

Influence of Marine Tenure Types on Livelihoods of Fishing Communities in Mafia Island, Tanzania

Rukia A. Kitula*

Institute of Marine Sciences, University of Dar es salaam

Research Article

Received date: 29/03/2016

Accepted date: 15/04/2016

Published date: 08/05/2016

*For Correspondence

Rukia A Kitula, Institute of Marine Sciences,
University of Dar es salaam, Zanzibar, Tanzania.

E-mail: rkitula@yahoo.com or rkitula@ims.udsm.
ac.tz

Keywords: Marine tenure types, Fishery
resources, Livelihoods, Fishing communities.

ABSTRACT

This paper analyses influence of marine tenure types on livelihoods of fishing communities in Mafia Island, Tanzania. Data for the study were collected from 120 randomly selected households from four villages in Mafia Island using Participatory Rural Appraisal (PRA), discussions with key informants and questionnaire survey. Content analysis was used to analyse qualitative information collected through PRA, and discussions with key informants. Data from questionnaire were analysed using the Statistical Package for Social Sciences computer software. Ranking and scoring results revealed that state was the most dominant tenure regime with regards to contribution to livelihood capitals because it was ranked first. In the area, state tenure type was important in contributing to the livelihoods of communities through creating marine protected area (MPA) and organizations for collective action, enhancing physical capital, supporting income generation activities and enhancing natural capital. The study revealed that creation of MPA has resulted in the increase of fish abundance and recovery of coral reefs, mangrove forests and seagrass in areas that were almost damaged before the Mafia Island Marine Park took over the management. Therefore, there is a need for continuing effort in promoting marine parks to ensure sustainable management of fishery resources in Mafia Island.

INTRODUCTION

Fisheries provide employment and livelihoods to a substantial number of people^[1]. In this study, the term livelihoods refers to activities, assets, capabilities and strategies required and employed by fishing communities in satisfying fundamental needs of a household^[2]. According to Kleih et al.^[3], Gautam et al.^[4] livelihoods are about how actors can mobilize their capital assets and capabilities to achieve wellbeing. In Tanzania for example, about 182,741 people are engaged on fulltime fishing for livelihood improvements, of which about 175,077 people are involved in fresh water fishing and 7,664 people in marine fishing URT^[5]. In addition, more than 4 million Tanzanians make their livelihoods through various fisheries related activities, such as boat building, net making, fish processing and food marketing URT^[5]. Fisheries are also a source of recreation, tourism and foreign exchange. Marine tenure systems mediate access to fishery resources to facilitate their sustainable use and management^[6,7]. The term marine tenure refers to rules invented by societies to regulate behavior. Rules of tenure define how rights to marine resources are to be allocated within societies. They define how access is granted to rights to use, control, and transfer marine resources, as well as associated responsibilities and constraints. They determine who can use what resources for how long, and under what conditions suggested by Aswani^[8]. Rules of tenure determine the degree to which an enabling environment for livelihoods of fishing communities is in place Allison and Horemans^[7]. They can facilitate investment in seafood processing industries, fostering employment and improvement of communication systems for livelihoods of fishing communities Kleih et al.^[3] Kebe et al.^[9]. Various marine tenure regimes are being implemented at different governance levels in Tanzania in an attempt to manage

fisheries resources sustainably. They include open access, state, communal and private tenure types URT ^[10]. For many years management of fishery resources in Tanzania has been entirely operated and implemented by the government. The management defines fisheries resources as open access property. Anyone can gain access to the resource through the licensing system. According to Arnason ^[11] open access system encourages more investment and fishing effort and it attracts new fishermen to the fishing industry. However, the de facto open access of marine fisheries and inadequate fisheries management due to low capacity of Tanzania government in terms of human and financial resources have threatened marine biodiversity across the country including Mafia Island ^[12-16]. This means that the government alone is not capable to ensure sustainable utilization of marine resources. During 1970s the tenurial arrangements in some parts of marine waters of Tanzania changed from open access nature to state control is explained Muhando and Francis ^[12]. In most countries of the world, marine and freshwater resources are considered state property and under the management of various governmental bodies. Under the state system, the government retains most of the management responsibility either through exclusive control, or by granting limited user rights over marine resources. In Tanzania for example, the state marine areas entail the central and local government gazette marine parks and reserves. They are owned and managed by the central government through the Marine Parks and Reserves Unit URT ^[17]. Currently, Marine Protected Areas (MPAs) are being promoted in many parts of marine waters of Tanzania including Mafia Island Muhando and Francis ^[12]. They are designed to control the use of certain coastal or marine area to conserve natural resources, biodiversity, and historical and cultural features. The creation of MPAs is geared towards providing concerted intervention for addressing abuse and destruction of the environment in areas where traditional ways of management have been ineffective, and threats to the marine environment are high URT ^[18]. As an example, the Mafia Island Marine Park (MIMP) was declared as Tanzania's first marine park in 1995. Meanwhile, 55% of villages of the Mafia District are under the MIMP programmed by Mwaipopo ^[14]. This means that the programmer covers some of the most lucrative traditional fishing grounds of local people. Recognizing that local resource users as the principal beneficiaries and custodian of any fisheries management a new regulation known as collaborative fisheries management or beach management units (BMUs) is being promoted in marine waters of Tanzania since over the last decade. The system emphasizes the community responsibility and accountability for managing the resources ^[4,19]. It takes into account the local situation where a group of people with common interests control and manage productive resources Kitula ^[20]. This arrangement gives power local fishing communities to develop and enforce locally appropriate rules within village boundaries to improve the management of a fishery that has historically suffered from weak management and enforcement. Such arrangements aim to make people dependent on fishery resources with greater participation in the decisions influencing the management of marine resources URT ^[21]. There has been little interest by the government of Tanzania in promoting private ownership of marine space due to the assumption that the oceans are part of the commons and can neither be owned nor leased. Some studies have shown that commercial enterprises have the rights to use and manage marine space to safeguard marine resources and benefit local communities through Marine Conservation Agreements. In this regard, commercial enterprises can acquire rights to marine and coastal areas for fisheries, energy and other uses Nature Conservancy. For example, in Mafia Island Tanzania, some marine resources are owned privately by the Alpha rust Company. In Zanzibar Tanzania, Chumbe Island Coral Park is also owned privately Mwaipopo ^[14]. One of the characteristics of the private ownership of marine space is that it excludes other members of the community from using marine resources without the consent of those who hold the rights Kitula ^[20]. Following implementations of these tenure types, several studies about MPAs have been done in marine waters of Tanzania. A study assessing the link between management preferences, perceived benefits and conflicts among resource users and managers was done in the MIMP, Tanzania McClanahan et al. ^[22]. Likewise, a study looking at social dimensions of marine protected areas was done in MIMP Mwaipopo ^[14]. The link between poverty, MPA management and use of destructive fishing gear in marine waters of Tanzania was also explored by Silva ^[23]. However, information linking marine tenure types and livelihoods is lacking in these studies. Therefore, this study was designed to assess influence of marine tenure types on livelihoods of fishing communities especially in Mafia Island Tanzania. Information generated therein would aid to the improvement of management strategies of fisheries in the area.

