

Marine conservation: local community perceptions of coastal resources conservation and livelihood implication in Bagamoyo

Abstract

The observed coastal and shoreline changes, eroded beaches, destructed fish haunts and shifted shorelines affects the beautiful scenery, disfigure beaches, fish catches, coastal forest and related livelihood activities. Such situation increases vulnerability to coastal resources and local livelihood. In understanding the changes in coastal resources and local livelihood a questionnaire survey, key informant interviews and field observation were deployed to explore local perceptions on coastal resources management and implication on community livelihood in two wards of Bagamoyo district. The data were analyzed by using content and trend analysis, Microsoft excel and Statistical Package for Social Science (SPSS). The results revealed changes in the marine and coastal environment such as degradation of habitats in the coastal zone, which were attributed by increase in population (35%), use of deleterious fishing techniques (35%) such as dynamite and the recurring climate change and variability (21%) that increased extraction and destruction of natural resources. A weak institutional infrastructure to monitor and regulate destructive activities (32%) were reported to reduce the ability of authorities to prevent deleterious practices. Such perceived environmental changes resulted in reduced fish catches, agricultural production and affected local livelihood activities along the coastal area. Despite the presence of Beach Management Units (BMUs) and Collaborative Fisheries Management Areas (CFMAs), which aims to empower local fishers to monitor and become responsible for the resources and habitats they depend on, most of the local community are not motivated and have low awareness on such initiatives. Thus, with increased dependency on natural resources, use of low technology and low adaptive capacity render community's livelihood vulnerable to environmental changes and fluctuating weather patterns. To ameliorate the situation; strategies aimed at reducing the risk and improving environmental management have been recommended. These include the provision of education to all key stakeholders. Adherence and implementation of existing bylaws; this need to include regular visit and involvement of local communities in cleanup on the coastal areas, and the provision of incentives to the local community for managing resources.

Keywords: perceptions, coastal resources management and livelihood

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Brown Gwambene, Ernest Karata

Department of Geography, Faculty of Social Sciences and Entrepreneurship, Marian University College, Tanzania

Correspondence: Brown Gwambene, Department of Geography, Faculty of Social Sciences and Entrepreneurship, Marian University College, PO Box 47, Bagamoyo, Tanzania, Tel +25571 3503276, Email gwambne@gmail.com

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Introduction

Coastal erosion and shoreline changes aggravated by the adverse impacts of Changing environment, increases vulnerability to coastal resources and community's livelihood. The coastal area/villages are exposed to changing environment caused by climate change and non-climate related stresses.¹ The impacts pose danger to livelihoods, social assets and the natural environment. Although the effects of Environmental change are global, but its impacts are felt more at local level.²

The limited involvement of local community in the management of coastal resources resulted in a very low awareness of risk of changing environment, natural hazard and climate change adaptation activities.¹ In addition, a weak governance, lack of enforcement and lack of research, the policymakers sometimes underestimate the risk intensities.³ But usually the risk is properly identified by local communities, who are often traditional people with a strong knowledge of their local ecosystem.⁴ Thus, better understanding community perceptions of risk contribute in reducing, preventing and developing adaptation plans with stakeholders. This improves the

livelihood of coastal communities, increase resilience and strengthen/recover ecosystems that provide essential services in the face of changing environmental.

The outcomes of coastal resource management varied depending on available livelihood strategies.^{3,5} The local community in coastal areas is most often concerned about the exclusion of fishers and subsistence harvesters from the area with more unease on demarcation of a management where people cannot make a living from fishing and collecting natural resources.^{3,6} Another concern is the negative impact on fishers and resources, although minimal impact on fishers expected because regulations allowed small-scale fishing.³

