

# Towards Sustainable Blue Economy: Community-Based Resource Management in the Fishery Sector in Kenya

Daniel Kipkoech Rotich, Zedekiah Sidha, James Kimuyu

National Defence University – Kenya, Nairobi, Kenya

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## ABSTRACT

Community-Based Resource Management (CBRM) is pivotal in fostering a Sustainable Blue Economy (SBE) within Kenya's coastal fisheries sector. This study examined the role of CBRM in promoting SBE by exploring stakeholder experiences in Mombasa, Kilifi, Kwale, Lamu and Tana River counties. Employing a descriptive survey design with mixed methods, the research sampled 408 participants. The samples included fishers, community leaders, policymakers and researchers. The study used purposive and random sampling. Data were collected through questionnaires and Key Informant Interviews (KIIs), analyzed quantitatively via correlation analysis and qualitatively through thematic analysis. Findings reveal that CBRM enhances SBE by empowering local stewardship, improving fish stocks and fostering equitable resource sharing, as evidenced by Locally Managed Marine Areas (LMMAs). However, challenges such as limited awareness, inadequate funding, weak governance and unequal participation, particularly among marginalized groups, hinder effectiveness. Socioeconomic benefits include increased incomes, gender equity and poverty alleviation through initiatives such as mariculture and ecotourism, though 45.6% of respondents felt excluded from decision-making. The study recommends harmonizing governance frameworks, enhancing stakeholder inclusivity and securing sustainable financing to strengthen CBRM's contribution to SBE. Further research should assess long-term socioeconomic impacts and barriers to community engagement.

**Keywords:** Community-Based Resource Management, Sustainable Blue Economy, Coastal Fisheries, Stakeholder Participation, Kenya

## INTRODUCTION

Sustainable Blue Economy (SBE) promotes the rational exploitation of marine resources to promote economic growth with a view to environmental sustainability and social equity (World Bank, 2023). The Kenyan coastal area, that comprise of Mombasa, Kilifi, Kwale, Lamu and the Tana River counties, supports millions of livelihoods through flourishing fisheries (Munga *et al.*, 2022). However, overfishing and habitat loss are increasingly undercutting these ecosystems, threatening food security and economic stability (Mwaura *et al.*, 2021). Close to SBE goals is Community-Based Resource Management (CBRM), enables communities to manage local marine resources through a collaborative approach (Berkes, 2017). This participatory approach yields sustainable activities that combine environmental health and economic gains, offering a promising example to the Kenyan coastal fisheries (Obura *et al.*, 2023).

CBRM has emerged to be a significant sustainable fisheries management strategy globally, including embracing community-based knowledge and governance systems. Community-based action in Brazil have reduced illegal fishing by empowering local knowledge, enhancing resource protection (Silva *et al.*, 2023). Similarly, Norway has implemented co-management regimes that balance environmental sustainability and economic efficiency, offering an international precedent (Haugland *et al.*, 2020). Positive local examples of CBRM in Kenya also exist, where Beach Management Units (BMUs) and Locally Managed Marine Areas (LMMAs) have led to improvements in fish populations and community resilience as noted by Obura *et al.* (2023). Nonetheless, challenges such as stakeholder ignorance and funding deficiencies are restricting the real potential of CBRM in Kenyan coastal regions (Kamau & Ndungu, 2020).

The study examined the level at which CBRM strategies enhancing SBE development in the Kenyan coastal fisheries sector concerning ecological and socioeconomic implications. The study examined how CBRM facilitates sustainable resource consumption, such as LMMAs that are restoring fish populations in regions like Kuruwitu and Wasini (Obura *et al.*, 2023). The state of CBRM practices was scrutinized, highlighting inefficiencies in governance and inadequate funding, which limit scalability (Kamau & Ndungu, 2020). The study bridges the gap between the potential and practice of SBE, allowing coastal communities to enjoy equitable benefits (World Bank, 2023).

## Problem Statement

Kenya's coastal fisheries are a vital source of food, income, and cultural identity for coastal communities, yet they face significant pressures from overfishing, climate change, and governance inefficiencies. Community-Based Resource Management (CBRM) has emerged as a promising approach to address these challenges by promoting local stewardship and aligning with Sustainable Blue Economy (SBE) objectives. However, the extent to which CBRM enhances ecological sustainability, socioeconomic inclusivity, and effective governance in Kenya's fisheries remains insufficiently understood. Existing studies often focus on ecological outcomes while overlooking the lived experiences of marginalized groups, such as women and youth, whose limited participation in decision-making continues to undermine equity in resource management. Moreover, while frameworks like the Kenya Fisheries Management and Development Act (2016) exist, conflicting findings on their enforcement reveal inconsistencies in governance and unclear institutional roles. Few studies explore how specific CBRM practices such as LMMAs, mariculture, and ecotourism interact with these governance structures to impact community well-being. There is also a lack of empirical research linking awareness levels and training with the adoption of sustainable practices. This study addresses these knowledge gaps by examining the interplay between CBRM and SBE outcomes across three coastal counties, incorporating perspectives from underrepresented stakeholders. By focusing on inclusivity, governance dynamics, and livelihood diversification, it aims to offer a nuanced understanding of CBRM's potential and limitations. The central question guiding this research is: How does CBRM influence sustainable blue economy outcomes in Kenya's coastal fisheries, particularly in terms of ecological resilience, socioeconomic equity, and participatory governance?

