



# Coastal Resource Conservation in Dar es Salaam, Tanzania: Communities' Perception and its Implications

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## Abstract

Coastal and shoreline changes have increased the vulnerability of coastal resources to the consequences of significant climatic and non-climatic stressors. Climate change and variability negatively impact the coastal population whose livelihoods depend on marine resources in Tanzania's coastal areas. This study explored coastal resource conservation in Kinondoni Municipality, Dar es Salaam, focusing on community perception of coastal resource dynamics and its implications. The study used systematic random and purposive sampling to obtain a total of 237 respondents. Data were collected through semi-structured questionnaires, in-depth interviews, and remote sensing. Discourse, thematic approaches, and a geographical information system, Statistical Package for Social Sciences (SPSS version 22) were used to analyse data. As per the findings, the communities were aware of the available marine resources, but fish had significantly decreased in quantity and variety. However, mangrove forests had increased due to afforestation. The change of marine resources in the study areas caused a decline in fish, a decrease in income, and the destruction of coral reefs. community engagement, enforcement of conservation rules for sustainable marine resource management.

## Introduction

Coastal and shoreline changes driven by environmental shifts have significantly increased the coast's vulnerability, in turn affecting the livelihoods of communities in the area. In Tanzania, it is estimated that more than half of the population around the coast relies on marine resources for their sustenance (Malherbe et al., 2020; Mkama et al., 2013; Gwambene et al., 2015) In developing countries; the coastal areas are highly exposed to changing environments due to climatic as well as non-climatic stress, causing detrimental impacts on people's livelihoods as local communities' social assets as well as the natural environment get affected (Gwambene et al., 2019; Fernández-Llamazares et al., 2016; & Redclift et al., 2011)

Studies such as Mkama et al. (2013) and Kitunda (2023) revealed that the persistence of limited local community involvement in coastal management has led to low awareness of the risks posed by environmental change, natural hazards, and climate change adaptation activities. Furthermore, weak governance, poor enforcement of laws, rules, and regulations, and limited research lead policymakers to underestimate the risk intensities. This trend undermines adequate protection of marine resources. Local communities have greater knowledge of their ecosystems; thus, a better understanding of their



perceptions of marine resource protection is vital for reducing risk and developing sustainable adaptation plans with other stakeholders, thereby improving the livelihoods of coastal communities.

Challenges, such as, poor infrastructure (processing, storage and transportation facilities); the use of improper fishing techniques such as dynamite, and the degradation of the coastal zones, including the destruction of fish habitat altered shoreline that negatively impacts the environment and local livelihoods affect the management of coastal resources (Gwambene et al., 2019; Laska et al., 2005) Poor institutional infrastructure designed to monitor and regulate such activities have weakened the ability of authorities to prevent such practices.

Despite these persisting challenges, the Beach Management Unit (BMU) and collaborative fisheries management areas (CFAMs) have been playing a decentralising role to ensure local community participation in marine resources protection, as their being responsible and accountable for the resources and inhabitants they depend on (Russell 2023 & Fanning et al., 2009). To strengthen sustainable practices in marine protection, management, and conservation, international organisations continuously ensure access to microfinance services. Such support is usually influenced by the perception and thought of management and governance practised by local communities (Russell, 2023; Fanning, 2009; Gwambene et al., 2019)

The decline in marine resources along Tanzania's coast has been alarming, posing a threat to coastal communities that depend on them as their primary source of livelihood. The observed coastal and shoreline changes, eroded beaches, destroyed fish haunts, and shifted shorelines affect the beautiful scenery, disfigure beaches, reduce fish catches, coastal forests, and related livelihood activities (Gwambene et al., 2019). For instance, Mkama et al. (2013) noted the persistence of significant changes among the coastal people of Bagamoyo, which affected livelihoods and increased dependence within the society. Generally, he viewed a change in marine resources as a catalyst that posed a danger to livelihoods, social assets, and the natural environment. Studies conducted by Bennetta et al. (2014) and Kitunda (2023) show that coastal resources management strategies vary depending on the livelihood strategies. They further added that, in most cases, local communities are concerned about the exclusion of fishers and subsistence harvesters from the area, as they cannot make a living from fishing and collecting natural resources. Additionally, the existence of a regulatory framework that favours small-scale fishing poses a threat to the fishery as a resource.

