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Socio-Economic Profiles of Communities Adjacent to Tanga Marine Reserve Systems, Tanzania: Key Ingredients to General Management Planning

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Abstract: The aim of the present study was to appraise socio-economic profiles and dependence on coastal and marine resources of communities adjacent to the newly established Tanga Marine Reserve systems (TMRs) as a key element that will inform development of a General Management Plan (GMP) for the reserves. Establishment of Marine Protected Areas (MPAs) have been sought as viable measures to prevent coastal and marine resources degradation whilst ensuring viable livelihoods options for local communities. A total of 140 household interviews and seven semi-structured key informant in-depth interviews were administered in seven representative villages. Fishing (inclusive of fish vending) and agriculture were common occupations, which quite often overlapped. The limitations to community development were rooted in lack of modern equipment and technological advancement for fisheries and agriculture. These emanated from limited access to capital and markets. Illiteracy was also implicated in the deterioration of livelihoods in most households. Household expenditure to income ratio indicated that, household budgets are vulnerable to deficits and that rival and recurrent expense items like food drew the majority of household income. Enhancement and diversification of livelihoods occupations is one of viable management strategies to be incorporated into the GMP for TMRs because predominant fishers may gradually shift to off-fishing occupations. A robust transition is therefore pertinent. Some of the eminent examples for consideration as alternative sources of income are suggested.

Key words: Coastal marine resources, general management plan, livelihoods, marine protected areas, tanga

INTRODUCTION

The coastal zone of mainland Tanzania encompass five coastal regions which cover about 15% of the country's land area and home to about 25% of the population (with current estimate of population standing at about 40 million people). This coastal zone is endowed with rich natural ecosystems including coral reefs, seagrass beds, beaches, estuaries and extensive coastal forests including mangroves. The poor rural coastal communities variably rely on these coastal and marine resources for their primary livelihoods (TCMP, 1999). High dependence on the coastal and marine resources, compounded with ever increasing population, exerts increasing pressure on the resources from competing users with various interests (Wells *et al.*, 2007). In response, the concept of MPAs (IUCN, 1988), have been introduced since the last couple of decades (Samoilys and Kanyange, 2008). In the mainland Tanzania, the Marine Parks and Reserves Act No. 19 of 1994 provided the first guide on the establishment and institutional mechanisms for management of MPAs including marine parks, marine reserves, and community-based management areas. Marine parks are defined as relatively large multiple use zoned areas while marine reserves are smaller no take zoned areas. Community-based management areas are based on the idea of empowering communities to care for their own resources whereby village and district by-laws are jointly established to institute management portfolios often with technical support from the fisheries departments and other conservation non-governmental organizations.

Marine protected areas primarily operates to ensure that fishery resources are sustainably exploited under proper management and conservation measures, so as to achieve economic growth, human development, and employment creation, while maintaining a sound ecological balance (Sesabo *et al.*, 2006). Much as it is an institutional approach, it is suggested that social environment, rather than biophysical variables, are the primary determinants of MPAs' successes (Roberts, 2000; Pomeroy *et al.*, 2006). It is however and often more difficult to get the social components of an MPA "right" than the biophysical components which are easily drawn from field measurements, inventories and census. Because of this, communities' socio-economic welfare has tended