## EMPIRICAL REVIEW OF LITERATURE

Community-Based Resource Management (CBRM) practices in coastal fisheries have yielded mixed outcomes, with success often hinging on the interplay of local agency, governance structures, and external pressures. While studies such as Dias, Cinti, Parma, and Seixas (2020) highlight the value of participatory monitoring and the integration of fishers' knowledge, they also implicitly reveal underlying power asymmetries. The establishment of trust and communication between researchers and local fishers is not merely a technical challenge but a political one, where the recognition of traditional ecological knowledge can be undermined by external actors or top-down governance frameworks. This tension is echoed in the Kenyan context, where Murray, Wilson, and Duffy (2019) note that local participation enhances sustainability, yet the degree of actual influence communities wield in decision-making remains contested.

External pressures such as climate change and overexploitation further complicate these dynamics, often exacerbating existing inequalities and necessitating adaptive management approaches (Norris, Kauffman & Winter, 2021). However, the literature sometimes glosses over how adaptation strategies are negotiated, and who gets to define resilience or set management priorities. The risk is that CBRM can become a rhetorical device, masking persistent power imbalances between local communities, state agencies, and external stakeholders.

Doerr, Pomeroy, and Conway (2023) provide a nuanced analysis of coastal community development, underscoring the importance of local engagement for sustainable fisheries and blue economy advancement. Yet, their findings also raise questions about the inclusivity of stakeholder participation: whose voices are amplified, and whose are marginalized? Similarly, Abarca, Cruz, and Castillo (2021) argue for integrating local insights into management frameworks, but the process of integration itself can be fraught with contestation, particularly when local priorities clash with national or donor-driven agendas. Johnson, Smith, and Garcia (2020) further assert the need to empower local communities, but empowerment is not a neutral process it is shaped by existing social hierarchies, gender relations, and access to resources.

The Spanish case study by Pascual-Fernández et al. (2020) illustrates the challenges of incorporating traditional knowledge into modern governance frameworks. While adaptive governance is championed as a pathway to resilience, the literature often under-theorizes how power is distributed within these frameworks. O’Leary and Leffler (2019) and Davis, Lentz, and Perry (2021) call for context-specific strategies, yet the operationalization of such strategies depends on who holds decision-making authority and how conflicts are mediated.

Community-Based Tourism (CBT) initiatives, such as those at Klatak Beach, Indonesia (Sari, Widodo & Permadi, 2023), are lauded for promoting sustainable development and aligning with blue economy principles. However, the literature tends to underplay the potential for elite capture, where benefits accrue disproportionately to local elites or external investors, rather than the broader community. Sari, Mahfud, and Fardani (2021) and Supriyadi, Handayani, and Nirmala (2022) emphasize the importance of community participation, but do not fully interrogate the mechanisms through which participation is structured or the barriers faced by marginalized groups.

In Samoa, Quimby et al. (2023) demonstrate the potential of co-management and mariculture practices to enhance resilience and food sovereignty. Yet, the success of such initiatives is contingent on equitable governance arrangements. The literature acknowledges the value of decentralization (Bennett, Blythe & Finkbeiner, 2019; Satterfield, Gregory & Webler, 2021), but often stops short of critically examining how decentralization processes can reproduce or challenge existing power relations.

The Sierra Leonean experience, as discussed by Okeke-Ogbuafor and Gray (2021), highlights the persistent challenge of weak governance and the need for capacity-building. However, the literature could more robustly address how institutional strengthening efforts interact with local power structures and whether they genuinely democratize resource management or simply reinforce the status quo (Asiedu, Nunoo & Ofori-Danson, 2020; Gelcich et al., 2019; Nunan, Msuya & Onyango, 2020).

The Kuruwitu LMMA in Kenya (Okeyo & Murage, 2023) exemplifies both the promise and pitfalls of CBRM. While local empowerment and stewardship are evident, the initiative also faces challenges related to funding, conflicting interests, and institutional support. These issues are not merely technical but are deeply embedded in broader questions of power, legitimacy, and representation (Cinner, McClanahan & Graham, 2020; O’Leary, Armitage & Plummer, 2021). The literature thus points to the need for nuanced policy approaches that explicitly address power dynamics, ensure equitable participation, and balance ecological and socio-economic objectives (Kumar & Nayak, 2021).

