

Local community engagement, governance, and sustainability in marine resource management: Evidence from Tanzania

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ABSTRACT

Marine resources and coastal ecosystems support the livelihoods of billions of people in developing countries. To ensure the sustainability of marine resources, it is imperative to understand local community awareness of the governance instruments that regulate their utilization. The present study explored the actors responsible for the management and conservation of marine resources, investigated governance instruments used, and identified the challenges encountered in marine resource utilization and management in Dar es Salaam. The study used a case study design and was guided by Ostrom's common pool resource theory. The study used a sample size of 223 respondents for quantitative data and 14 respondents for qualitative data, making a total of 237 participants. Respondents were selected from two wards of Ununio and Mbweni using simple random and purposive sampling techniques. Various tools were used in collecting the information, including the use of structured questionnaires and in-depth interviews and reviewing the relevant literature. The data was analyzed using descriptive statistics, discourse analysis, and thematic analysis, as well as a relative importance index using the Statistical Package for Social Sciences version 12. The findings obtained were presented using tables and descriptions organized across major themes. The results indicate that the local community asserts the existence of various governance instruments, which include policies, rules, regulations, traditions, and norms that govern the utilization of the marine resources. Furthermore, various actors were responsible for the management and conservation of the marine resources, including the government through its respective ministries, the Beach Management Unit, and the local community. Despite the efforts of marine resource actors, several challenges hindering the conservation and management of marine resources were identified, including inequitable sharing of coastal resources, inadequate stakeholder engagement in decision-making, and inadequate communication among key stakeholders. Thus, to enhance sustainable management and conservation of marine resources, the respondents call for the establishment of regular patrols and enhancement of the cooperation between B.M.U. and the local communities in managing marine resources.

Keywords: Community Engagement, Governance, Marine Sustainability, Tanzania

I. INTRODUCTION

Marine and coastal ecosystems support the livelihoods of billions of people in the world by providing food security. They also generate livelihoods, regulate climatic conditions, as well as providing aesthetic and cultural values. Despite their potentialities, marine and coastal ecosystems are affected by various factors that include natural and human activities that call for immediate and effective management interventions. A study conducted by Newell et al. (2019) revealed that globally, marine and coastal ecosystems are affected by severe degradations caused by overfishing, coastal development pollution, mining, and the growth of tourism activities. The occurrence of this threat has called upon several policy responses with the aim of conserving and ensuring the sustainability of those resources. The policy response includes the United Nations Sustainable Development Goal 14 (Life Below Water) and marine protected areas (MPAs) that are confined to the conservation and sustainable use of water bodies such as oceans, seas, and marine resources. Other aspects of policy include enhancement of biodiversity that generates economic benefits to its members through governance structures, enforcement mechanisms, and financial resources, respectively (Newell et al., 2019 & Katikiro et al., 2021).

Marine resource governance can be understood as the decision-making processes and institutional arrangements that guide how humans interact with the ocean environment and its resources, determining who gets access, who makes decisions, and how benefits and responsibilities are shared. Marine resources governance followed top-down centralized management that trickled down towards a more participatory and community-based approach (Newell et al., 2019). Effective marine resources governance requires integration between international targets, national policies, and local implementation through a combination of top-down and bottom-up approaches (Okafor-Yarwood et al., 2020). In Africa, marine resource management is affected by development imperatives, livelihood dependencies, and conservational demands. Usually, initiation of large blue economy projects in the continent that prioritize economic gain and foreign

investment over social inclusion and sustainability of the marine ecosystem has caused displacement risks to the traditional fishing communities and the marginalized small-scale fishers who depend on the marine ecosystem as their bases of livelihoods (Okafor-Yarwood et al., 2020). The exclusion of traditional fishing communities is mainly influenced by the need to undertake coastal and port expansion projects that exclude small-scale fishers. The exclusion is mainly in planning and making decisions that undermine small-scale fishers' accessibility to nearshore and customary fishing grounds (Thoya et al., 2022).

A study by Yanda et al. (2023) revealed that the African coastal communities are more vulnerable to the climate change impacts that manifest themselves through sea level rise, increased stormy intensity, and warming of the oceans. The occurrence of climate change and its impact have posed a threat to the marine resources. It reduces their reliability and increases the vulnerability of the coastal population, which depends heavily on the utilization of marine ecosystems for food security and resilience. Despite this pressure caused by climate change, several African countries have adopted progressive policy frameworks, including Marine Spatial Planning (MSP) and Nature-based Solutions, to reconcile development objectives with conservation imperatives (Yanda et al., 2023). However, the implementation of these frameworks is affected by governance fragmentation, which limits the effectiveness of integrated coastal management across African coastal areas (Nunan et al., 2020). Thus, community-centered management approaches and locally led protected areas have been identified as essential parameters that link conservation with livelihoods (Okafor-Yarwood et al., 2020).