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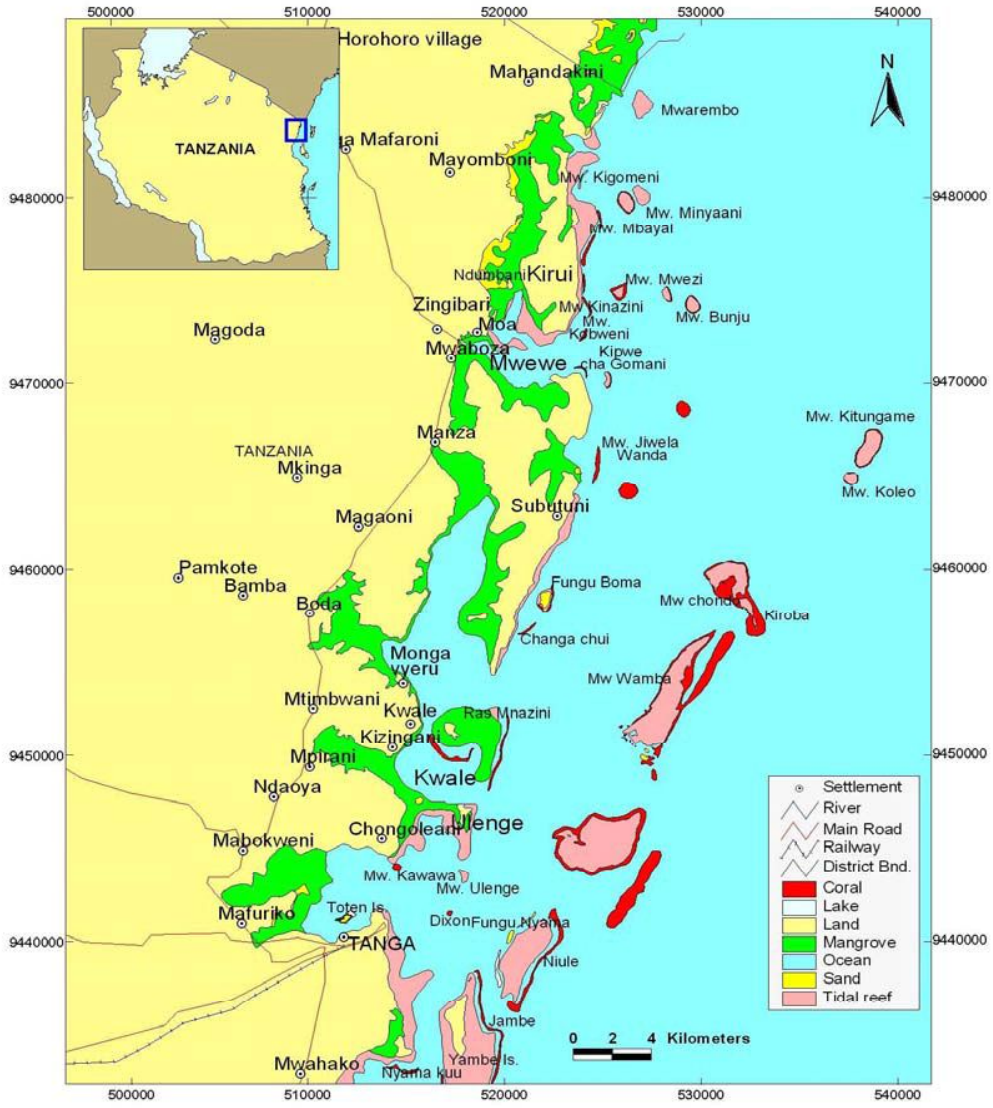


Fig. 1: Map showing Tanga Marine Reserve systems and associated coastal and marine habitats and resources around them. Mw is a short form for Mwamba which locally refers to a reef representing a fishing ground. Institute of Marine Sciences GIS Database

to be undermined. But, while in essence livelihoods and prosperity of the people depend upon the condition of the same resources that are being protected. Because humans both affect and are affected by establishment of MPAs, these are directly linked to the socio-economic environment in which they operate (Fiske, 1992; Cocklin *et al.*, 1998). It is therefore paramount for close communication with communities to keep up the spirit of collaborative management and enhance local community in participation MPAs management planning and other decision-making processes. This is particularly important because once a GMP is developed it is often a legal document (Thomas and Middleton, 2003). Therefore report here selected findings of a participatory socio-economic survey we conducted in communities adjacent to TMRs as a prerequisite for a GMP process.