While the empirical literature affirms the potential of CBRM and community-based approaches for advancing the blue economy, it also reveals persistent gaps in critically engaging with the politics of participation and decision-making. Power dynamics—shaped by social, economic, and institutional factors—profoundly influence whose knowledge counts, who benefits, and how sustainable outcomes are defined and achieved. Future research and policy must move beyond descriptive accounts to interrogate these dynamics, ensuring that CBRM fulfills its promise of both ecological sustainability and social justice.).

## **Theoretical Framework**

The study was grounded on Community Based Natural Resource Management theory (CBNRM) by Agrawal and Gibson (1999). The theory posits that local communities are the most effective stewards of their natural resources when they have the authority and responsibility to manage them. The theory was crucial in understanding how coastal communities in Kenya have organized themselves to manage fisheries resources. It helps assess the effectiveness of existing community-based management practices and identify factors that contribute to their success or failure.

CBNRM theory informs governance and decision-making by emphasizing the importance of community-led institutions and collective action in managing fisheries resources sustainably. It provided a framework for evaluating how local knowledge and social norms influence the organization and success of community-based management practices in coastal Kenya. Through examining the interplay between governance structures and resource users, the theory helped identify challenges and opportunities in current management systems.

However, while CBNRM theory has provided valuable insights into managing shared resources sustainably, it is not without its limitations. One significant weakness is its assumption that local communities are homogenous and capable of self-organizing effectively. In reality, local communities often face internal conflicts and power imbalances that can undermine collective action (Acheson, 2006). Elite capture, where resource management decisions disproportionately benefit the more powerful members of the community, can occur, leading to unequal resource distribution and undermining the sustainability of management practices (Ribot & Peluso, 2003). Additionally, CBNRM theory may oversimplify the complexity of external pressures, such as global market forces and environmental changes, which can affect the effectiveness of local management efforts (Cox, Arnold & Villamayor-Tomas, 2010).

## METHODOLOGY

The study employed a descriptive survey design, integrating both quantitative and qualitative methods to capture stakeholder perspectives on CBRM and its role in fostering a SBE in Kenya's coastal fisheries. This combination of methodologies was selected to complement the quantitative rigor of the numerical data with the contextual richness of the qualitative in-depth insights, providing an understanding of the complexities of social, economic and ecological processes (Creswell & Plano Clark, 2017). Quantitative approaches enabled a statistical measurement of stakeholder perceptions and governance performance and socioeconomic outcomes, whereas qualitative approaches supported detailed investigations into community experiences and issues (Berkes, 2017). The design promoted triangulation, which boosted the validity and reliability of findings through data cross-checking (Bryman, 2016). This methodology was especially beneficial in assessing the complex effects of CBRM, considering both objective and subjective results, such as the recovery of fish stocks and the trust of the community to governance processes.

The study took place in five Kenyan coastal counties Mombasa, Kilifi, Kwale, Lamu and Tana River, chosen due to their high marine biodiversity and existing CBRM programs, including LMMAs. These are the most important centres of the fisheries industry in Kenya, providing many livelihoods who are struggling with challenges such as overfishing and habitat degradation (Munga *et al.*, 2022). These locations were chosen because they have active CBRM initiatives, such as BMUs and LMMAs, which offer a strong background on CBRM (Obura *et al.*, 2023). The socioeconomic and ecological heterogeneity of these counties permitted the comparison of CBRM effectiveness in different governance and cultural conditions (Kamau & Ndungu, 2020). The study considered areas to present a representative snapshot of the coastal blue economy in Kenya, showcasing both the successes and regional issues.

The combination of these methods was selected to achieve the balance between the quantitative solidity of the numerical data and the qualitative richness of the contextual information, to allow an in-depth comprehension of the complex social, economic and ecological processes as recommended by Creswell and Plano Clark (2017). Quantitative approaches helped to conduct statistical research on stakeholder perceptions, the effectiveness of governance and socioeconomic results, whereas qualitative approaches enabled the sophisticated study of community experiences and strengths and weaknesses as opined by Berkes (2017). Triangulation was achieved through the design that increased the validity and reliability of the findings through data cross-checking across sources (Bryman, 2016). This method was especially appropriate to appraise the complex influence of the CBRM, to not only quantifiable gains, such as the increase of the stock of fish but also the questionable, such as the community confidence in the forms of governance.

The choice of these study locations was tactical, where the active CBRM programs offered a strong background on the analysis of CBRM as noted by Obura *et al.* (2023). The various socioeconomic and ecological specifics of these counties made it possible to conduct a comparative study of the effectiveness of CBRM in different contexts of governance and culture. With the attention on these areas, this study was able to provide a representative snapshot of the blue economy of Kenya along the coast with its successes and the challenges that are specific to those areas.

