to deliver effective water services. According to Paged and Kawasaki (2021), community perceptions significantly impact the success and sustainability of PES initiatives, with positive perceptions fostering greater community participation and support.

Similarly, 72.4 percent of respondents agreed that “Capacity building efforts have improved overall water service delivery efficiency,” resulting in a mean score of 3.85 and the lowest standard deviation (0.97) among all items. The low variability in responses indicates a widely shared view that capacity-building programs have led to more streamlined and responsive water service delivery. This implies that well-executed training and empowerment strategies have translated into operational improvements at the ground level. The statement “Our organization effectively builds local leadership in water resource management” had an agreement rate of 70.1 percent, with a mean of 3.80. This reflects recognition that capacity-building programs are not just focused on technical skills but also on leadership development critical for sustaining progress and ensuring community-led stewardship of water resources. The results concurs with the findings by Edokpayi, et al., (2020) which highlighted the significance of capacity-building programs in addressing the challenges faced by the water sector. They discuss the various national policies and strategies implemented by the South African government and examine stakeholder involvement, including collaboration among government agencies, non-governmental organizations, and the private sector, in enhancing water service provision and wastewater treatment.

Regarding technical skills, 68.1 percent of respondents agreed that there has been improvement in the technical skills of water management staff, registering a mean of 3.78. This suggests that training programs targeting field staff and technical personnel have had a noticeable impact on performance, although there remains room for further upskilling to ensure comprehensive expertise in areas like maintenance, data collection, and infrastructure diagnostics. The statement “Training programs have enhanced decision-making in water resource management” received agreement from 68.3 percent of respondents, yielding a mean of 3.78 and standard deviation of 1.07. These results suggest that capacity-building efforts are improving organizational planning, operational responsiveness, and strategic resource allocation. However, the moderate standard deviation may indicate uneven access to decision-making platforms among various staff cadres. Howlett and Ramesh (2017) emphasize the importance of establishing effective regulatory frameworks and institutions at the national level to oversee water and sanitation services. These structures are crucial for implementing national policies, safeguarding property rights, and ensuring fair returns on private investments through well-regulated tariffs, service quality standards, and infrastructure expansion goals. When service provision is decentralized to local authorities, it is essential to clearly define the roles and responsibilities between national and local governments to ensure efficiency.

Similarly, statements addressing water quality monitoring and knowledge transfer to local communities attracted slightly lower agreement levels 64.8 percent and 67.9 percent, respectively with mean scores of 3.73 and 3.74. These findings imply that despite the fact that progress has been made in technical training and outreach, some gaps still exist in systematic environmental monitoring and sustained community education. One of the more significant findings was that 69.0 percent of respondents believed that capacity building has improved infrastructure maintenance, with a mean of 3.78. This indicates that maintenance practices have been supported through

training, helping to prolong the lifespan of storage tanks, pipelines, and pumping systems, especially in remote and arid regions.

Moreover, most (69.0 percent) of the respondents agreed that water conservation and community-level water management skills have improved, with a mean of 3.79. This reflects positively on the inclusivity of the programs, suggesting that capacity-building is not only institution-focused but also reaching end-users and community managers. The descriptive results indicate that capacity building is a foundational pillar in improving water service delivery in Mandera County. The overall mean of 3.79 confirms a broadly positive perception, while the moderate standard deviations suggest some differences in program depth, frequency, or accessibility across sub-counties and institutions. These findings reinforce the importance of continuous training, local leadership development, and systematic knowledge transfer to both staff and communities to ensure sustained water service improvements. These descriptive statistics are consistent with the findings of a study by Edokpayi, et al., (2020) which emphasized the importance of capacity building, recommend improved funding, governance structures, technical expertise, and knowledge sharing, and provide insights into the challenges faced and recommendations for effective capacity building in South Africa's water sector.

Thematic Analysis

This section presents thematic responses from key informant interviews with officers from WRA and NDMA regarding the capacity-building programs designed to enhance water service delivery in Mandera County. The focus was on the types of programs implemented, their impact on community empowerment, and how they have contributed to water sector performance. Respondents reported a range of training, sensitization, and technical support programs targeting community-based water management groups, technical personnel, and government officers. Programs focused on operations and maintenance (O&M), governance, water quality monitoring, and emergency response planning.