The coastal recourses management affected by a number of challenges that include infrastructure challenges including processing, storage and transportation facilities. This coincides with the use of deleterious fishing techniques, such as dynamite, which has led to the degradation of habitats in the coastal zone, eroded beaches, destructed fish haunts and shifted shorelines affects the beautiful scenery, disfigure beaches, fish catches, coastal forest and related livelihood activities. A lack of institutional infrastructure required to monitor and

regulate such activities has also weakened the ability of authorities to prevent such practices. Despite these obstacles, some oversight and planning has been decentralized to the community level through Beach Management Units (BMUs) and Collaborative Fisheries Management Areas (CFMAs), which empower local fishers to monitor and become responsible for the resources and habitats they depend on. Likewise, as micro-finance continues to be made available by international organizations in the sector, sustainable practices should be strengthened.⁷ Local supports for natural resources management often yield a success in conservation. Such supports are strongly influenced by perceptions of the impacts experienced by local communities and opinions of management and governance. Developing a more general understanding of these processes, so we need to include peoples' perceptions, both in research and in governance. It is necessary, therefore, for researchers, natural resources officers and policy makers to interact with communities to access local knowledge, which is very useful in management and shaping strong policies and research needs. This study, therefore, seeks to understand the perception and vulnerabilities of coastal communities in the District so as to improve coastal resource management and livelihood resilience and reducing vulnerability in communities to changing environments.

Methodology

The study was conducted in two wards (Kaole and Dunda) along the coastal belt of Bagamoyo District. The Bagamoyo district is one among six districts of the Coastal (Pwani) Region of Tanzania, situated 75 km north of Dar-es-Salaam.¹ The district bordered to the North by the Tanga Region, to the West by the Morogoro Region, to the East by the Indian Ocean and to the South by the Kinondoni and Kibaha Districts.⁵ The district lies between Latitudes 6° and 7° South, and Longitudes 37° and 39° East with an altitude ranging from 0 to 100 meters above sea level (masl), with sand, sandy loam and heavy clay soils.⁶ The district covers an area of 9,842 km², where 855 km² is covered by water (Ocean and river) while the remaining part, which is 8,987 km² is occupied by dry lands.⁶ The main economic activities in the district include small holder farming, artisanal fishing, livestock keeping, mariculture (sea weed and prawn farming), salt production, trade, and tourism. The marine fishery (of which 96 percent catch is from the artisanal fishery) is very important in Bagamoyo district where the majority of the population depends on the fishing activity as their major sources of daily income and food for their families.^{1,8} Most of the marine artisanal fishers in Bagamoyo obtain their fish in shallow water habitats and nearby reef areas in the vicinity of the coastline.¹ The Wami and Ruvu river estuaries also provide a good diversity of fish types to Bagamoyo residents.

The study used both primary and secondary sources of data in exploring the perception of the Local community on coastal resources management and their implication in local livelihood. Secondary data were mainly from library, office reports and internet search. Whereas primary data were collected through survey questionnaire, key informant interview and field observation. The questionnaires elicited information on household demographics socioeconomic and geophysical characteristics, economic activities, environmental changes and their perception of an array of coastal management aspects. Attitude questions concerning the responsibility of resource management and recommendation on the management of coastal resources were phrased and featured in the data collection tools. Key-informants were drawn from experienced local community, experts from district natural resources management, ward/ village leaders. The

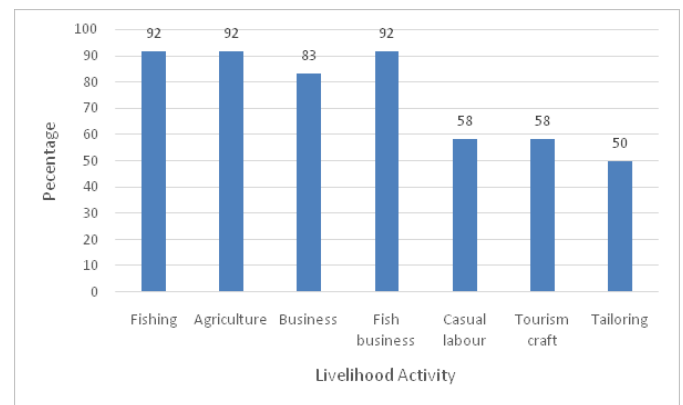
qualitative data were analyzed through content, trends and in-depth analysis to complement the discussion of analyzed quantitative data. The quantitative data were cleaned, sorted, summarized, stored and analyzed using (Statistical Package for Social Science (SPSS 20) and Microsoft Excel. The analyzed data both descriptive and inferential statistical were presented in the form of chart, table and description.