METHODOLOGY

The study area

The study was carried out in Mafia Island Tanzania **Figure 1**. Because different marine tenure types existed in the area. These were open access, state, communal and private tenure types. The island receives an average annual rainfall of 2,000 mm. It experiences two rainy seasons: short rains in November/December and long rains from March to May. It has a temperature between 20°C and 33°C throughout the year. The economy of the Mafia district depends on fishing, crop production, trade and to a very limited extent on industrial activities Mwaipopo ^[24] (**Figure 1**).

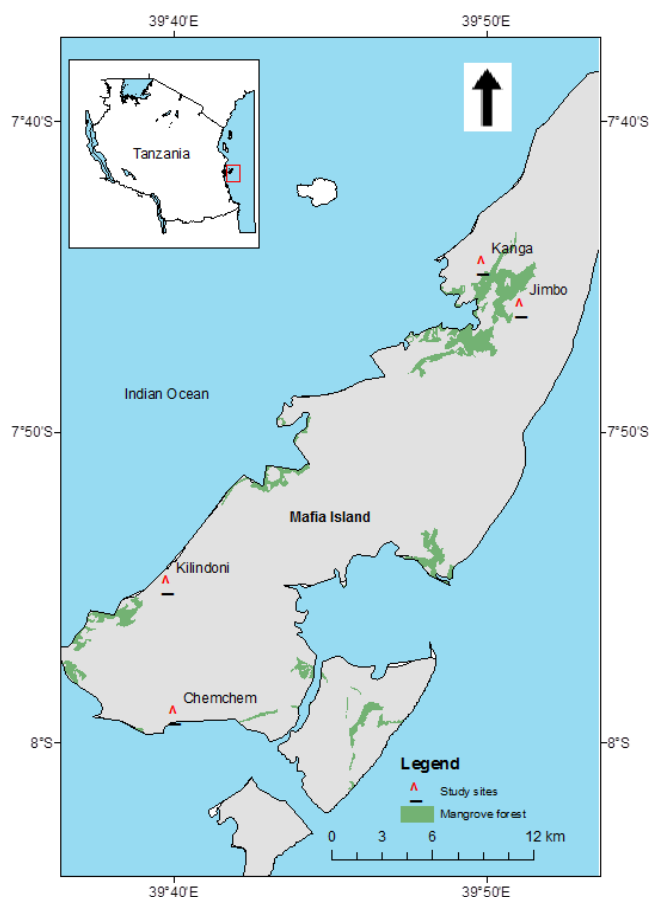


Figure 1. Map of Mafia Island showing study villages.

