A Socio-economic Baseline Assessment of the Mnazi Bay Ruvuma Estuary Marine Park

D. Malleret

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For the UNDP/GEF Development of Mnazi Bay Ruvuma Estuary Marine Park (MBREMP) Project

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EXECUTIVE SUMMARY

Introduction
A socio-economic assessment of the Mnazi Bay - Ruvuma Estuary Marine Park (MBREMP) was carried out from March to July 2004 with the objective of increasing understanding on communities (approximately 28 000 people) who live within the Park. Understanding better these communities, the way in which they use and how much they depend on MBREMP marine resources will increase the chances of involving these communities effectively in MBREMP management, as stipulated in the Marine Parks and Reserves Act (1994), and thus increase chances of achieving sustainable resource use.

In the first stage of this assessment, the economic structure (occupational structure) of MBREMP communities was mapped. This gave a first indication of the dependence on marine resources at the community and MBREMP levels. It also showed the variety of activities on which livelihood strategies are based. The second step of the assessment was a household survey in five selected villages to investigate further the dependence on marine resources at the household level and households’ relative wealth status. At the same time marine resource related use patterns and user based conflicts were studied through focus groups and key informant interviews.

Occupations
The occupational structure showed that a wide variety of activities are carried out in the Park (55 activities were identified) and that 35% of the MBREMP households are involved in marine resources associated activities (they depend at least partly on marine resources for their livelihood) through fishing and trading (fish, crustaceans, holothurians, cephalopods and shells) and in a very small proportion through sea weed farming. It showed that MBREMP communities could be differentiated according to four main geographic areas: seafront communities whose involvement in marine resource exploitation and trading is much higher than in other communities (50-60% of households involved), mangrove villages, riverine villages, and ‘other’ villages.

The most dependent villages on marine resources (highest number of fishers, and/or highest proportion of households involved in marine resource associated activities) are sea front villages and Tangazo (a mangrove village). Most marine resource dependent households also depend on other activities for their livelihood. Very few rely only on marine resources. This was confirmed by the household survey.

The household survey provided further details on the level of dependence on marine resources at the household level. The time commitment to fishing was found to be high; most fishers spend 5 to 6 days fishing per week, days-off being taken for religious practices and gear or boat maintenance. A few days are taken off per month at the beginning of neap tides which is not considered a productive period. Most fishing households in seafront and mangrove villages fish at least three quarters of the year. Months taken off are for farming or due to weather conditions (strong winds). Most fishing households did not consider fishing to provide a sufficient source of income to sustain them, despite ranking fishing as their main source of income.

Stakeholders, resource use patterns and user group conflicts
Stakeholders of the marine resources in the Park are numerous and varied, they include fishers (men and women), traders (men and women), agents, exporters, local government, consumers, the Marine Park authority and so on. These stakeholders are based in or outside the Park (e.g. inland Tanzania, Dar es Salaam, Europe, Asia etc.). The resource use patterns investigation focused on the primary stakeholders: resident fishers (approximately 1400) and resident traders (approximately 160).

Fishing methods used in MBREMP include nets, spears, lines, trap, and diving. Fishing is carried out day and night, mostly near shore with small non motorised boats. Handlines and nets, particularly ‘tandilo’ (women), are the most widely used gear. Men dominate the activity except for ‘tandilo’ fishing. Shell fishing is very common and involves a high number of fishers. This activity is divided between men who go diving, particularly ornamental shells, and women who glean for shells mainly for food. Shell fishing was found to be opportunistic and occasional.
Tidal and seasonal patterns affect fishing in the Park. Most fishing starts at low tide and ends at high tide. Spring tides are considered the most productive times of the month for fishing. Spring tides are the peak octopus and shell fishing times. Three main seasons were identified by fishers: the Southeast monsoon (March-October), the Northeast monsoon (November-February), and the ‘matalai’ (between the seasons). Most fishers consider the Northeast monsoon and ‘matalai’ as the best fishing seasons (best sea conditions and higher catch) except sea cucumber fishers for whom the Southeast monsoon is best.

Fishers who operate in MBREMP are mostly residents of the Park; however crews from Mtwara, Msangamkuu, Ngao, and Mikindani also fish in the Park. Similarly, Park fishers also fish in Mozambique. Results suggest that the most used fishing grounds for MBREMP fishers are those located around Bahasha, Litokoto, and Namponda.

Findings from this study suggest that MBREMP’s marine resources are under pressure. Most resources are perceived as having declined in the last 10 years (catch has reduced and the number of fishers has increased). This is particularly the case for ornamental shells, sea cucumbers, and demersal fish. However, large mesh size net fishers and some ‘tandilo’ fishers perceived their catch as having increased. Two reasons for this were identified by the groups interviewed: the effective end of dynamite fishing in 2000, and the ban on beach seining by the Marine Park. Despite the drop in catches, income is not considered as having dropped dramatically in recent years due to price increases.

Fishing skills and cost of gear often determine which fishing gears fishers will use. Fishers expressed a preference for net fishing, the most expensive fishing method, because it is considered as providing the best income and catch. Fishers can also join net fishing crews at no capital cost. Fishing gear and boats are often shared among a group of fishers, or belong to rich individuals ‘tajiri’ who employ fishers.

Results also showed that trading is an important economic activity in MBREMP communities, particularly in Msimbati where more than a third of marine product traders are located. Fresh fish are mostly traded at the local level (Park villages and Mtwara), dried fish is mainly sold inland, and sea cucumbers, octopus and shells are mostly exported. Sea cucumbers, shells, opercula, and octopus are sold by traders to agents in Mtwara who operate for exporters based in Dar es Salaam and Zanzibar. These exporters provide agents with cash, and sometimes with boats and ice boxes, to purchase the products. Some exporters operate directly from Mtwara (e.g. for octopus) or base themselves temporarily in the Marine Park (e.g. sea cucumber exporters).

Traders’ peak seasons relate to product availability, demand (customers’ purchasing power which increases during cash crop harvests) and rainfall patterns (dried products are of better quality during the dry season). These three factors are interlinked. The amount of product traded increases during these peaks, as does the number of operating traders. The margins taken by traders vary according to the products sold, from 30% (sea cucumber) to 100% (fresh fish). Traders and agents interviewed all have noticed a decline in ornamental shells and sea cucumbers availability. At the same time the dried fish, seashell opercula (protective cover of seashells), and octopus trades are booming. It was estimated that 300 mt of octopus is exported from Mtwara per year (30 mt from the MBREMP), 1.5 mt of sea cucumber and 30 mt of opercula.

Despite the lack of information on income, it appears that sea cucumber and dried fish traders are generally the wealthiest marine resource dependent groups.

Investigating fishing and trading use patterns showed that Mozambique plays an important part as a fishing ground and marine product provider to MBREMP communities. According to agents, most ornamental shells and sea cucumbers come from Mozambique.

A lack of organisation among the fishers and traders was detected. No fisheries related association or cooperative were mentioned as being active in the MBREMP.

Although no major conflicts were identified among stakeholders (setting aside the relationship between Nalingu community and the MBREMP that excluded them from this study), some important conflicts
exist. A number of groups (including fishers and traders) interviewed expressed resentment towards the MBREMP. Disagreement between traders and fishers based on the lack of respect for informal financial agreements is another important source of conflict. Another important conflict was found between local and outside traders relating to the higher purchasing power of outside traders. This may affect the price and quantity of fish available at the local level (access to affordable protein for local people) and on a seasonal basis.

**Socio-economic status**

Figures on income and catch were difficult to obtain, however it appeared from the groups that were interviewed that traders were better off than fishers, particularly sea cucumber traders and dried fish traders. Sea cucumber fishers also consider themselves well off. This was confirmed by the household survey.

A simple indicator was used to measure the relative wealth of different user groups. The indicator was based on material style of life data (household assets) and took into consideration local based wealth/poverty criteria. These included house construction material and condition, livestock, land ownership, transport ownership, and households’ access to power.

The impact of demographic, economic and geographic factors on households’ socio-economic status, were tested. Although no significant differences were found according to general categories of activities, significant differences were detected within activity groups. Indeed results show that households mainly dependent on fishing (fishing ranked as the most important source of income) are the poorest of the ‘marine dependent households’. Traders and particularly sea cucumber traders are the wealthiest in the group.

Widow headed households were found to be more vulnerable than other households. Fishing households’ relative wealth status was not found to vary significantly according to the fishing patterns (e.g. gear, access to boats etc.), however, results showed that boat ownership and the type of boat owned reflects the wealth of fishing households.

Finally, one of the most significant findings of this part of the research was that wealth, as measured by material style of life data, is positively linked to the diversity of the households’ portfolio of livelihood activities. The most vulnerable households were found to be households dependent solely on one activity for their livelihood, and the most vulnerable of all are those who depend solely on marine resources for their livelihood.

**Issues raised and recommendations for monitoring**

Based on the socio-economic baseline assessment, a number of issues were highlighted and a monitoring programme was recommended.

- The main threats to MBREMP marine resources come from: a) the number of people involved in marine resource extraction; b) the dependence of the communities in general on marine resources for their livelihoods and a high number of households in particular; c) poverty/lack of access to funds/capital; d) the demand for marine products and the volume of trade of specific marine products; and e) destructive fishing methods.

- The dependence on marine resources varies from village to village (the most dependent on marine resources are Mkubiru, Mngoji, Msimbati and Tangazo, and probably Nalingu). The heterogeneity of village level dependence will have to be taken into consideration in the zoning process to ensure that the most vulnerable households are not deprived of their main source of livelihoods. Alternative livelihood opportunities could help to mitigate negative impacts of zoning if readily available.

- Shells are heavily exploited. It is recommended that the sustainability of the current level of shell exploitation and the contribution of shell meat to the households’ animal protein supply be investigated further. This would provide the Park with a basis on which to take decisions on how to regulate shell collection/fishing.
• Destructive methods, particularly small mesh size nets are of concern. One of the most difficult issues for the Marine Park will be to deal with ‘tandilo’ fishing. This is a small/zero mesh size fishing method (mosquito net or cloth) used by women. Contrarily to beach seines, ‘tandilo’ is not perceived as a destructive gear by the communities. Its use is very widely spread and may be one of the only direct sources of income for women in the Park. Further information on the cultural, social, religious, and economic factors that affect women’s economic opportunities in the MBREMP will be necessary for the Park to work with these women to identify appropriate alternative sources of livelihood.