METHODOLOGY

The study area: TMRs are the most recent MPAs in Tanzania declared in June 2010. These marine reserve systems encompasses four islands of Kirui, Mwewe,

Kwale, and Ulenge, which form a unique ecological system that comprise of a diverse coastal and marine habitats ranging from luxuriant fringing corals, seagrass beds and an almost continuous strip of mangrove stands along the north eastern coastal strip bordering with Kenya (Fig. 1). In addition to the rich fishing grounds around the intertidal areas and surrounding reefs, the islands also have other land cover and vegetation types that allow for a range of activities including small scale crop farming and livestock keeping, and harvest of forest wood products. There are also cultural values linked to the adjacent communities such as historical ruins, traditional and spiritual connections as ancestral grave yards and sacred groves. These are potential amenities for community based ecotourism and other recreational promotions. Seven villages were selected for this socio-economic survey including Mahandakini, Ndumbani, Moa, Kwale, Kizingani falling in Mkinga district and Chongoleani and Mabokweni within Tanga city. Selection of these villages sought to have a representation in relation to the closeness, access and dependence on the four islands marine reserves such that Mahandakini, Ndumbani and Moa are associated with Kirui and Mwewe marine reserves, Kwale and Kizingani are associated with Kwale marine reserve, and Chongoleani and Mabokweni are associated with Ulenge marine reserve.

Data: Primary data were obtained through two participatory tools. Household questionnaires survey and key informant in-depth interviews during July-August 2011. In each of the seven villages, household questionnaires were administered to 20 randomly selected individual heads of households or their representatives (depending on their availability and willingness to participate) making a total of 140 individual interviews. With the assistance of the village leaders a fairly representative proportion of different social and wealth classes of the households were maintained. Data from these interviews were retrieved for descriptive and statistical analyses such as percentages, frequency distributions, cross tabulations, means and variance analysis, using Statistical Package for Social Sciences (SPSS). Key informant in-depth interviews were conducted with village leaders and a selection of one or two influential villager (s) who were conversant with the historical background of their village. Information from these in-depth semi-structured interviews was subjected to content analysis.

RESULTS AND DISCUSSION

Household demographic characteristics: Overall distribution of heads of households indicated that 83% of the households were male headed. From cultural point of view, in most Tanzanian societies, men have predominantly been heads of households regardless of being in rural or urban areas. Nonetheless, the remainder 17% female headed households is quite considerable. This type of household distribution pattern explains the observed marital status of female heads of households which indicated that most (88% of female headed households) were widows and divorcees. In rural settings especially, gender relations have implications on household welfare in terms of both food and income security. Often female headed households are found to be more food insecure and poorer than male headed households (Malleret, 2004). This proportion of female headed households provides for an MPA management clue, that, gender consideration is important for prospective socio-economic interventions. This social group may require commissioned attention as they are often marginalized, their voices not heard or just ignored in planning and decision making processes. Not only are institutional frameworks that undermine women, but also, both culture and religious mixture in coastal communities of Tanzania has tended to marginalize women (Ingen *et al*., 2002).

Age distribution of heads of households was fairly similar across surveyed villages. The lowest encountered age of a household head was 20 years with a mean age of 47±1 years. About 76% of interviewed heads of households were within age range of 20 to 60 years. This pattern of age distribution of heads of household indicated that majority were within active and productive age. In Tanzania, 18 years is considered the official adult age and 60 years is the compulsory retirement age. Age is essentially considered to directly or indirectly determine how active and productive the head of household would be. Age of head of household also have an implication of the availability of able-bodied labour in charge of primary production, reduction in the degree of risk aversion and may thus affect the ease and rate of household adoptive innovations for enhancing livelihood occupations and ultimately reducing poverty (Dercon and Krishnan, 1998). For household members other than the head of household, it was observed that most households had high proportion of members who are able-bodied and active labour for primary production. Dependent household members (children and the old) were less. For example, 40% of the households had no members below 5 years and only 35% had at least an old member of above 60 but these did not exceed 3 in any given household. The larger number of less active adults (e.g., the old or the unemployed) and children in a household, the heavier the burden on active members in meeting the cost of minimum household nutrition, and hence, the higher the level of food insecurity and the probability or intensity of poverty, and vice versa (Lanjouw and Ravallion, 1994). With this pattern of age distribution, communities in the surveyed villages have potentially large labour force for diversifying livelihood activities (Harrison, 2010) that