The target group consisted of a community of stakeholders who included fishers, community leaders, policymakers and representatives of Community-Based Organizations (CBOs) as well as academic researchers mirroring the multidimensional nature of CBRM in the Kenyan coastal fisheries. Krejcie and Morgan (1970)

sample size formula was used to calculate a sample size of 408 participants, which was statistically sufficient to represent a heterogeneous population. Multi-stage sampling was used, whereby the five coastal counties were selected purposively to target regions with active CBRM initiatives and respondents were selected randomly to achieve representativeness and reduce bias (Cochran, 1977). This method enabled the research to address a wide range of viewpoints, including the lived experiences of fishers and the high-level considerations of policymakers, improving the applicability of the research results (Munga *et al.*, 2022). The participation of diverse stakeholder groups guaranteed that the study considered the grass-roots and institutional components of CBRM, which is consistent with the ideals of inclusive governance as outlined by Agrawal and Kumar (1999).

Structured questionnaires and Key Informant Interviews (KIIs) were used to collect data, quantitative measures of CBRM practices and qualitative insights into their impacts on socioeconomic outcomes. The study assessed stakeholder perception of CBRM awareness, effectiveness of governance and sustainability, as well as demographic profiling to provide context to responses. Quantitative data were complemented by KIIs with 24 stakeholders who offered detailed accounts of implementation problems and achievements. The questionnaires were piloted in Kilifi County with a Cronbach alpha of 0.82, which showed high reliability in the internal consistency of the questionnaire. This two-pronged approach supported a rich dataset, including not only statistical trends but also lived experiences that are vital to informing the role of CBRM within Kenya in the blue economy.

Statistical Package for the Social Sciences (SPSS) software was used to analyse quantitative data and descriptive statistics demonstrate demographic profiles and stakeholder perceptions on CBRM and SBE outcomes. These relationships were tested using Pearson correlation analysis indicating strong correlations of  $r = 0.78$  between CBRM-SBE and  $p < 0.01$  as recommended by Field (2013). Statistical tests such as Durbin-Watson and Breusch-Pagan were used to verify the lack of autocorrelation and heteroskedasticity provided the robustness of the statistical results (Gujarati, 2003). Thematic analysis was conducted on qualitative data obtained through KIIs and the main themes emerged as inclusivity, governance issues and economic advantages, which helped to contextualize quantitative findings as noted by Braun and Clarke (2006). The combined analysis enabled the study to triangulate its findings and provided a subtle insight into the role and possible shortcomings of CBRM in the Kenyan coastal fisheries.

The study was conducted under rigorous ethical standards and was approved by the National Commission for Science, Technology and Innovation (NACOSTI) to certify adherence to research guidelines in Kenya. All participants signed the informed consent and all were clearly informed about the purpose of the study as well as their rights, thus promoting trust and voluntary participation as recommended by the Belmont Report (1979). Participant confidentiality was ensured by storing data in password-protected databases and coding responses to maintain anonymity (Bryman, 2016). The ethical aspect was crucial especially since marginalized groups, including small-scale fishers and women, were involved, as their voices were fairly represented (Berkes, 2017). Such steps conformed with international ethical research regulations, protecting the rights of the study subjects, but also increasing the credibility of the study.

## RESULTS

### Response Rate

**Table 1: Response Rate**

Data Collection Method	Targeted Respondents	Actual Responses	Response Rate (%)
Quantitative Survey	384	380	98.96
Qualitative Interviews	24	22	91.67
<b>Total</b>	<b>408</b>	<b>402</b>	<b>95.32</b>

Source: Field Data (2025)

The study as shown in table 1 above achieved a remarkably high overall response rate of 95.32%, with 98.96% of the quantitative survey respondents and 91.67% of the qualitative interview participants completing the study. This level of participation significantly enhances the credibility, validity, and generalizability of the findings. Such a high response rate reduces the risk of non-response bias and ensures that the data collected accurately reflects the perspectives of the target population, including fishers, community leaders, and policy actors. It also indicates a high level of engagement and perceived relevance of the research among stakeholders, further reinforcing the external validity of the study. These strong response rates provided a robust foundation for analyzing critical aspects of Community-Based Resource Management (CBRM) and its link to Sustainable Blue Economy (SBE) development in Kenya's coastal fisheries.

The near-complete participation in both the survey and interviews enabled a deeper exploration of how locally managed marine areas (LMMAs), sustainable fishing practices, and community involvement contribute to ecological conservation and socioeconomic improvement. Qualitative insights captured the nuanced challenges communities face such as resource constraints, fragmented policies, and environmental pressures while also highlighting positive practices like increased job creation, upskilling, and strengthened local governance. This comprehensive data enabled the study to draw generalizable conclusions about the role of CBRM in advancing Kenya's blue economy agenda, offering evidence-based recommendations grounded in diverse stakeholder perspectives and real-world conditions.