• The lack of fisher and trader organisations, and the difficulty to access funds/capital, constrains people’s economic opportunities. This lack of economic opportunities is likely to increase pressure on currently exploited marine resources. Investigating possibilities of creating an enabling environment for marine resource user groups to organise themselves to access funds/capital may be a way to reduce pressure on MBREMP marine resources. Micro credit schemes for the marine resource user groups would be worth exploring.

• MBREMP’s communities’ dependence on apparently declining Mozambican marine resources is a pressing issue to tackle for the Park to achieve its goals.

• Good Park/community relations are essential if the Marine Park is to achieve its objectives and be managed in a sustainable way. It was found that miscommunication and misinformation are often at the root of negative attitudes from the communities towards the MBREMP. It would be worth strengthening MBREMP’s community awareness activities.

• This study shows that the health status of Marine Park resources is subject to a complex web of international/global, national, regional, and local influences that are determined by aspects such as basic food needs, taste, aesthetics, culture, and religious practices. The Marine Park does not have the power to influence all these aspects, however, by working in close partnership with as wide a spectrum of stakeholders as possible who impact MBREMP resources and will be impacted by Marine Park regulations, the Park may contribute to changing consumer preferences (e.g. in relation to threatened species).

• In order for Park Management to be aware of changes in the socio-economic context of the MBREMP, and the impacts of Park Management actions on community behaviour and economic opportunities, it is recommended the following be monitored:
  1. Community occupational structure (in the most marine dependent villages),
  2. Resource use patterns (in the most marine dependent villages),
  3. The trade of seashells, sea cucumbers and octopus (in all relevant villages)
  4. Marine product prices (in all relevant villages),

It is also recommended that a comprehensive socio-economic assessment be carried out periodically (e.g. every 10 years).
1 INTRODUCTION

Coastal communities are often highly dependent on marine resources for their livelihood and food security (Malleret King, 2000, Malleret King et al., 2003). By introducing changes to traditional user rights, and to the socio-cultural context within which coastal communities determine access to marine resources (Fiske, 1992; Cocklin et al., 1998), Marine Protected Areas (MPA), such as the Mnazi Bay - Ruvuma Estuary Marine Park (MBREMP), are likely to affect these communities.

Past experiences show that without the support of the communities affected by the establishment of an MPA, the MPA has very little chances of success (Salm and Ngoile, 1998). Increasingly, coastal communities’ effective involvement is seen as paramount to the success and sustainability of MPA management (Christie and White, 1997, Cocklin et al., 1998). However, effective community involvement is not always achieved. Two main reasons for this have emerged, the difficulty in finding a good balance between community empowerment and government role, and the failure to acknowledge communities’ heterogeneity (Leach et al., 1997; Cocklin et al., 1998). Indeed, communities are a complex make up of user, gender, ethnic, religious and wealth groups, whose interests and objectives are often in conflict (Leach et al., 1997). When these differences are not acknowledged by MPA managers, key stakeholder groups may not be involved in the MPA establishment and management process, thus leading the MPA to fail.

For MPAs to have a chance to succeed in their marine resource management and conservation objectives, it is thus essential that managers understand the diversity of stakeholders, of livelihood strategies, the way they use the resources and the way in which they determine access to the resources. This is why a socio-economic baseline assessment of the Mnazi Bay - Ruvuma Estuary Marine Park communities was carried out. The objective of this assessment is to increase the Marine Park’s understanding of the communities within it and provide the foundation for taking account of their diversity in the Marine Park’s management plan.

1.1 Background to the socio-economic assessment

The Mnazi Bay - Ruvuma Estuary Marine Park (MREMBP) was gazetted in 2000 following a consultative process that had started in 1998. It covers an area of 650 km², 450 km² of which are land. The remaining 200 km² are marine, including mangrove forests, islands, seagrass, and coral reef ecosystems. The rationale behind incorporating such a wide area of land into the Marine Park was to constitute a buffer zone and control human activities that impact the protected marine environment (UNDP/GEF, 2000).

The inclusion of the land and communities adjacent to the marine area was also to ensure that local marine resource users are included into the management and planning processes as required by Marine Parks and Reserves Act (1994). This meant, however, that 11 villages, 3 sub-villages with a population of approximately 28,000 people (Census 1988) were incorporated into the Marine Park. Furthermore, population densities around the Marine Park are high (UNDP/GEF, 2000).

The MBREMP is located in Mtwara Region, at the Southern tip of Tanzania’s coast. It is rich in biodiversity and has outstanding beaches and seascapes, coral diversity, an important population of turtles and marine mammals such as whales migrating through the area on a seasonal basis. This was the basis of its establishment. Its tourism potential as well as its location within the realm of international economic development initiatives (e.g. Mtwara Development Corridor Project) makes the Marine Park an important player in developing opportunities by the attraction it represents for external investors. However, recent biodiversity assessments and previous research in the area have shown that the marine environment is highly impacted by human activities, particularly by over fishing, destructive fishing, and coral mining (Guard et al. 1998; UNDP/GEF, 2000; Guard, 2002; Obura et al., 2004; Richmond, 2004). Mangrove forests were also found to bear the mark of intensive use (Wagner et al., 2004).
A UNDP/GEF project was initiated in 2002 in order to assist in "Conserving a representative example of internationally significant and threatened marine biodiversity" with a parallel objective to "enable local and government stakeholders to protect effectively and utilise sustainably the marine biodiversity and resources of the MBREMP". Thus, one of the main tasks of the project is to reduce pressure on the marine environment in order to achieve sustainable use of marine resources and conserve the Marine Park’s marine biodiversity (UNDP/GEF, 2000).

The biodiversity assessments carried out in the Marine Park were to establish baseline knowledge on biodiversity and health status of mangroves forests, corals reefs, intertidal and seagrass areas. At the same time, it was necessary to establish baseline knowledge on the social and economic context of the Marine Park because the main task of the project concerned resource use and because ‘managing natural resources is about managing resource users’. A baseline socio-economic assessment was thus also required.

The combination of biodiversity and socio-economic assessments will contribute to inform the development of a Marine Park General Management Plan (GMP), particularly the zoning process. These assessments also provide a basis on which the Marine Park will be able to monitor its progress in achieving its goals and help steer its actions. The results will be entered into the GIS database that has been developed to help manage the Marine Park.

The socio-economic assessment is the first step towards understanding the communities that operate in the Marine Park, their activities, their relation with marine resources, their vulnerabilities, and their concerns about resources and their management. This understanding is essential for the Marine Park to be able to work with the communities whose participation will be key to its success and sustainability.

This report presents the finding of the socio-economic assessment carried out from April to July 2004.

After the introducing the objectives of the assessment, methods and research team in section 1, a brief literature review is done in section 2. Section 3 presents the occupational structure of the Marine Park, and aspects relating to the dependence of households involved in fisheries associated activities.

Section 4 investigates further fisheries related resource use patterns (i.e. methods used, timing, location of activities, characteristics of the users) as well as changes, conflicts and challenges related to marine resource uses.

Findings on the relative socio-economic status (as measured by households assets) of Marine Park households are presented in Section 5. In sections 6 and 7 the report is concluded and recommendations on a monitoring programme are made.

1.2 Aims and objectives of the socio economic assessment

The aim of the socio-economic assessment is to provide the UNDP/GEF Development of MBREMP project with baseline information on the existing livelihood systems of Marine Park communities, their dependence on marine resources, the relationships amongst user groups, the way in which marine resource dependent people use the marine resources and their relative wealth status. The socio-economic assessment also includes a review of relevant literature.

As stated in the terms of reference (Appendix 1), the socio-economic assessment integrated the following aspects:

1. A review of the relevant socio-economic information
2. An occupational structure study for which data was collected in August 2003 and analysed in March 2004 (see Malleret and Simbua, 2004)
3. A resource use patterns and conflicts study (data collected in April 2004)
5. Capacity building
The three research components (occupational structure, resource use patterns and conflict, socio-economic status) overlapped. This enabled the author to cross check and build on the findings of each component. The objectives of the above components are described below.

1.2.1 The literature review
The objective of investigating previous socio-economic information on the MBREMP area was to be able to understand the area better, build on existing information, and compare results and identify changes.

1.2.2 The occupational structure
The first step in carrying out the socio-economic assessment was to investigate the occupational structure of Marine Park communities, that is, what Marine Park people do for a living, be it for income or subsistence (Berkes et al., 2001). The results of the occupational structure survey (Malleret and Simbua, 2004) contributed to identifying aspects that needed further investigation, some of which are explored in this report. If monitored, the occupational structure will help predict whether pressure on marine resources is likely to increase or decrease, it will also indicate whether the development or promotion of alternative livelihood activities or income generating options by the project are successful or not.

The objective of understanding the occupational structure of the Marine Park was to provide a "map" of the activities which constitute the Marine Park communities' complex livelihood systems, and establish what their dependence on marine resources is, as well as identifying zones of potential high impact (threats) on marine resources. Other livelihood activities considered important were also identified and investigated further (details can be found in Malleret and Simbua, 2004).

At the same time, the occupational structure established a comprehensive sampling frame of households that was used in the two other research components of this assessment.

Detailed results of the occupational structure are available in Malleret and Simbua (2004). This report focuses on presenting results of the occupational structure survey related to fisheries associated livelihoods in particular.

1.2.3 Resource use patterns
The second step of the assessment was to research the marine resource use patterns (Bunce et al., 2000) and user group relations (concentrating on conflicts) with the Marine Park. This was to provide the Marine Park with baseline information on:

- who exploits the resources and whether they are from the Marine Park or not
- how these resources are exploited (equipment),
- when are the peak seasons,
- what species are mainly exploited,
- where activities are concentrated.