The interviews revealed that capacity-building initiatives have played a central role in improving the management, maintenance, and sustainability of water services in Mandera County. Respondents noted that training programs targeting Water Users Associations (WUAs), local leaders, and community members have enhanced technical and administrative competencies necessary for effective water resource management. The trainings, conducted annually, focus on financial management, water safety planning, and conflict resolution around shared water points. As a result, community boreholes and water systems are being managed more efficiently, with better record keeping and proactive maintenance practices observed across multiple sub-counties.

Findings further showed that technical capacity development has been instrumental in reducing system downtimes and dependency on external contractors. Respondents explained that local youth and artisans have been trained in pump repair, solar panel maintenance, and borehole servicing, allowing for rapid response to breakdowns. This shift toward local technical empowerment has minimized delays in water restoration, lowered operational costs, and strengthened community resilience during drought emergencies. The inclusion of drought preparedness training for chiefs, local leaders, and volunteers by NDMA has also contributed to better disaster response coordination and awareness of water conservation practices.

Respondents emphasized that these capacity-building interventions have led to greater community ownership and accountability. Trained committees and user groups now mobilize resources for repairs, form security teams to prevent vandalism, and establish rotational usage schedules to

reduce conflict over water access. Many respondents observed that water projects are now lasting longer, with several schemes remaining operational for over five years without major external intervention. This improvement was attributed to the enhanced knowledge, responsibility, and transparency developed through continuous training and mentoring programs.

The findings also highlighted progress in promoting inclusivity and gender balance in local water governance. Respondents indicated that women's participation in WUAs has increased, leading to more responsive water service planning that takes household needs into account. Female leadership in these committees was reported to have improved hygiene practices, reduced domestic conflict, and contributed to more equitable decision-making in resource allocation. This inclusive approach has made water governance more participatory and reflective of the needs of diverse community members.

Despite these achievements, the study found that sustaining and expanding capacity-building programs remains a challenge. High turnover of committee members, especially following elections or community disputes, was said to result in loss of institutional knowledge. Limited literacy among trainees, logistical barriers in remote areas, and inconsistent funding for refresher courses were also cited as major setbacks. Respondents noted that mobility of pastoral communities and security challenges further complicated training continuity. To address this, mobile training units and on-site mentorship programs have been introduced, though their coverage remains limited. Overall, the interviews demonstrated that capacity building has strengthened the foundations of water service management but requires continuous support to maintain its long-term impact.

The interviews reveal that both WRA and NDMA have made significant strides in capacity-building to enhance the sustainability and efficiency of water services in Mandera County. Programs targeting Water User Associations, local technicians, and public officers have improved community ownership, reduced infrastructure breakdowns, and enhanced water governance. There is also evidence of increased women's participation and better hygiene practices. Capacity building is foundational to the success of water projects in challenging environments. The findings suggest that institutionalizing training within community structures and ensuring continuity through refresher courses are essential. Future programs should integrate literacy-sensitive materials, mobile delivery models, and digital monitoring to overcome regional constraints. Sustained donor support and stronger county government commitment will be critical to scale and sustain the gains made.

Provision of Water Services

The dependent variable in this study was provision of water services in Mandera County. This variable was used to assess the outcomes associated with the implementation of the National Water Policy (2021) in relation to access, quality, reliability, affordability, and overall satisfaction with water service delivery. Table 2 presents the descriptive statistics results for the provision of water services.

Table 2: Descriptive Statistics on Provision of Water Services

Statement	Strongly Disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly Agree (%)	Mean	Std. Dev.
Access to clean water has significantly improved in our service area.	3.9	7.5	18.6	44.2	25.8	3.81	1.07
The quality of water provided has improved over time.	5.0	9.0	19.3	43.1	23.6	3.71	1.10
Water services are reliable and consistent.	6.4	10.1	21.7	41.0	20.8	3.60	1.12
There is equity in the distribution of water services across different areas.	8.7	12.9	23.1	38.0	17.3	3.42	1.17
Our water infrastructure adequately meets community needs.	5.5	9.3	20.6	42.7	21.9	3.67	1.09
Water service coverage has expanded significantly in recent years.	4.2	6.1	16.8	46.5	26.4	3.85	1.01
Water services are affordable for most community members.	7.1	11.6	22.0	39.0	20.3	3.54	1.15
Water quality meets all relevant health and safety standards.	6.3	9.4	18.9	43.3	22.1	3.65	1.08
Water services have improved community health outcomes.	3.5	6.7	20.2	47.1	22.5	3.79	1.01
Customer satisfaction with our water services has increased.	4.1	8.0	19.7	45.6	22.6	3.75	1.05
Overall Mean						3.68	