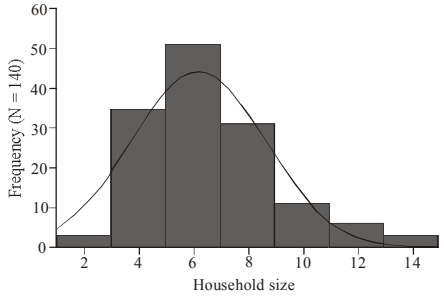


Fig. 2: Frequency distribution of household sizes in surveyed villages

may be of credit for planning and promotion of interventional strategies to reduce dependence and pressure on coastal and marine resources in the wake of enforcing TMRs.

Average household size in the surveyed communities was 6.2 (Fig. 2) with 74% of households having 4-8 people per household. This average was relatively higher compared to the averages reported in the National Population and Housing Census of 2002 at district, regional and national levels which were 4.5, 4.6 and 4.9, respectively. Household size could have a negative or positive correlation with household food insecurity and the probability and intensity of poverty, depending on the dependence ratio, which is usually positively correlated with the intensity of poverty. For example, in terms of expenditure, household characteristics like actual school attendance and incidence of child labour may reveal negative relationship between household size and poverty because with increase in household size, expenditure per student decline which result into increased drop-outs and thus vulnerability to child labour (Akarro and Mtweve, 2011). Nevertheless, household size may be positively correlated with household food and income security and wealth status if the household dependence ratio is low (Kamuzora and Gwalema, 1998; Kamuzora and Mkanta, 2000). They related this kind of observation to demands of a labour intensive socio-economy whereby households that have more labour tended to be less poor. Even though, they remained cautious because the paradox still remains because there are high proportions of bigger households which are poor in Tanzania.

Development and social services: Provision of health services was rated high at 91% as an important driver of welfare change across villages. Not all villages had a health facility, cases in which villagers had to travel some distance to neighbouring villages where there is one or to Tanga city to seek medical services. A dispensary was only found in Moa, Chongoleani and Mabokweni villages. However, these dispensaries all lacked important medications in most times. Attending patients were accustomed of being directed for medical purchases from private dealers. This is a challenge that collaborative conservation initiatives will have to seek to address in winning community support.

Education was second at 88%. There were a considerable number of those who completes primary education in all villages, but quite a few who goes on to complete secondary education and even much less in post secondary education. Again, a considerable proportion of members of households across villages had not attended any formal education. Despite of there being a popular nationwide campaign for ward secondary schools, these schools seems to have not yet exerted significant impact to the communities around and quite a large number of primary school leavers from the surveyed villages do not qualify or even are not able to join the schools on lack of financial capacity. Illiteracy was therefore still high. It is a driver that may require a particular boost to raise the education standards which will in turn equip the communities with the necessary human capital for coping and engaging on emerging livelihood opportunities. Education is vital for making people more aware and easy to adopt new emerging opportunities for earning a living. It is often hypothesized that the educational status of especially a head of household is positively correlated with household income-earning capacity and, therefore, negatively correlated with the food insecurity and poverty status of the household (Litchfield and McGregor, 2008; Akarro and Mtweve, 2011).

Water supply and services was also ranked high (84%) in driving for community welfare. Availability, access and use of safe drinking water is low across villages except for Mabokweni and Moa villages which had a fairly reliable supply of tap water. Traditional and natural water holes were characteristic water sources especially in the villages of Mahandakini and Ndumbani villages. In the other villages these were supplemented by limited constructed bore holes, rarely fitted with hand pumps.

