

Community Customs and Sustainability of Beach Management Units in Homabay County, Kenya

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ABSTRACT

The sustainability of Beach Management Units (BMUs) in Homabay County, Kenya, continues to face substantial challenges due to a disconnect between community customs and formal governance structures. This study aimed to address these challenges by investigating the effect of community customs on BMU sustainability and exploring the moderating role of project committee composition. The study was guided by Hardin's theory of the tragedy of the commons and Network Analysis theory. A concurrent mixed-method research design was employed, targeting 143 BMUs across active fishing sites, with a population of 7,151 individuals, including 1,939 key informants and 5,212 fishing participants from five sub-counties along Lake Victoria. A sample of 647 respondents was selected through stratified random sampling, proportionate stratified sampling, and purposive sampling techniques. Primary data was collected by use of structured questionnaires and key informant interview schedules that captured the various variables of the study. Both descriptive and inferential statistics were used to analyze the data collected. Quantitative results revealed that community customs ($\beta = 0.123$, $p < 0.05$) had a positive and statistically significant effect on BMU sustainability. The correlation coefficient ($r = 0.711$, $p < 0.01$) indicated a strong positive relationship, with a 71.1% probability that increased alignment with community customs would enhance project sustainability. Qualitative findings further reinforced the significance of local customs, such as traditional ecological knowledge, dispute resolution mechanisms, and collective decision-making in ensuring compliance and enhancing conservation efforts. The study concludes that aligning BMU governance structures with community customs strengthens community ownership, increases regulatory compliance, and promotes sustainable resource management. The research underscores the critical need for managers to actively engage with local communities and incorporate their customs into governance processes. It also urges policymakers to design inclusive governance strategies that bridge the gap between traditional practices and formal management structures. By fostering culturally aligned governance, BMUs can enhance project acceptance, leading to more effective and sustainable natural resource management in developing countries.

Keywords: Beach Management, Community Customs, Culture, Governance, Sustainability, Kenya

I. INTRODUCTION

The sustainable management of natural resources, particularly fisheries, has become a critical issue globally. Coastal and lake communities, which have long depended on these resources, often possess intricate customs and traditional practices that align with ecological preservation. These community customs are deeply rooted in indigenous knowledge systems, which have historically regulated the use of natural resources to prevent over-exploitation and maintain ecological balance (Berkes, 2018). In the context of this study, community customs refer to the shared practices, beliefs, values, and behaviors that are passed down through generations within a community, particularly those that are linked to the social, cultural, and economic activities surrounding beach and fishery management.

These customs can include traditional fishing practices, taboos, rituals, communal governance systems, conflict resolution mechanisms, and the ways in which local communities interact with and conserve natural resources. However, modern pressures such as population growth, commercialization, and environmental degradation have strained these traditional practices, necessitating the introduction of formal management structures such as Beach Management Units (BMUs).

These units aim to promote co-management of fisheries between local communities and government agencies, fostering sustainable use of marine and freshwater resources. Specifically, in the case of Beach Management Units (BMUs) in Kenya, community customs involve the collective traditions and local knowledge that inform how communities utilize and manage fish resources along Lake Victoria. These customs not only define how fishing is conducted but also play a significant role in fostering cooperation, decision-making, and compliance with sustainable

practices. By integrating these customs into formal beach management strategies, BMUs can leverage local community support to enhance the sustainability of fishery resources.

Globally, the integration of traditional customs into formal resource management systems has seen varying levels of success. In Latin America, indigenous communities in Brazil have developed resource management systems based on the seasonal availability of resources, blending local customs with government regulations (Berkes, 2018). In Asia, Japan's local fishing communities maintain traditions such as "Ike-jime" that not only ensure sustainable fishing but also enhance the quality of the catch (Makino, 2018). Indonesia's local tenure systems, known as "Sasi," regulate marine resource use through customary laws, demonstrating how community customs can complement formal governance frameworks (Cinner et al., 2012). Similarly, in Europe, Norway has successfully merged community customs with modern fisheries management to promote sustainability in coastal regions (Jentoft & Chuenpagdee, 2015).

In Africa, where many communities have relied on natural resources for generations, integrating traditional customs into modern governance frameworks has been challenging. In Ghana, for instance, traditional fishing taboos were once effective in regulating resource use, but the imposition of external commercial pressures has disrupted these practices (Torell et al., 2020). In South Africa, some success has been achieved in coastal regions like Western Cape, where local fishing communities have collaborated with government agencies to incorporate traditional practices into modern fisheries management (Sowman et al., 2014).

In Kenya, the government introduced BMUs in 2006 to address the over-exploitation of fisheries, particularly in Lake Victoria and coastal regions. BMUs seek to decentralize fisheries management and empower local communities to participate in co-managing fishery resources alongside government agencies. However, there are significant challenges in incorporating community customs, the traditional knowledge and practices that have historically governed fishing activities into these modern frameworks. In regions such as Homabay County, local fishing communities previously adhered to seasonal fishing bans and other customs designed to preserve fish populations. These customs were aligned with ecological rhythms and spiritual beliefs about the sanctity of the lake (Ocholla et al., 2015). However, the introduction of BMUs has often neglected these local practices, resulting in tensions between modern regulatory frameworks and traditional customs.