Source: Field Data, 2025

The descriptive findings revealed a generally positive perception of water service provision in Mandera County, with an overall mean of 3.68, indicating moderate satisfaction among respondents. The highest agreement (72.9%, $M = 3.85$, $SD = 1.01$) was for the statement that water service coverage had expanded significantly in recent years, followed by 70.0% affirming improved access to clean water ($M = 3.81$, $SD = 1.07$) and 69.6% recognizing better community health outcomes ($M = 3.79$, $SD = 1.01$). Increased customer satisfaction was also noted by 68.2% of respondents ($M = 3.75$, $SD = 1.05$), suggesting visible service improvements though with variations across locations. On water quality, 65.4% of participants agreed that quality had improved ($M = 3.71$, $SD = 1.10$), and a similar proportion felt that water met safety standards ($M = 3.65$, $SD = 1.08$), reflecting progress but with lingering inconsistencies linked to local treatment and maintenance.

However, challenges persist in affordability, reliability, and equity of distribution. Only 59.3% agreed that water services were affordable ($M = 3.54$, $SD = 1.15$), while just 55.3% believed that water distribution was equitable ($M = 3.42$, $SD = 1.17$), indicating disparities across sub-counties. Reliability was also moderate, with 61.8% agreeing that services were consistent ($M = 3.60$). These results highlight that while Mandera County has made notable strides in water access, coverage, and quality, significant gaps remain in ensuring affordability, fairness, and reliability of services. The findings call for strengthened infrastructure, equitable allocation of resources, and enhanced

quality monitoring to sustain progress and ensure inclusive water service delivery across all communities.

Correlation Analysis

Correlation analysis aimed to determine the degree of association between the implementation of National Water Policy (2021); capacity building and the provision of water services in Mandera County. SPSS software was used to compute the Pearson correlation coefficients, and the results are presented in Table 3.

Table 3: Correlation Matrix

		Provision of Water Services
Provision of Water Services	Pearson Correlation	1.000
	Sig. (2-tailed)	
Capacity Building	Pearson Correlation	.654**

Source: Field Data, 2025

The study found a strong and significant positive correlation between capacity building and provision of water services ($r = 0.654$, $p < 0.01$). This indicates that training, knowledge-sharing, and institutional strengthening efforts can enhance water service delivery. Pagdee and Kawasaki (2021) support this view through their research in Thailand, which found that community perceptions and capacity-building programs are critical to the success of water service programs. Their findings show that when communities and stakeholders are trained and informed, their participation and support increase, improving service outcomes. While the study focused on PES programs in Thailand, the parallels to Kenya’s decentralized water policy are evident, especially in promoting local-level capacity to implement and monitor policy objectives.

Regression Analysis

The study further conducted simple linear regression analysis assess the effect of capacity building on the provision of water services in Mandera County. Linear regression analysis was applied to examine how training, knowledge sharing, and institutional strengthening influence the performance of water service delivery in the region. Table 4 presents the model summary for this relationship.

Table 4: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.654a	0.428	0.425	0.45233

a Predictors: (Constant), Capacity Building

Source: Field Data, 2025

The model summary results in Table 4 shows coefficient of determination (R^2) of 0.428, indicating that 42.8% of the variation in the provision of water services in Mandera County is explained by capacity building. This indicates a moderate level of influence. The Adjusted R^2 of 0.425 confirms that the model remains effective even when adjusted for degrees of freedom. Table 5 shows the ANOVA results.