Livelihood occupations: Majority of livelihoods activity in the surveyed villages is related to fisheries and associated activities including fish vending. Fishing types varied across villages. A wide variety of fishing methods used in the communities adjacent to TMRs, similarly represented a wide variety of fishing habitats (Fig. 1) and targeted fish species. Some fishing methods were fairly of general scope, aiming at many types of fish, while others were more specialized, geared to capture specific species. Some fishing methods were traditional, while others were more recent introductions using modern materials (e.g., spear fishing). Mahandakini and Mabokweni villages were characteristic for ring net fishing while in other villages a mixture of fishing methods and gears were variably reported but mainly including among others gill nets, hand lines, basket fish traps, and octopus gleaning.

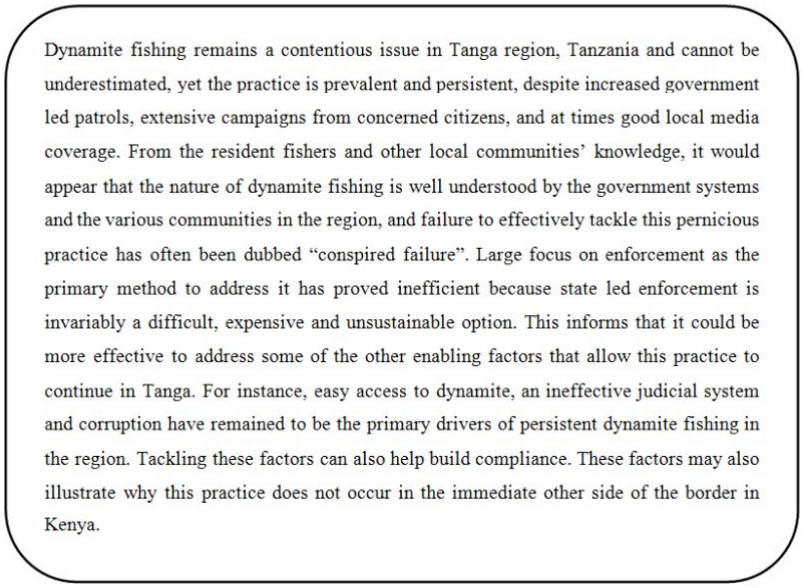


Fig. 3: The politics of dynamite fishing (Samoilys *et al.*, 2007a, b; Samoilys and Kanyange, 2008)

Hand line was ancient and is probably more selective than many other methods. Literally most fishers reported to fish all year round but they only reduced fishing efforts during SE rough monsoon winds which prevail from May - August. On a monthly basis, fishers reported to abide to the lunar cycles and most methods and/or gear types are influenced by this cycle. That, in prime fishing season of NE monsoon during November-February most fishers go out for up to 23 cyclic days from lunar day 17 to lunar day 9 into the following lunar month depending on the method and gear type. Fridays are virtually spared for prayers.

Fishers perceived drop in productivity as mostly related to the increase in number of fishers due to limited employment opportunities for young school leavers and high mobility of fishers mainly from the islands of Pemba and Unguja. Lack of modern equipment (vessels and gears) and technological advancement to allow for offshore fishing where fishes are thought to seek refuge from increased pressure and use of destructive and illegal fishing practices (especially dynamite fishing, Fig. 3) in the near shore fishing grounds. Fish marketing and pricing is also a challenge to small scale artisanal fishers who often rely on capital and materials support from a few fisher lords. As such, organization of fishing activities were mainly reported to be monopolized by these fisher lords (who are often major fish vendors) who owns the fishing vessels and gears, only hiring labour for large fishing crews for ring nets and gill nets on outboard engine or sail boats. Informal agreements quite often exist between fish vendors and fishers; whereby traders lend money to fishers with the understanding that the fisher will sell his catch to the trader (Malleret, 2004).