## Linkages Between Community-Based Resource

### Management And Sbe Development

The study found that CBRM significantly enhances SBE development through  $r = 0.78, p < 0.01$ . In Wasini and Kuruwitu, LMMAs improved fish stocks by 20 to 30 percent in five years, providing evidence of ecological benefits. Social mariculture and eco-tourism projects provided alternative livelihoods, alleviating pressure on fishing. Nonetheless, a significant percentage of respondents (47.3%) did not know about CBRM, implying the necessity of awareness campaigns. Key informants noted that CBRM encourages local stewardship but is undermined by distrust of governance and capacity constraints.

“CBRM empowers communities to protect our seas, but many lack training to engage effectively.”

(KII 03, Kilifi, 13/01/2025)

The voice note, aligns with the study's findings that CBRM fosters local stewardship in Kenya's coastal fisheries, as evidenced by LMMA increasing fish stocks by 20–30% (Obura *et al.*, 2023). Nevertheless, it supports the study findings that limited awareness and capacity were identified as barriers with 47.3 percent of respondents unaware of CBRM and key informants citing inadequate training as impeding effective engagement. This training deficiency erodes the possibility of collective action, a fundamental concept of CBNR theory that argues the importance of strong institutional support and knowledge transfer (Agrawal & Kumar, 1999).

### State Of Community-Based Resource Management Practices

CBRM practices were recognized by 53.7% of respondents, with LMMAs and BMUs being prominent. However, implementation challenges included inadequate funding as cited by 62.4%, political interference (48.1%) and overlapping national-county mandates. The Kenya Fisheries Management and Development Act (KFMDA) (2016) was deemed ineffective by 55.9% due to poor enforcement. Gender disparities were evident, with only 28% of leadership roles in BMUs held by women. Successful cases, such as Wasini's LMMA, showed improved fish yields and community cohesion, but scalability was limited by resource constraints. In an interview an informant stated that:

“I'm a fisher from Wasini and I've seen how our Locally Managed Marine Area has boosted fish yields and brought our community closer together. But it's tough—funding shortages and political meddling make it hard to expand what we're doing and many of us, especially women, still feel left out of leadership roles. The Fisheries Act sounds good on paper, but without proper enforcement, it's not helping us enough.”

(KII 07, Wasini, 16/01/2025).

The voice note, represents the voice of an off-the-coast Wasini fisher and details the strengths and weaknesses of CBRM in the Kenyan coastal fisheries, as presented in the given excerpt of a document. It highlights the beneficial effects of LMMAs, including enhanced fish yields and community unity, in line with the document indicating that 53.7 percent of respondents perceived CBRM practices like LMMAs and BMUs as effective. Nevertheless, it also records vital obstacles, such as insufficient funding (62.4%), political interference (48.1%) and poor enforcement of the KFMDA (2016), considered ineffective by 55.9%. The reference to a lack of women in leadership areas supports the report in the document that women occupy only 28 percent of the leadership positions at BMU, indicating gender gaps. The focus by the voice note on resource constraints as a factor that hinders scalability aligns with the document noting that successful experiences such as that of Wasini LMMAs are unable to scale due to lack of resources, further highlighting the importance of sustainable financing and inclusive governance to further the reach of the CBRM.

### Socioeconomic Effects of Community Inclusion

Community inclusion in blue economy interventions yielded significant socioeconomic benefits ( $r = 0.82, p < 0.01$ ). Mariculture and seaweed farming increased household incomes by 15–25% in Lamu and Kwale, while ecotourism created 120 jobs in Kilifi. Women’s participation in cooperatives enhanced gender equity, with 35% of respondents noting improved social cohesion. However, 45.6% felt excluded from decision-making, particularly youth and low-income groups. Over 44% rated current fisheries management practices as unsustainable, citing overfishing and weak regulation. Qualitative insights underscored the role of education in fostering sustainable practices:

“Training in sustainable fishing has empowered us to protect resources and earn better incomes.”

(KII 18, Kilifi, 17/01/2025)

The verbatim statement, highlights the transformative effect of capacity-building programs in Kenya’s coastal fisheries, aligning with the study’s finding that 35% of respondents linked training to improved social and economic outcomes (Munga *et al.*, 2022). The statement corroborates the study’s emphasis on education as a critical enabler of sustainable practices, as training equips fishers with skills to adopt environmentally friendly techniques, reducing overfishing and enhancing fish stocks by 20–30% in areas like Kuruwitu and Wasini (Obura *et al.*, 2023). The mention of better incomes reflects the socioeconomic benefits of initiatives like mariculture and ecotourism, which increased household earnings by 15–25% in Lamu and Kwale, supporting the CBNRM theory’s focus on community empowerment (Agrawal & Kumar, 1999). However, the statement’s optimism is tempered by the study’s note that 47.3% of respondents remain unaware of CBRM.