Sub-Saharan Africa does not differ much from other parts of Africa since most of the coastal communities in the region relied much on nearshore marine resources, as artisanal fisheries acted as primary sources of protein and income for millions of people. In a similar vein, other marine resources, such as mangroves, coral reefs, and seagrass, support these fisheries and local food security systems, though they are affected by severe degradation and habitat degradation (Okafor-Yarwood et al., 2020). To ensure the marine resources' sustainability in Africa, various community-based natural resource management (CBNRM) and co-management arrangements in Africa have been established. Such arrangements result in varying management outcomes; in some areas, they collaborate effectively with local community institutions, while in others, they are hindered by weak capacity and institutional fragmentation, which negatively impacts the sustainability of the resources. Yanda et al. (2019) cemented that in Sub-Saharan Africa, there is a close linkage between the manifestation of coastal poverty, livelihood diversification, and the resource use pattern. For instance, the decline in fish stocks and in accessibility influences the coastal communities to opt for alternative and more destructive fishing practices. These include the use of destructive fishing methods and the application of more intensive extraction practices that finally create negative feedback loops that further degrade the marine ecosystem. In a similar vein, a study by Andriesse et al. (2022) noted in sub-Saharan Africa most of the formal co-management institutions, such as Beach Management Units (BMUs) and village-level resource management committees, are frequently undermined by informal power dynamics, top-down reporting structures, and misalignment between formal rules and customary norms, finally limiting fisher participation and institutional accountability.

Furthermore, the governance of coastal areas in Tanzania is affected by fragmentation and multiple sector-led management competition. This creates an impact on village-level institutions that impede integrated management and accountability (Nunan et al., 2020). Integrated Coastal Management efforts in eastern Tanzania are affected by sustainability challenges such as inadequate monitoring systems, weak institutional attachment, and limited long-term financing that constrain their potential benefits (Sabai, 2023). In urban coastal areas, particularly around the Dar es Salaam coast, the areas still experience pressure that is intensified by habitat loss, pollution, rapid urbanization, and the development projects that cause the manifestation of conflicts over the main resource users (Raycraft, 2019). The coastal communities' limited livelihood options have been linked to engagement in destructive fishing practices, such as dynamite fishing. In some Tanzanian coastal communities, such practices indicate the complex social drivers of unsustainable resource use (Kamat, 2019).

Tanzania's coastline is endowed with rich marine biodiversity, including coral reefs, mangrove forests, and seagrass meadows that support productive fisheries and encourage the growth of the tourism sector. Despite its potentiality, the coastal ecosystem faced a severe degradation that is influenced by anthropogenic factors such as destructive fishing practices, coastal development, and pollution, as well as climate change stressors such as oceanic warming and acidification (Mbije, 2023). The country has designed various governance instruments at different levels to overcome the challenges encountered. These include the initiation of beach management units, marine protected areas, and integrated coastal management (ICM). Although the country has implemented various governance instruments to address these challenges, these interventions have produced mixed social and ecological outcomes. In addition, the study by Andriesse et al. (2022) asserted that those governance instruments that aim to enhance community participation have shown uneven effectiveness. Formal institutional arrangements and local power relations shape their performance, either enabling or constraining meaningful fisher participation and influence in decision-making.

1.1 Statement of the Problem



The coastal areas of Tanzania, specifically Dar es Salaam, possess a variety of marine resources that serve as the foundation for community livelihoods. However, the anthropogenic activities have degraded these marine resources. The persistence of severe degradation calls for the establishment of various instruments to govern the management and conservation practices to ensure its sustainability. Despite these efforts, several studies have noted the persistence of ongoing marine degradation that is affecting its sustainability. Moreover, the existing studies (Mbije 2023; Andriesse et al., 2022 & Yanda et al., 2019) have examined social and ecological dimensions that drive marine resource degradation in isolation without considering the interlinkages between community engagement and governance that drive marine resource sustainability. Thus, the present study fills the critical knowledge gaps regarding community engagement and governance that influence conservation and management sustainability.