This information will help the Marine Park identify where the pressures come from (who impacts the marine resources), directly and indirectly, and whose participation will be required to establish the management plan. It will also contribute to identify areas where and periods when pressure on the marine resources is likely to be highest.

Stakeholder perceptions of changes in the status of resources were also investigated in order to show the current and perceived trends related to resources.

The objective of investigating conflicts was to understand how marine users groups relate to each other. Conflicts can reflect increasing pressure on resources (higher competition for the resources), but also how local stakeholders perceive management authorities. If the marine users have a negative perception of the Marine Park management authorities, working with these communities and
establishing sustainable management systems will be more difficult. Thus, conflicts and the reasons behind these will provide information on:

- potential areas where a number of incompatible activities are carried out, and where user based conflicts are likely to occur. Understanding these will be essential for effective planning and management.
- how stakeholders perceive the Marine Park and thus allow suggestions to be made for the Marine Park improve relations with communities.

1.2.4 Socio-economic status/ Well being

The objective of investigating the relative socio-economic status of Marine Park communities, particularly of households involved in marine and fisheries activities was to provide the Marine Park with a more comprehensive understanding of the communities within its boundaries as well as potentially identifying the most vulnerable user groups. This information will contribute to increase the Marine Park’s capacity to evaluate the implications of some of its activities on target groups, and help identify groups who may need special attention. Relative wealth may affect groups’ attitudes towards changes in marine resource management systems and their capacity to cope with such changes (Maxwell and Frankenberger, 1992).

1.2.5 Training requirements

Increasing the understanding of the Marine Park team on why socio-economic work is needed when establishing and managing a Marine Park, and increasing their capacity to carry out socio-economic work was sought throughout the socio-economic assessment process. Members of the MBREMP team were involved in the study from the beginning. Training was provided on data collection and entry, which was partly done by the MBREMP community conservation team (see table 3). Field guides and notes were produced and are available at the MBREMP office (Appendices 2 and 3).

Local community members were also hired and trained to assist with data collection (i.e. household surveys). Skilled facilitators were hired from Mtwara to collect data on resource use patterns (see table 3).

1.3 Sites

The Marine Park is located in Southern Tanzania; its southern end is contiguous to the Mozambique border (see Map 1). Eleven villages and three sub-villages are within the Marine Park. Four of these are located around the significantly large bay of Mnazi Bay: Mkubiru, Nalingu, Mngoji, and Msimbi. Mkubiru is not a village per se, but a sub village of Mnaowe, the main area of which is not included in the Marine Park. Despite being a sub-village, it will be referred to as a village in this report due to its size and for ease of presentation.

Five villages are closely located to the Ruvuma estuary and border the mangrove area (Madimba, Mitambo, Litembe, Tangazo, Kilambo) and two villages are further inland along the Ruvuma River (Mahurunga and Kitunguli). Kihimika is the village furthest from the marine and riverine ecosystems (see Map 1).

Despite the fact that Nalingu (including the sub-villages of Mnaizi and Mnete) is suspected to be the largest marine resource dependent community, no information could be collected on this village because villagers refuse to participate in Marine Park activities and have violently threatened the Marine Park team despite attempts to improve relations. The lack of information on Nalingu is the main limitation of this study.
1.4 Methods

Participatory techniques (focus group discussions, key informant interviews, informal interviews) and a more conventional household survey were used to provide both qualitative and quantitative data. Synergies were sought with other assessments (e.g. fisheries, coral reefs, mangroves etc.) done in the Marine Park.

1.4.1 Literature review

The literature review aimed at identifying existing information on:

- Marine Park communities
- The general socio-economic context of MBREMP

Conventional literature searches were carried out at the Ministry of Tourism and Natural resources, the National Environment Management Council (NEMC) and the offices of the Marine Parks and Reserves Unit (MPRU) in Dar es Salaam. Mtwara based non-governmental organisations (NGOs), particularly the Regional Integrated Programme Support (RIPS) and Concern, were consulted to identify potential relevant sources of grey literature and other unpublished information.

1.4.2 Key informant interviews

Key informant interviews (Bernard, 1995; Bunce et al., 2000) provided the main source of information for the occupational structure.

Informants (men and women) with a good knowledge of their community were selected with the help of the Marine Park Village Liaison Committees1. Two to four informants were consulted per village or per quarter (sub-village) for the largest villages (up to 900 households). The term ‘quarter’ or ‘kitongoji’ refer to sub-areas within the villages that may, or may not, be official divisions, but are well known to the villagers.

The first step in the interview process was to agree on a definition of "household". The definition agreed upon with the informants was; people living together sharing food and money. This definition is similar to the sociological “common-cooking pot definition” of the household: "a group of persons sharing a home or living space, who aggregate, and share their incomes, as evidenced by the fact that they regularly take meals together" (Marshall, 1994).

During the interview process key informants were asked to go mentally through the households in their area (following a pattern) (Bunce et al., 2000; Malleret-King et al., 2003) and list for each household: the number of household members, the number of active members (those who contribute to the household’s livelihood), and all the activities that are carried out, not only for income but also for subsistence, by men or women. Informants were prompted, based on an interview guide (Appendix 2), so that details and activities were not missed out. Details on particular activities (e.g. businesses, trading, cash crops, wood related businesses and of course marine related businesses etc.) were also asked for.

For larger villages, several interview sessions were necessary to avoid informant fatigue and poor quality data (Slocum et al., 1995) which long sessions (over 2 hours) often result in.

Key informant interviews with traders and marine product dealers were also used for the resource use pattern research.

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1 Village Liaison Committees were instituted by the Marine Park management authority as the principle mechanism to involve local communities in marine Marine Park activities, planning and decision making. Such committees are a requirement of the Marine Marine Parks and Reserves Act (1994) as a means to ensure stakeholder participation in Marine Park management and planning.
1.4.3 Focus groups and mapping

Focus group discussions (Slocum et al., 1995; Bunce et al., 2000) were the main source of information for the resource use patterns study. Key informant interviews and informal interviews were also used to cross check specific information. Focus group discussions were carried out in all the marine associated villages (Mkubiru, Mngoji, Msimbati, Madimba, Mitambo, Litembe, Tangazo, and Kilambo) except Nalingu.

Groups were composed of 3 to 10 participants (of mixed ages and gender when relevant). Groups were user based (fishers grouped according to gear, shell fishers, traders according to product traded, and seaweed farmers).

Themes discussed included:

- Who carries out the activity?
- How many people are involved?
- Where is the activity carried out?
- When?
- How is the activity carried out (i.e. techniques, equipment …)?
- What resources are used/targeted?
- How much is exploited/traded?
- Preferred gear
- Conflicts between marine user groups.

Because seasonal fluctuations highly affect the East African Coast and its marine activities (McClanahan, 1988; King, 2000; Malleret King et al., 2003; Shao et al. 2003) the seasonal aspects of the themes investigated were given emphasis.

A team of six researchers facilitated the group discussions. These researchers were selected because they had facilitation skills but they were given additional training. The discussions were based on interview guides developed by the Team Leader (see Appendix 5).

In addition to the verbal interview process, fisher groups were also asked to draw maps on the ground or on a flip chart of where their main fishing grounds were located. These maps were then transferred onto paper by the facilitators (see examples Appendix 6).

A total of 46 focus group discussions and 343 participants were interviewed through this process.

1.4.4 Household survey

A questionnaire was used to investigate the socio-economic status of Marine Park households and factors affecting this status.

The questionnaire was composed of four parts (see Appendix 7). The first part concentrated on household characteristics, the second part on activities carried out by household members and their relative importance. The third part focused on the well-being of the households based on Material Style of Life data (Pollnac and Crawford, 2000; Berkes et al., 2001). Further details on the indicators used to measure the relative socio-economic status of households are provided in section 5.

The fourth part of the questionnaire targeted fishing households. More detailed information was sought on the fishing activities and assets, including an estimation of income derived from fishing.

As well as providing information on households’ relative socio-economic status, the questionnaire provided complementary information to the occupational structure and resource use patterns surveys.

Households were surveyed in five villages (Mngoji, Msimbati, Tangazo, Litembe, and Mahurunga). These were selected based on their importance in marine resource use (findings from the occupational
structure), and their representation of locations in the Marine Park (the three areas identifies as seafront, mangrove and inland/river).

Questionnaires were administered in Swahili. A team of interviewers was trained in each of the villages surveyed. The questionnaire took no more than 15 to 20 minutes to be administered and a total of 643 households were interviewed (see Table 1).

1.4.5 Sampling strategy

The “household” was chosen as the unit of study. Indeed, the household is considered as being the unit at which resources are pooled and decisions taken about consumption, production and investment (Corbett, 1988).

Non-random as well as random sampling methods were used. For the Occupational structure, purposive sampling was chosen (Bernard, 1995). Informants (men and women who knew the community well) were suggested by the Village Liaison Committee according to research needs.

The occupational structure provided a comprehensive list of households (head of household name) which was then used as a sampling frame for the focus groups and the household survey. Participants to the focus groups were selected randomly according to their activity. Simple random sampling was used to select the households to be surveyed.

Between 20 and 40% of the households were surveyed in the five villages as shown in the Table 1.

<table>
<thead>
<tr>
<th>Villages</th>
<th>No. of households</th>
<th>% of the Marine Park households (excluding Nalingu)</th>
<th>Surveyed households</th>
<th>% village households surveyed</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mngoji</td>
<td>434</td>
<td>8.8</td>
<td>89.0</td>
<td>20.5</td>
<td>Sea Front</td>
</tr>
<tr>
<td>Msimbati</td>
<td>911</td>
<td>18.4</td>
<td>187.0</td>
<td>20.5</td>
<td>Sea Front</td>
</tr>
<tr>
<td>Litembe</td>
<td>323</td>
<td>6.5</td>
<td>92.0</td>
<td>28.5</td>
<td>Mangrove</td>
</tr>
<tr>
<td>Tangazo</td>
<td>921</td>
<td>18.6</td>
<td>185.0</td>
<td>20.1</td>
<td>Mangrove</td>
</tr>
<tr>
<td>Mahurunga</td>
<td>222</td>
<td>4.5</td>
<td>90.0</td>
<td>40</td>
<td>River</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>2811</strong></td>
<td><strong>56.8</strong></td>
<td><strong>643</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The villages selected represented more than half of the population of the Marine Park when Nalingu is excluded.