This study focuses on examining the sustainability of BMUs in relation to community customs, using Homabay County as a case study. The paper aims to explore how integrating community customs into the formal governance structures of BMUs can enhance the sustainability of fisheries in Kenya. Drawing on empirical evidence from the study area and global examples from Asia (Birle et al., 2020), Africa (Andriesse et al., 2022), Latin America, and Europe, provides arguments that shape how BMUs can be enhanced to be sustainable, (Birle et al., 2019).

The depletion of fish stocks and the degradation of aquatic ecosystems have prompted governments worldwide to seek more sustainable fisheries management approaches. Formal fisheries management systems, often based on scientific data and regulatory frameworks, focus on setting limits for resource extraction, establishing quotas, and enforcing penalties for non-compliance. However, these systems frequently overlook the value of community customs the indigenous knowledge, cultural beliefs, and practices that have been central to local resource management for generations (Jentoft & Chuenpagdee, 2015). Many fishing communities, particularly in the Global South, have relied on customs passed down through generations to regulate fishing activities in a way that aligns with ecological sustainability (Berkes, 2018).

In Latin America, Chile provides an example of how formal fisheries management systems can integrate community customs to achieve sustainability. Through the establishment of Territorial Use Rights for Fisheries (TURFs), fishers are granted exclusive fishing rights in designated areas, allowing them to manage resources based on traditional knowledge (Gelcich et al., 2010). This approach has restored depleted stocks and supported local economies, particularly in indigenous communities. In Peru, customary practices surrounding anchoveta fishing have helped local fishers manage marine resources sustainably (Salas et al., 2020). These examples highlight how blending formal management with community customs can lead to more sustainable fisheries management.

In Africa, the challenge has been more complex. The introduction of co-management models such as BMUs in Kenya, Uganda, and Tanzania was intended to empower local communities and reduce the over-exploitation of fisheries resources. In Kenya, where BMUs were implemented in Lake Victoria and along the Indian Ocean coast, the goal was to involve fishing communities in decision-making processes and enforcement of fishing regulations. However, the integration of traditional fishing practices into the BMU governance structure has been limited. In Homabay County, for instance, the local fishing community's customs such as seasonal bans on fishing during breeding periods have been undermined by modern regulations that do not account for local ecological knowledge (Aura et al., 2020).

The literature on co-management emphasizes the importance of integrating local customs into formal governance systems to enhance compliance and promote sustainability (Berkes, 2018). In South Africa, for example, local communities have played a critical role in marine conservation by incorporating their customs into co-management frameworks, demonstrating that community participation is vital for sustainable resource use (Sowman et al., 2014).

Similarly, in Asia, Japan and Indonesia have shown that combining traditional fishing practices with modern governance can lead to more effective management of marine resources (Makino, 2018; Cinner et al., 2019).

In Kenya, BMUs have yet to fully capitalize on the potential of community customs as tools for sustainability. Traditional customs that once regulated fishing in Homabay County such as prohibitions on fishing during sacred periods and the use of specific gear are at odds with modern BMU regulations (Ocholla et al., 2015). The exclusion of these customs has weakened community participation in BMU activities and has led to challenges in enforcing sustainability measures. This study explores the role of community customs in the sustainability of BMUs and argues for a more inclusive approach to fisheries management that respects and promotes traditional practices alongside formal governance structures.

1.1 Statement of the Problem

The implementation of Beach Management Units (BMUs) in Kenya was intended to address the growing concerns of overfishing, depletion of fish stocks, and declining livelihoods in fishing communities, particularly in Lake Victoria and coastal areas. However, despite the introduction of BMUs as a co-management strategy, many fisheries continue to face significant sustainability challenges. (Tubman, 2019). In areas such as Homabay County, traditional fishing customs rooted in ecological knowledge and cultural beliefs have been displaced by modern regulatory frameworks that do not account for local practices (Odhiambo et al., 2023). This has led to conflicts between local communities and BMUs, weakened compliance with regulations, and undermined the sustainability of fisheries.

The exclusion of community customs from BMU governance has had several negative impacts. First, it has eroded the trust and cooperation between local fishers and BMU leadership, as many fishers feel that their traditional knowledge is undervalued. Second, the disconnect between BMU regulations and community customs has resulted in poor enforcement of fishing rules, as local fishers are more likely to comply with practices that align with their cultural beliefs. Third, the failure to integrate community customs into BMU governance has contributed to the ongoing decline of fish stocks, as traditional conservation practices such as seasonal bans and sacred fishing periods are no longer observed (Kuboja et al., 2024).

This study seeks to address the problem of the decline evidenced by the continued use of illegal fishing methods that have contributed to lower fish catches and landings in Homabay County, Kenya (Gichuru et al., 2019). This problem is exacerbated by the overreliance on conventional fisheries management practices that devalue cultural dimensions especially in project design and implementation by exploring how the integration of community customs into BMU governance can enhance the sustainability of fisheries in Kenya, with a focus on Homabay County. The study draws on empirical evidence from Kenya and global case studies to argue that a more inclusive approach to fisheries management one that respects and promotes community customs can lead to better sustainability outcomes. The findings will provide insights into how BMUs can be restructured to incorporate traditional practices, ultimately contributing to more sustainable and equitable fisheries management in Kenya and beyond.

1.2 Research Objective

To examine the effects of community customs on sustainability of beach management units in Homabay County, Kenya

1.3 Research Questions

What are the effects of community customs on sustainability of beach management units in Homabay County?