1.2 Research Objectives

This study is guided by the following specific objectives;

- i. To examine the main actors in the management and conservation of marine resources in coastal areas of Dar es Salaam
- ii. To assess the instruments used to govern the management and conservation of the marine resources in coastal areas of Dar es Salaam
- iii. To explore the challenges that hinder effective management and conservation of the marine resource in coastal areas of Dar es Salaam

II. LITERATURE REVIEW

2.1 Theoretical Review

This study is informed by Ostrom's (1990) Common Pool Resource Theory. The theory holds the assumption that local communities, under specific conditions, possess the capacity to devise effective institutional arrangements for sustainable resource governance. Similarly, the theory holds the belief that the local resource users have the ability to organize a collective action and self-governance to attain a sustainable outcome when appropriate conditions are present. He further identified eight design principles that characterize strong, long-enduring resource management institutions, which include defined boundaries of the resource and user groups; congruence between appropriation and provision rules and local conditions; collective-choice arrangements that allow resource users to participate in modifying operational rules; effective monitoring of resource conditions and user behavior; graduated sanctions for rule violations; accessible and low-cost conflict resolution mechanisms; recognition of rights to organize by external authorities; and nested enterprises for larger resource systems (Ostrom, 1990). Basically these principles insisted on the need of having participatory decisions in rule making, transparent monitoring, credible enforcement mechanisms, recognition of the local right, and multi-level governance structures that link community-level institutions and higher administrative levels (Suharti et al., 2022; Palomo & Hernández-Flores, 2019).

Generally, the theory recognizes that local communities possess ecological knowledge about their resources and are legitimate decision-makers and implementers of rules and regulations; therefore, their participation is a crucial ingredient for effective governance (Blythe et al., 2017). In the current study, the common pool theory offers a systematic analysis of how the primary marine resource actors are aware of various governance instruments, engage in the rule-making process, monitor mechanisms, and develop enforcement capacities that ultimately shape the effectiveness of marine resource management in the coastal communities of Dar es Salaam.

2.2 Empirical Review

Different literatures have analysed marine resource management and conservation actors in various parts of the world. For instance, Levine (2016) conducted a study in Pemba on marine resources and governance in Misali Island Marine Conservation Area (MIMCA) and expanded Pemba Channel Conservation Area (PECCA). The study indicated that there were co-management arrangements between the local fisherman associations, NGOs, and government institutions that worked together to support the sustainable use of the marine resources. However, upon scaling down the decision to PECCA, donor influence and the government-driven expansion affect the local community's engagement, weaken local institutions, and finally impede conservation and management efforts. In a similar vein, Katikiro et al. (2021) analyzed stakeholders' participation and governance effectiveness in Mnazi Bay-Ruvuma Estuary Marine Park. In their study they found that several actors were engaged in the conservation of the Mnazi Bay, including park authorities, community groups, NGOs, donors, and private stakeholders. The same study revealed that actual engagement among those stakeholders was weak and poorly coordinated due to poor communication, inconsistent enforcement, and the persistence of conflicting conservation priorities among the actors who finally hindered effective management and conservation practices.



With regard to policies, rules, regulations, and norms that govern marine resource management, the reviewed literature reveals various perspectives. For instance, the studies conducted by Verheij et al. (2004) on collaborative coastal management in Tanga found the use of marine conservation instruments such as village bylaws, reef closure, and jointly enforced arrangements within the district government supported marine resource conservation, as it reduced destructive fishing methods (the use of dynamite) and improved reef conditions and fish catches. Thus, the use of formal and informal instruments was sought to make effective instruments in the management and conservation of the marine resources. In a similar vein, McClanahan et al. (2008) analyzed formal regulations and local norms on Mafia Island. In their study they noted that usually conflict manifested when there is uneven compliance between the formally established rules and local livelihoods' needs and customary access rights. Thus, their studies insisted on recognizing local norms within the formal regulatory instrument so as to avoid resistance and enforcement failure.

On challenges and strategies for marine resource conservation and management, the empirical literature review indicated that increasing threats posed by climate change (sea-level rise, storm surges, and flooding), pressures on fisheries and mangroves, declining fish catch and crop yields, and governance are some of the factors that undermine conservation and management aims (Yanda et al., 2023). In a similar vein, the study conducted by Njaya (2007), which assessed governance challenges of the implementation of fisheries co-management in Malawi, found that marine management and conservation are affected by the persistence of unclearly defined stakeholder roles. They limit participation of civil society groups, weaken accountability, as well as persistent poverty among the communities. They also undermined the compliance to marine resources conservation and management strategies. He further noted that the existence of weak governance institutions and unfulfilled promises (e.g., revenue sharing, gear compensation) usually reduced the co-management efforts. Despite the documentation of several studies on marine resources, few studies have comprehensively addressed the intricate relationship between community engagement, governance, and the sustainability of these resources.