DATA COLLECTION METHODS

A cross-sectional design was adopted in this study because it is economical. Purposively sampling was used to select four fishing villages each implementing different tenure type. These villages are Chemchem, Jimbo, Kanga and Kilindoni. Chemchem village represented state tenure type because the village falls within the marine park boundary. Jimbo village represented private type of tenure because some of its marine resources were owned privately by the Alphakrust Company. Kanga village represented open access tenure arrangement because management of fishery resources was under the District Fisheries Officers. Kilindoni village represented communal arrangements because marine resources were governed by village by-laws under BMU arrangements. Unit of analysis in this study was a household. Thirty households were randomly selected for detailed study in each study village irrespective of population size Bailey ^[25]. Participatory Rural Appraisal (PRA), discussions with key informants and questionnaire survey were used to collect primary data. Secondary data were collected by studying both published and unpublished documents relevant to the research. These combinations of techniques were employed for triangulation purposes. Participatory Rural Appraisal (PRA) tools such as ranking and scoring were done to identify tenure type with high influence on livelihoods. Questionnaire was used to collect primary data from 120 households. Questionnaires were administered by both the researcher and research assistants. Discussions with key informants were done to obtain information that would assist in clarifying particular issues that were raised in PRA exercises and questionnaire survey. In this study key informants were MIMP officials, Fisheries Officers, Rufiji-Mafia-Kilwa-World Wide Fund for nature (RUMAKI-WWF) officials in Mafia, Tanpesca Ltd. and Alphakrust Limited.

DATA ANALYSIS

Content analysis analysed qualitative information collected through PRA, discussions with key informants and documentary reviews. Data from questionnaire were coded and analysed using the Statistical Package for Social Sciences (SPSS) computer software. The main analyses were descriptive statistical analysis. Significant differences between categories were judged based on χ^2 values at 5% level of significance.

Analysis of Influence Of Tenure Types On Livelihoods

The attributes used to analyse marine tenure types and livelihoods of fishing communities in Mafia Island, Tanzania are given in **Table 1**. The attributes were drawn from the framework of sustainable livelihoods and they include social, physical, human, financial, political, natural and cultural capitals. **Table 1**.

Table 1. A list of attributes used to analyses marine tenure types and livelihoods in Mafia Island.

| Dimension | Sub dimension | Rating |
|---------------------|--|----------------------------------|
| Livelihood capitals | Livelihood indicators | 1= poor; 2=satisfactory; 3= good |
| Social capital | Ability to create local organizations to govern the use and management of fishery resource | |
| Physical capital | Ability to stimulate ownership of fishing tools | |
| | Influence on construction of public facilities | |
| Human capital | Ability to enhance capability and skills | |
| | Ability to enhance formal education | |
| Financial capital | Employments to local people | |
| | Ability to collect revenue | |
| Natural capital | Influence on improvement of fishery resources | |
| Political capital | Influence on voice and power to local communities | |
| Cultural capital | Ability on respecting norms and taboos on fishery resources management | |

RESULTS

Marine tenure types

The study revealed that state was the most dominant tenure type with regards its contributions to livelihood capitals because it was ranked first **Table 2**. The use of marine resources in MIMP boundary is governed by MIMP General Management Plan of 2011. Through such general management plan people are allowed to use some parts of the marine park for fishing while other area of the park is designated for ecotourism activities only. There is also a core 'no-take' area where no fishing, tourism or any disturbance is allowed. This means that communities are allowed to use the resources in the park sustainably for livelihood improvements (**Table 2**).

Table 2. Ranking order of tenure types and livelihoods in Mafia Island, Tanzania.

| Characteristics | Tenure types | | | |
|-----------------|-----------------------------|---------------------------------|-------------------------|----------------------------|
| | State (Chemchem village) | Communal (Kilindoni village) | Open (Kanga village) | Private (Jimbo village) |
| Social | 3 | 3 | 2 | 1 |
| Physical | 3 | 2 | 1 | 1 |
| Human | 3 | 2 | 1 | 3 |
| Financial | 3 | 3 | 3 | 2 |
| Natural | 3 | 2 | 1 | 1 |
| Political | 3 | 3 | 1 | 1 |
| Cultural | 2 | 3 | 3 | 1 |
| Total score | 20 | 18 | 12 | 10 |
| Ranking order | 1 | 2 | 3 | 4 |

Key: 3 = Good; 2 = Satisfactory; 1 = Poor

Influence of marine tenure types on livelihoods

Livelihood capitals that are presented in this section are social, physical, human, financial, political, natural and cultural.

Influence of Marine Tenure Types on Social Capital

Perceptions of communities on the influence of marine tenure types on social capital differs significantly in the study area at $\chi^2=39.956$ and $p=0.000$ (**Table 3**). Private tenure type was ranked poor by 63.3% of respondents in Jimbo village in creating local organizations to govern the use and management of marine space owned privately. More than 170 ha of coastal and marine space close to Jimbo village were privately owned or leased to Alphakrust Ltd for shrimp farms and communities have no mandate to govern the use and management of these farms. This means that the Alphakrust Ltd was excising territorial use rights in some parts of coastal and marine space close to Jimbo village. In villages such as Chemchem and Kilindoni, various local organizations were established to govern the use and management of fishery resources for the benefit present and future generations. The creation of local organizations was possible in these villages because rules and regulations allow for the establishment of local institutions for management of coastal and marine resources in Tanzania URT ^[1,10,17] The study revealed that Village Liaison Committee (VLC) and Village Enforcement Unit (VEU) were established in Chemchem village to provide the link between communities and Marine Park officials in the management of fishery resources. Beach Management Unit (BMU) was introduced in Kilindoni village by RUMAKI-WWF to manage coastal and marine resources in collaboration with VGs. The establishment of local organizations such as VLC, VEU and BMUs involved handing over the management responsibilities of the government organizations such as Mafia District Council to the groups of local communities who hold the de facto user rights of fishery resources. In fact, the establishment and operating of the self-governing local organizations like VLC, VEU and BMUs