II. LITERATURE REVIEW

2.1 Theoretical Review

2.1.1 Hardin's Theory of the Tragedy of the Commons

Garrett Hardin's *Tragedy of the Commons* in 1968 describes how shared environmental resources are overused and depleted when individuals act in their own self-interest. Unregulated use leads to the depletion of resources, as individuals prioritize personal gain over the collective good. Hardin suggests that implementing restrictions, such as property rights, can help prevent this. This theory illustrates how short-term personal benefits often drive unsustainable use of common resources, negatively impacting everyone in the long run. Illegal fishing is a key example, where unregulated fishing practices deplete fish stocks globally, affecting both the environment and economies like Kenya's. Understanding this concept helps individuals and firms make more sustainable decisions, balancing personal needs with long-term resource conservation.

2.1.2 Network Analysis Theory

Social Network Theory, introduced by Barnes in 1954, examines relationships and interactions within social groups. His study of social ties in a Norwegian parish highlighted the importance of both strong and weak connections

in forming networks. These relationships, built on mutual interests and exchanges of information, can significantly influence ecological management. In the context of beach management, social networks allow fishers to share knowledge and improve decision-making, reducing uncertainty in resource use. Such networks may include other fishers, industry leaders, or officials. Understanding social ties helps explain how communities can collaborate to manage resources sustainably, integrating local customs and relationships to enhance conservation efforts. This framework applies to various settings, including the sustainability of Beach Management Units (BMUs).

2.2 Empirical Review

A custom is a traditional and widely accepted way of behaving or doing things that is specific to a particular society, location, or time period. Every society, religion, and community has its own unique set of customs. Customs play a significant role in shaping culture, serving as a form of cultural representation. They encompass actions and behaviours that are typical and traditional among the people of a specific group or area. The study uncovers the elements of conflict management, territorial controls and behaviour patterns (Stacey, 2023).

Community customs, sometimes called "folklore" or "folklife," is the living expression of culture in everyday life—anyone's culture—learned and passed on informally from person to person (Eyerman & Eyerman, 2019). It must be alive and current to be folklife, though it may have existed over long stretches of time. Everywhere people take the experiences of their lives and transform them into song, story, decoration, ritual, and celebration—examples of what folklorists call "expressive culture." When such expressions communicate the shared experiences, thoughts, and feelings of a group, and are passed on to others, they become traditions. Community customs are characterized by fundamental assumptions about valid behaviors, guidelines and their daily manifestations. Communities are bound by culture. Even in society there's always something that's unique to you and how you interact with the people around it. Religion, food, history, language - one thing or another differentiates us from the rest of the world and it's also the reason why we stick to those traditions (Eyerman & Eyerman, 2019).

Sustainable development occurs within cultural contexts. Therefore, community custom must be integrated into sustainable development strategies (Throsby, 2019). In addition, culture is a driver of sustainable development. The introduction and the integration of culture into the social, environmental, and economic dimensions of sustainability are vital in delivering a more holistic approach to sustainable development (Throsby, 2019). Community customs serves as a foundation of a community's cultural identity. Customs are common social practices that are followed by the majority of people in a society. In general, custom is a widely accepted, traditional way of behaving or doing something that is unique to a specific society, location, or time (Garcia & Sanchez, 2021). Each society, religion, and community has its own set of customs. Customs are an important aspect of culture. It contains aspect of conflict management, territorial controls, behaviour pattern among others. Community participation is also one of the critical factors, in the success of sustainability efforts. The key determinants of community participation in sustainability include awareness, understanding, benefits, and incentives. Community participation is also one of the critical factors, in the success of coral reef conservation efforts in Malaysia. The key determinants of community participation in coral reef conservation in the country include awareness, understanding, benefits, and incentives (Benedict, 2019).

To improve compliance and advance sustainability, the literature on co-management highlights how crucial it is to include local customs into official governance structures (Berkes, 2018). As an illustration of how community involvement is essential for sustainable resource use, local communities in South Africa have been instrumental in marine conservation by integrating their customs into co-management frameworks (Sowman et al., 2014). Similar to this, Japan and Indonesia have demonstrated throughout Asia that integrating traditional fishing practices with contemporary governance can result in better marine resource management (Makino, 2018; Cinner et al., 2019).

III. METHODOLOGY

This study employed a concurrent mixed-method research design, integrating both quantitative and qualitative approaches. This integration allows researchers to leverage the strengths of both methodologies, providing a more comprehensive understanding of complex problem by providing both breadth (through quantitative data) and depth (through qualitative data). Mixed methods allow researchers to obtain a comprehensive understanding of the research enhances credibility by giving equal importance to both data types. This design was deemed appropriate for the study as it aimed to investigate both numerical trends and the rich, contextual experiences of communities involved in beach management.

The study targeted 143 Beach Management Units (BMUs) across active fishing sites in Homabay County, with a total population of 7,151 respondents. This population included 1,939 key informants and 5,212 individuals involved in fishing activities across five sub-counties bordering Lake Victoria. Stratified random sampling, proportionate stratified sampling, and purposive sampling methods were employed, yielding a final sample of 647 respondents. Data was collected through structured questionnaires and interviews with BMU members, fishers, and community leaders.