1.4.6 Analysis

1.4.6.1 Quantitative data

Basic statistics were used to analyse the occupational structure data, and dependence on marine resources. Most of the analysis was done at the community level. For communities involved in marine resource associated activities, data was also at sub-community levels.

Analysis of Variances, simple t-tests and Pearson correlations were carried out using with Systat (10.2) and Excel (Microsoft) software packages, to analyse the household survey data and identify factors influencing households’ socio-economic status.

In addition, GIS technology was used to show how the occupational structure, farming systems, and more specifically the level of dependence on fisheries resources by fisheries dependent households varied within the spatial context of the Marine Park. Maps produced combining GIS technology and Power Point (Microsoft) software were produced to identify core threat areas in the Marine Park.
(number and proportion of marine resource users, main fishing grounds) as well as marine products movements from and to the Marine Park.

1.4.6.2 Qualitative data
Results of the qualitative data collected are presented in tables.

1.4.7 Summary of methods
Table 2 summarises methods, sampling strategies and sites investigated in the socio-economic assessment.

<table>
<thead>
<tr>
<th>Item</th>
<th>Methods</th>
<th>Sampling</th>
<th>Analysis</th>
<th>Villages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review</td>
<td>Secondary information</td>
<td></td>
<td></td>
<td>All</td>
</tr>
<tr>
<td>Occupational Structure</td>
<td>Key informant</td>
<td>Purposive</td>
<td>Quantitative, qualitative</td>
<td>Mkubiru, Mngoji, Mkubiru, Madimba, Mitambo, Litembe, Tangazo, Kilambo</td>
</tr>
<tr>
<td>Use patterns</td>
<td>Focus groups, mapping, Key informant interviews</td>
<td>Random, purposive</td>
<td>Qualitative (tables), part quantitative</td>
<td>Mkubiru, Mngoji, Mkubiru, Madimba, Mitambo, Litembe, Tangazo, Kilambo</td>
</tr>
<tr>
<td>Conflicts</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Socio-economic status</td>
<td>Household survey</td>
<td>Random</td>
<td>Quantitative</td>
<td>Mngoji, Msimbati, Litembe, Tangazo, Mahurunga</td>
</tr>
</tbody>
</table>

1.5 The Research Team
The research team and their roles are presented in table 3. Twenty-three researchers participated in the socio-economic assessment.

<table>
<thead>
<tr>
<th>Name</th>
<th>Organisation</th>
<th>Role</th>
</tr>
</thead>
<tbody>
<tr>
<td>D. Malleret</td>
<td>CORDIO EA</td>
<td>Team leader: concept, methodology, coordination, interview design, data entry, analysis and report writing, training</td>
</tr>
<tr>
<td>R. Mwaipopo</td>
<td>University of Dar Es Salaam</td>
<td>Assistant: Literature review, resource use pattern data analysis, questionnaire design</td>
</tr>
<tr>
<td>J. Simbua, S. Mkama</td>
<td>Mnazi Bay - Ruvuma Estuary Marine Park</td>
<td>Local coordinators: Coordination in the field, occupational structure data collection, data entry</td>
</tr>
<tr>
<td>Mr. Salomon</td>
<td>Regional Government (Education)</td>
<td>Research assistant: Data collection, data entry (occupational structure)</td>
</tr>
<tr>
<td>N. Milali, R. Eliakim, S. Nahatula, B. Msalya, N. Kaijage, J. Mlaponi</td>
<td>District Government (Education, Lands), NGOs (Concern)</td>
<td>Facilitators: facilitate use pattern focus groups and collect data.</td>
</tr>
</tbody>
</table>
2 BACKGROUND SOCIO-ECONOMIC INFORMATION

Although a rapid socio-economic assessment was done when the MBREMP development project (UNDP/GEF, 2000) was designed, the full report was not available at the time of this study. Furthermore, although non governmental organisations (NGOs) and programmes such as the Regional Integrated Programme Support (RIPS), Concern, Voluntary Service Overseas (VSO), Medecins Sans Frontieres (MSF), Peacecorps and Japan International Cooperation Agency (JICA) have been operating in Southern Tanzania and Mtwara Region for a number of years, socio-economic information is patchy on the Marine Park area.

2.1 Location, population, wealth and services

The Marine Park is located in the Mtwara Region, Mtwara Rural District at the southern tip of Tanzania. Mtwara Region is one of Tanzania’s poorest regions with 38% of its population living below the basic needs poverty line, which is a higher percentage than the national average but lower than Mtwara Region’s neighbour, Lindi’s is (Household Budget Survey, 2001). Within the Mtwara region, the coastal population was found to be poorer than average (URT, 1997).

According to the population census of 2002, the population of Mtwara region was 1,123,523 inhabitants divided into 5 Districts (MSEP, 2003). Approximately 18% of the Region’s population (204 157) were located in Mtwara Rural District (URT, 2004) with an average household size of four people. Based on the 1998 census, the MBREMP communities would represent approximately 15% of the Mtwara Rural District’s population (URT, 2004). These communities are predominantly of Makonde Malaba ethnic origin, which is the coastal sub-group of the main Makonde tribe of southern Tanzania, and the Muslim faith dominates (NEMC, 1998).

According to URT (1997), primary education is available to most people in the region, and access to education is likely to have improved thanks to the on-going UPE (Universal Primary Education) and MEMKWA (Mpango wa Elimu Maalum Kwa Waliochelewa) projects which target children who were late to enroll in school programmes. The literacy rate is 44% in the District according to the population census of 2002, with higher rates for men (URT, 2004). The health care situation is more challenging due to poor communications, poor infrastructure, poor water supply, and poor management of this infrastructure (URT, 1997).

2.2 Economic base and livelihood activities

According to the most recent population census, 85% of households are involved in agriculture in Mtwara Rural District (URT, 2004). Cashew nuts are widely produced and were found to be the main source of income for Mtwara, providing 25% of the Region’s income in 1996 (URT, 1997). The importance of cashew nuts in the Marine Park is documented by URT (1997); NEMC (1998); and CONCERN (2004). These studies suggest that most households depend on subsistence farming, and on cashew as a cash crop. CONCERN (2004) found that the farming yields were low in the Marine Park area due to the low soil productivity, poor farming techniques, poor quality seeds, losses due to pests and wildlife (e.g. monkeys and wild pigs), limited extension services and unreliable weather patterns.

Prior to the establishment of the Marine Park, a quick socio-economic assessment was done by NEMC (1998) which showed that marine and coastal resource exploitation in the Marine Park included fishing, mangrove cutting, shell collection and trading, sea cucumber collection and trading, seaweed farming, and salt and lime production. The assessment also suggests that due to the high cost of running salt pans and the increase in imported salt, salt production has decreased significantly in the recent years in the Marine Park. Following the trend in Tanzania (Shao et al., 2003), seaweed production was developed in the Marine Park in 1997. At the time, it was carried out in Nalingu, Mnete, Mkubiru, Msimbati, and Mngoji.
2.3 Fishing

In 1996, the number of fishers in Mtwara Region was estimated to be 2050 (approximately 10% of the total number of artisanal fishers in Tanzania) whose catch contributed to 7.8% of the national artisanal catch (FFS, 1998).

NEMC (1998) suggests that fishing in the MBREMP area, as in other parts of Tanzania (Jiddawi, 2003), is mainly small scale. However, Mtwara fishers contribute to the regional income by exporting fish, prawns, lobsters, shells, octopus, sea cucumbers, shark fins and jaws (NEMC, 1998). For example Guard (2002) estimated that 103mt of Octopus were caught annually in the Mtwara area (including MBREMP) mainly for exported. Guard (2002) identifies the main octopus fishing area as Msamgamkuu, which is located on the edge of the Marine Park and includes extensive reef areas in the Marine Park.

The UNDP/GEF (2000), Obura et al. (2004) and Richmond (2004) note the use of beach seines, nets, spears, handlines, and tidal weirs in the Marine Park, similar to other parts of Tanzania.

Fishing activities in Mtwara Districts are carried out close to shore and are influenced by tidal and climatic patterns (Guard, 2002) as in other parts of Tanzania (Shao et al., 2003; Malleret King et al., 2003). Mtwara has one of the highest tidal ranges on the East African Coast of over 3 m (Guard, 2002). Guard (2002) notes that activities such as octopus fishing are mainly carried out at low spring tides.

The climate in Mtwara, as along the rest of the coast of Tanzania is dominated by monsoon winds, which influence the weather and coastal current patterns such as the East African Coastal Current (Guard, 2002). A longer rain period occurs in March to May, and shorter rainy season usually occurs in November (Shao et al., 2003).

The Southeast monsoon (‘Kusi’) winds prevail from May to October and the Northeast monsoon (‘Kaskazi’) winds prevail from November to March (McClanahan, 1988; Shao et al., 2003). It was found by Shao et al. (2003) that in Tanzania catches drop during the Southeast monsoon, partly because of the adverse fishing conditions (e.g. very strong winds). The effects of monsoon winds were also detected by Guard (2002), who found that octopus catches dropped in Msangamkuu during the Northeast monsoon when the wind direction made it difficult for the local fishers to get to sea.

2.4 Resource status

For Shao et al. (2003) marine and coastal resources are highly degraded in Tanzania due to their increased and unregulated use (increase demand for the resources, use of destructive gear, demographic increase, migration to coastal areas etc.). For Linden and Lundin (1995) dynamite fishing, the smashing of coral heads by nets and fishers trampling the reef, the use of poisons, the use of small-mesh nets catching juveniles, trawling and the use of beach seines on sea-grass beds are of particular concern to the marine environment. Semesi (1998) emphasised the fact that mangroves are also heavily used and show signs of overexploitation.