Results and discussion

The main coastal livelihood activities and resource management

Fishing and small scale farming, which depends on the environment and climate are the major source of income in coastal communities. Fishing and related activities jointly performed for the local community along the coastal belt and during the appropriate fishing season, fishing complements agriculture as a source of staple food. Apart from fishing they involved in petty trade, crop farming (cashew nuts, coconut and seasonal farming) and livestock keeping. There has also been a gradual shift to alternative sources of income, such as upcoming tourism industry, new infrastructure, providing new employment opportunities, and petty trading.¹ Figure 1. Indicates the main livelihood activities in the coastal of Bagamoyo.

Figure 1 The main livelihood activities of Bagamoyo small scale fisheries and



farmers.

About 92% of respondents depending on fishing, agriculture and fish business as the main livelihood activities. They often involve household fishing or farming income, supplemented with other activities. Generally, fish catches and products are sold at dispersed points of landing and partly being consumed at a family level.⁹ The small scale fisheries or artisanal fishery is characterized by simple technologies such as fishing traps, dhows (mashua), outrigger canoes (ngalawa) and small wooden boats, low level of productivity which is constrained by social and geographical features.⁹ Fishing takes place in shallow water where fish forks employ a wider range of harvesting methods and techniques.⁹

In the coastal and marine resources, the coral reefs harbors a substantial fish resources, and are important for recreational and tourist purposes. Shells and other curio commodities are obtained from the fringing reef, which are also important for octopus, and lobster fishing. However, the use of indiscriminating techniques such as dynamite fishing destroys reefs and kills fish haphazardly. Such techniques are not friendly to the environment and ecology and increased challenges to the livelihood and coastal resource management.

Changes in coastal environmental/ resources management

The study revealed a change in the coastal resources and management measures. The perceived changes were resulted from the increased extraction and destruction of natural resources. Through key informants and household questionnaire changes in coastal resources, reduced fish catches, decreased agricultural production and affected the local livelihood activities along the coastal area. Figure 2 indicates the perceived cause of changes in coastal resources and activities.

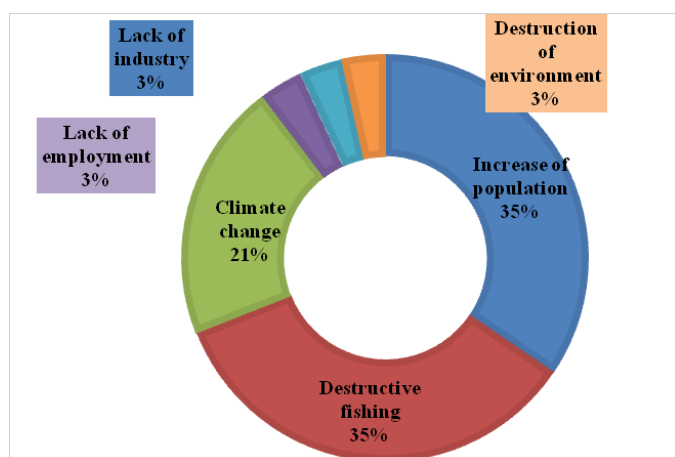


Figure 2 Reason for change in coastal environment and resources.

The results in Figure 2 indicate that increase of population and the use of destructive fishing gear are the main cause of coastal resources and environment. Other causes include climate change (21%), lack of industry (3%) and lack of employment (3%) which propels more people to engage in limited fishing activities with low technology/ poor fishing gear. Based on the key informant and household survey the use of some of the fishing gear has been changed due to environmental changes. Such changes include the use of traditional fishing gear such as shark nets and hand line, fixed stacked trap (uzio or wando), basket trap (dema), collection of shell fishes (cockles), shrimp fishing using clothing material or mosquito netting materials mainly for women. The coastal environment also changed, for example, the shift of shorelines that affects beautiful scenery, disfigure beaches, reduced fish catches, loss of coastal forest and other natural environment and livelihood activities.

Implication of environmental change in coastal livelihood and resource management

The low levels of investment in artisanal fisheries, as much needed for household consumption increased challenges to the coastal resources. The economic hardship propels many people to enter in artisanal fisheries that increased the number of fishfolks compared to the number of fish catch. This increased the struggle and involvement in environmental degradation through dynamite and or mangrove clearance. Figure 3 indicates the adverse implication of coastal and marine resources management.