to govern the use and management of fishery resources at village level has been contributing to livelihoods by enhancing social and human capitals, a view that is also shared by Gautam ^[4] (**Table 3**). There was no legally registered fishing organizations encountered in all villages surveyed. The main reason for this was lack of trust, external support and common goal among fishers. There was informal social group of women in Chemchem village organized for octopus fishing in the near reefs. The group relied on Tanpesca Company for boat hire to take them to and from the fishing ground and for selling their catches. Selling catches to Tanpesca Company was observed to limit their opportunity to bargain and thus force them to sell their octopus at Tsh. 2000 per kg, which was considered low price. Men were informally organized for fishing reef species, catching lobsters, squids and prawns and harvesting sardine either singly, in pairs or in large groups. Fishing for lobsters involved diving in deep water using SCUBA equipment and this activity was mainly dominated by younger men. The organization structure to support group development action for the identified informal fishing groups was rather inadequate. However, they had group leader who was responsible in regulating fishing activities. The person was selected based on long experience in fishing and knowledge on fishing habitats. This means that for many years fishers have been relying on informal social groups in pursuing their fishing activities. The informal fishing groups formed in the study area were for economic development. These results compare well with the findings by Kleih et al. ^[3] and Kebe et al. ^[9] Who observed that fishers in Bangladesh and Liberia respectively depend on the informal social relations for pursuing their fisheries activities.

Table 3. Perception level on the influence of marine tenure on social capital.

| Village names | Social capital | | | Total | Statistical test |
|------------------|----------------|--------------|-----------|-----------|------------------|
| | Poor | Satisfactory | Good | | |
| Chemchem (n=30) | 2 (6.70) | 1 (3.30) | 27 (90.0) | 30 (100) | |
| Jimbo (n=30) | 19 (63.3) | 5 (16.7) | 6 (20.0) | 30 (100) | p=0.000 |
| Kanga (n=30) | 5 (16.7) | 4 (13.3) | 21 (70.0) | 30 (100) | $\chi^2=39.956$ |
| Kilindoni (n=30) | 4 (13.3) | 3 (10.0) | 23 (76.7) | 30 (100) | |
| Total (N=120) | 30 (25.0) | 13 (10.8) | 77 (64.2) | 120 (100) | |

Influence of Marine Tenure Types on Physical Capital

Communities perceptions on the influence of marine tenure types on physical capital did not differ significantly in the study area at $\chi^2=9.422$ and $p=0.151$. There was a wide range of boats available in Mafia Island. These include dugout canoes, outrigger canoes, dhows, mashua (planked boats) and boats. There was an increasing trend on the number of vessels in the study area in **Figure 2**. Most of the boats, mashua and dhows available in Mafia Island were not fishing vessels but were used for transport mainly from Kilindoni village to other parts of coastal districts of Tanzania. The majority (69%) respondents own fishing vessels. The most common types of fishing vessels owned by fishermen in the study area were dugout canoe, outrigger canoe and dhow. This means that private ownership of physical assets such as fishing vessels and boats for transport are crucial to support livelihood strategies in the study area (**Tables 4 and 5**). The study revealed that few (20%) fishermen depend on others vessels for fishing. These fishermen had an arrangement with the vessel owners regarding the distribution of catch per unit effort. The arrangement was such that the largest share of the catch per unit effort should be given to the vessel owner and the remaining portion to be allocated to the crew members. This means that some people were engaged indirectly in fishing activities by having arrangements with fishers regarding the use of fishing vessels and catch distribution. Provision of fishing vessels to support fisheries is crucial since it support livelihood strategies by enhancing physical capital. A variety of nets and other gear were used in the study area to capture marine products. Focus group discussions revealed that the dominant gears used by fishermen in the study area include nets, traps, hand lines and long lines. Some (35%) respondents did not own fishing gears. They relied on fish traders to supply them with fishing gears. In such a situation, informal condition for receiving the fishing gears has to be made. The condition requires that the entire catch must be sold at the sea direct to the trader who supplied the fishing gears. Focus group discussions revealed that there was an exercise of fishing gear replacement in Chemchem village. During such exercise fishermen were given large meshed gillnets and long lines. The gear exchange exercise was organized by WWF in collaboration with MIMP to protect near shore fishing habitats, encourage off shore fishing and to abandon the use of destructive fishing gears such as seine nets. The use of seine nets damage sea grasses and corals as well as take out large numbers of juvenile fish (URT, 2011). This in turn negatively affect the long term fishing prospects. Therefore, the provision of fishing gears to support capture of marine products and protecting fishing habitats have been contributing to the livelihoods of local communities by enhancing physical and natural capitals. The study revealed that primary schools have been built in all study villages. Only Kilindoni village had both government and private primary schools. The Alphakrust Ltd was found to be important in helping communities in Jimbo village to construct primary school. Construction of primary school in Chemchem village was possible through financial support from MIMP. There were ward secondary schools in Chemchem and Kilindoni villages. URT indicated that government and NGOs have legal mandate to implement decisions making and policy recommendations on capacity building including support for formal education.