Furthermore, despite declining fisheries resources, Anderson and Ngazy (1998) found that fishers are reluctant to move out of the fishery, due to traditions, economic returns and the lack of alternative opportunities.

The literature suggests that MBREMP marine resources have not escaped this fate. According to Obura et al., (2004), coral reefs show signs of overexploitation (e.g. a lack of large fish in surveyed areas in the Marine Park) and of degradation from destructive methods (e.g. beach seines and ‘juya’). In addition, Wagner et al. (2004) note that despite the fact that the MBREMP mangrove forest is one of the largest and in best condition in Tanzania, it already shows signs of overexploitation (e.g. shift in species composition, small tree sizes in some areas). Finally, according to Richmond (2004), the intertidal area is overexploited and Muir et al. (2003) state that the Marine Park turtle population has been decimated for years.

2.5 Resource governance

In order to mitigate marine and coastal resources' degradation, a number of strategies have been developed at the national level, which have also been applied to Mtwara Region and thus to the Marine Park area.

For Shao et al. (2003) however, the most significant evolution for marine resource management in recent years in Tanzania has been the central government's recognition that increased involvement of local resource users in the management of their resources will achieve more sustainable coastal management. Raising awareness at the local level has also become a priority. The promotion of stakeholder participation in resource management is illustrated for example by the 1994 Marine Parks and Reserves Act where participation of and consultation with local communities is a requirement for establishing and managing a marine protected area. The act also recommends creating Village Liaison Committees.

For Shao et al. (2003) and TCMP/STWG (2003) the devolution of authority in natural resource management to the local level is illustrated by the fact that Local Government is now responsible for implementing and enforcing fisheries and other natural resource management initiatives through the Village Councils. These Councils have been given mandate to facilitate the establishment of community based institutions and by-laws to regulate resource uses in their area of jurisdiction. TCMP/STWG (2003) gives an example of a by-law developed by coastal communities around the Bagamoyo area who have made it compulsory for visiting fishers to report to local authorities and pay a fee.

The Village Councils also have to establish five committees one of which is the Village Environment Management Committee (VEMC), which has a legal mandate to manage natural resources at the village level (Shao et al., 2003). At the same time, the development of Beach Management Units (based on the model developed in Lake Victoria) to complement the marine resource related activities of the VEMCs, is promoted by central Government.

Similarly, Mangrove Protection Committees were established by the NORAD funded National Mangrove Management Project. These are responsible for mangrove management at the village level, and charge a fee for mangrove exploitation on behalf of the District Natural Resources Department (NEMC, 1998).

However Shao et al. (2003) and Malleret King et al. (2003) found that due to the lack of resources and sometimes due to political patronage, local committees are often ineffective and marine resources continue to degrade. For Bagamoyo-ICM (2003), TCMP (2003) and TCMP/STWG (2003) these dysfunctions are particularly noticeable in the case of areas where no specific coastal resource management programmes, such as the Tanga Coastal Management and Conservation Programme, exist.

MBREMP communities have been part of the national trends and all have established VEMCs. In addition, as required by the Marine Park and Reserve Act (1994), Village Liaison Committees were also created in all MBREMP villages when the Marine Park was established. The Marine Park authorities may develop and enforce coastal management regulations that supersede other natural resource legislation within the Marine Park, however the MBREMP is still within the jurisdiction of the local Government (King, pers. comm.). Outside the Marine Park, District authorities, especially the District Fisheries office and the Mangrove Management Project are responsible for enforcing of fisheries and mangrove related regulations (NEMC, 1998).

2.6 Opportunities in the MBREMP

The literature suggests that opportunities for MBREMP stakeholders are likely to be developed. Economic opportunities may arise with the development of the Mtwara Development Corridor Project (MtDC), a South African Development Bank supported initiative that aims to promote economic exchanges between Malawi, Tanzania, and Mozambique. The Project promotes economic development in the corridor area. The MtDC project considers MBREMP as a key attraction with its wealth of marine resources and sandy beaches (Simbakalia, 2002; MtDC Project Manager, pers. comm.).
Other opportunities are facilitated by locally based development programmes such as CONCERN (Tz) which has, for five years, promoted a project which aims at ‘improving crop production, storage and marketing processes’ in 3 Wards of Mtwara Rural District, one of which is located within MBREMP (CONCERN, 2002). This project is expected to build people’s capacities to identify ways of increasing their incomes. The successes of such programmes may reduce people’s reliance on marine products.

Other projects, which may have benefited the MBREMP villages, include the Rural Integrated Project Support Programme (RIPS). The Finnish funded project has concentrated in the last fifteen years on facilitating the development of Community Based Organisations (CBO) in order to build communities’ capacity to manage their resources (RIPS, 1998).

One of the CBOs considered as most successful is SOZOCO (Southern Zone Confederation for the Conservation of the marine environment), most commonly known as ‘Shirikisho’. Coastal communities developed the organization in 1996 in Kilwa, Lindi, and Mtwara Districts. It major goal was to end dynamite fishing which. SOZOCO extends its mandate to the general protection of the marine environment and the promotion of community based alternatives on natural resource management (1998). Since 1998 RIPS has collaborated with SOZOCO to initiate projects to support unemployed youths most of whom were formally involved in dynamite fishing such as fish and sea weed farming (NEMC 1998), this with mitigated success (RIPS, 1998). It has been noted however that SOZOCO has not had support from RIPS in recent years and may no longer be as effective as it once was (King, pers. comm.).

One of RIPS activities has also been to improve access to credit for fishers in the Region (RIPS, 1998). Credit opportunities are often scarce for fishers in Tanzania (FANRM, 2003; Malleret King et al., 2003). The latter studies identified the lack of access to funds as a major constraint to the livelihood development of fishing households, affecting gear choices in particular. Indeed, Malleret King et al (2003) identified that the lack of adapted credit facilities (e.g. prevailing high interest rates and inappropriate conditions, few working revolving funds, or ineffective cooperatives) often forced young fishers to enter destructive fisheries (e.g. join beach seine crews).

MBREMP will be able to build on lessons learnt by RIPS, such as credit opportunities, development of income generating activities from small-scale cashew processing, and so on (RIPS, 1998). Thus in order to improve the economic status of Marine Park communities, the Marine Park can benefit from synergies with a number of activities and organizations in the area to contribute to the development of opportunities for Marine Park communities (NEMC, 1998) while improving the status of the resources.

2.6.1 Summary

The literature suggests that fishing is an important activity in the MBREMP and is carried out in a similar way to the rest of Tanzania. It is small-scale and mainly provides fish for local markets, although a number of products are exported.

The Marine Park is located in a poor area of Tanzania where marine resources are likely to be an important source of livelihoods. These resources however are showing signs of overexploitation due to intense use, high demand and use of destructive fishing gears. Other livelihood opportunities for local people may arise with the conjunction of the establishment of the Marine Park (including promotion of tourism, protection of the resources), the work of NGOs, and the promotion of economic development through the Mtwara Development Corridor Project.

Facts on the communities living in the Marine Park are however scarce in the literature. Dependence on marine resources is suggested, although little is known on the extent of this dependence. It is suggested that marine resource uses are similar to those of other areas on the Tanzanian coast but little information is available, similarly no comprehensive information on the wealth status of MBREMP communities specifically was found.

The aim of the socio-economic baseline assessment will thus be to fill these gaps. Understanding better the way in which people use the marine resources, and their dependence on the marine resources will help the Marine Park find avenues for improving management and contribute to the development of additional livelihood opportunities for the local communities.
3 GENERAL OCCUPATIONAL STRUCTURE AND DEPENDENCE ON MARINE AND OTHER RESOURCES IN THE MARINE PARK

Dependence on marine resources (proportion of households involved in marine resources related livelihood activity, importance of marine related activities in the household’s livelihood system) is an indicator of potential threats to marine resources. The more households are dependent on marine resources for their livelihoods, the more they are likely to be defensive about their activity, and reducing pressure on marine resources by zoning activities or banning certain gears without acceptable alternatives proposed may be difficult. This section concentrates on evaluating how much Marine Park communities depend on marine resources.

Dependence on other natural resources (wood, wild plants, mangroves…) was also investigated at a broader level as these may by essential for the integrity of the marine ecosystem to be preserved (e.g. mangrove forests, terrestrial coastal forests). Furthermore, these other resources are part of the attraction of the Marine Park.

3.1 Demographics/Marine Park stakeholders

The occupational structure provided information on a total of 4958 households from 11 villages. Due to the difficulty of accessing Nalingu, the village was not included in this research. Although some households may have been omitted, it is believed that most households were listed. This list will constitute a good sampling frame for further research.

When investigating the occupational structure, information on the number of household members, the number of active people in the household was also required. Similarly the household size was investigated in the household survey in selected villages (refer to part 1.4.4). Table 4 summarises this information.