About 50% of respondent perceived the decline of fish catch as the main impact of change in environment and coastal resource management. This followed by the decrease of income (37%) and destruction of rocks (13%). Decline in fish catch and income were frequently mentioned by the small scale fisheries as it constitutes their livelihood while the environmental aspect less weight. Other environmental impacts include eroded beaches, destructed fish haunts

and loss of coastal infrastructure caused by environmental changes and poor policy enforcement. The policy implementation, even when the policy set and Government forces are equipped for it, implementation becomes negligible.

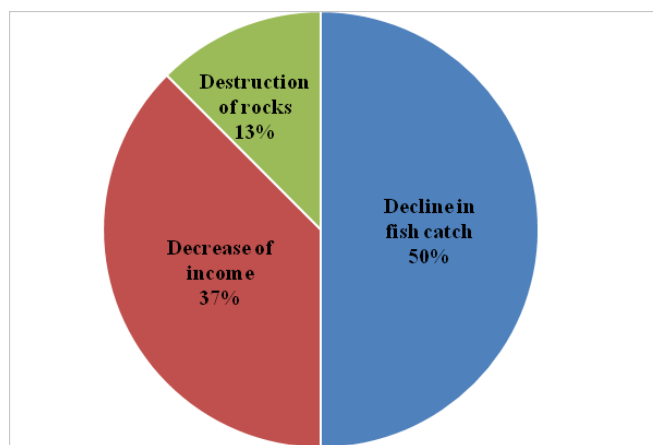


Figure 3 The effect of change in coastal and marine resource conservation.

Responsibility of conservation and management of coastal resources

The study revealed the need for collective management that involves the sharing of the functions, rights, and responsibilities of resource management among various stakeholders including government authorities and resource users. Involving local communities in a meaningful way planning and management of coastal and marine resources rape a good result in resources management. Figure 4 indicates the main responsible groups in coastal area management.

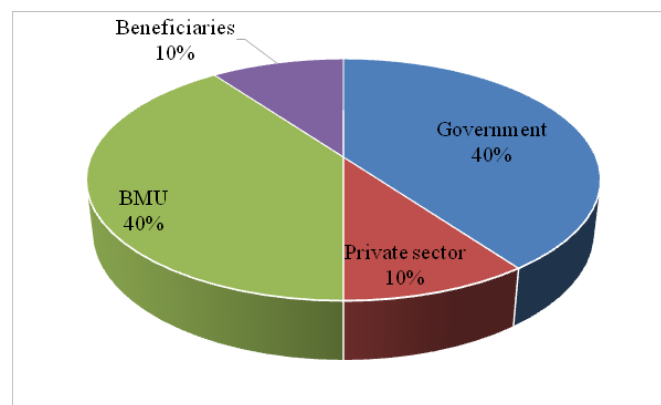


Figure 4 The perceived responsible groups in coastal resource management.

The results in Figure 4 indicates the main groups in coastal resource management that include the Government (40%), Private sector (10%), BMU including the local community (40%) and other beneficiaries (10%). In sharing the responsibilities in resource management among the government authorities and resource users, the Government authorities use policies, legislation and regulations based on controlling and fining as one component of resource management. Other equally important component is the involvement of local communities and other key stakeholders in all aspects of resource management. Local community constitutes an important aspects in coastal resource management as they have knowledge accrued through a long experience within the vicinity and across the levels, scale and sector. Figure 5 indicates the perceived contribution of local communities in the coastal resource management.

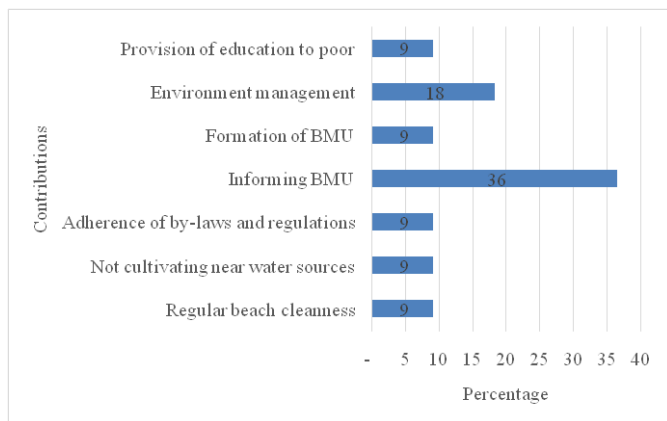


Figure 5 Perceived local community contribution in coastal resource management.