III. METHODOLOGY

3.1 Research Design

This study used a case study design to investigate the research topic. A case study design allows the use of mixed research approach that combines the use of both qualitative and quantitative data collection techniques in order to complement the results and respond to the research questions under investigation.

3.2 Study Location

This study was carried out at Ununio and Mbweni wards located in Kinondoni Municipality, Dar es Salaam. The wards were selected purposely because most of the community's livelihoods depend on the exploitation of marine resources as their main livelihood activities. Moreover, the wards are close to the Indian Ocean that is endowed with marine resources such as fishes, mangroves, sea shells and sea grasses.

3.3 Target Population, Sampling Procedures and Sample

This study was conducted to the communities that are found around the Indian Ocean particularly Mbweni and Ununio wards. The sample of 223 households was selected to represent the total of 12,636 households in the wards.

A total of 223 households were obtained using the equation for determining the sample size for a known population and proportion, as suggested by Kothari (2004), stated as follows:

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2 (N - 1) + z^2 \cdot p \cdot q}$$

Where: n = Sample size

z = Standard variate at a given confidence level (which is 1.645 at a 90% confidence level based on the table of area under the normal curve)

p = Sample Proportion = 0.7

$q = 1 - p = 1 - 0.7 = 0.3$

N = Population size = 12,636

e = Precision (acceptable error) = 5% = 0.05

$n = (1.645)^2 (0.7) (0.3) (12,636) = 223.31 \approx 223$

$$(0.05)^2 (12,636) + (1.645)^2 (0.7) (0.3)$$

The sample proportion was derived using the following formulae
 $[(N/12,636) \times 223]$

The computations and sample sizes for each study ward are depicted in Table 1.

Table 1

Distribution of the Household in the Study Ward

Name of the ward	Number of the Households	Sample size	Percentages
Mbweni	3219	57	25.5
Ununio	9417	166	74.5
Total	12636	233	100

These sample units in each ward, as presented in Table 1, were randomly selected using Kothari's Formulae of calculating sampling proportional that is stated as $[(Ni/12,636) \times 223]$

In order to get the respondents for filling questionnaires for quantitative data, simple random sampling technique was used. To enable the operationalization of this technique, a list of names of households included in the sample were written on a piece of paper that were folded and placed in a box before a researcher picked one at a time to determine respondents of the study until the required number of respondents (223) was reached. The names from each street were treated separately to ensure proportional samples of 166 in Mbweni ward and 57 in Ununio ward. Thus, the household heads were the unit of analysis in this study. Similarly, apart from 223 households, 14 key informants, comprising 7 females and 7 males, comprised of beach management leaders and government officials were purposively selected in order to provide in-depth insight for the study.

3.4 Data Collection Instruments

The data were collected using questionnaires and in depth interviews. Semi structure questionnaires were administered to the heads of the households to capture their understanding on marine resources governance and assessing its effectiveness. Also the questionnaires identified actors who are responsible for the marine management and conservation. They further explored the instruments used in governing marine resources as well as the challenges that impede effective marine resources conservation and management practices. Similarly, in-depth interview was used to gather the information's from 14 key informants who comprised of beach management unit leaders and government officials to provide the information about marine governance instruments and marine resources conservation and management.

3.5 Data Analysis

The data were mainly analysed using a descriptive statistics and Relative Importance Index (RII) by using the Statistical Package for the Social Sciences (SPSS) version 22. A relatively important index analysis was selected in this study to rank respondents on the challenges that faced marine resources management coupled with the strategies for improvement. The RII is calculated as the weighed mean of respondents' ratings for each item, considering the Likert scale weights (1 to 5). The following formula was used

$$\text{Relative Importance Index} = \frac{5n_5 + 4n_4 + 3n_3 + 2n_2 + 1n_1}{A \times N}$$

Whereas, $A \times N$

N_5 = Number of respondents for Strongly Agree

N_4 = Number of respondents for Agree

N_3 = Number of respondents for Neutral

N_2 = Number of respondents for disagree

N_1 = Number of respondents for strongly disagree

A = Highest weight (5)

N = Total number of respondents

Based on the ranking (R) of relative indices (RI), the weighted average for the perception and adaptation to climate change was determined. Thus, five important levels were transformed from RI value as suggested by Tonidandel and LeBreton, (2011), high (H) ($0.8 \leq RI \leq 1$), high medium (H-M) ($0.6 \leq RI \leq 0.8$), medium (M) ($0.4 \leq RI \leq 0.6$), medium-low (M-L) ($0.2 \leq RI \leq 0.4$) and low (L) ($0 \leq RI \leq 0.2$). For the qualitative data, content analysis was employed, following six thematic steps: familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and naming themes, and producing the report. Data from the in-depth interviews and are presented straightforwardly, with rich descriptions supported by representative verbatim quotations.