<table>
<thead>
<tr>
<th>Village</th>
<th>Number of households</th>
<th>Household Size</th>
<th>Active members</th>
<th>In % of the Marine Park households</th>
<th>Household Size</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mkubiru</td>
<td>199</td>
<td>3.6</td>
<td>2.1</td>
<td>4.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mngoji</td>
<td>434</td>
<td>3.6</td>
<td>2.1</td>
<td>8.8</td>
<td>3.0</td>
<td></td>
</tr>
<tr>
<td>Msimbati</td>
<td>911</td>
<td>3.7</td>
<td>2.1</td>
<td>18.4</td>
<td>5.1</td>
<td></td>
</tr>
<tr>
<td>Madimba</td>
<td>453</td>
<td>3.9</td>
<td>2.1</td>
<td>9.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mitambo</td>
<td>347</td>
<td>3.5</td>
<td>1.9</td>
<td>7.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Litembe</td>
<td>323</td>
<td>3.4</td>
<td>1.9</td>
<td>6.5</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Tangazo</td>
<td>921</td>
<td>3.8</td>
<td>2.2</td>
<td>18.6</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>Kilambo</td>
<td>563</td>
<td>3.3</td>
<td>2.2</td>
<td>11.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maharunga</td>
<td>222</td>
<td>3.7</td>
<td>2.1</td>
<td>4.5</td>
<td>4.6</td>
<td></td>
</tr>
<tr>
<td>Kitunguli</td>
<td>313</td>
<td>2.3</td>
<td>1.1</td>
<td>6.3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kihimika</td>
<td>272</td>
<td>4.1</td>
<td>2.1</td>
<td>5.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>MBREMP</strong></td>
<td><strong>4958</strong></td>
<td><strong>3.5</strong></td>
<td><strong>2</strong></td>
<td><strong>100.0</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Excluding Nalingu

The largest villages, in descending order, are Tangazo, Msimbati, and Kilambo, which amount to 47% of the Marine Park’s households (excluding Nalingu). On average, households in the Marine Park were found to have 3.5 members, out of which two contributed income of subsistence generation. This is believed to be low and it is suspected that key informants had omitted children. Results of the household survey show a higher household size in some of the villages surveyed, which is more consistent with the District average of four members per households (URT, 2004).
The proportion of women headed households (WHH) was also investigated (see Table 5) in the household survey. Results showed that on average 18% of the households surveyed in the selected villages were headed by women (not married or widows), and that 9.7% were widow headed households.

Table 5: Women (WHH) and Widow headed households as a percentage of households surveyed

<table>
<thead>
<tr>
<th>Village</th>
<th>% WHH</th>
<th>% of widow headed households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litembe</td>
<td>15.2</td>
<td>4.3</td>
</tr>
<tr>
<td>Mahurunga</td>
<td>14.4</td>
<td>3.4</td>
</tr>
<tr>
<td>Mngoji</td>
<td>26.1</td>
<td>19.3</td>
</tr>
<tr>
<td>Msimbati</td>
<td>21.9</td>
<td>13.5</td>
</tr>
<tr>
<td>Tangazo</td>
<td>13.6</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>18.1</td>
<td>9.7</td>
</tr>
</tbody>
</table>

In the surveyed villages, the percentage of widow headed households was highest in Mngoji and Msimbati.

3.2 A wide range of activities in the Marine Park

The occupational structure survey showed that there is a wide array of activities carried out in the Marine Park. These include marine related activities such as fishing, seaweed farming, and shell collecting, and trading fish, prawns, sea cucumbers, and octopus. Other activities include river based fishing and river fish trading, other natural resource exploitation such as wood cutting and trading (including mangrove wood), charcoal production, palm weaving, sea salt production, and farming for income or subsistence.

Traditional activities such as traditional medicine, dancers and drummers are also present, as are artisans including tailors, mechanics, carpenters, net menders, boat builders and a large variety of small businesses such as food vending (prepared food), palm wine tapping and trading, shop keeping etc.

The average number of activities per household is 1.9 for all the surveyed villages, the highest average being in Msimbati where households are larger. Overall, the occupational structure shows that on average households are involved in 1.73 categories of activities (see Figure 1 for the definition of categories of activities). The occupational structure study also shows that marine resource dependent households were involved in a significantly higher number of categories of activities than other households were involved in (2.03 on average for households involved in marine resource associated activities and 1.34 on average for other households; Malleret and Simbua, 2004).

Fifty-five activities were identified through the occupational structure survey, most of which were also identified in the household survey, where 50 activities were identified (see list of activities in Appendix 8). Figure 1 shows the way these activities were grouped for the purpose of the analysis.
### 3.3 General occupational structure of the Marine Park

The occupational structure data shows that 35% of the Marine Park households are involved in marine resources associated activities (depend on marine resources at least for part of their livelihood).

* Activities in bold are activities that are of focus and on which details will be provided  
** Activities dependent on other natural resources are activities such as businesses or artisans that are separated from the general activity categories because although these activities are not the primary focus of the Marine Park, they may impact existing marine and coastal biodiversity if not carried out sustainably, or they are natural resources based activities that might be of interest from the perspective of Alternative Income Generating (AIG) activity development.

*Activities in bold are activities that are of focus and on which details will be provided.*

**Activities dependent on other natural resources are activities such as businesses or artisans that are separated from the general activity categories because although these activities are not the primary focus of the Marine Park, they may impact existing marine and coastal biodiversity if not carried out sustainably, or they are natural resources based activities that might be of interest from the perspective of Alternative Income Generating (AIG) activity development.**

---

<table>
<thead>
<tr>
<th>Direct dependence on marine resources</th>
<th>Indirect dependence on marine resources</th>
</tr>
</thead>
</table>
| **Marine Resource Dependence**  
(excluding mangroves) | All types of **Fishing**, all types of **Fish Trading** and marine products trading (fresh fish, dried fish, sea cucumbers, octopus, prawns). **Seaweed farming**, **Shell collecting** (for home consumption and trade). |
| **River Resource Dependence** | Relates to river fishing and river fish trading |
| **Other Natural Resource Dependence**  
(including mangroves) | **Wood trading and cutting** (fuelwood and timber, **Mangrove** wood and others). **Lime** making, **charcoal** making, **weaving** and bed making (using **dried palm leaves**). **sea Salt** production, **traditional** trap making, **Wood carving**, **Hunting**, **traditional medicine**. |
| **Farming** | Crops (for subsistence and income - details on **Income crops**), livestock keeping. |
| **Other business** | Variety of businesses: prepared food selling, laundry, providing transport on bicycle, shop keeping, coconut trading, palm wine making and selling, thatch trading (thatch made from coconut palm leaves) etc. |
| **Artisans (Other)** | Tailors, mechanics, bicycle menders, net menders, fishing boat builders, black smiths, carpenters, hairdressers etc. |
| **Casuals** | Mainly casual farm labour, coconut pickers, casual wine tapper. |
| **Employed** | People in salaried jobs, including both private and government. |
| **Other** | Mainly include people in traditional folklore activities (musicians, dancers), retired people. |

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* Figure 1: Categories of activities and groupings for the purpose of the analysis*

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* Activities dependent on other natural resources are activities such as businesses or artisans that are separated from the general activity categories because although these activities are not the primary focus of the Marine Park, they may impact existing marine and coastal biodiversity if not carried out sustainably, or they are natural resources based activities that might be of interest from the perspective of Alternative Income Generating (AIG) activity development.

---

* Activities in bold are activities that are of focus and on which details will be provided.**

---

* Activities dependent on other natural resources are activities such as businesses or artisans that are separated from the general activity categories because although these activities are not the primary focus of the Marine Park, they may impact existing marine and coastal biodiversity if not carried out sustainably, or they are natural resources based activities that might be of interest from the perspective of Alternative Income Generating (AIG) activity development.**
Figure 2: Dependence on the different activity categories at the Marine Park level (excluding Nalingu)

Very few households rely on one activity only, thus the sum of households per type of occupations is higher than 4958 (100%). Each bar represents the proportion of households in the MBREMP who depends at least partly on each type of activity.

At the Marine Park level, findings show that on average household livelihoods are composed of 1.73 categories of activity. In order of importance these are farming (87% households), marine associated activities (35% - excluding mangrove harvesting), other natural resources associated activities (21% households), other business (18% households), artisans, casual labour, employment, river dependent activities and other.

However, this structure is not homogeneous across the Marine Park and varies according to villages as shown in Map 1. Map 1 suggests that villages can be grouped according to their geographic location, based on their proximity to the sea, to the river, and the mangrove area. This illustrates the relationship between the physical environments and livelihood activities.

Villages can be grouped as follows:

- **Sea bordering villages** (Mkubiru, Nalingu, Mngoji and Msimbati). These villages represent 31% of the listed households, excluding Nalingu (see table 1).
- **Mangrove villages** (Madimba, Mitambo, Litembe, Tangazo, and Kilambo). These villages represent more than half the households listed (52.6%, table 1).
- **River villages** (Kitunguli and Mahurunga), which represent 10.8% of the listed households.
- **Other**: Kihimika, which is, located the furthest from the sea, river, or mangrove (5.5% of the listed households).

Natural resources exploitation it likely to be affected by the location of the villages in relation to these natural resources, however, other aspects such as access to markets and infrastructure might have an impact which were not analysed in this study.
Map 1: Occupational structure at the community level

(Source: occupational structure and household survey)
As shown in Map 1, the proportion of households involved in marine resources associated activities (dependent on) are highest in sea bordering villages. More than 60% of their households are involved in marine associated activities (74% in Msimbati). In these villages, farming is still one of the most important activities with 80% households farming in Mngoji. Msimbati and Mkubiru are the villages with the least farming households (60% and 61% respectively) within the Marine Park. Findings of the household survey confirm the occupational structure results except for Mngoji where the proportion of households involved in marine related activities was found to be much lower in the household survey than in the occupational structure. However, the focus groups results tend to confirm the occupational structure (100 fishermen and women and over 100 shell fishers were identified by the focus groups).

Fisheries resource dependence (fishing and fish trading) in Mahurunga, Kitunguli, and Kihimika mainly refers to river resources although a crew of fishers from Kihimika was identified to be fishing in the mangroves during the focus group interviews. Fishing is carried out by 15% to 19% of village households in Mahurunga and Kitunguli and only 9% of household fish in Kihimika (25 households). A small amount of marine fishing was however identified in Mahurunga by the household survey (5% of the household surveyed) which in general confirmed the results of the occupational structure.

In most villages, farming is by far the most widely spread activity with between 87% and 99% households involved. However, although secondary, the marine and fisheries resources associated activities are still significant in the mangrove villages with between 20% (Kilambo) and 30% (Litembe) households involved in such activities. A small amount of river fishing was detected in Mahurunga by the household survey in general confirmed the results of the occupational structure.

In terms of volume, the highest numbers of households involved in marine resource associated activities were found to be, in decreasing order, Msimbati, Mngoji, Tangazo and Mkubiru, the most fishers and shell fishers being in Msimbati, Mngoji and Tangazo.