The contribution of local communities in coastal resource management as indicated in Figure 5 include informing the BMU and participating in environment management. Other contributions are provision of education to others/poor, formulation of BMU, adhering to the bylaws and regulations and regular beach cleanness. Such contributions are of importance in coastal resource management and improving local livelihood along the coastal areas.

Challenges of coastal resources conservation and management

Limited participation, inequitable sharing economic benefits from coastal resources, and lack of conflict resolution mechanisms, increased the problem in coastal resource management.³ Weak institutional infrastructure to monitor and regulate destructive activities that reduced the ability of authorities to prevent deleterious practices. Figure 6 indicates the challenges in the costal resource use and conservations.

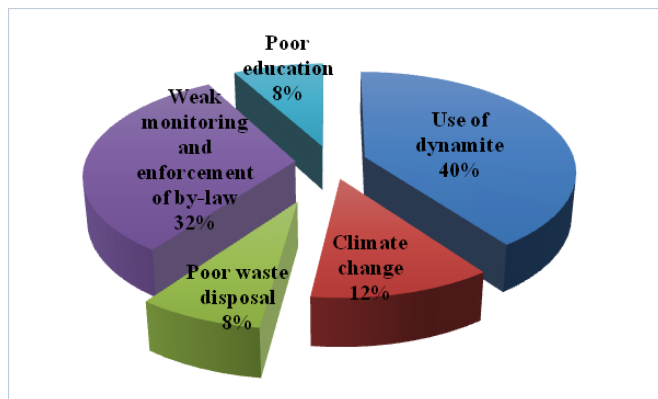


Figure 6 Coastal resources use and management challenges.

Deleterious fishing techniques and activities such as the use of dynamite (40%) as indicated in Figure 6 is among the main cause of change in coastal resources that followed by weak monitoring and enforcement of by-laws (32%). Other challenges include poor waste disposal, climate change, poor education and unreliable market. Poor education resulted in poor fishing, environmental degradation while climate change affects the fish catches and environmental resources. The market forces have failed to support the growth of the required services and technology development among the small scale fishing.

There is a significant shortfall of data and information that hamper coastal resource management and evaluation. The scientists who work in the field of natural resources management and climate change has a problem of communicating complex technical research to broad audiences. Such problem much experienced in the field of conservation of biodiversity, marine resources, environmental services, and climate change risks.³ An effective communication channel between scientists, politicians, local authorities, and people are crucial in developing effective adaptation and management strategies. This need to unpack some technical topics, which are difficult in environmental and coastal science. This may include translating information into an accessible language for politicians and local people through explaining different concepts, such as a cultural, technical and those aiming to boost specific agenda or priorities.¹ It has stipulated that working with common perception increase scientific relevance and helping to reduce the level of complexity.^{1,3}

Reducing the risk and improving costal livelihood and resources management

The study revealed the important strategies in coastal resources, managing and reducing the adverse impact of environmental changes. Addressing the challenge of decreased access to coastal resources for livelihoods and household use required a significant improvements to governance, management and local community attention. Local community involvement builds a trust and ameliorate relationships among stakeholders to improved management outcomes through engendering support and compliance. Table 1 show the perceived strategies for management of coastal environmental resources.