3.6 Ethical Issues

The study adhered to ethical standards, including voluntary participation by respondents, confidentiality, and anonymity throughout the research process.

IV. FINDINGS AND DISCUSSION

4.1 Demographic Characteristics of the Study Respondents

The demographic characteristics of the respondents studied are crucial since they provide insights that are important in examining local community engagement, governance, and sustainability of the marine resources. For the current study, the age and educational level of the respondents are examined (Table 2).

Table 2

Demographic Characteristics of the Study respondents

Age	Frequencies	Percentages
20-29	27	11.9
30-39	77	35.0
40-49	82	36.6
50-59	29	13.0
60+	8	3.5
Total	223	100
Education Level		
Primary	118	52.9
Secondary	60	26.9
Tertiary	19	1.8
Non-formal	26	11.7
Total	223	100

The dominant age groups for this study were 40-49 and 30-39. The years represent that most of the people who engage in the utilization of marine resources, such as fishing and mangrove extraction, are youth. These groups are more likely to possess substantial experience and knowledge on the management and conservation of the marine resources that are crucial for sustainable management practices.

Furthermore, in terms of educational qualification, the study exhibits that more than 50% of the respondents had primary education, followed by 26.9% who had secondary education. Given their level of education, it is undeniable that most of the respondents depend on marine resource utilization as their primary source of livelihood. In a similar vein, their education level can be a limiting factor toward their inclusion in the decision-making process, such as policy formulation. This finding is supported by Yanda et al. (2023), as they found that most of the respondents in Southern Tanzania who depend on marine resources as their main livelihoods had primary school education.

4.2 Marine Resources Management and Conservation Actors

Marine resource management and conservation require collaborative efforts among various stakeholders for them to become effective. The collaboration aimed to ensure equitable sharing of duties, rights, and responsibilities among marine resource users. The findings from the study revealed that 40% of the respondents asserted that the government through its ministries is primarily responsible for coastal management. Those ministries include the Ministry of Water, Natural Resources and Land. Those results highlighted the central role played by governmental bodies in regulating marine resources. The Beach Management Unit (BMU), according to 38% of respondents, is also the organ responsible for protecting marine resources. One of the key informants emphasized that the main function of the Beach Management Unit (BMU) is to act as a responsible organ in managing marine resources.

"To manage coastal resources and beaches in general, protect coral reefs and mangroves, ensure environmental cleanliness, and prohibit the use of hazardous fishing methods such as explosives, guns, electric shock devices, and toxins. Such behavior harms marine ecosystem organisms."

Moreover, 12% of the respondents acknowledged that local communities were responsible for ensuring the proper management of marine resources. This finding symbolized that the local community engagement was low, which affected effective management and conservation practices that were taking place. The findings from this study align with those of Katikiro (2020) & Mwanjela and Lokina (2016), as they insisted that marine resource management and conservation in Tanzania are shared responsibilities among various resource stakeholders, such as the government, the private sector, and international organizations, as well as local communities. Similar studies emphasized the possible roles played by marine parks and BMUs, particularly in decentralizing decision-making processes and enhancing community participation. In most cases, marine parks and the Beach Management Unit are responsible for building the legitimacy of conservation efforts by ensuring that decisions are effective and sustainable. Thus, the findings

demonstrated that marine resource management in Tanzania is a multidimensional responsibility that requires close cooperation and coordination among key stakeholders. Although the government plays a crucial role, the contributions of BMUs and local communities should not be undervalued. Therefore, strengthening these collaborative frameworks among the key actors is very essential for sustainable marine resource management (Katikiro, 2020; & Mwanjela & Lokina, 2016).

4.3 Marine Resources Conservation Instruments

Institutions are guided by instruments such as policies, rules, and regulations that are formed at the national and local levels for them to perform their duties effectively. In most cases, rules, regulations, and policies usually play crucial roles in managing marine resources. Their primary functions include the promotion of sustainability and responsibly ensuring the sustainable use of maritime resources while safeguarding the environment and the interests of different stakeholders.