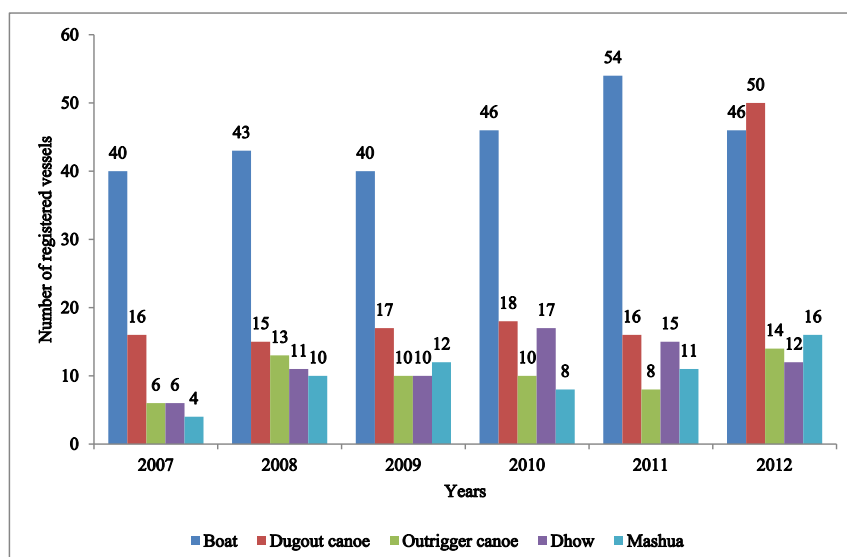


Figure 2. Number of registered fishing vessels by years in Mafia Island, Tanzania.

Table 4. Perception level on the influence of marine tenure types on physical capital.

| Village names | Physical capital | | | Total | Statistical test |
|------------------|------------------|--------------|-----------|-----------|----------------------------|
| | Poor | Satisfactory | Good | | |
| Chemchem (n=30) | 5 (16.7) | 4 (13.3) | 21 (70) | 30 (100) | $\chi^2= 9.422$ p=0.151 |
| Jimbo (n=30) | 4 (13.3) | 3 (10) | 23 (76.7) | 30 (100) | |
| Kanga (n=30) | 6 (20) | 7 (23.3) | 17 (56.7) | 30 (100) | |
| Kilindoni (n=30) | 2 (6.7) | 1 (3.3) | 27 (90) | 30 (100) | |
| Total (N=120) | 17 (14.2) | 15 (12.5) | 88 (73.3) | 120 (100) | |

Table 5. Fishing vessels owned by fishers in Mafia Island, Tanzania.

| Variable | Village names | | | | Total |
|---------------------------|---------------|-----------|-----------|-----------|-----------|
| | Chemchem | Jimbo | Kanga | Kilindoni | |
| Do you own fishing vessel | | | | | |
| Yes | 22 (73.3) | 16 (53.3) | 20 (66.7) | 25 (83.3) | 83 (69.2) |
| No | 8 (26.7) | 14 (46.7) | 10 (33.3) | 5 (16.7) | 37 (30.8) |
| Type of vessels owned | | | | | |
| Dugout canoe | 17 (56.7) | 9 (10) | 12 (40) | 10 (13.3) | 48 (40) |
| Outrigger canoe | 3 (10) | 6 (20) | 7 (23.3) | 12 (40) | 28 (23.3) |
| Dhow | 2 (6.7) | 1 (3.3) | 1 (3.3) | 3 (10) | 7 (5.8) |

Influence of Marine Tenure Types on Human Capital

In the study area VLC and VEU in Chemchem village as well as BMUs in Kilindoni village had received awareness training regarding the management of fishery resources. They received training from seminars and workshops. VLC and VEU received awareness training on management of fishery resources from WWF in collaboration with MIMP officials. On the other hand, BMUs received awareness training on management of fishery resources from WWF in collaboration with Fisheries officers. They were trained on several management aspects: legal and illegal activities, resource use conflicts, conflicts management strategies, governance and controlling migrant fishers. They were also trained on the right of resident and migrant fishers to access fishing grounds. Seasense project dealt with awareness raising on conservation of endangered species like whale sharks and marine turtles. Such knowledge was subsequently transmitted by VLC and BMUs to other village members through village assemblies. The majority of respondents in Chemchem (90%) and Kilindoni (86.7%) villages acknowledged receiving such knowledge from village assemblies and peer groups **Table 6**. The training was found to be very crucial in enhancing human capital of the participants. The majority of respondents had attained primary level of education (**Table 6**). This was due to a fact that attending school for all children from seven years old is compulsory in Tanzania since 2001. The Alphakrust Ltd was responsible in offering breakfast and lunch to pupils in Jimbo Primary School. Few (12%) respondents had attained secondary level of education. Low level of secondary education to most respondents in the study villages could be explained by lack of secondary schools in the past years in Mafia Island and early marriage among the girls. Mafia Island Marine Park was responsible in paying school fees to secondary school students from poor families. Facilitating secondary education contributes to human capital by improving quality of education Sumra and Rajani ^[13] and efficiency in the marine resources management ^[25,26]. In their study Kajembe and Luoga ^[27] argued that promoting formal education creates awareness and positive attitudes of communities in sustainable use and management of natural resources.