To assess the reliability of the research instruments, Cronbach's Alpha values were calculated, yielding 0.850 for community customs and 0.788 for project sustainability, indicating high reliability. For validity, factor analysis was conducted on community customs, which yielded a Kaiser-Meyer-Olkin (KMO) value of 0.815, above the acceptable threshold of 0.5, confirming sample adequacy. Bartlett's Test of Sphericity was significant ($p < 0.05$), further validating the instrument's suitability for statistical analysis. Variables were measured using a five-point Likert scale, ranging from 1 (Strongly Disagree) to 5 (Strongly Agree), to assess the influence of community customs on the sustainability of BMUs. A linear regression model was adopted to test the hypothesis concerning the effect of community customs on the sustainability of beach management projects. The equation used was:

$$Y_{it} = \beta_0 + \beta_1(CC_{it}) + \varepsilon_{it}$$

Where :

Y_{it} = Dependent variable for unit i at time t

CC_{it} = Climate change variable as discussed in Andriess et al. (2022)

β_0 = Intercept

β_1 = Coefficient measuring the effect of climate change

ε_{it} = Error term

This model helped in determining the impact of community customs on the sustainability of BMUs.

IV. FINDINGS & DISCUSSION

4.1 Effects of Community Customs on Sustainability of Beach Management Units

The respondents were asked to state levels of agreement regarding six items on this variable. This variable was measured using a Likert Scale where SA represented Strongly Agree and was coded with a numerical value of 5, A represented Agree and was coded with a numerical value of 4, N represented Neutral and was coded with a numerical value of 3, D represented Disagrees and was coded with a numerical value of 2, while SD represented Strongly Disagree and was coded with a numerical value of 1. Results obtained were presented in Table 1.

Table 1

Descriptive Statistics for Community Customs

	1	2	3	4	5	M	SD
	F (%)	F (%)	F (%)	F (%)	F (%)		
BMUs have an established mechanism for handling conflicts that may arise	23(7.4)	4(1.3)	11(3.5)	125(40.2)	148(47.6)	4.19	1.093
There are rules and regulations in place used to minimize conflicts among BMUs	21(6.8)	5(1.6)	19(6.1)	120(38.6)	146(46.9)	4.17	1.085
BMU adhere to established territorial boundaries within for harmonious coexistence	33(10.6)	30(9.6)	19(6.1)	121(38.9)	108(34.7)	3.77	1.305
Adherence of territorial boundaries has reduced overexploitation of fish	44(14.1)	52(16.7)	31(10)	115(37)	69(22.2)	3.36	1.365
Existing cultural customs helps team members to live and work with people of different backgrounds	23(7.4)	15(4.8)	30(9.6)	147(47.3)	96(30.9)	3.89	1.121
Community customs not been integrated in the co management regime implemented through the Beach Management Units (BMUs).	49(15.8)	87(28)	47(15.1)	61(19.6)	67(21.5)	3.03	1.405
Overall Mean and Standard Deviation						3.74	1.23

Table 1 presents the results for items related to community customs within Beach Management Units (BMUs). The overall mean response is 3.74 on a 5-point scale, suggesting a generally neutral stance from respondents regarding community customs. This neutrality is significant, as it indicates that while respondents acknowledge the existence of community customs, there may be uncertainty or ambivalence about their role in the BMU management system. Additionally, the low standard deviation across the items suggests that responses were clustered closely around the mean, highlighting consistency in how respondents perceive the role of community customs within the BMUs.

The study reveals that respondents agreed on the effectiveness of BMUs in handling conflicts, with a mean of 4.19 (SD = 1.093) for the item stating that BMUs had established mechanisms for resolving disputes. This finding is consistent with the literature on local resource management systems, where traditional community customs are often crucial for maintaining harmony and reducing conflicts (Ostrom, 1990). Similarly, respondents agreed that there are

rules and regulations in place that help minimize conflicts among BMUs ($M = 4.17$, $SD = 1.085$), further supporting the role of customary practices in sustaining social cohesion within the management of fisheries.

However, neutrality was observed in items related to territorial boundaries and their impact on resource management. Respondents were neutral regarding whether BMUs adhered to established territorial boundaries for harmonious coexistence ($M = 3.77$, $SD = 1.305$). This neutrality is critical because it contrasts with previous studies that emphasize the importance of territorial customs in maintaining resource sustainability. For example, Kurien (2005) found that territorial boundaries in many fishing communities help to prevent conflicts and overuse of resources, but in this case, respondents did not strongly agree that these boundaries were effective. The neutral stance further extends to the item that adherence to territorial boundaries has reduced overexploitation of fish ($M = 3.36$, $SD = 1.365$), suggesting that while territorial norms exist, their implementation may be inconsistent or insufficient to achieve sustainable fisheries management.

One important finding is the neutral response regarding the integration of community customs into the formal co-management regime ($M = 3.03$, $SD = 1.405$). This finding contrasts with the growing body of research advocating for the full integration of local knowledge and customs into resource governance systems to ensure sustainability and community buy-in (Agrawal, 2020; Pretty, 2003). The respondents' ambivalence could reflect structural barriers within BMUs, where traditional customs are either underrepresented or not fully recognized by formal management systems. This gap between the community and formal structures may hinder the overall effectiveness of co-management in addressing issues like resource overexploitation.