Usually, various factors, such as overexploitation of marine resources and environmental change, trigger changes in coastal resources. The impact of such changes, particularly sea level rise, has had and will continue to cause physical, human, and economic consequences for these natural systems (Nicholls, 2010). Overuse of coastal and marine resources intensifies competition among community members for those resources. Despite being confined by the (Jiddawi, 2002; Fabinyi, 2018), changes in coastal resources cause detrimental impacts on coastal populations' livelihoods.

Recent studies by Fabinyi (2018) and Trung et al. (2020) examined historical trajectories of coastal and marine resource use, as well as the core drivers of their dynamism and decline over time. They found out that the current situation of coastal and marine resources change is largely accelerated with the increased activities around the coastal areas. For instance, the study conducted by Fabinyi (2018) identified the role of governance frameworks in mitigating the decline in coastal resources. Although the decline in coastal and marine resources is attributed to global capitalism, the reality in underdeveloped nations, including Tanzania, is quite different due to technological limitations. Thus, the current study aimed to assess local communities' perceptions of marine resource dynamics and their implications. By doing so, the current study enabled policy makers and natural resources officers to gain insight into their perceptions and knowledge, which serves as a stepping stone for informing policy makers in developing and shaping existing marine resource policies.

## Methodology

### Study Area

The study was conducted in two wards, Mbweni and Ununio, in the Kinondoni district, Dar es Salaam. Kinondoni district is one of the five districts of the Dar es Salaam region. The district lies between latitude 6° 42' 43" S and longitude 39° 07' 54" E. The Indian Ocean borders the district to the north, Ilala District to the south, and Ubungo District to the North (Figure 1). The district covers a total area of 531 km<sup>2</sup> (URT, 2020). The area was selected for its long stretch of coastline, which is rich in marine resources, but also faces significant degradation due to increasing human pressure.

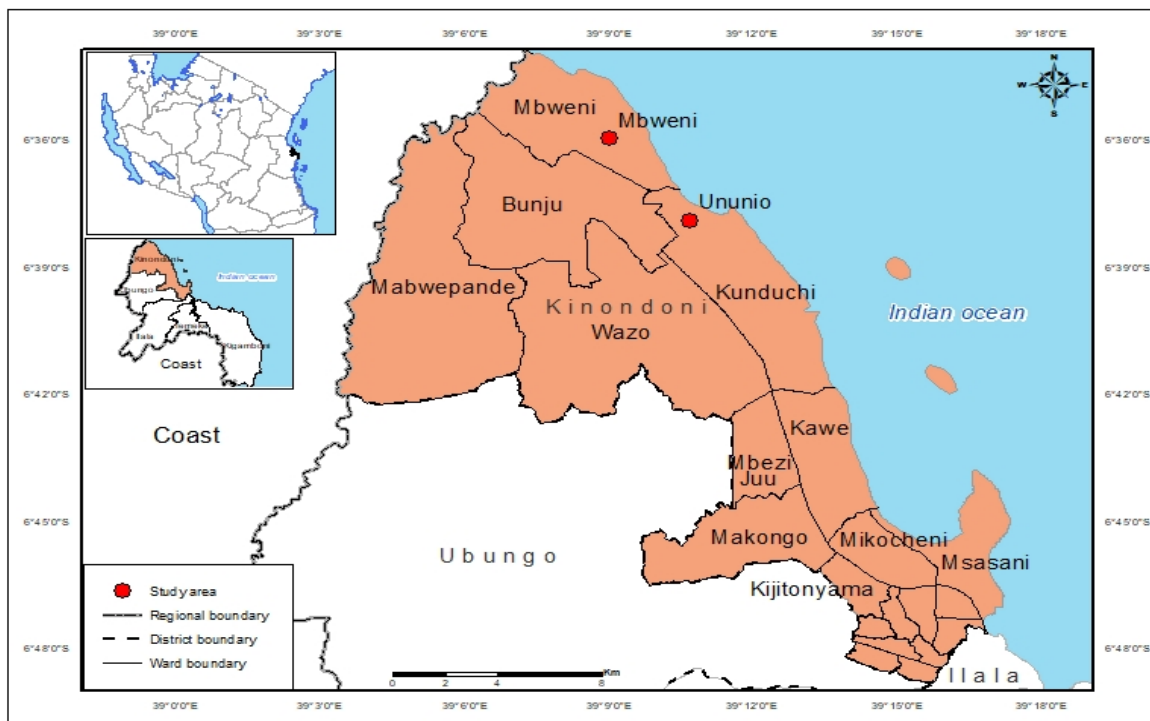


Figure 1: Map of the study area

Source: Cartographic Unit of Dar es Salaam

### Economic Activities

The primary economic activities in Kinondoni include smallholder farming, artisanal fishing, livestock keeping, Mari culture (seaweed and prawn farming), salt production, trade and tourism. The marine fishery, which accounts for 96% of the artisan fishery catch, is a vital source of income and food for most of the population. Most of the marine artisanal fishers in Kinondoni operate in shallow water habitats and nearby reef areas in the vicinity of the coastline. The Kunduchi and Mbweni coastal areas also provide Kinondoni residents with a diverse range of fish (Gwambene et al. 2019).