Table 6. Influence of marine tenure types on human capital in Mafia Island, Tanzania.

| Attributes | Village names | | | |
|--|-----------------|--------------|--------------|------------------|
| | Chemchem (n=30) | Jimbo (n=30) | Kanga (n=30) | Kilindoni (n=30) |
| Received awareness training on the use and management of fishery resources | 27 (90) | 8 (26.7) | 12 (40) | 26 (86.7) |
| Primary education | 24 (80) | 18 (60) | 20 (66.7) | 25 (83.8) |
| Secondary education | 5 (16.7) | 0 (0) | 1 (3.3) | 6 (20) |

Influence of Marine Tenure Types on Financial Capital

Financial capital refers to the financial resources which are available to people and which provide them with different livelihood options ^[3]. Most (90%) respondents in the area were involved in fisheries as their main source of income. In average, about Tsh. 1,750,000.00 could be earned annually by a respondent from fishing activities. Income from fishing was often used to obtain inputs for other activities that contribute to livelihoods, such as to purchase farm inputs, purchase food and generate working capital for small scale business like restaurant. This means that communities were generally enjoying substantial amount of income from fishing. Focus group discussions revealed that about 200 men from Jimbo village were employed by the Alphakrust Ltd in shrimp farm. Key informant interview revealed that a reasonable number of people from Mafia Island were employed by the Alphakrust Ltd in the shrimp hatchery farm in Kilindoni village and Tanpesca Company for seafood processing in Kilindoni village. This means that shrimp farm in Jimbo village, shrimp hatchery farm in Kilindoni village and fish processing factory in Kilindoni village were important in the livelihood improvements through providing employment opportunities to local communities. The study revealed that VLC and BMUs were entitled to collect fines from illegal fishing and fees for establishing fishing camp and selling of seafood at the landing sites. Depending on the nature of the crime, fines from illegal fishing in the marine protected area were from Tsh. 50,000/= to Tsh. 200,000/=. Fee for establishing fishing camp was Tsh. 3000/= per fisherman per three months. Some of this money went to the village government where the money was spent for other developmental activities in the village. Key informant interview revealed that the Alphakrust Ltd is paying Tsh. 1000/= daily as its contribution in running Village Government activities in Jimbo village. This shows that fines, fees and contributions were important sources of revenue that can facilitate improvement of financial capital to the local communities. The study observed that presence of whale sharks in Kilindoni bay has encouraged eco-tourism activities. Discussion with village leaders revealed that there are groups of people responsible for guiding tourist to the whale sharks sites within the bay and are not paying fees to the BMU. However, the tourists were also reported to have accommodation at Kilindoni village and buy different commodities including mats, hats and food, this in turn increase income of local people.

IMPROVEMENT OF NATURAL CAPITAL

Natural capital is the quality and quantity of natural resources that are available to people and above all, the access and control people have over these natural resources. Most respondents in Chemchem village perceived that creation of the MPA has resulted in the increase of fish abundance and recovery of coral reefs, mangrove forests and sea grass in areas that were almost damaged before the MIMP took over the management in **Table 7**. These results are in line with what Frontier Tanzania ^[28] observed that the reefs in the MIMP area are in good health. Gutierrez et al. ^[29] observed that marine reserve in Philippine is a highly successful initiative in coral reef fishery and marine biodiversity conservation.

Table 7. Perception of respondents on status of natural resources in Mafia Island, Tanzania.

| Resources status | Village names | | | | Total (N=120) |
|------------------|-----------------|--------------|--------------|------------------|---------------|
| | Chemchem (n=30) | Jimbo (n=30) | Kanga (n=30) | Kilindoni (n=30) | |
| Fish | | | | | |
| Increasing | 18 (60.0) | 7 (23.3) | 5 (16.7) | 14 (46.7) | 44 (36.7) |
| Decreasing | 3 (10.0) | 19 (63.3) | 20 (66.7) | 10 (33.3) | 52 (44.3) |
| No change | 9 (30.0) | 4 (13.3) | 5 (16.7) | 6 (20.0) | 24 (20) |
| Coral reefs | | | | | |
| Good | 24 (80) | 7 (23.3) | 9 (30) | 17 (56.7) | 57 (47.5) |
| Bad | 4 (13.3) | 14 (46.7) | 16 (53.3) | 7 (23.3) | 41 (34.2) |
| Don't know | 2 (6.7) | 9 (30) | 5 (16.7) | 6 (20) | 22 (18.3) |
| Mangrove forests | | | | | |
| Good | 22 (73.3) | 0 | 19 (63.3) | 24 (80) | 65 (54.) |
| Bad | 3 (10) | 30 (100) | 5 (16.7) | 0 | 38 (31.7) |
| Don't know | 5 (16.7) | 0 | 6 (20) | 6 (20) | 17 (14.2) |
| Sea grass | | | | | |
| Good | 24 (80) | 9 (30) | 12 (40) | 19 (63.3) | 64 (53.3) |
| Bad | 2 (6.7) | 11 (36.7) | 13 (43.3) | 7 (23.3) | 33 (27.5) |
| Don't know | 4 (13.3) | 10 (33.3) | 5 (16.7) | 4 (13.3) | 23 (19.2) |

Communities in Jimbo village perceived that the condition of mangrove forest in their area was bad because of the establishment of shrimp farm. Large area (170 ha) of mangroves was cleared to establish the shrimp ponds. Respondents in Jimbo and Kanga villages perceived that there has been decrease in the density of seagrass in their marine waters because some fishermen are still using bad fishing methods. About 44% of respondents perceived that fish stock abundance in the study area has declined nowadays as compared to the past 30 years. They were complaining that nowadays large proportion of catches consists of juveniles and smaller fish. Factors that were mentioned during the survey to cause decline in fish stock abundance were increasing number of fishers, use of illegal fishing methods, unemployment and population growth (Table 7).