4.3.1 Policies, rules, regulations, traditions, and norms that govern marine resources

Policies are critical for guaranteeing the sustainable use of marine resources, protecting ecosystems, and promoting responsible economic development. Under that premise, the respondents' awareness of policies was investigated among the respondents. Out of the surveyed respondents, 76.3% were unaware of the policies governing marine resources. This is because these policies are typically set at the national level and are not disseminated to the lower level. Only a small proportion (23.7%) asserted that they were aware of the existence of the marine resources policy (Table 2). In most cases, this group comprised individuals who were committee members of B.M.U. The findings from the study revealed the persistence of the knowledge gap between resource users (local communities and B.M.U. committee members), can impede effective collective governance that finally enhances the risk of overexploitation of the marine resources. These findings concurred with the studies conducted by Nyangoko et al. (2022) and Katikiro et al. (2024), who observed the persistence of gaps across East African coastal communities, where top-down policy formulation at national levels frequently fails to reach grassroots users.

Table 3

Awareness of Marine Governance Instruments

Awareness of policy	Response	Frequency	Percentage
Are you aware of the marine resource management policy?	Yes	53	23.7
	No	170	76.3
Are you aware with the marine resource rules, regulations and laws?	Yes	162	72.7
	No	61	27.3
Are you aware with the marine traditions and norms?	Yes	100	44.8
	No	123	55.2
Total		223	100

The study was further interested in understanding which type of policy the respondents were aware of. Most respondents (76.3%) claimed that they do not know the type of policy that governs marine resources management and utilization. For those who claimed to be aware of the policy, the majority claimed that the marine resources are basically governed by environmental policy, followed by water policy, forest policy, and fisheries policy.

Similarly, the study examined the respondents' knowledge of the rules, regulations, and bylaws governing the utilization practices of marine resources. About 72.7% of the respondents asserted that they were aware of the regulations governing marine resources. Among the dominant rules and regulations that were in place included prohibiting nail fishing for octopus, preventing unacceptable fishing nets, and avoiding conducting fishing activities near the coast. This fact was supported by one respondent from Ununio ward asserted that:

“The beach management unit usually ensured that the rules and regulations are communicated to the local communities, as it has a responsibility of educating and raising awareness in the community on the importance of marine resource management and conservation. Further, it ensured that the rules and regulations formed were well adhered to by the community members since once someone breached the rules, they were subjected to the penalties.”

The higher awareness of operational rules and regulations in the study area indicates the ongoing presence of critical governance dynamics that have significant implications for marine sustainability in the region. This suggests that locally salient and operational norms, rather than formal state instruments, primarily govern the day-to-day marine utilization. These findings echo to Ostrom's (1990) common pool resource theory that advocated the importance of participation in decision making among the resource users, since it ensured the existence of local ownership. In a similar

vein, the rules identified ensure marine conservation, as they protect vulnerable species, reduce habitat damage, and preserve critical nursery areas. This contributes positively to the resources' sustainability when they are enforced effectively (Nyangoko et al., 2022).

The study also found that several mechanisms were used to ensure the local community's compliance with the rules, regulations, and bylaws. One of the mechanisms investigated includes the use of penalties. The study identified several penalties that were used to correct undesirable behavior. Such penalties, include the use of fines, license revocation, or vessel confiscation. Insisting on the importance of penalties, one respondent said that:

“Penalties are significant as they ensure that all individuals comply with the rules, laws, and regulations related to marine resource exploitation. The guide encourages the stakeholders to abide by the principles of proper fishing quotes, fishing seasons, net size, harvesting mangroves, and polluting the coastal area, which in the final analysis results in marine resource protection”.

These findings echo the studies conducted by Lin et al. (2013) and Beyerl et al. (2016), which found that fines and confiscation correct undesirable behavior among fishers. They also b enhances community compliance through a sense of shared responsibility and moral obligation among marine resource users in the coastal area.

The study also found that the local communities used local control mechanisms to manage and regulate marine resources. These were in addition to the formal rules and regulations that guide their management and utilization. Such local mechanisms include traditional norms, taboos, and spiritual folk tales, which have become prime reasons for marine resource conservation. In an attempt to assert the roles played by traditions and norms, the respondents were investigated to determine if they were aware of traditions and norms that govern marine resource utilization. Out of all respondents, 55.2% claimed that they were unaware of any traditions or norms in relation to governing marine resource utilization. This group comprised most of the respondents who were not native to the area. Meanwhile, the remaining (44.8%) contended that they were aware of traditions and norms that exist in their communities. Such traditions and norms include the existence of demons in the ocean, which prohibit the community from fishing in the deep sea, as well as beliefs that prohibit fishing for some species such as prawns. To insist on these, one respondent from the study area said that:

“Some fishes are not fished because they normally cause asthma. One of our colloquies children consumed Proms, and he suffered from asthma, resulting in his death in the final analysis. Also, he adds that women in the menstruation circle are not allowed to touch the sea water because spirits will attack them”. Generally, one can argue that these traditions and norms aim to ensure that the fish and the water resources on the coast are well protected.