Moreover, respondents indicated a neutral stance toward the item that existing cultural customs help team members live and work with people from different backgrounds ($M = 3.89$, $SD = 1.121$). While this is slightly more positive than the other neutral responses, it suggests that cultural customs provide some degree of social cohesion within BMUs, though perhaps not as strongly as expected. The low standard deviation for this item implies consistent views among respondents, yet the moderate mean score reflects that cultural customs are not viewed as universally influential across all interactions within the units.

The findings on conflict resolution mechanisms and the existence of rules to minimize conflicts align with earlier research, especially Ostrom's (1990) theory of local governance systems, which highlights the ability of communities to self-regulate resource use and resolve conflicts. Additionally, Pomeroy and Berkes (1997) also emphasize the effectiveness of co-management regimes when they incorporate traditional conflict resolution methods, as observed in this study.

On the other hand, the neutral findings concerning the impact of territorial boundaries contrast with the results of recent studies, which have shown the significant role that territorial boundaries play in resource management. For instance, Cinner et al. (2012) demonstrated the positive effects of community-based management practices, such as territorial use rights, in improving fishery outcomes. The neutral responses in this study raise questions about whether enforcement challenges or external pressures, such as overfishing by non-local fishers, may be diluting the effectiveness of territorial norms.

Moreover, the neutrality regarding the integration of community customs into the co-management system ($M = 3.03$) sharply contrasts with scholars like Agrawal (2005), who argue that traditional knowledge systems must be formally recognized and integrated into co-management frameworks for these systems to succeed. The respondents' neutral stance suggests a gap in operationalizing these ideals within the BMUs studied. The researchers acknowledge that while conflict resolution processes reflect community customs, there is an evident need to institutionalize these customs more fully into the BMU governance system.

The overall neutrality observed in respondents' views about community customs, as indicated by the mean score of 3.74, presents a critical point for reflection. While conflict resolution mechanisms appear to work well, other critical aspects of community customs, such as territorial boundaries and their role in reducing resource overexploitation, seem to lack the same level of impact. This mixed result raises questions about the extent to which BMUs have successfully incorporated traditional practices into their formal management structures.

Furthermore, the neutral response regarding the integration of community customs into the co-management regime highlights a gap between theory and practice. Although scholars advocate for the full inclusion of local customs into management systems, this study suggests that such integration is either insufficient or inconsistent in practice. This gap could have significant implications for the long-term sustainability of fisheries management, as the lack of full community engagement may lead to weaker compliance with regulations and increased pressure on resources.

In summary, while the study corroborates earlier findings on the importance of conflict resolution within BMUs, it contrasts with recent research advocating for the full integration of community customs into formal management structures. The researchers point to the need for more comprehensive institutionalization of these customs to ensure effective and sustainable management of fisheries resources. The neutral responses related to territorial boundaries and the role of customs in promoting social cohesion further suggest that more work is needed to bridge the gap between traditional practices and modern governance frameworks.

Table 2
Descriptive Statistics for Project Sustainability

	1	2	3	4	5	M	SD
	F (%)	F (%)	F (%)	F (%)	F (%)		
The project undertaken by the BMUs has improved the economic situation of the community	17(5.50)	34(10.90)	18(5.80)	133(42.80)	109(35.00)	3.91	1.155
Improving socio-economic opportunities of BMUs members contribute to sustainable project development	8(2.60)	24(7.70)	42(13.50)	141(45.30)	96(30.90)	3.94	.992
The projects implemented by BMUs are financially and socially viable	8(2.60)	61(19.60)	29(9.30)	128(41.20)	85(27.30)	3.71	1.142
The projects implemented by BMUs have extended value/benefit to the beneficiaries	12(3.90)	44(14.10)	45(14.50)	139(44.70)	71(22.80)	3.68	1.091
Members of community participate in project management to enhance the sustainability of the projects	8(2.60)	58(18.60)	43(13.80)	104(33.40)	98(31.50)	3.73	1.166
Overall Mean and Standard Deviation						3.79	1.11

Table 2 presents the results of sustainability of beach management units. The overall mean response approximates to ($M = 3.79$) on the 5-point scale used in the questionnaire indicating that respondents generally were neutral on the items relating to sustainability of beach management units. It can also be observed that the overall standard deviation for sustainability of beach management units is low ($SD = 1.11$) implying the responses are confined within a small range about the overall mean response. Based on the mean interpretation scale, the respondents were generally neutral regarding the view that the project undertaken by the BMUs had improved the economic situation of the community ($M = 3.91$, $SD = 1.155$) and that improving socio-economic opportunities of BMUs members contribute to sustainable project development community ($M = 3.94$, $SD = 0.992$). Further, the findings revealed that the respondents held a neutral position regarding the view that the projects implemented by BMUs are financially and socially viable ($M = 3.71$, $SD = 1.142$) and that the projects implemented by BMUs have extended value/benefit to the beneficiaries ($M = 3.68$, $SD = 1.091$). Moreover, the respondents were neutral with regards to the view that Members of community participated in project management to enhance the sustainability of the projects ($M = 3.73$, $SD = 1.166$).