### Research Design

This study used a concurrent mixed-methods design, which included quantitative and qualitative methods (Creswell et al., 2017). For validation and verification, the concurrent design enables researchers to triangulate the methodologies by directly contrasting quantitative statistical data with qualitative findings Creswell et al. (2017). For corroboration, the concurrent design was favoured, as



it enabled the study to collect both quantitative and qualitative data.

**Population and Sampling**

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* =  $\frac{(1.645)^2 (0.7) (0.3) (12,636)}{(0.05)^2 (12,636) + (1.645)^2 (0.7) (0.3)} = 223.31 \approx 223$

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

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

*Table 1: Distribution of households in the study wards*

Street wards	Ununio	Mbweni	Total
Number of households	9417(74.5)	3219(25.5)	12636(100)
Proportional sample size [(Ni/12,636) x223]	166(74.4)	57(25.6)	223(100)

N.B. () indicates percentage

These sample units in each ward, as presented in Table 1, were randomly selected using Kothari’s Formulae. To obtain the heads of the households to be investigated based on the sample size of each ward. In this simple random method, the number of households included in the sample was written on a piece of paper and kept in the box. An anonymous child in each ward used a rotary system to select the specific household to be studied until 166 households were selected in Ununio and 57 households in Mbweni. 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, were purposely selected.

**Data Collection Instruments**

*Semi-structured Questionnaires*

A total of 223 semi-structured questionnaires were administered to household heads. The questionnaire comprised both open- and closed-ended questions designed to capture the demographic characteristics of study respondents, the marine resources available in the study area, perceptions of changes in Marine resources and their drivers, and the implications of these changes for the surrounding community.

*Key Informant Interview*

Fourteen key informants, comprising beach management leaders and ward executive officers who were believed to have adequate knowledge of marine resource changes, their underlying drivers, and



their impacts, were consulted and provided significant insight for the current study. The information was collected through the interview guide.

### *A Remote Sensing Technique and Geographical Information System (GIS)*

Spatial data included satellite images produced at different times, which were downloaded from the United States Geological Surveys (USGS-GLOVIS) and Earth Explorer. The satellite images were used to map and explore land-use/cover changes, which determine the states of mangrove forests, water, built-up areas, shrubland, and cultivable land, to assess the rates and trends of change, which are vital for supporting indicators of marine resource changes. The land-use / cover map of 1993,2003,2013 and 2023 were used.,

In order to detect types of land-use/cover changes and to determine the rate of changes, the study uses satellite Landsat image of 19983 and RapidEye of 2023. The images were obtained from the Department of Urban Planning in Tanzania (DoSUP), downloaded from the Department of Survey and Urban Planning (DoSUP), Tanzania. Downloaded from Earth Resources Observation and Science (EROS) at ([http:// glovis.usgs.gov](http://glovis.usgs.gov)) of the Geological Survey of the United States of America.

### *Data analysis*

To analyse the data collected through the questionnaire, descriptive statistics were employed, and factorial analysis was used to assess the strength of the variables, using the Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy and Bartlett's test of sphericity to confirm the suitability of the data for factorial analysis. The results showed that the KMO statistic exceeded 0.5 and that the p-value for Bartlett's test was less than 0.05, indicating that factorial analysis was appropriate for this study. Two factorials were extracted, explaining 33.88% and 18.58%. of variance, respectively, with a total explained variance of 52.46%. On the other hand, remote sensed data was analysed using geographical information system G.I.S in analysing the land-use cover change in order depict the change in land-use categories to triangulate the information with the respondents' opinions. The results are presented in figures, charts and tables. Qualitative data from key informants were subjected to content analysis, which complemented the quantitative findings. Findings from qualitative data are organised around the themes and sub-themes of the study.