INFLUENCE OF MARINE TENURE TYPES ON POLITICAL CAPITAL

Political capital refers to structures of representation, voice and power (Kleih et al.). Results from FGDs revealed that communities in Chemchem and Kilindoni villages have confidence on public leadership because of the training and exposure visits. Through VLC and BMU, communities in Chemchem and Kilindoni villages have the power to protect fishery resources close to their villages. VLC and BMU are responsible in keeping records of boat owners, and their fishing equipment, fishers operating from the beach, participation in vetting boat owners and crew for licensing, undertaking monitoring as well as control and surveillance operations in collaboration with the MIMP and Fisheries Officers. In addition, VLC and BMU are involved in inspecting visiting boats and give permission to land, indicating a role in monitoring of fishery resource. Access to fishery resource in Chemchem and Kilindoni villages is through a permit from VLC and BMU respectively and Fisheries Officer. This means that VLC and BMUs give power local fishing communities to enforce by-laws within village boundary to improve management of fishery resource.

INFLUENCE OF MARINE TENURE TYPES ON CULTURAL CAPITAL

Cultural capital refers to traditions and local knowledge in fishery resources. The study revealed that ritual pray has to be performed before fishing to increase confidence during fishing and catch more (Table 8). It was a taboo to do fishing in some reef due to belief that they are home of ancestors. There was a belief that in order to catch more, sacrifice in form of bread must be given to the ancestors. This belief was spread widely in all study villages and it was respected by the majority (80%) of fishermen. All respondents had strong belief that fish meat is good nutritionally when compared to other sources of meat. Some marine resources like ray fish, seagrass and dead corals were used as medicines for treating simple ailments such skin diseases. Marine waters were mentioned to be very important in removing misfortunes. This shows that there was high level of fishers to respect norms and taboos regarding the use of fishery resource (Table 8).

Table 8. Influence of fish on cultural capital in Mafia Island, Tanzania.

| Attribute | Village names | | | | Total (N=120) |
|---------------------------------------|-----------------|--------------|--------------|------------------|---------------|
| | Chemchem (n=30) | Jimbo (n=30) | Kanga (n=30) | Kilindoni (n=30) | |
| - Perform ritual plays before fishing | 25 (83.3) | 24 (80) | 27 (90) | 21 (70) | 97 (80.8) |
| - Giving sacrifice before fishing | 18 (60) | 20 (66.7) | 22 (73.3) | 16 (53.3) | 76 (63.3) |
| - Fish meat is good nutritionally | 30 (100) | 30 (100) | 30 (100) | 30 (100) | 120 (100) |
| - Fish provides medicine | 20 (66.7) | 20 (66.7) | 22 (73.3) | 21 (70) | 83 (69.2) |
| - Remove misfortunes | 27 (90) | 22 (73.3) | 20 (66.7) | 25 (83.3) | 94 (78.3) |

*Figures in brackets indicate percentages.

CONCLUSION AND RECOMMENDATIONS

The study established that out of the four tenure types identified during the survey, state was the dominant tenure type in the contribution to livelihood capitals. Certainly this was attributed by the fact that communities are allowed to use resources in the park sustainably for livelihood improvements. People in the study area were depending on informal fishing groups to pursue their fishing activities. However, none of these fishing groups were legally registered largely due to lack of trust among fishers and lack of external support. Concern regarding overfishing and degradation of fishing habitats was received by the government and this situation stimulated MIMP to introduce the gear exchange programme in villages under marine park area including Chemchem village. The study established that creation of the MPA has resulted in the increase of fish abundance and recovery of coral reefs, mangrove forests and seagrass in areas that were almost damaged before the MIMP took over the management. There is a need for continuing effort in promoting MPA to ensure sustainable management of fishery resources in the area.

ACKNOWLEDGEMENTS

The study was possible through financial support received from the Western Indian Ocean Marine Science Association (WIOMSA) through the Institute of Marine Sciences (IMS) of the University of Dar es salaam UDSM). I would like to acknowledge WIOMSA on this. Grateful acknowledgement is extended to all Mafia Island district staffs for accepting me and their supportive assistance during the entire time of data collection. All respondents and village government leaders are very much thanked for providing the necessary information that made this study a success. I would like to extend our gratitude to my field assistants who served as guides and enumerators.