4.3.2 Effectiveness of the Marine Governance Instruments

The study was further interested to capture how the policies, rules, regulations, and by laws operate in the study area to yield the desired outputs. Respondents were supposed to assess how the marine resource instruments are effective to ensure sustainable management of the entire resources. The study findings revealed that 76.2% of all respondents failed to assess the effectiveness of the marine resources, which has a serious impact on the sustainable management practices (Table 3). In supporting this one respondents from Ununio ward reported that

“We are not part of the meetings where policies, rules and were discussed or decided. What usually happens is that we are just told that certain rules already exist and that we must follow them. No one asks for our opinions or experiences, although we are the ones living in this area for many years”

This finding revealed the existence of limited awareness, understanding, or engagement among key resource users and stakeholders regarding existing policies. This caused difficulty in achieving meaningful compliance, co-management, and participatory governance that are essential for sustainable marine resource use. Other groups of respondents claimed that the effectiveness of marine policy was high (9.5%). About 14.3% of respondents asserted that the policy was moderate. The persistence of such variation clearly indicates disparities among local communities, reflecting unequal access to information and differences in the involvement in marine resource activities. This can undermine collective action efforts necessary for sustainable resource management.

Table 4

Community Perception on the Effectiveness of the Marine Processes

Effectiveness of the Policy	Frequency	Percentage
High	21	9.5
Moderate	32	14.3
I don't know	170	76.2
Total	223	100
Effectiveness of rules, regulation and laws		
High	47	21.1
Moderate	84	37.6
Low	71	31.8
Idont know	21	9.4
Total	223	100

On the other hand, the respondents had different opinions on effectiveness of the rules, regulation and laws that govern the marine resources since most respondents (84%) said the compliance is moderate. Conversely, the smallest proportion (9.4) of respondents said they were unaware of the rules and regulations as reflected.

4.4 Challenges and strategies for effective Marine Resource Conservation and Management

Several challenges impede effective management and conservation of the marine resources. The study findings revealed that the majority of the respondents (82.3%), acknowledged the unequal sharing of coastal resources as a main challenge (Table 4). The persistence of unequal sharing of the marine resources among the key stakeholders impedes the collective efforts toward sustainability of the resources. The occurrence of inequalities usually caused the conflicts among the resource users. On the other hand, 63.3% of respondents asserted limited involvement of stakeholders in the decision-making processes as another major challenge. Usually, the exclusion of key stakeholders, particularly local communities from decision-making processes directly in the coastal management policy formulation reduced compliance with the conservation efforts. In supporting that one respondent from Mbweni ward reported that;

“We know that tax is collected from fish market and those who are caught to breach the rules, however are not told how much is collected or where it goes. This behavior makes us feel excluded from something that affects our life”

Lack of financial transparency also emerged as a challenge, as it was supported by a smaller proportion (18.7%) of respondents. Lack of financial transparency in marine conservation projects can lead to mistrust and mismanagement of funds that finally impede the conservation efforts (Table 4).

Table 5

Challenges in Marine Resources Management and Conservation

Challenge Experienced	Factor 1	Factor 2
No equity in coastal resource sharing	.823	.156
Inadequate stakeholder involvement in decision making	.632	.249
Inadequate communication with stakeholders	.584	.252
Corruption among officials	.552	.040
Existence of rapid rate of marine degradation	.057	.624
Lack of organ coordination	.532	.618
Lack of financial transparency regarding marine resources	.187	.363

These challenges delay the realization of the targeted success by various stakeholders in addressing the effects of marine degradation along the coastal areas. The identified challenges by the current study align with the study by Gwambene and Karata (2019) as they pointed out that ineffective marine resource management is influenced by overexploitation, climate change, governance issues and poor law enforcement. Others are limited awareness, overfishing, and pollution since they exacerbate the degradation of marine ecosystems.

The study further noted that conflicts over marine resource utilization are another challenge that was found in the study area, as it was acknowledged by 60% of the respondents. The existence of conflict impedes effective management and conservation of the resource management. These conflicts were mainly caused by the variation of interests among the key resource users. Such users were artisanal fishers, commercial operators, and local communities who depend on the same marine resources for their livelihoods. For instance, the artisans may prioritize access to fishing

grounds for their subsistence, while commercial operators may focus on maximizing profits, often employing more intensive and sometimes unsustainable methods.