On the other hand, the satellite images were analysed using Quantum GIS (Open-source software). Before a change was detected, the classified images were checked for accuracy using post-processing. Then, an error matrix table was produced to show the land-use/land-cover classification report and the overall accuracy levels of the satellite images. The accuracy level accepted for this study was 80%. Then, a semi-automatic classification plug-in was used to calculate the changes in land use. The product of this process was a change trajectory map showing what has changed and what has not, and cross-tabulation tables showing the extent of the changes and annual changes. The summation of losses and gains was used to calculate and identify the net changes for each land-use type. Overall changes were calculated by dividing net changes by the number of years from 1998 to 2018 to obtain annual land-use changes. The following formula was used to calculate the annual land-use changes:

$$r = \frac{\left[ \ln(A_{t_1}) - \ln(A_{t_v}) \right]}{t_1 - t_v} \times 100$$

$r$  = rate of annual change

$A_{t_1}$  = land-use area in the initial

$A_{t_v}$  = land-use area in the final year or time



$t_1$  = initial time (year)

$t_v$  = final time (year)

ln = constant

Source: *Kashaigili et al. (2013)*

The data from the land-use analysis and satellite images were presented in tables and maps that show land-use/land-cover changes.

### ***Ethical Consideration***

The study adhered to ethical principles of voluntary participation, confidentiality and anonymity. It also ensured participants' safety and privacy.

### **Results and Discussion**

#### ***Demographic Characteristics of the Study Population***

The demographic characteristics of the study population provide critical insight into the profile of respondents involved in coastal resource management and conservation, as shown in Table 2.

*Table 2: Demographic characteristics of the study population*

Age	Frequencies	Percentage
20-29	27	11.9
30-39	77	35
40-49	82	36.6
50-59	29	13
60-69	8	3.5
<b>Total</b>	<b>223</b>	<b>100</b>
Marital Status		
Single	20	9
Married	125	56.1
Widowed	73	32.7
Divorced	5	2.2
<b>Total</b>	<b>223</b>	<b>100</b>
Primary Education		
Primary Education	118	52.9
Secondary Education	60	26.9
College/ University	19	8.5
None	26	11.7
<b>Total</b>	<b>223</b>	<b>100</b>

The findings, as per (Table 2), indicate that the dominant age of respondents for this study was 40-49 and 30-39 years indicating that most of the people who engaged in coastal activities like fishing and mangrove extraction were youth and middle aged thus had adequate knowledge on management of the coastal resources crucial for sustainable management practices as supported by (Mndeme,2023) where he found out that the youth and elders are more engaging in the utilisation of the coastal resources. Likewise, based on marital status, the findings revealed that the majority (56.1%) were married, while only the smallest proportion, 9% were single.



Based on their educational qualifications, the study revealed that more than 50% of the respondents had attained primary education, followed by 26.9% with secondary education. In comparison, the smallest proportion (8.5%) had reached the tertiary level. The primary level of education by most of the respondents determine their dependence on marine resources exploitation and utilisation as their primary source of livelihood as they can hardly be absorbed in the formal employment opportunities. This finding aligns with the study by Yanda, et al. (2023) which found that most of the people in southern Tanzania were depending on marine resources as their main source of livelihood since they were primary school leavers.

#### **What are the marine resources that are dominant in the Study Area?**

As shown in Figure 2, the dominant marine resource in the study area was fish (45.3%). The information obtained from key informants indicated that the dominant fish types available in the study area include *lobster, Kasumba, Nisi, Tuka, Numa, Futuna, Change, Red\_snaiper, and Msiwa, as well as sardine*. These were followed by coral reefs (34.1%) obtained from fringing reefs as well as mangrove trees (10.8%). Meanwhile, seaweeds and shells had the smallest proportion (6.3% and 3.6%), respectively. Based on the study findings, fish, coral reefs, and mangroves were dominant marine resources in the study area.