Another important livelihood occupation was agriculture. Crop farming and livestock keeping seemed to be well indicated as essential household livelihood occupations but when referenced to income sourcing and contribution to the household food, crop farming was minimally scaled across surveyed villages and remained so rudimentary an activity for household engagement. Coastal communities in Tanga and Tanzania at large are not traditional cultivators. In the surveyed villages, low crop yield attributed to poor soil fertility and pre-harvest losses due to incidences of wild animal predation were commonly cited as some of the reasons for reluctance to crop cultivation in these areas. Nonetheless, from the local knowledge it was indicative that crop farming holds much potential of becoming a major source of livelihood. The most potential crop in the villages is cassava which was indicated to fetch quite a reliable market in the region. Promotion of this kind of crop production would boost both household incomes and enhance household food security as households will be producing a large share of own food with reserves to cover for times of general food shortages. Cassava is an easy crop to process and preserve. These reasons point to important policy and management issues regarding agricultural development and extension in the surveyed villages. The problem of inadequate access to agricultural credit points to the need for efficient micro-credit schemes for sustainable agricultural development. The interrelated problems of poor soil fertility and low crop yield may be calling for measures to make fertilizers readily available to farmers and promote soil conservation and farm management practices.

Table 1: Comparing household total mean annual income and expenditure levels (Tanzania shilling '000, mean±SE) and ratios for different surveyed villages (n: 20; N: 140)

Village	Income	Expenditure	Expenditure to income ratio
Mahandakini	3215±309	2579±233	0.8020
Ndumbani	2587±180	2272±142	0.8779
Moa	3770±343	2517±218	0.6677
Kwale	3828±498	2705±313	0.7067
Kizingani	3858±467	2519±285	0.6529
Chongoleani	4071±557	2814±309	0.6912
Mabokweni	3877±448	2583±181	0.6662
Overall	3601±160	2570±92	0.7136

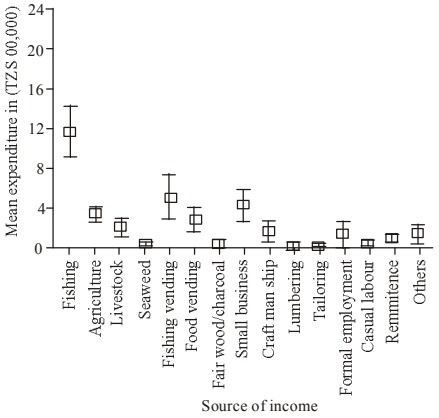


Fig. 4: Annual household income (Tanzania Shilling) from various sources (mean±SE at 95% CL)

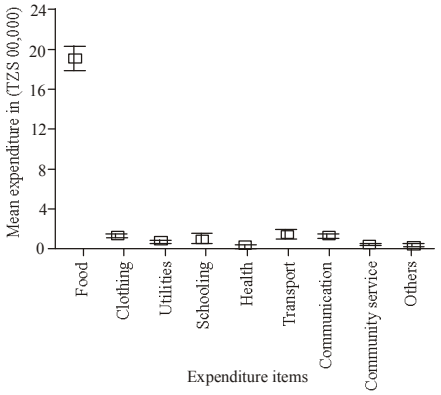


Fig. 5: Annual household expenditure (Tanzania Shilling) pattern on various items (mean±SE at 95% CL)

Household income and expenditure: There were no significant differences ($p = 0.05$) in levels of income accrued from different activity sources between villages except for seaweed farming ($p = 0.001$). There were also no significant differences deduced on expenditure levels on different items across villages. Overall means for annual total incomes and expenditure indicated mean expenditure to income ratios of over 70% (Table 1). This was an indication that majority of households in the surveyed villages were more or less proportionally spending much on recurrent commodities with little or no savings for household development endeavours like construction of better houses and or purchase of durable assets which often act as safe-nets in events of household economic shocks. For the purpose of this survey, housing expenses which characteristically would take a large potion were omitted. The higher the ratio, the higher a household would be at risk of income insecurity as households become more prone to not being able to self sustain in covering all household expenses, because earnings are hardily sufficient and therefore budgets are vulnerable to deficits. Such households tend to be more prone to poverty.