4.2 Correlation Analysis

The correlations coefficient between each pair of variables is used to explore the interrelationship between two variables negatively or positively at a certain level of significance. The symbol "r" denotes the correlation coefficient values. A correlation coefficient of +1.00 signifies a complete positive correlation, a correlation coefficient of -1.00 signifies a complete negative correlation, and a correlation coefficient of 0.00 shows no linear association between variables. The findings presented in Table 3 demonstrate that all the variables in this study exhibited a positive and statistically significant correlation with project sustainability.

Table 3
Correlation Analysis

		PS	CC
Project Sustainability	Pearson Correlation	1	
	Sig. (2-tailed)		
	N	311	
Community Customs	Pearson Correlation	.711**	1
	Sig. (2-tailed)	.000	
	N	311	311

**. Correlation is significant at the 0.01 level (2-tailed).

The correlation coefficient for community customs ($r = 0.711$, $p = 0.01$) indicates a strong positive association, suggesting that as community customs strengthen, there is a 71.1% probability that project sustainability will increase. This significant relationship underscores the critical role of local traditions and practices in ensuring the long-term sustainability of community-driven initiatives like Beach Management Units (BMUs). The statistical significance ($p = 0.01$) further validates this finding, affirming that the association is not due to chance, but a meaningful connection.

However, while the positive correlation highlights the importance of community customs, a critical view reveals potential limitations in over-relying on cultural practices. Community customs, although essential for project buy-in and participation, may at times conflict with modern sustainability frameworks or environmental regulations. For instance, customs that promote collective governance may also hinder the adoption of innovative practices if they are perceived as contrary to tradition. As noted by previous researchers such as Oino et.al (2014), while community engagement fosters ownership, it may also result in resistance to external interventions, particularly when new methods challenge deeply entrenched customs.

In addition, the strong correlation between community customs and project sustainability, though significant, does not imply causation. Other factors such as economic conditions, external funding, or environmental policies may also influence the sustainability of BMUs but are not captured within the scope of this analysis. These externalities, as noted by Kwambai et al. (2023), play a considerable role in determining project outcomes and should not be overlooked when considering the impact of community customs.

Thus, while the findings demonstrate that integrating community customs is pivotal for the sustainability of BMUs, a balanced approach that incorporates both traditional knowledge and modern sustainability strategies is necessary. Engaging the community while also promoting adaptability to new, sustainable methods may offer the most effective path toward long-term success, especially in contexts where rapid environmental changes demand innovative management solutions.

4.3 Regression Analysis

The purpose of this study was to establish the effect of community customs on beach management sustainability. To achieve this, inferential analysis was undertaken. Specifically, the study used linear regression analysis to test for the effect of the independent variable on the dependent variable.

4.3.1 Model Summary for Independent Variable

Model 1 shows the regression results of the independent variable. The results demonstrate that the independent variables, specifically, accounted for 92.2% of the variation in project sustainability. The R coefficient of determination is 92.2% implying that 7.8 % of variation in this model can be accounted for by factors outside this study.

Table 4

Model Summary for Independent Variables

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.922	.850	.848	1.58533	.850	434.166	4	306	.000

The coefficient results indicate that community customs ($\beta = 0.123$, $p < 0.05$) have a positive and statistically significant effect on the sustainability of Beach Management Unit (BMU) projects, suggesting that a unit increase in the emphasis on community customs leads to a 12.3% increase in project sustainability. These results can be corroborated, contrasted, and critiqued based on previous studies, offering a more nuanced understanding of the role of community customs in resource management.

The regression results from Model 1 show that the independent variables accounted for 92.2% of the variation in project sustainability, as indicated by the R-squared (R^2) value of 0.922. This high R^2 value implies that the model is highly effective in explaining the factors contributing to the sustainability of Beach Management Unit (BMU) projects. Specifically, it indicates that 92.2% of the variance in project sustainability can be attributed to the independent variables included in the model, while 7.8% remains unexplained and could be influenced by other factors not captured in this study.

An R-squared of 92.2% suggests that the predictors in the model, such as community customs, governance, conflict resolution mechanisms, and adherence to rules, are highly relevant in explaining the sustainability of BMU projects. The unexplained 7.8% of the variation may point to external or unaccounted-for variables, such as external economic factors including market forces, such as demand for fish or global economic conditions; environmental variables such as changes in environmental conditions could also influence sustainability but may not have been considered; and institutional and policy changes where there are shifts in government policies, funding, or enforcement of BMU regulations could impact the effectiveness of the project but were outside the scope of the study. The high R-squared value aligns with studies by (Pretty & Ward, 2001) and Ostrom (1990), who found that local governance and well-structured community-based management can explain a significant portion of the variance in sustainable resource management projects. These studies underscore the importance of community engagement and rules that support resource management, similar to the findings of this study.

However, other studies, such as (Kooiman et al., 2005), have highlighted the role of external factors, such as state support, international regulations, or market dynamics, in determining the long-term sustainability of community-based projects. These factors may explain part of the 7.8% unexplained variation in this model. Additionally, Cinner et al. (2012) noted that while community-based management can be highly effective, the complexity of socio-economic and environmental factors often means that a portion of the variance remains outside the community's control, which could be a reason for the unexplained variation in this model.