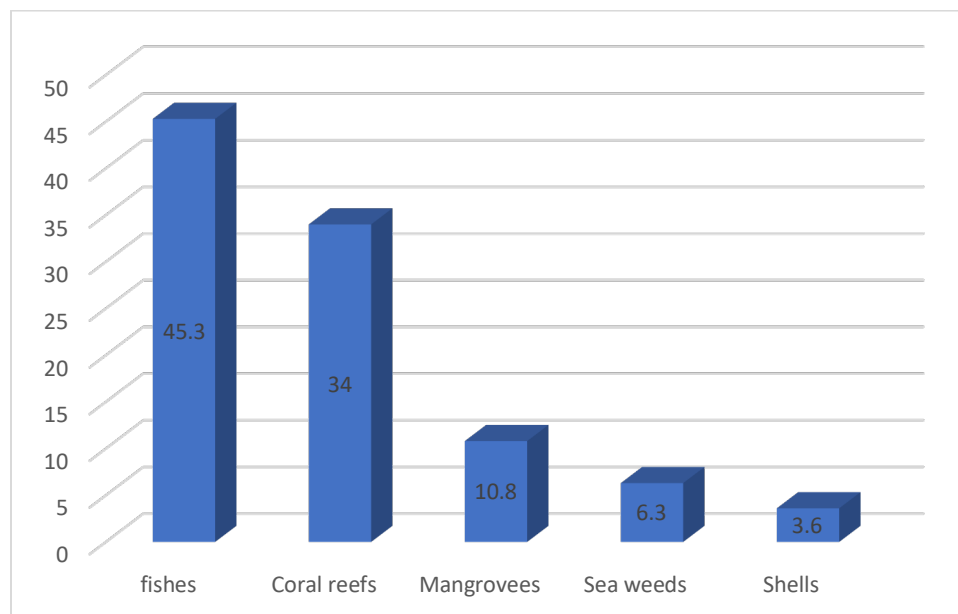


Figure 2: Marine Resources Available

The importance of the highlighted resources in Figure 1 was supported by the key informants, who stated that fish (45.3%) formed an integral part of the local marine ecosystem, while coral reefs (34%) were identified as providing habitat for marine species. Mangroves (10.8%), on the other hand, were cited as essential in the area for protecting the coast from erosion and as a nursery for many fish. These findings align with Masalu (2020) and Gwambene et al. (2019) studies in Tanzania, which identified coral reefs and mangroves as the major coastal marine ecosystems in Tanzania's coastal zone. The presence of these resources underlines the need for effective conservation strategies to protect and sustain the marine diversity in the study area.

#### **What are the indicators of marine resource changes?**

The study further investigated local communities' perceptions of changes in marine resources and management measures. The findings in Table 3 indicate various indicators of the coastal environment,



particularly mangrove forests, fish species, coral reefs, and sea-level changes. The study’s factorial analysis revealed that most respondents (78.4%) in the study area acknowledged an increase in mangrove forests, primarily due to afforestation. Supporting the increase of mangroves along the coast, one of the interviewed respondents said:

*The mangroves are currently more abundant than before when they were being more destroyed. Several rules have been instituted prohibiting individuals from destroying mangroves by any means. Additionally, the B.M.U., through its meeting, emphasises to the community the importance of replanting mangroves, especially in the open space.*

Both results confirm the persistence of positive change in the mangrove forest along the coast. The statistical findings clearly demonstrated the community perception that mangrove cover increases due to afforestation, while the respondents explained the underlying reasons for this improvement, including enforcement of rules against destruction and the active role of the Beach Management Unit (B.M.U) in sensitising community members to replant mangroves. The study findings clearly revealed the shift in community attitudes toward environmental conservation. As noted by Teka et al. (2019), changes in communities’ attitudes, coupled with conservation and rehabilitation efforts, have significantly curbed the loss of mangrove habitats globally, particularly in the 21st century.

Additionally, regarding respondents’ awareness, 72.8% acknowledged the disappearance of certain fish species, such as red snapper, *msiwa*, and *Kisumba*, as a clear indicator of changes in the marine environment. The key informants linked this decline to overfishing, changes in oceanic conditions, and coastal degradation caused by both anthropogenic activities and natural factors. In supporting this, one of the key informants from Mbweni had this to say;

*Currently, fish are scarce because some of them have migrated to distant places. This is mainly due to the use of modern boats with small nets, which produce a lot of noise during fishing. Moreover, the boats with small nets exacerbate the problem, as catching small fish while destroying breeding grounds ensures current and future fish scarcity.*

Similar findings were observed by Brown et al. (2023) and Williams et al. (2025), who documented similar patterns of species decline in the United States due to overfishing and destructive fishing practices, highlighting these issues as prominent indicators of ecological change in marine resources.

On the other hand, 29.8% of the respondents identified the decline of coral reefs as the second most significant indicator of changes in the marine environment. The decline in coral reefs in the study area is influenced by climate change, which manifests as rising sea temperatures, leading to coral bleaching. These findings are in line with the studies conducted by Ali et al. (2020), and Wilson et al. (2012), which link coral reef decline to broader marine coral reef decline to broader marine resource change with adverse effects on biodiversity, fish populations, ecosystem services, and overall impact on marine resources availability.