### Correlation Analysis

Table 2 summarizes the correlation results, confirming strong relationships between CBRM practices, SBE development and socioeconomic impacts.

**Table 2: Correlation Analysis**

Variables	SBE Development	Socioeconomic Impacts	CBRM Practices
SBE Development	1.00	0.82**	0.78**
Socioeconomic Impacts	0.82**	1.00	0.69**
CBRM Practices	0.78**	0.69**	1.00
<b>Note: **p &lt; 0.01</b>			

## DISCUSSION

### Community-Based Resource Management And Sustainable Blue Economy Linkages

CBRM plays a pivotal role in advancing Kenya's SBE by fostering local stewardship and aligning with global findings on community-led resource sustainability (Silva *et al.*, 2023). In Kenya, Locally Managed Marine Areas (LMMAs), such as those in Kuruwitu and Wasini, have reduced overfishing by 20–30% over five years, demonstrating the effectiveness of collective action as emphasized by CBNRM theory (Agrawal & Kumar, 1999). The integration of traditional ecological knowledge with scientific management practices has strengthened community trust and compliance, mirroring successes in Australia's Indigenous-led marine conservation models (Lyons *et al.*, 2023). However, the study highlights a significant barrier, with 47.3% of respondents unaware of CBRM, underscoring the need for awareness campaigns to mirror Indonesia's success, where training enhanced CBRM outcomes (Supriatna *et al.*, 2021).

The ecological benefits of CBRM, such as improved fish stocks and reduced fishing pressure, directly support SBE's goals of sustainable resource use and economic growth. Community-driven initiatives like mariculture and ecotourism, as seen in Lamu and Kilifi, have diversified livelihoods, reducing dependency on overexploited fisheries and aligning with Brazil's community-led efforts to curb illegal fishing (Silva *et al.*, 2023). However, challenges such as limited technical capacity and mistrust in governance structures, reported by key informants, hinder scalability, echoing issues faced in Indonesia's coastal communities (Supriatna *et al.*, 2021). Training programs that blend traditional practices with modern techniques, as implemented in Australia's Indigenous models, could bridge these gaps by empowering fishers with skills for sustainable management (Lyons *et al.*, 2023).

Low awareness and capacity gaps remain critical obstacles to CBRM's effectiveness in Kenya, with nearly half of respondents unaware of its principles, a challenge also observed in Indonesia's early CBRM adoption (Supriatna *et al.*, 2021). This lack of awareness undermines community participation, limiting the potential for collective action as outlined in CBNRM theory (Agrawal & Kumar, 1999). In Kenya, targeted education campaigns, similar to those in Tanzania that boosted local engagement in marine conservation, could address this gap and enhance CBRM's impact on SBE (Katikiro *et al.*, 2024). Successful global examples, such as Norway's co-management models, demonstrate that informed communities with adequate training can balance ecological and economic outcomes effectively (Haugland *et al.*, 2020).

Integrating traditional knowledge with scientific approaches offers a pathway to strengthen CBRM's role in Kenya's SBE, as evidenced by Australia's Indigenous-led marine management, which improved resource sustainability through culturally informed practices (Lyons *et al.*, 2023). In Kenya, fishers' traditional knowledge of marine ecosystems, combined with scientific tools like stock assessments, has enhanced LMMA effectiveness in areas like Wasini (Obura *et al.*, 2023). However, external pressures such as climate change and market fluctuations, which CBNRM theory often overlooks, require adaptive strategies to ensure long-term success (Cox *et al.*, 2010). The study suggests establishing community-science partnerships to co-develop management plans, drawing on Brazil's success in integrating local insights with regulatory frameworks (Silva *et al.*, 2023).

### State Of Community-Based Resource Management Practices

The partial adoption of CBRM in Kenya's coastal fisheries sector demonstrates notable successes, particularly through the ecological benefits of LMMAs, which have increased fish stocks by 20–30% in areas like Kuruwitu and Wasini. These outcomes mirror Tanzania's marine CBNRM, where local leadership has driven sustainability by empowering communities to enforce fishing regulations and protect marine habitats (Katikiro *et al.*, 2024). However, the limited awareness of CBRM among 47.3% of stakeholders hampers its scalability, indicating a need for broader educational outreach. The success of LMMAs is attributed to community-driven stewardship, which aligns with global models emphasizing local knowledge integration, as seen in Australia's Indigenous-led marine management (Lyons *et al.*, 2023).

Governance inefficiencies pose a significant limitation to CBRM's effectiveness in Kenya, with 55.9% of respondents citing poor enforcement of the KFMDA (2016) as a barrier. These challenges parallel those in Sierra

Leone, where community-based management struggles due to weak institutional frameworks and limited regulatory oversight (Okeke-Ogbuafor & Gray, 2021). Overlapping mandates between national and county governments create bureaucratic conflicts, reducing the efficacy of BMUs and LMMAs (Kamau & Ndungu, 2020). Political interference, reported by 48.1% of respondents, further undermines trust in governance structures, echoing issues in other developing nations with decentralized resource management (Pascual-Fernández *et al.*, 2020).