On specific terms, fishing was the major source of income in the surveyed villages contributing to over one-third of mean annual total household incomes (Fig. 4). This implicitly meant that, disrupted artisanal fisheries operations would amount to considerable shocks in livelihoods dynamics of the communities if there will be no appropriate integrative safe-net measures as access to fishing grounds around the island reserves become restricted. In terms of expenditure, the most important item of expenditure was food which was indicated to be by far drawing large portion of the accrued household income at a proportion of about two-thirds (Fig. 5). The expenditure on food combined estimates for both own-produced and purchased food. This observation conformed to our experience from other rural communities in the Mnazi Bay-Ruvuma Estuary Marine Park (unpublished) where the poor tends to devote a high share of their budget to rival goods such as food.

Non-food recurrent commodities that had most widespread consumption by households were clothing, education, transport and communication. Analysis showed that even if expenses on these non-food major household items were summed up they would still remain disproportionately less to expenses on food. Generally, local conditions and circumstances often dictated the relative distribution of total household expenditure on various non-food consumer items. For example, the surveyed coastal communities are largely Muslims and therefore take periodic religious and secular/cultural ceremonies very seriously such that households tended to make savings for and close to these events and relatively high shares of household expenditure are often devoted to especially clothing. Meagre expenditure on health represented the general experience with rural poor households that due to lack of and/or inefficient medical services, they tend to rely on traditional herbal remedies of which they can't put value on and account for.

CONCLUSION

Generally MPAs are recent conservation initiative in many developing countries and Tanzania is not an

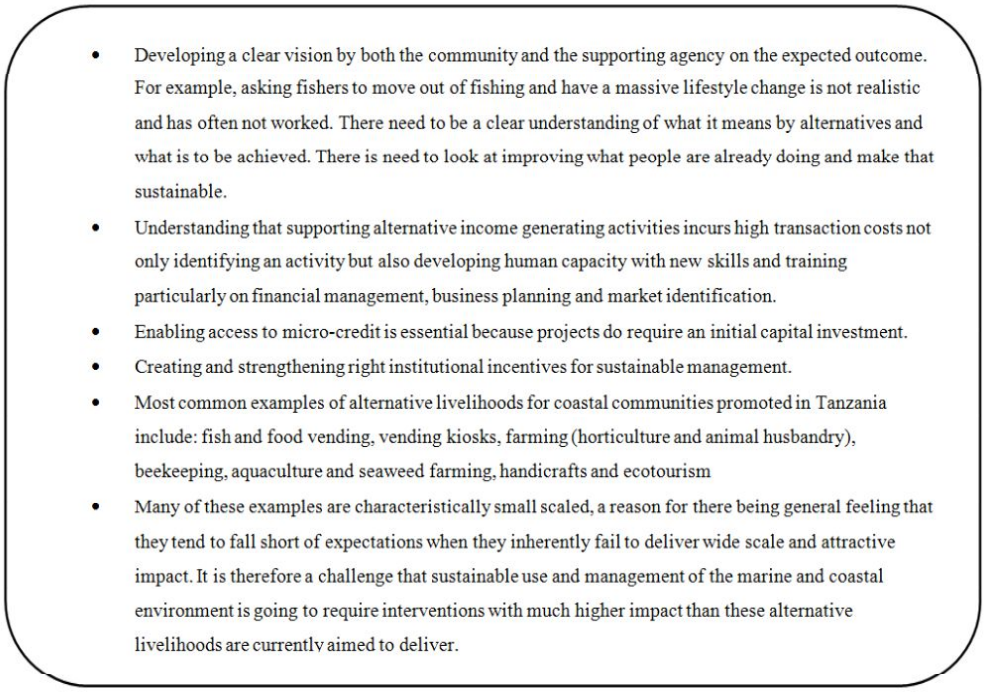


Fig. 6: Summary guide to best practice for sustainable alternative livelihoods activities for coastal communities of Tanzania (Ireland, 2004)