Table 1 The strategies used for managing coastal environmental resources

Strategies for coastal area management	N	Percent	Percent of cases
Allocation of area for fishing	4	6.7	9.1
Allocation of trading area	4	6.7	9.1
Restriction of destructive fishing/ dynamite	4	6.7	9.1
Restricting on water sources	4	6.7	9.1
Formation of different committees	4	6.7	9.1
BMU, and local community to manage resources	8	13.3	18.2
Adherence to By-laws	12	20	27.3
Formulation of BMU	4	6.7	9.1
Formulation of By-laws	4	6.7	9.1
Destroying fish net	4	6.7	9.1
Regular patrol	8	13.3	18.2
Total	60	100	136.4

Knowledge of the condition of the fisheries resources, active management or enforcement over the coastal resources and marine habitats affects the result in coastal management benefits. Table 2 shows the perceived coastal management strategies that include adherence to by-laws, involvement of BMU, and local communities in coastal resource management and regular patrol in the coastal and marine environment. Allocation of area for fishing and trading, restriction of destructive fishing/dynamite and formation of BMU and By-laws. The participatory approach is of prerequisite for bettering

socio-economic development processes and addressing resource management issues. Amenable coordination among key stakeholders including local communities in management of coastal resources and related initiatives.³

Table 2 Opinion on coastal and marine resource management

Opinion on marine conservation	N	Percent	Percent of cases
Education	9	21	30
Regular meetings	3	7	10
Creating an environment awareness	3	7	10
Government should fulfill their responsibility	9	21	30
Facilitating BMU	9	21	30
Establishment of industry	3	7	10
Improve fishing gear	6	14	20
Total	42	100	140

Awareness raising, communities sensitizing and providing technical information on fisheries resources ownership and management and provision of education to all key stakeholders comprise a hinge role in resource management. This need to include the adherence and implementation of existing bylaws, provision of incentives to the local community for managing resources. Figure 7 describes the perceived measures used to reduce the adverse impacts.

The results in Figure 7 indicate collective effort among the stakeholders and common understanding across the domains which is a prerequisite in resource management. This will require improving a socioeconomic well-being of coastal communities through sustainable use, participatory coastal and marine resources management and raising awareness on the coastal resource management and strengthen livelihoods by improving the environment for small-scale enterprise. The respondents were given a chance to air their views on coastal and marine resource management. The main ideas in coastal and resource management is shown in Table 2 below.

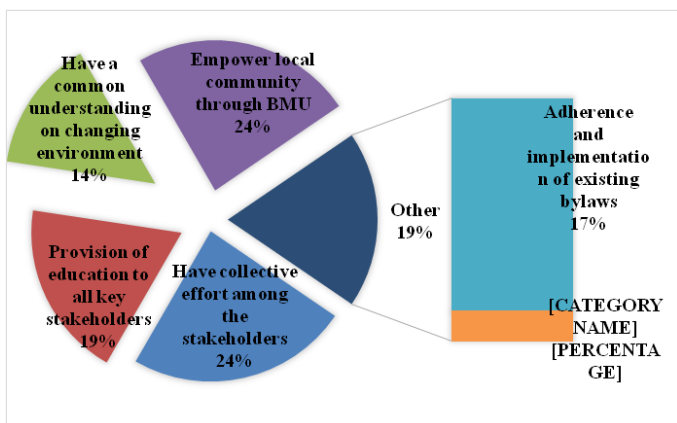


Figure 7 Measures to reduce adverse effects on natural resources.

Table 2 above shows that education (30), facilitating BMU (30), improve fishing gear (20) regular meetings (10) are important components in coastal resource management. The government should fulfill their responsibility (30) and creating environment awareness (10) and establishment of industry (10) to increase employment opportunity that in turn reduce pressure on coastal and marine resources. Coastal resource management outcomes take into account

the broad array of issues and their root causes that management actions are coordinated among key stakeholders across the coastal area.

Conclusion

Local community participation in coastal resource management and provision of incentives to motivate the local community for managing resources form important component of sustainability. Despite the presence of Beach Management Units (BMUs) and Collaborative Fisheries Management Areas (CFMAs), which aims to empower local fisheries to monitor and become responsible for the resources and habitats they depend on, most of the local community are not motivated and have low awareness on such initiatives. Increased dependency on natural resources, use of low technology and low adaptive capacity render community’s livelihood vulnerable to environmental changes and fluctuating weather patterns. To ameliorate the situation; strategies aimed at reducing the risk and improving environmental management need to include the provision of education to all key stakeholders, adherence and implementation of existing by-laws and local community participation.

Acknowledgments

None.

Conflicts of interest

Authors declare that there is no conflict of interest.

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