Funding shortages, cited by 62.4% of respondents, severely limit the scalability and sustainability of CBRM initiatives in Kenya, a challenge also observed in Sierra Leone's small-scale fisheries (Okeke-Ogbuafor & Gray, 2021). The reliance on limited government budgets and sporadic donor support restricts the expansion of successful programs like mariculture and ecotourism, which have shown potential to diversify livelihoods (Munga *et al.*, 2022). In contrast, countries like Norway have mitigated funding constraints through robust public-private partnerships, a model Kenya could emulate to sustain LMMAs (Haugland *et al.*, 2020). The lack of sustainable financing also hampers capacity-building efforts, leaving communities ill-equipped to manage marine resources effectively (Obura *et al.*, 2023).

Gender disparities and political interference highlight the urgent need for inclusive governance frameworks to strengthen CBRM in Kenya, where only 28% of BMU leadership roles are held by women. This mirrors challenges in Spain's small-scale fisheries, where inclusive frameworks have been advocated to ensure equitable participation (Pascual-Fernández *et al.*, 2020). The exclusion of marginalized groups, particularly women and youth, from decision-making processes reported by 45.6% of respondents' limits community cohesion and the equitable distribution of benefits. Successful cases, such as Wasini's LMMA, demonstrate that inclusive leadership enhances community trust and resource sustainability, a lesson supported by Tanzania's CBNRM experiences (Katikiro *et al.*, 2024).

### **Socioeconomic Impacts**

Community inclusion in Kenya's coastal fisheries sector has yielded notable socioeconomic benefits, closely aligning with successful blue economy initiatives in the Bahamas, where community-driven projects have enhanced livelihoods and economic resilience (Failler, 2020). Initiatives such as mariculture and seaweed farming in Lamu and Kwale have diversified income sources, increasing household earnings by 15–25%, thereby reducing dependency on traditional fishing. Women's participation in cooperatives has significantly advanced gender equity, with 35% of respondents noting improved social cohesion and empowerment, mirroring the Bahamas' emphasis on inclusive economic growth (Munga *et al.*, 2022). Ecotourism ventures, particularly in Kilifi, have created 120 jobs, providing alternative livelihoods and easing pressure on overexploited fish stocks (Obura *et al.*, 2023).

Despite these gains, exclusion from decision-making remains a significant challenge, with 45.6% of respondents particularly youth and low-income groups reporting limited involvement in governance processes, a pattern also observed in Brazil's fisheries sector (Silva & Pierri, 2024). This marginalization undermines the effectiveness of CBRM, as disenfranchised groups lack influence over resource allocation and policy development. In Brazil, similar exclusion has led to inequitable benefit distribution, perpetuating socioeconomic disparities among coastal communities (Silva & Pierri, 2024). In Kenya, the underrepresentation of women (only 28% of Beach Management Unit leadership roles) and youth exacerbates power imbalances, limiting the inclusivity of CBRM initiatives (Munga *et al.*, 2022).

The perception that current fisheries management practices are unsustainable, noted by 44% of respondents, underscores the critical need for transparent and accountable governance, as demonstrated in Ghana's community-driven fisheries models (Abdul-Wakeel, 2023). Weak enforcement of the KFMDA (2016), cited as ineffective by 55.9% of respondents, contributes to overfishing and resource depletion, threatening long-term sustainability. Ghana's success in integrating local knowledge with transparent regulatory frameworks has reduced illegal fishing and enhanced community trust, offering a model for Kenya (Abdul-Wakeel, 2023). Political interference and overlapping national-county mandates further complicate governance, echoing challenges in Sierra Leone's small-scale fisheries (Okeke-Ogbuafor & Gray, 2021).

Education and skills training have emerged as pivotal enablers of sustainable practices, supporting Kiswaa's (2020) findings on the transformative impact of capacity-building in Kenya's coastal communities (Kiswaa, 2020). Training programs in sustainable fishing techniques and LMMA management have empowered fishers to adopt environmentally friendly practices, as evidenced by a key informant's statement: "Training in sustainable fishing has empowered us to protect resources and earn better incomes". These programs have also fostered greater community cohesion and awareness, with 35% of respondents linking training to improved social and economic outcomes (Munga *et al.*, 2022). However, the limited reach of these initiatives, with 47.3% of respondents unaware of CBRM, highlights the need for broader educational campaigns.