Businesses (related to "other" natural resources and non natural resource based) are an important component of the communities’ occupational structure. They constitute a significant part of livelihood systems, particularly in Kihimika where such activities involve 45% of the households and in the mangrove villages especially, Madimba, Kilambo, and Mitambo (mangrove villages). The household survey shows a lower percentage of households involved in such activities except for Msimbati, this is probably due to the unwillingness to disclose some of the activities. 20% of the households in Msimbati were found to depend on other resources for part of their livelihood.

More than 12% of households are involved in "other businesses" in all villages except in Kitunguli. "Other business" is one of the dominant activities in Kihimika with 43% of the households involved. These other businesses are an important part of a community's economy and essential at the household level for income, both for men and women who are mainly involved in small businesses such as food vending, small stands etc. Results of the household survey confirmed the occupational survey results.

Another important part of the communities’ economic basis are artisans, these have an important place particularly in Tangazo and Kihimika where they represent more than 12% of listed households. These results were confirmed by the household survey.

Finally casual labour, which is mainly farm labour (including coconut pickers) can be a last resort for getting an income, and is notably important in Litembe (25% of households) and Kihimika (22% of households). The figure was slightly lower for the village surveyed in the household survey.

The salaried employment rate is very low in all villages. It is highest in Madimba where 6% of households find a source of income through employment and lowest in Mitambo and Mahurunga (less than 1% of the households). Employment includes teachers, police officers, nurses etc. This was also found in the household survey where 5% and less of the households depended on salaried employment.

Thus throughout the Marine Park natural resources (marine or other) are an important source of livelihood. Dependence (proportion of households involved in) on marine resources is high and varies according to the community location. It is highest in the sea bordering villages and lowest in the river villages.
The level of dependence on marine resources was examined further, and results are presented in the section below.

3.4 Focus on fishing

3.4.1 Is fishing an important source of livelihood for the Marine Park communities?
Fishing came out as one of the most important activities for the sea front villages and a number of mangrove villages from both the household survey and the occupational structure survey. It was found that 26% of Marine Park households depend or are involved in fishing (54% for the sea bordering villages households and 19% of mangrove bordering village households).

As shown in Figure 3 results were similar in the household and occupational structure surveys for Msimbati (52% instead of 54%) and for the mangrove villages (19-22%) but lower (25% HHS) for Mngoji than in the occupational structure survey. Results of the Mngoji focus group discussions suggest that the household survey results may be more accurate. The focus groups identified 141 fishers. The number of fishers does not correspond to the number of fishing households however, and often more than one fisher operates in one household. According to table 7, there are 1.2 fishers on average per fishing household in Mngoji. One hundred and forty one fishers would thus be distributed among 118 households. Therefore, the percentage of fishing households in Mngoji would amount to 27% of the total number of households in the village.

The higher number of fishing households identified during the occupational structure may come from the fact that occasional fishers, particularly occasional hand line fishers were taken into consideration whereas they may not have been in the household survey.

3.4.2 Dependence on fishing and other marine associated activities at the household level
To appreciate better how much Marine Park communities depend on fishing and other marine associated activities, further analysis was carried out to establish the proportion of households relying solely on marine resources for their livelihood. These results are illustrated in Map 2. The table on the map shows the number of households and proportion of the village’s households they represent.
Map 2: Level of dependence on marine resources (income and subsistence) for marine resources dependent households. (Source: Occupational structure)

<table>
<thead>
<tr>
<th>Village</th>
<th>Number of Marine Dependent Households</th>
<th>% of villages’ house holds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kila mbo</td>
<td>125</td>
<td>62.8</td>
</tr>
<tr>
<td>Mangu</td>
<td>268</td>
<td>61.7</td>
</tr>
<tr>
<td>Mbita</td>
<td>278</td>
<td>74.4</td>
</tr>
<tr>
<td>Madimba</td>
<td>118</td>
<td>26</td>
</tr>
<tr>
<td>Malimbo</td>
<td>98</td>
<td>24.8</td>
</tr>
<tr>
<td>Liembe</td>
<td>99</td>
<td>30.6</td>
</tr>
<tr>
<td>Tangazo</td>
<td>257</td>
<td>27.9</td>
</tr>
<tr>
<td>Klambo</td>
<td>106</td>
<td>18.8</td>
</tr>
</tbody>
</table>

Legend
Dependence of marine resources dependent households:
- Fishing on:
- Mar. res. on.:
- &Subs. far.:
- &Others:
- &Other:
- Tarmac road
- All-weather
- Minor road
- Footpath
- Rivers
- Land
- Non-mangrove forest
- Mangrove
- Ocean
- Sand
- Tidal reef

Map: MBREMP Villages
Map: Dependence of marine resources dependent households

Data: Near(1990) ArcGIS

Receive by:
OGIS – ARN Institute
P.O. Box 609, Abidjan, Cote d'Ivoire
As illustrated by Map 2, few households depend only on fishing, (9.6% of Mkubiru and 3.8% and 5.2% in Msimbati and Mngoji of the marine dependent households). However, a fifth of households involved in marine activities in Msimbati depend only on marine resources for their livelihood (20%), that is fishing only and or/other marine resource associated activities only. This represents a relatively high percentage of the households, which would suggest a high vulnerability to any negative change in the marine resource base or exploitation regimes.

Although the proportion of households only dependent on fisheries and other marine related activities is low in most villages, it is relatively higher in Msimbati, Mkubiru, and Tangazo (mangrove area) where it amounts to a third or more of the marine dependent households. This was found to be higher than in other parts of coastal Tanzania (Malleret-King, 2003) and than in the household survey.

Most households involved in marine resource associated activities depend on "other" combinations of activities. Thus, the data suggest that the strongest level of dependence on marine resources in terms of subsistence and income is found in the sea bordering villages, particularly Msimbati and Mkubiru, but also in Tangazo (mangrove village).

Fishing was however considered as the most important source of income by on average 69% fishing households (78% in Msimbati, 64% in Mngoji), the other important source of income of fishing households is farming (on average 25% of the fishing households). Findings are presented in Table 6.

Table 6: Marine dependent activities as the main source of income, % fishing, % trading etc

<table>
<thead>
<tr>
<th>Activities ranked first as main source of income</th>
<th>Mngoji</th>
<th>Msimbati</th>
<th>Litembe</th>
<th>Tangazo</th>
<th>Mahurunga</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine Related</td>
<td>15.7</td>
<td>43.6</td>
<td>16.0</td>
<td>21.1</td>
<td>10.0</td>
</tr>
<tr>
<td>Of which fishing</td>
<td>85.7</td>
<td>89.0</td>
<td>85.7</td>
<td>56.4</td>
<td>100.0</td>
</tr>
<tr>
<td>Of which Trading</td>
<td>14.3</td>
<td>9.7</td>
<td>14.3</td>
<td>43.4</td>
<td></td>
</tr>
</tbody>
</table>

Fishing households

| Fishing as main source of livelihood | 64.7 | 78.0 | 66.7 | 65.6 | 47.4 |

(Source: Household survey).

3.4.3 Time committed to fishing

The number of fishers per fishing household (household involved in fishing) was investigated in the household survey. Results show that the average number of fishers per fishing households is highest in Msimbati (3.7) and lowest in Mahurunga (1) as shown in Table 7.

Table 7: Average number of fishers per household at the village level

<table>
<thead>
<tr>
<th>Village</th>
<th>Average of number per household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Litembe</td>
<td>1.3</td>
</tr>
<tr>
<td>Mahurunga</td>
<td>1</td>
</tr>
<tr>
<td>Mngoji</td>
<td>1.2</td>
</tr>
<tr>
<td>Msimbati</td>
<td>3.7</td>
</tr>
<tr>
<td>Tangazo</td>
<td>1.16</td>
</tr>
</tbody>
</table>

(Source: Household survey)

Fishing is not always carried out full time. Most fishers also contribute to the households farming activities whether for commercial or subsistence purposes. Findings from the household survey show that fishers go to sea 5 to 6 days a week and most of them have at least one month off fishing in the year to perform other activities. Table 8 shows the average number of days off per month and months off fishing per year in each village.
Table 8: Average number days and months off fishing per month

<table>
<thead>
<tr>
<th>Village</th>
<th>Average number days off fishing per month</th>
<th>Months off fishing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mngoji</td>
<td>5.75</td>
<td>1.14</td>
</tr>
<tr>
<td>Msimbati</td>
<td>8.2</td>
<td>2.2</td>
</tr>
<tr>
<td>Litembe</td>
<td>10.3</td>
<td>3.3</td>
</tr>
<tr>
<td>Tangazo</td>
<td>8.3</td>
<td>2.2</td>
</tr>
<tr>
<td>Mahurunga</td>
<td>8.8</td>
<td>3.8</td>
</tr>
</tbody>
</table>

(Source: Household survey)

Significant differences were found in the number of months off fishing according to the villages (F=16.1 p<0.001). On average, the seafront villages fish longer in the year and more days per week than other villages.

In order of importance, the reasons mentioned for not going fishing on a weekly basis include religion (most fishing households), gear and boat repairs, other activities, and tides.

On a monthly basis, a high percentage of fishers (27% of fishing households surveyed in Tangazo and 83% in Msimbati) do not go fishing at the coming of the neap tides for two or three days because fish are considered scarce. Spring tides are considered best. This was confirmed in the focus groups.

Farming activities (preparing the land particularly), strong winds, and river flooding in the case of Tangazo are the most common reasons for fishers to take months off fishing. For 60 to 80% of the fishing households surveyed (except in Tangazo) farming, particularly the preparation of land and harvests were given as a reason for not going fishing for a month. Figure 4 illustrates the yearly fishing patterns for the different villages.