Table 3: Changes in marine resources

Indicators of Marine resources	Factor	
Changes	1	2
Increase in mangrove forests	.784	101
Disappearance of fish species	728	271
Decline in the number of fish	716	457
Changes in sea level	507	452
Decline in coral reefs	298	728



To justify the indicators of the changes identified by the respondents, land-use/cover changes were conducted in the study area to depict mangrove and sea-level change rates. Thus, a comprehensive 30-year analysis of Landsat imagery was conducted. This analysis revealed significant fluctuations in mangrove land cover over three decades, reflecting both natural and human activities, as indicated in Table 4 and Figure 3. From 1993 to 2003, the area occupied by mangrove forests was 775.03 ha; however, the following decade (2003-2013) witnessed a substantial decline in mangrove coverage, shrinking to 439.13 ha. This decrease was attributed to anthropogenic factors, such as coastal development, illegal logging, and other unsuitable practices, which severely impacted the mangrove ecosystem. The decline observed during this period aligns with the global pattern of mangrove degradation, often driven by expanding urbanisation and agricultural activities, which are prevalent along the coasts of many developing countries (Friess & Webb, 2023)

Interestingly, the period from 2013 to 2023 showed an increase in mangrove forest coverage from – 493.3 to 401.72 ha. This increase concurred with observations by respondents in the study area, who noted recent improvements in mangrove practices. These efforts were mainly attributed to the active involvement of the Beach Management Unit (B.M.U) in promoting sustainable management practices and community awareness of the importance of mangroves. As a result, the existence of such community-led initiatives has been recognised as important in reversing environmental degradation, as they foster local stewardship and enhance the resilience of the coastal ecosystem (Rusell,

2023).

Despite that confirmation, the Landsat analysis presented in Table 4 and Figure 4 revealed a general decline in mangrove forests over the 30 years (1993- 2023), with a net loss of 737 ha. This decline underscores the persistent challenges facing mangrove conservation in the region, including ongoing pressure from land-use conversion for agriculture, settlement and industrial activities. The overall trend in satellite imagery underscores the need for more robust, sustained conservation efforts to protect these critical ecosystems.

Generally, the fluctuation in mangrove coverage over the 30 years reflects the broader socio-economic and environmental dynamics affecting the coastal areas of Dar es Salaam. While recent gains suggest that community engagement and improved governance can lead to positive outcomes, the long-term decline underscores the need for continuous monitoring and adaptive management strategies. These strategies should address the root causes of mangrove loss and reinforce the legal and institutional frameworks that support conservation efforts, as suggested by Mwalyosi et al. (2024). Table 4 indicates land-use /cover change of the coastal area of Dar es Salaam.

Table 4: Land-use / cover change of the coastal of Dar es Salaam

									Change detected (ha)				Rate of change per annum (%)		
	1993		2003		2013		2023		1993 - 2003	2003- 2013	2013- 2023	1993 - 2023	1993- 2003	2003- 2013	2013- 2023
	Ha	%	Ha	%	Ha	%	Ha	%	Ha	Ha	ha	Ha			
Water	2171.41	39.04	2264.01	41	2214.18	39.8	2243.63	40.3	-92.6	49.83	-29.45	72.22	-0.41	0.023	-0.131261
Mangrove forest	1837.99	33.05	1062.96	19	1502.09	27	1100.37	19.8	775.03	439.13	401.72	-737.62	7.29	0.292	3.650772
Bare Areas	515.86	9.275	812.09	15	169.91	3.1	113.75	2	296.23	642.18	56.16	-402.11	-3.65	3.780	4.9371429
Built-Up	124.2	2.233	797.75	14	1136.17	20.4	1905.14	34.3	673.55	338.42	768.97	1780.93	-8.44	0.298	-4.036291
Shrub land	739.47	13.3	479.31	8.6	502.34	9	193.06	3.5	260.16	-23.03	309.28	-546.41	5.43	0.046	16.01989
Cultivated	172.9	3.109	145.71	2.6	37.13	0.7	5.88	0.1	27.19	108.58	31.25	-167.02	1.87	2.924	53.146259
<b>Total</b>	<b>5561.83</b>	<b>100</b>	<b>5561.83</b>	<b>100</b>	<b>5561.83</b>	<b>100</b>	<b>5561.83</b>	<b>100</b>							