Table 5: ANOVA Results

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	37.847	1	37.847	185.177	0.000 ^b
	Residual	50.534	209	0.242		
	Total	88.381	210			

a. Dependent Variable: Provision of Water Services

b. Predictors: (Constant), Capacity Building

Source: Field Data, 2025

The ANOVA results in Table 5 shows that the overall model is statistically significant ($F = 185.177$, $p = 0.000$), suggesting that capacity building contributes meaningfully to explaining variance in the provision of water services. This indicates a good model fit overall, even though the individual predictor may not be significant. Regression coefficient results are shown in Tale 6.

Table 6: Regression Coefficient Results

Model		Unstandardized		Standardized t	Sig.
		Coefficients			
		B	Std. Error	Beta	
1	(Constant)	0.979	0.114	8.588	0.000
	Capacity Building	0.414	0.045	0.654	1.771

a. Dependent Variable: Provision of Water Services

Source: Field Data, 2025

$$Y = 0.979 + 0.414X$$

Where:

Y = Provision of Water Services

X = Capacity Building

Regression coefficient results as presented in Table 6 indicate that capacity building has a positive but statistically insignificant effect on the provision of water services in Mandera County ($\beta = 0.414$, $p = 0.078 > 0.05$). This implies that while there is a positive relationship between the two variables, the influence is not strong enough to be considered statistically significant at the 95% confidence level. The t-value of 1.771 further suggests that the relationship, though positive, does not meet the conventional threshold for significance. These findings are contrary to the findings of a study by conducted by Khan (2021), which recognized the importance of capacity building in improving water governance, especially through enhanced risk awareness and institutional coordination. However, the study also pointed to weaknesses in decision-making and communication channels, factors that may explain why capacity building in Mandera has not yet translated into statistically significant improvements in service delivery outcomes.

In Thailand, Pagdee and Kawasaki (2021) found that capacity building when grounded in community engagement and knowledge dissemination, significantly improves water service outcomes. The difference in significance between that context and Mandera could stem from differences in implementation structure, community involvement, or the maturity of training programs.

CONCLUSION

Capacity-building programs, while generally well-received, have not yet produced statistically significant improvements in water service provision in Mandera County. Despite widespread agreement on the value of training, leadership development, and technical upskilling, the observed outcomes point to underlying challenges in implementation scope, program quality, and institutional absorption capacity. Variations in training frequency, relevance, and follow-up mechanisms suggest that not all institutions benefit equally from capacity-building efforts. Furthermore, logistical difficulties in remote areas, high turnover of trained personnel, and limited funding for continuous professional development impede long-term impact. While positive correlations between capacity building and service improvement exist, the absence of strong regression significance signals the need for more targeted, consistent, and sustainable interventions. Capacity building must evolve from isolated training sessions into institutionalized learning systems that support ongoing staff development, leadership mentoring, and knowledge transfer to local communities. Establishing effective monitoring systems to evaluate training effectiveness and adapting programs to local realities will be crucial in translating human capital investments into service delivery gains.

RECOMMENDATIONS

The findings on capacity building also provide important perspective to development literature, particularly by highlighting the gap between positive perception and measurable impact. Although stakeholders appreciate training and empowerment initiatives, the study finds that capacity-building programs alone may not yield statistically significant outcomes unless they are adequately structured, continuously funded, and contextually relevant. This contribution challenges the assumption that capacity building is inherently effective and calls for more rigorous design, monitoring, and evaluation of such interventions. It supports the idea that human capital development in the water sector must be institutionalized, evidence-based, and strategically targeted to influence service delivery outcomes meaningfully.

Furthermore, the national government through the ministry of water, in conjunction with development agencies such as the UNDP, should allocate dedicated funding for integrated water governance programs that combine technical infrastructure with institutional, environmental, and social interventions. The current siloed approach to water service provision undermines impact and sustainability. To correct this, the ministry should require all donor-funded projects in arid counties like Mandera to include components for stakeholder coordination, catchment protection, infrastructure maintenance, and climate resilience. National-level policy makers should also mandate that all counties prepare and submit annual water sector performance reports that include indicators on partnership effectiveness, environmental sustainability, infrastructure functionality, and adaptive planning. These reports should be used to guide future investment decisions and monitor the achievement of national water access targets as outlined in Vision 2030 and the National Water Policy (2021).

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