While the model demonstrates a strong capacity to explain project sustainability, the remaining unexplained variation suggests that future studies should consider incorporating a broader range of factors. This could include external economic pressures, environmental changes, and institutional shifts that may also play a crucial role in project sustainability. Additionally, the model's strong explanatory power could be further validated by expanding the study across different regions or examining longer-term outcomes of BMU projects, where the sustainability might be influenced by factors that evolve over time. In conclusion, the regression results indicate that the independent variables, particularly community customs, governance, and conflict resolution mechanisms, have a significant impact on the sustainability of BMU projects. However, acknowledging the unexplained variance is critical in ensuring a comprehensive understanding of project sustainability, especially as external, environmental, and policy factors may come into play.

4.3.2 Analysis of Variance for Independent Variables

Table 5

Analysis of Variance for Independent Variables

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	4364.705	4	1091.176	434.166	.000 ^b
	Residual	769.060	306	2.513		
	Total	5133.765	310			

The regression results indicate an R-squared (R^2) value of 0.850, meaning that 85% of the variation in project sustainability can be explained by the independent variables in the model, while the remaining 15% of the variation is due to factors not included in the model. The ANOVA results revealed an F-statistic of 434.166 with a p-value of 0.000, which is highly significant ($p < 0.05$). This indicates that the model is statistically fit for further analysis, showing a strong overall relationship between the independent variables and the sustainability of Beach Management Unit (BMU) projects.

The R^2 value of 0.850 implies that the selected predictors—such as community customs, governance mechanisms, conflict resolution, and adherence to rules—are very effective in explaining the sustainability of BMU projects. However, the remaining 15% of unexplained variation suggests there are additional factors that influence sustainability but were not captured in this study. These could include external factors such as economic fluctuations, environmental changes, and policy and institutional changes.

The F-statistic of 434.166, with a corresponding p-value of 0.000, confirms that the independent variables in the model significantly contribute to explaining project sustainability. The significance of the F-statistic ($p < 0.05$) means that the combined influence of the independent variables on project sustainability is statistically strong, and the model is well-suited for predicting outcomes based on the given predictors. The findings align with those of Pretty and Ward (2001), who argued that well-structured community-based governance models can explain a significant proportion of sustainable resource management outcomes. However, studies such as Cinner et al. (2012) pointed out that, despite the strength of community-based approaches, external factors such as government policies, market pressures, or environmental variability can account for a portion of the unexplained variation in project sustainability. This is consistent with the 15% of the variance that was not explained by the model in this study.

While the model accounts for a significant 85% of the variation in project sustainability, the unexplained 15% suggests the need for future research to explore additional factors. For example, incorporating economic, environmental, or institutional variables could improve the model's explanatory power. Additionally, the long-term impact of BMU governance and community customs on sustainability might evolve over time, so longitudinal studies could provide more insights. From the foregoing, the results demonstrate that the independent variables significantly affect the sustainability of BMU projects, and the model is statistically robust based on the R^2 value and F-statistic. However, the unexplained variance highlights the importance of considering broader external factors in future analyses to gain a more comprehensive understanding of project sustainability.

4.3.3 Analysis of Coefficient Results

Table 6

Coefficient Results for Independent Variable

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	-1.901	.202		-9.411	.000
	Community Customs	.123	.045	.091	2.762	.006

The coefficient results indicate that community customs ($\beta = 0.123$, $p < 0.05$) have a positive and statistically significant effect on the sustainability of Beach Management Unit (BMU) projects, suggesting that a unit increase in the emphasis on community customs leads to a 12.3% increase in project sustainability. These results can be corroborated, contrasted, and critiqued based on previous studies, offering a more nuanced understanding of the role of community customs in resource management.

The positive relationship between community customs and sustainability of BMUs aligns with findings from Agrawal (2005) and Ostrom (1990), who argue that local communities, through their customs and practices, are often better at managing resources sustainably. In this study, respondents agreed that BMUs have an established mechanism for conflict resolution ($M = 4.19$, $SD = 1.093$) and rules to minimize conflicts ($M = 4.17$, $SD = 1.085$), supporting the notion that these customs can create social cohesion, enhance cooperation, and foster conflict resolution, which are essential for the sustainability of BMU projects.

Similarly, Aswani et al. (2007), in their research on traditional resource management in the South Pacific, found that integrating customs into resource management, such as establishing territorial boundaries, helped conserve resources and maintain project sustainability. This finding resonates with the current study's results where respondents agreed that existing cultural customs help team members from diverse backgrounds work together ($M = 3.89$, $SD = 1.121$), further underscoring the value of these customs in promoting harmonious coexistence within BMUs.

Despite these positive contributions, several studies caution against over-reliance on traditional customs for managing resources. Cinner et al. (2012) highlight that while customs can play a significant role, they may not be sufficient when economic pressures, modern governance conflicts, or population growth interfere. This is reflected in the current study, where respondents were neutral on the effectiveness of territorial boundaries within BMUs for reducing overexploitation of fish ($M = 3.77$, $SD = 1.305$). This neutrality suggests a potential disconnect between community customs and the actual enforcement of territorial regulations, possibly due to external pressures such as increasing fishing demand or insufficient institutional support for these customs.

Furthermore, the respondents were neutral on the integration of community customs into BMU co-management regimes ($M = 3.03$, $SD = 1.405$), indicating some ambiguity in how well customs are embedded in formal governance structures. Gichuru et al. (2019) argues that integrating community customs with formal regulatory frameworks can be challenging, especially when there is a lack of alignment between local practices and state governance mechanisms. This points to a potential gap in the current co-management system in Kenya, where customs, while valuable, may not be fully incorporated into institutional frameworks, thereby limiting their effectiveness in ensuring long-term project sustainability.