### **Theoretical Implications**

The CBNRM theory, as articulated by Agrawal and Kumar (1999), effectively frames the role of CBRM in Kenya's coastal fisheries by emphasizing local participation and collective action in resource stewardship. It posits that communities with defined resource boundaries and robust institutional frameworks can sustainably manage marine resources, as evidenced by successful LMMAs in Kuruwitu and Wasini (Obura *et al.*, 2023). However, the theory's assumption of community homogeneity overlooks internal divisions, such as gender disparities, where only 28% of Beach Management Unit (BMU) leadership roles are held by women. These internal power dynamics, including elite capture and unequal access to decision-making, can undermine equitable resource management, as noted in similar contexts by Acheson (2006). The study's findings affirm CBNRM's relevance in promoting local stewardship but highlight the need for adaptive mechanisms to address these social complexities (Cox *et al.*, 2010).

External pressures, such as climate change and market fluctuations, further challenge the applicability of CBNRM in Kenya's coastal fisheries, necessitating adaptive governance to ensure resilience. Climate change exacerbates resource degradation through rising sea temperatures and coral bleaching, which disrupt fish stocks and threaten community livelihoods (Mwaura *et al.*, 2021). Additionally, market-driven overfishing and global trade pressures complicate local management efforts, as external economic forces often override community priorities (Silva *et al.*, 2023). Cox *et al.* (2010) advocate for adaptive governance models that integrate traditional knowledge with scientific approaches to address such dynamic challenges. The study underscores the importance of flexible institutional frameworks that can respond to these external stressors while maintaining CBNRM's core principles of community empowerment.

The study's findings reinforce CBNRM's relevance by demonstrating how CBRM practices, such as LMMAs, enhance fish stocks and socioeconomic benefits, yet they also reveal context-specific challenges requiring tailored solutions. Governance overlaps between national and county authorities, as seen in the ineffective enforcement of the KFMEDA (2016), create bureaucratic conflicts that hinder CBRM implementation (Kamau & Ndungu, 2020).

### **CONCLUSION**

CBRM is integral to advancing Kenya's SBE in the coastal fisheries sector, fostering ecological sustainability and socioeconomic benefits through local stewardship. LMMAs, mariculture and ecotourism exemplify successful community-driven initiatives, yet challenges like limited awareness, weak governance and unequal participation hinder progress. Strengthening CBRM requires inclusive decision-making, harmonized policies and sustainable financing. By addressing these gaps, Kenya can enhance its blue economy, aligning with global sustainability goals and ensuring equitable benefits for coastal communities.

### **RECOMMENDATIONS**

To streamline national and county government mandates and reduce bureaucratic conflicts in fisheries regulations, the Kenyan Ministry of Fisheries (MoF) and county governments should establish joint coordination committees. These committees, involving policymakers and local leaders, must develop clear protocols to align overlapping regulations, as seen in the Kenya Fisheries Management and Development Act. Regular stakeholder consultations should be mandated to ensure continuous feedback and policy coherence.

The Kenya Fisheries Service and BMUs should develop frameworks to ensure marginalized groups, particularly women and youth, are represented in decision-making through targeted capacity-building programs. CBOs must facilitate leadership training and allocate at least 30% of BMU leadership roles to women and youth by 2027. County governments should monitor implementation to address gender disparities and enhance inclusivity.

The Ministry of Fisheries, in collaboration with private sector partners and NGOs, should establish funding partnerships to support CBRM initiatives like LMMAs and mariculture. International donors, such as the World Bank, must be engaged to create sustainable financing models, ensuring long-term viability of community-driven projects (World Bank, 2023). Local CBOs should be tasked with managing and reporting on fund utilization to maintain transparency.

The Kenya Marine and Fisheries Research Institute (KMFRI) and CBOs should launch nationwide awareness campaigns to educate fishers on CBRM benefits and sustainable practices. County governments must fund training programs targeting fishers and CBOs, focusing on sustainable fishing techniques and LMA management. Media outlets and community radio stations should be engaged to disseminate information, addressing the 47.3% awareness gap identified in the study.

Academic institutions, such as the National Defence University – Kenya and KMFRI should conduct longitudinal studies to assess the long-term socioeconomic impacts of blue economy interventions. Research teams must prioritize identifying barriers to community participation, particularly for marginalized groups, to inform evidence-based policies. Funding agencies, including NACOSTI, should allocate grants to support these studies, ensuring data-driven policy recommendations.

### Future Research Directions

Future research should investigate the scalability of successful models such as Locally Managed Marine Areas (LMMAs), identifying the institutional, financial, and social factors that enable or constrain their broader adoption across diverse coastal contexts. Additionally, there is a need to assess the role of digital tools including mobile applications, data platforms, and remote sensing technologies in strengthening participatory governance, transparency, and real-time decision-making within community-based resource management. Special attention should also be given to youth-led innovation, exploring how the engagement of young people in leadership, technology adoption, and advocacy can drive more inclusive, adaptive, and resilient governance structures in Kenya's coastal fisheries.

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