Source: Field Survey 2023

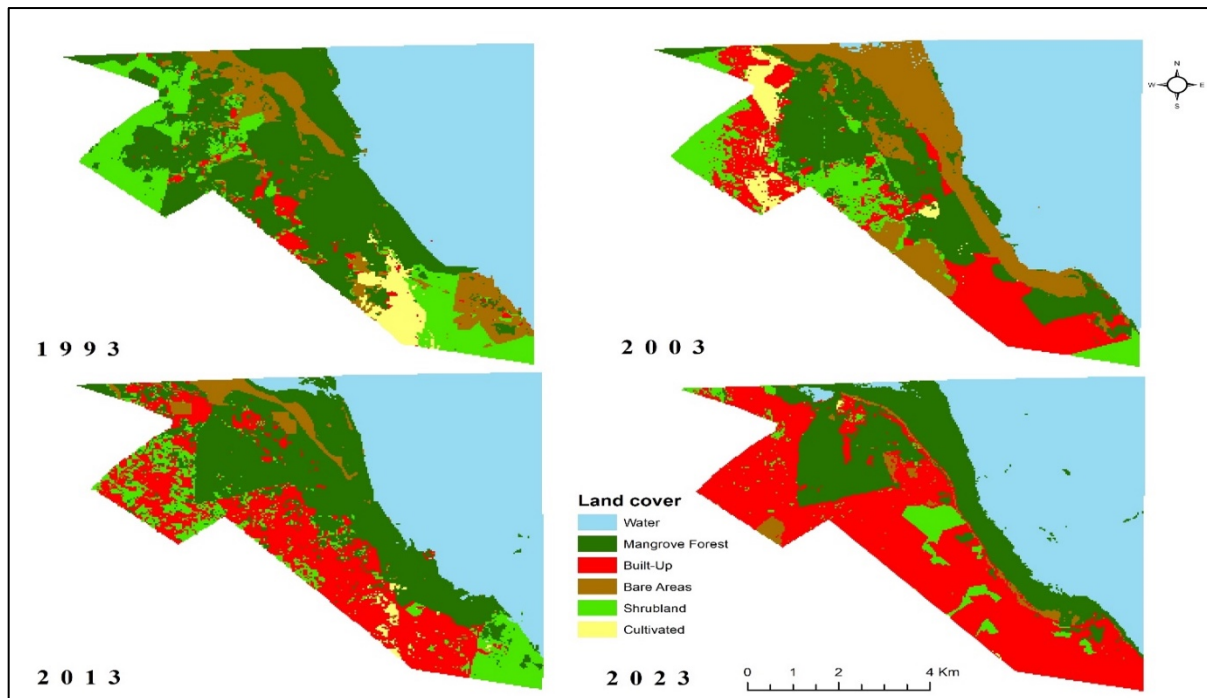


Figure 4: Land-use/ cover map of the Coastal Area

**What are the key Drivers of Marine Resource Dynamics?**

The study further investigated the causes of changes in the marine environment. Among the surveyed respondents, 35% noted that an increase in the human population, as well as the use of destructive fishing gear, contributed to these changes (Figure 5). The rapid growth in the population increased



the pressure on coastal resources, which forced the community to rely on fishing as its main livelihood activity

This population increase has led to the overexploitation of marine resources, often through unsustainable fishing methods that degrade the environment. The use of destructive gear, such as small-mesh nets and dynamite fishing, has exacerbated this degradation, leading to significant declines in fish populations and the destruction of vital habitats, including coral reefs and mangroves.

Some other respondents (21%) attributed the changes to climate change and a lack of employment, which compel people to engage in fishing activities using low-tech methods and poor practices (as shown in Figure 4). The information obtained from key informants revealed that climate change is causing more frequent and severe weather events, including storms and floods, which contribute to coastal erosion and the loss of mangrove forests. The expansion of coastal cities and tourism resorts was cited as playing a significant role in altering the natural landscape, leading to habitat destruction and increased pollution. Insisting on the key drivers of changes in coastal resources, one respondent reported that " Coastal resources are deteriorating due to population growth; though, climate change has caused the sea to encroach on and destroy mangroves"

The findings of this study align with those by Gwambene et al. (2019) in Bagamoyo. Tanzania shows that population pressure, climate change, and the use of destructive fishing methods affect coastal areas. The combined effects of these factors have diminished the aesthetic value of coastal regions, disfigured beaches, and reduced fish catches, leading to the loss of the coastal forest, which is critical to the livelihoods of the local community.