While the statistical results show that community customs have a significant and positive effect on the sustainability of BMU projects, this relationship is complex and may depend on several contextual factors. For instance, Béné (2020) support the role of local governance institutions in promoting sustainability, but caution that these institutions require support from external frameworks, especially in resource-limited settings. In the current study, while respondents acknowledged the positive aspects of customs (e.g., conflict resolution mechanisms and regulations), the neutral responses regarding adherence to territorial boundaries and the integration of customs into co-management regimes suggest that customs alone may not be sufficient to achieve sustainability.

Additionally, Cohen et al. (2013) caution against romanticizing community customs as inherently sustainable, especially in contexts where external pressures or environmental changes challenge traditional practices. In line with this, the current study found that adherence to territorial boundaries has not fully addressed the problem of fish overexploitation ($M = 3.36$, $SD = 1.365$), pointing to a potential weakness in relying solely on customary practices without complementary modern governance measures or enforcement mechanisms. For BMUs to fully leverage the benefits of community customs, greater institutional support is needed to ensure that these customs are effectively integrated into co-management regimes. Furthermore, ongoing adaptation and enforcement mechanisms are crucial to maintaining the balance between traditional customs and modern governance demands, especially in the face of evolving socio-economic and environmental pressures. Thus, while community customs play an important role, they should be complemented by broader institutional frameworks to ensure the long-term sustainability of BMU projects.

The findings from the study underscore the importance of local cultural practices in shaping the effectiveness and sustainability of BMU operations. Both qualitative and quantitative data from the study reinforce this outcome, highlighting the critical role that community customs play in resource management and conservation. However, while the impact of community customs is generally seen as positive, the complexity of aligning these customs with modern sustainability efforts is also apparent. The qualitative data from key informants and focus group discussions provided rich insights that complement the quantitative findings.

Respondents emphasized how community customs foster a sense of ownership and collective responsibility toward local resources. For instance, one key informant noted that when BMU management practices align with local traditions, community members are more likely to comply with regulations, thus contributing to better conservation outcomes. Another respondent highlighted the role of traditional ecological knowledge, passed down through generations, in guiding sustainable fishing practices and resource management.

The notion of collective decision-making and community participation is crucial to the governance of beach resources. Customs that emphasize unity and collaborative problem-solving can improve adherence to regulations and conflict resolution, thereby enhancing sustainability. The importance of customs as a framework for amicable dispute resolution was also noted during focus group discussions, underscoring the role of cultural practices in maintaining community harmony and ensuring sustainable resource use.

While the findings overwhelmingly show that community customs positively influence BMU sustainability, several challenges arise when traditional practices conflict with modern conservation methods. One key informant mentioned that certain community members resist changes to long-held practices, viewing new, sustainable methods as a threat to cultural identity. This resistance can hinder the adoption of practices that, while beneficial to sustainability, may be seen as conflicting with the established customs.

The generational gap between older and younger community members further complicates this issue. Older individuals tend to adhere more closely to traditional practices, while younger members may be more open to adopting innovative approaches. This divergence in perspectives can create tensions within communities, delaying the implementation of new, more sustainable methods. This underscores the need for culturally sensitive approaches that honour traditions while introducing sustainability measures in ways that are respectful and inclusive. Odhiambo et al (2023) and Makino (2018) noted that customary practices, such as restricted access to sacred areas and limits on harvesting particular species, often enhance community-led sustainability efforts. These practices provide frameworks for managing resources sustainably, much like the customs mentioned by respondents in the study. The ability of community customs to regulate resource use and promote collective responsibility is also supported by studies such as Tubman (2019), which emphasized the importance of traditional governance systems in conservation efforts.

A critical challenge in this context is balancing the preservation of cultural customs with the need for more sustainable practices. As the findings suggest, community customs can be both an asset and an obstacle to sustainability. On one hand, they foster a sense of ownership, unity, and responsibility, which are crucial for resource conservation. On the other hand, resistance to change, particularly when it threatens cultural identity, can slow the adoption of new practices. This tension is not unique to the BMU context but reflects a broader issue in integrating traditional knowledge with modern sustainability initiatives.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

Overall, the findings reveal that community customs play a pivotal role in the sustainability of BMU projects. However, the success of integrating these customs with modern sustainability efforts depends on the community's willingness to adapt to new methods while preserving their cultural identity. Engaging communities in a respectful and collaborative manner, and finding ways to harmonize tradition with innovation, will be key to ensuring long-term sustainability of beach management projects. This study contributes to the growing body of evidence showing that cultural practices must be considered in the design and implementation of sustainable resource management strategies.

5.2 Recommendations

Engage Community Members through Collaborative Dialogue by establishing open, respectful communication with the community to involve them in decision-making, ensuring their perspectives are considered and fostering a sense of ownership over sustainability efforts.

Integrate Traditional Knowledge with Modern Sustainability Practices through combined traditional ecological knowledge with innovative sustainability methods to create solutions that respect cultural heritage while promoting effective conservation. Demonstrate the Benefits of New Practices Respectfully by Showcasing the advantages of new sustainability practices in a way that aligns with the community's values and cultural identity, reducing resistance and enhancing acceptance.

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