REFERENCES

1. URT United Republic of Tanzania. The Fisheries Act Ministry of Natural Resources and Tourism Dar es Salaam. 2003;42.
2. Montoya F and Drews C. Livelihoods community wellbeing and species conservation: A guide for understanding evaluating and improving the links in the context of marine turtle programs WWF-Marine and species program for Latin America and the Caribbean San Jose Costa Rica. 2006.
3. Kleih U et al. Livelihoods in coastal fishing communities and the marine fish marketing system of Bangladesh: synthesis of participatory rural appraisals in six villages and assessment of the marketing system report of project "Fish Distribution from Coastal Communities – Market and Credit Access Issues". NRI Report No 2712 Project A1004 United Kingdom Department for International Development (DFID). 2003.
4. Gautam A P. Equity and livelihoods in Nepal's community forestry. *International Journal of Social Forestry (IJSF)*. 2009;2:101-122.
5. URT -United Republic of Tanzania Fisheries annual statistics report. Ministry of Livestock and Fisheries Development Dar es salaam. 2013.
6. McClanahan TR et al. Management of Kenyan coast Ocean and Coastal Management. 2005;48:901-931.
7. Allison EH and Horemans B. Putting the principles of the sustainable livelihoods approach into fisheries development policy and practice. *Marine Policy*. 2006;30:757-766.
8. Aswani S. Assessing the effects of changing demographic and consumption patterns on sea tenure regimes in the Roviana Lagoon Solomon Islands. *Ambio*. 2002;31:272-284.
9. Kebe M et al. A livelihoods analysis of coastal fisheries communities in Liberia Food and Agriculture Organization of the United Nations Rome. 2009.
10. URT United Republic of Tanzania. The National Fisheries Sector Policy and Strategy Statement Ministry of Natural Resources and Tourism Dar es Salaam. 1997;24.
11. Arnason R. Alternative fisheries management system: the icelandic experience paper presented at the seminar on the future of commons Fishery Policy: The Voice of Europe's Fishing Regions European Centre for the Regions santiago de Comostela. 2001;29-30.
12. Muhando C A and Francis J. The status of coral reefs in the Dar es salaam marine reserves system and the state of reefs in other marine protected areas of Tanzania Institute of Marine Sciences Zanzibar. 2000;23.
13. Sumra S and Rajani R. Secondary Education in Tanzania: Key Policy Challenges Proceedings of Norwegian Post-Primary Education Fund for Africa (NPEF) Seminar Oslo Norway. 2006;10.
14. Mwaipopo R N. The Social Dimensions of Marine Protected Areas: A Case Study of the Mafia Wilson C D. Lake Victoria Fishers attitudes towards management and co-management forthcoming in Geheb Kim and Terri Sarch Broaching from the inland waters of Africa the management impasse: Perspectives on Fisheries and their management. 2001. Island Marine Park in Tanzania International Collective in Support of Fish workers Chennai.2008;54.
15. Samoilys M A and Kanyange N W. Assessing links between marine resources and coastal peoples' livelihoods: perceptions from Tanga Tanzania IUCN Cordial East Africa. 2008;30.
16. Fauzi A and Anna S. Socio-economic impacts of climate change on coastal communities: The case of the north coast of java small-pelagic fisheries International Symposium on Climate Change. Effects on Fish and Fisheries Sendai Japan. 2010;25-29.
17. URT United Republic of Tanzania. Mafia Island Marine Park: General Management Plan Ministry of Livestock and Fisheries Development Dar es salaam. 2011.
18. URT United Republic of Tanzania. The Marine Parks and Reserves Act (Cap 146) Regulations (Adoption of General Management Plans) Dar es Salaam. 2006.
19. Wilson CD. Lake Victoria Fishers attitudes towards management and co-management forthcoming in Geheb Kim and Terri Sarch Broaching from the inland waters of Africa the management impasse: Perspectives on Fisheries and their management. 2001.
20. Kitula M M. Influence of forest land tenure types on forest condition and livelihoods in Uluguru Mountains Tanzania MSc Dissertation SUA Morogoro. 2010.
21. URT United Republic of Tanzania. Guidelines for establishing community based collaborative fisheries management in marine waters of Tanzania Fisheries Development Division and World Wide Fund for nature Dar es Salaam. 2009;60.
22. McClanahan TR et al. Management preferences perceived benefits and conflicts among resource users and managers in the Mafia Island Marine Park Tanzania. *Environmental Conse*. 2008.

23. Silva P. Exploring the linkages between poverty Marine Protected Area Management and the use of destructive fishing gear in Tanzania World Bank Policy Research Working Paper. 2006;43.
24. Bailey B K. Methods of Social Research The free press Cliver- Macmillan Publishers New York. 1994;813.
25. TCMP. Tanzania State of the Coast: People and the Environment Tanzania Coastal Management Partnership (TCMP) and Science and Technical Working Group Dar es Salaam. 2001;54.
26. Crawford BR et al. Compliance and Enforcement of Community-Based Coastal Resource Management Regulations in North Sulawesi Indonesia. Journal of Coastal Management. 2004;32:39–50.
27. Kajembe G C and Luoga E J. Socio-economic Aspects of Tree Farming in Njombe District Sokoine. University of Agriculture Morogoro. 1996;19.
28. Frontier Tanzania An Assessment of the Reefs on Western Mafia Island Tanzania. In. Fosuah EN, Steer MD (eds). Frontier Tanzania Environmental Research Report 125 The Society for Environmental Exploration London UK the University of Dar es Salaam. 2009.
29. Gutierrez N et al. Leadership social capital and incentives promote successful fisheries. Nat. 2011;470:386-389.