exception. As such lessons and experiences from other MPAs in the country indicate that modalities of management and collaboration with communities have not been ascertained and their full potential and excellence to enhance livelihoods in coastal, especially rural communities have not been fully realized (Samoilys and Kanyange, 2008). It is therefore of continued relevance that understanding community profiles, needs and priorities remains a key prerequisite for acceptable and effective interventions that maximise the potential of community participation and support. As exploitation of marine resources remains particularly important in terms of income and food security, the value that people attach to their environment continue to depend on the extent to which the environment provide direct resources and services for their livelihoods. Therefore sustainable utilization of these resources through sound conservation measures is an obvious need. But, most social conflicts arise when governance systems fail to prove the rational sharing of the costs and benefits of conservation on grounds of poor understanding of the social-ecological nexus of resource sustainability. The present socio-economic survey was therefore eminent in providing indicative welfare profiles and desires of the communities that the state institutional management and conservational measures will seek to address while fostering community participation, acceptance and responsibility which are key ingredients to effective MPAs operations.

MANAGEMENT RECOMMENDATIONS

Based on the perceptive responses from the field interviews, community expectations, and expert observations and knowledge, a number of management recommendations are iterated to inform and advise Marine Parks and Reserves Unit (MPRU) for further analysis, consideration and integration into the GMP process practice.

- Conduct commissioned and detailed alternative livelihoods feasibility assessments to avoid misconceptions that have been experienced in previous support and in other areas where similar interventions have failed.Conduct community needs assessment with the support of local authorities to reveal the current level of reliance on coastal and marine resources and establish the footprints and therefore devise informed mechanisms on how such needs can be addressed without necessarily degrading the resource bases. A community based planning process will be a large step towards increasing communities' participation and informing them of the intentions of establishing the marine reserves.
- Factor in rural poverty and promotion of diversification of livelihood occupations with incomes from outside the fishing sector. Examples as provided in Fig. 6 may still well be applicable.

Enterprises like those related to cultural heritage and ecotourism (the island reserves host rich historical, cultural and ecological amenities), fish farming, craft (weaving) making, forestry/woodlot management and bee keeping have proven their capacity to uplift communities from poverty and when well designed, they are more income generating than traditional destructive activities that communities find comfort in.

- Focus on gender based and/or gender mainstreaming with regard to the promotion of entrepreneurship among females in households to enhance their income-earning capacity through training for technical and managerial skills acquisition, credit support, resource supply support, and sustainable social capital formation. Women's comparative advantage in rearing small stock (sheep, goats, and poultry), small-scale agro-processing, and produce marketing should be fully exploited to promote household food security and reduce household poverty.
- Support formulation of by-laws and their enforcement to guide the implementation of interventions geared towards coastal and marine resources management, and alleviate the mindset towards resource degradation with impunity.
- Information packaging and dissemination. The way information on TMRs and other MPAs is packaged and communicated to target communities will make a substantial difference from mere communication in the ordinary sense of the word which has quite often resulted into distortion and mislead. Given the observed low levels of formal education with most of the people in the communities, MPRU is ought to package its information in tailor made styles and adopt direct communication methods e.g. village meetings as a more appropriate communication medium in communities of this kind of socio-cultural and economic set up because miscommunication, misinformation, ill informed rumours may all prove to trigger community resentment against the marine reserves.
- Noting that TMRs are located towards and at the border with Kenya where there are also marine protected areas (Kisite Marine National Park, Mpunguti Marine National Reserve and a Community based Mtang'ata Collaborative Management Area), trans-boundary collaborative work is relevant for effective enforcement, delivery and community participation. This can be achieved through a number of mechanisms including: trans-boundary networking, joint awareness raising campaigns and community exchange visits, collaborative monitoring and surveillance, mirroring of management planning processes and implementation.

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