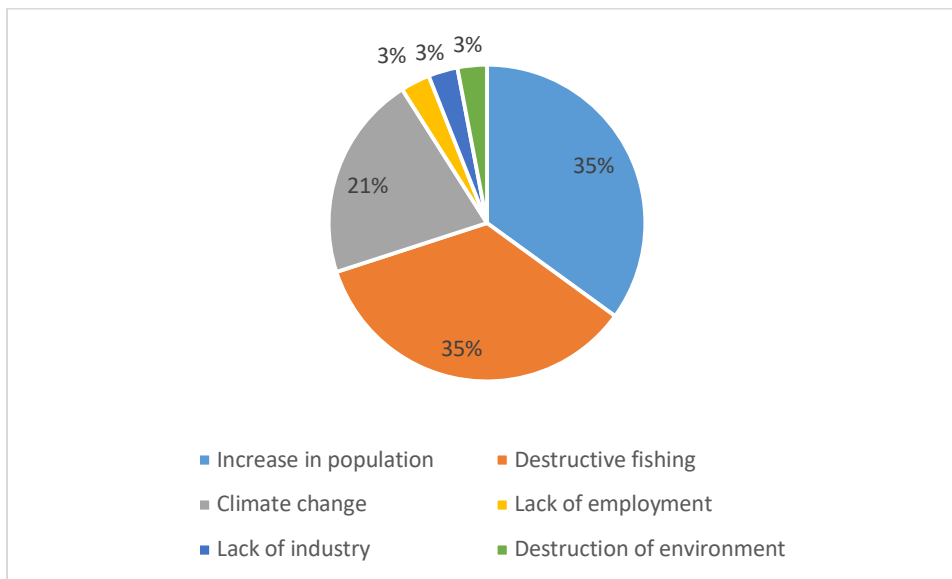


Figure 5: Drivers of coastal environment and resource change

Source: Field Survey 2023

### **What are the Implications of Coastal Environmental Change to the Coastal Communities?**

Changes in the marine resource environment have adverse impacts on coastal communities that depend on coastal resource exploitation as their primary source of livelihood. Thus, any alteration of the marine environment would affect.



The study findings indicate that 47% of respondents identified a decline in fish catch as a primary impact of changes in marine resources and the broader marine environment. This decline directly affects the primary source of income and food for these communities, leading to significant economic hardship. The reduction in fish availability is not only a food security issue but also has cascading effects on other economic activities related to fishing, such as fish processing and sales.

Moreover, 37% of the respondents reported a decrease in income as one of the effects of the changes in marine resources. This decrease in income is closely linked to the reduced fish catch, as fishing is the main livelihood for many coastal residents. The economic strain caused by diminished fish stocks forces families to seek alternative income sources, which are often scarce or less profitable, further exacerbating poverty and vulnerability in these communities. Other notable impacts reported included coral reef destruction and persistent beach erosion, noted by 3% of participants.

The degradation of coral reefs is particularly concerning because these ecosystems are vital for maintaining marine biodiversity and providing habitat for numerous fish species. The erosion of beaches not only affects the aesthetic value and tourism potential of coastal areas but also threatens the safety and infrastructure of coastal settlements. The findings from this study align with those of Ali et al. (2020), Yanda et al. (2023), and Senapati et al. (2014), which have documented similar impacts of marine resource changes on coastal communities. These studies highlight how environmental degradation, such as erosion and biodiversity loss, leads to property loss and increased vulnerability among poorer segments of the population. The compounded effects of these environmental changes exacerbate the socio-economic challenges faced by coastal communities, making it increasingly difficult for them to sustain their livelihoods and maintain their quality of life.

The adverse impacts of coastal environmental changes on coastal communities in Dar es Salaam call for the implementation of effective conservation and management strategies. These strategies should focus on sustainable use of marine resources, restoration of degraded ecosystems, and the development of alternative livelihoods to mitigate the economic and social consequences of environmental degradation.

### **Conclusion**

The findings have identified several indicators in marine dynamics, including increases in mangrove forests, declines in the diversity of fish species, changes in sea level, and declines in coral reefs. Such changes have tremendous impacts on coastal people's livelihoods, affecting their livelihoods and threatening food security. Thus, the study recommends strengthening community-based resource management, providing alternative livelihood programmes, providing education to the community, enforcing the sticker-fishing regulation, and fostering partnerships among key marine resources stakeholders.

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