On the other side, the remaining percentage of the respondents (40%) did not perceive any conflicts among resource users. This group comprised the households that were not directly engaged in marine resources management issues. These findings are in line with the studies conducted by Masalu (2000) and Cánovas-Molina and García-Frapolli (2020) who revealed that conflicts over resource use are a common challenge in coastal areas. They, in some case, lead to marine resource overexploitation, environmental degradation, and weakened governance structures.

In order to mitigate the adverse impacts of marine resource degradation and ensure sustainable management of the coastal environment, the study identified several strategies that emphasize enhanced engagement and cooperation among key stakeholders as shown in Tables 5.

Table 6

Strategies for Effective Marine Resources Management and Conservation

Strategies for Coastal Area Management	Frequency	Percentage
BMU and local communities in managing resources	48	22
Restriction of destructive fishing activities	29	13
Enhance collaboration in the formulation of laws	10	5.0
Regular patrol	56	25
Formulation of different committees	18	8
Creating marine resource conservation awareness	40	17
Improve fishing gear	22	10
Total	223	100

Effective collaboration between government entities and local communities is crucial for the successful conservation of marine resources. One of the primary strategies highlighted by the respondents (25%) was to strengthen regular patrols along the coast. Regular patrols are essential for combating illegal activities such as unregulated fishing, mangrove deforestation, and pollution, thus, promoting compliance with existing regulations. This approach resonates with the findings by Lin *et al.* (2013) that enforcement through patrols is vital for fighting non-compliance.

Collaboration between Beach Management Units (BMUs) and local communities was another key strategy identified by 22% of respondents. This finding concurred with Verheij *et al.* (2004) as they observed that the effectiveness of BMUs in managing coastal resources depends heavily on their ability to engage with and involve local communities in decision-making processes. The collaborative approach ensures that local knowledge and concerns are integrated into conservation efforts, for effective and culturally appropriate management practices. When local communities develop a sense of ownership and responsibility, they are more likely to support and adhere to conservation initiatives.

Additionally, the study found that the formation of various committees focusing on specific aspects of marine resource management, though less frequently mentioned (8%), also plays a role in enhancing conservation efforts. These committees can facilitate targeted interventions, such as addressing specific threats like illegal fishing or habitat degradation, while providing a platform for different stakeholders to collaborate and share best practices.

The management strategies perceived as important for proper managing of coastal resources are presented in Table 6. The findings clearly showed that provision of education was thought as a main strategy among the respondents (20%). It was followed with the need for the government to fulfil its responsibility as well as facilitating B.M.U. (21.5%) respectively (Table 6).

Table 7

Opinion on Coastal and Marine Resource Management

Opinion on marine conservation	N	Percentage
Education	48	22
Regular meetings	19	8.5
Environmental awareness	19	8.5
The government should fulfil its responsibility	48	21.5
Facilitating BMU	48	21.5
Establishment of industry	19	8
Improve fishing gear	22	10
Total	223	100



The findings in Table 7 show the suggestions provided by the respondents that align with broader research indicating that a combination of strategies is necessary to create effective synergies in marine resource management. As Lin et al. (2013) and Bulengela (2024) noted, successful marine conservation requires coordinated efforts among local communities, the central government, and local government authorities. This multi-stakeholder approach improves the enforcement of regulations and enhances the overall sustainability of resource use by fostering a shared commitment to conservation goals. The implication is that participatory methods improve marine resource management. A participatory approach involves engaging local communities in the decision-making process, ensuring that their voices are heard and that their traditional knowledge is utilized in conservation strategies. This approach is essential for addressing resource management challenges and improving socio-economic development in coastal areas. Agreed-upon coordination among crucial stakeholders, including local communities, central and local governments, and conservation organizations, is critical for the success of coastal resource conservation and related initiatives.

V. CONCLUSION & RECOMMENDATIONS

5.1 Conclusion

This study reveals that stakeholder are inadequately engaged in marine resource conservation and management. It has also noted that there are various instruments that are used to enforce sustainable conservation in marine resources management and conservation practices. The study underscores the necessity for a comprehensive strategy in marine resource management, integrating enforcement, collaboration, and participation. By strengthening regular patrols, fostering collaboration between BMUs and local communities, and forming specialized committees, stakeholders can work together for sustainable utilization of marine resources and the protection of coastal environments

5.2. Recommendation

The study recommends for the need to ensure effective community engagement in the management and conservation of marine resources. There is also a need to ensure that the instruments are well cascaded to the lower level to enhance its effectiveness. Moreover, there a need to strengthen inclusive awareness campaigns, enhancing BMU outreach capacity, and institutionalizing participatory policy dissemination mechanisms. These are essential to translate formal policies into community-wide understanding and compliance, thereby fostering the robust collective action necessary for viable co-management of these common pool resources.

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