Figure 4: Percentage of households taking months off from fishing per village

January, February, March, June and July were found to be the main months taken off for the purpose of farming (60% of households grow cashew nuts in the Marine Park). Strong winds in June, July and August are considered as adverse conditions for fishing and some fishers are reluctant to go to sea.
Table 9: Percentage of fishers fishing per number of months

<table>
<thead>
<tr>
<th>Number of months fishing</th>
<th>Litembe N=21</th>
<th>Mahurunga N=5</th>
<th>Mngoji N=22</th>
<th>Msimbati N=97</th>
<th>Tangazo N=37</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than 11</td>
<td>0</td>
<td>20</td>
<td>100</td>
<td>69.072</td>
<td>54.054</td>
</tr>
<tr>
<td>7 to 11</td>
<td>100</td>
<td>80</td>
<td>0</td>
<td>29.897</td>
<td>43.243</td>
</tr>
<tr>
<td>4 to 6</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2.703</td>
</tr>
<tr>
<td>Less than 4</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1.031</td>
<td>0</td>
</tr>
</tbody>
</table>

(Source: Household survey)

Most fishers fish all year round in Msimbati, Tangazo and Mngoji where fishing households are numerous. However, 43% of fishers were found to take 1 to 3 months off fishing per year in Tangazo. In Litembe and Mahurunga, the majority fish less than 11 months but more than 6 months (see Table 9). Very few households are involved in fishing for less than half the year or fish occasionally (less than 4 months per year in total). Occasional fishing was only detected in Tangazo and Msimbati (1 and 2 %).

Most fishers are involved 5 to 6 days a week for most of the year. Overall the most time spent fishing is in Mngoji, and the least in Litembe.

3.4.4 Is fishing enough to sustain the household?

Despite the fact that fishers are mostly engaged in the activity all year or three quarters of the year, 5 or 6 days per week fishing was often considered insufficient to sustain the households.

Households were asked whether fishing provides:
1. enough and more to the household in terms of income,
2. just enough to break even,
3. not enough income but enough food (fish)
4. not enough income and not enough fish.

The findings show that a minority of households considered fishing to provide enough and more to sustain the household (14% overall, none in Mngoji and a high percentage in Mahurunga). A quarter of the fishing households considered that fishing brought just enough in terms of food and income, but the largest majority (43% overall) considered fishing to provide enough food (fish) but not enough income to sustain the household. A minority overall considered that fishing brought not enough food or income, except in Tangazo where this concerned more than 40% of the households.

Figure 5: Is fishing considered enough as a source of food and income for the household (in proportion of fishing households).

(Source: Household survey)
On average in mangrove villages, the proportion of households was more equally shared among the four statements than in the seafront villages where statements 2 (enough to break even) and 3 dominate (not enough income but enough fish to eat for the household).

This confirms again that very few households depend only on fishing or only on marine resources for their livelihood as was found in the occupational structure, and is comparable to findings of previous studies (Anderson and Ngazy, 1998; Malleret King et al., 2003).

### 3.5 Summary

The occupational structure provides information on the number and percentage of households involved in fishing activities and other marine resource associated activities, thus on the general dependence on marine resources at the community and Marine Park levels. Results of this occupational structure could not provide comprehensive information on the dependence on fishing at the household level. The level of household dependence on fishing and other marine resources was thus investigated further in the household survey, particularly by researching the time committed to fishing, and how fishing ranked in relation to other household livelihood activities.

It was found that more than a third of the Park households are involved in marine resource related activities (35%), with the percentage of households involved being particularly high in the seafront villages (up to more than 60%). This is comparable to findings in other areas on the East African coast (Malleret King et al., 2003). In addition, the household survey showed that, at the household level, time commitment to fishing is high. Fishers fish on average 5 to 6 days a week and their days off are generally devoted to religious practices or gear repair and maintenance. Most fishers in seafront villages and Tangazo fish all year round. Most fishers in Litembe fish at least three quarters of the year (see Tables 8 and 9).

The household survey also showed that fishing is considered as the main source of income by the majority of fishing households surveyed except in Mahurunga despite the fact that a high percentage of these households do not consider fishing as a sufficient source of income to sustain the households (see Figure 5).

All the above suggests that the level of dependence on marine resources at the household and Marine Park levels is high, especially in seafront villages and Tangazo.

However, it was also found that few households depend solely on marine resources associated activities for their livelihoods. Most farm as well and/or have another activity, which suggests that although there is a high dependence on marine resources, households spread their livelihood risk by carrying out a number of activities. The highest percentages of households that depend solely on marine resources for their livelihood were found in Mkubiru, Msimbati, Tangazo and Mngoji (see Maps 1 and 2).
4 UNDERSTANDING BETTER FISHERIES RELATED LIVELIHOODS

To understand fisheries livelihoods, it is essential to identify who is involved in and who influences (e.g. through demand) fisheries associated activities; that is who the stakeholders are.

4.1 Who are the Marine Park marine resource stakeholders?

Stakeholders were identified based on the occupational structure data, focus groups information, household survey results, and key informant interviews. Findings are summarized in Table 10.

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Type of activity</th>
<th>Origin of stakeholder</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary stakeholders</td>
<td>Fishers</td>
<td>Set Nets</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Hand lines/long lines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Beach seines</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spear guns</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Spear/hand diving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Traps</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Tidal weirs</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Tandilo’</td>
</tr>
<tr>
<td></td>
<td></td>
<td>‘Juya’</td>
</tr>
<tr>
<td></td>
<td>Shell fishers and traders</td>
<td>For shells, meat and lime</td>
</tr>
<tr>
<td></td>
<td>Seaweed farmers</td>
<td></td>
</tr>
<tr>
<td>Secondary stakeholders operating in Marine Park villages</td>
<td>Traders, Agents, Exporters</td>
<td>Fish/ ‘dagaa’ (dry or fresh) traders</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sea cucumber traders, agents and exporters</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Octopus, lobster traders and agents</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prawn, lobster, crab traders</td>
</tr>
<tr>
<td>Seaweed farmers</td>
<td>Agent for Zanzibar based Company</td>
<td></td>
</tr>
<tr>
<td>Boat builders</td>
<td></td>
<td>Marine Park villages</td>
</tr>
<tr>
<td>Net menders</td>
<td></td>
<td>Marine Park villages</td>
</tr>
<tr>
<td>‘Tajiri’</td>
<td>Rich boat and gear owners who employ crews to fish</td>
<td>Msimbati</td>
</tr>
<tr>
<td>Consumers</td>
<td></td>
<td>Marine Park villages</td>
</tr>
<tr>
<td>Secondary stakeholders Operating in Mtwara and outside the Marine Park</td>
<td>Agents</td>
<td>Shells (including opercula) Sea cucumbers, shark fins, swim bladders Fishmongers</td>
</tr>
<tr>
<td></td>
<td>Gear sellers</td>
<td>2 shops</td>
</tr>
<tr>
<td></td>
<td>Agent/Exporters</td>
<td>Buying depot (fish, lobster, octopus…) ice providers</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Shells (opercula and shell)</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>Type of activity</td>
<td>Origin of stakeholder</td>
</tr>
<tr>
<td>------------------------------------</td>
<td>-----------------------------------------------------</td>
<td>----------------------------------------------</td>
</tr>
<tr>
<td>Consumers</td>
<td></td>
<td>Mtwara and around, Newala, Masasi etc.</td>
</tr>
<tr>
<td>Institutions</td>
<td></td>
<td>Main base in Mtwara but future base in Msimbati</td>
</tr>
<tr>
<td>MBREMP</td>
<td>Marine Park in charge of management</td>
<td>Main base in Mtwara</td>
</tr>
<tr>
<td>Fisheries Division</td>
<td>Fishing licenses</td>
<td>Main base in Mtwara</td>
</tr>
<tr>
<td>Village Liaison Committee</td>
<td>Intermediary between MBREMP and villages</td>
<td>Marine Park villages</td>
</tr>
<tr>
<td>Honorary rangers</td>
<td>Marine Park enforcement and monitoring</td>
<td>Marine Park villages</td>
</tr>
<tr>
<td>VEMC</td>
<td>Control of resource use in at the village level</td>
<td>Marine Park villages</td>
</tr>
<tr>
<td>Village Councils</td>
<td>Control of fish and other marine product trade, outside fishers</td>
<td>Marine Park villages</td>
</tr>
</tbody>
</table>

(Source: all research components)

Marine Park fisheries stakeholders include:
- Fishermen and fisher-women from the Marine Park, from around the Marine Park and further afield;
- Shell fishers (mainly men, women and children from the Marine Park);
- Seaweed farmers (men and women in Mkubiru and Nalingu);
- Traders, agents and dealers/exporters of fish (fresh and dried), shell, sea cucumber, octopus, prawn, lobster (men and women from the Marine Park, from Southern Tanzania or from abroad).

For clarity:

- **Traders** are people buying fish locally or around the Marine Park area (including Northern Mozambique), and selling to local customers or to traders at the local level or at the Southern Tanzania level. They operate on a small or medium scale.
- **Agents** are people who buy products from traders or local fishers on behalf of exporters or large dealers who operate from abroad or from Dar es Salaam or Zanzibar. Agents are given money to buy the products for the exporters or larger dealers. They operate on a larger scale than local traders do.
- **Exporters/Dealers** operate on a large scale and target up country or foreign markets, they buy from agents, traders or directly from fishers.

These categories may overlap, as someone may be an agent as well as an exporter. However, they give an idea of the scale of the trade involved.

Stakeholders also include:
- Net menders, boat builders, and richer boat owners who may be located in or outside the Marine Park ('Tajiri');
- The Marine Park authorities;
- The Fisheries Division (in charge of fishing licenses);
- Village Councils (in charge of informal trading licenses);
- Local Environment Management Committees (mandated to facilitate the development of environment focused Community Based Organisations and controlling natural resource uses at the village level). VEMCs may have become redundant because of the establishment of the Marine Park Village Liaison Committees.

The sections below focus on describing resource use patterns related to fishers, seaweed farmers, shell fishers, and marine product traders. Prices and costs will be expressed in USD (with one USD equivalent to 1000 TSh).
4.2 Fishing systems, use patterns

A number of fishing gears and methods are used by Marine Park fishers such as beach seines, seine nets (referred to as 'juya'), set nets, traps, lines (hand lines and long lines), spears, spear guns, diving, gleaning etc. Use patterns vary according to gear and fishing methods. Marine organisms harvested include demersal and pelagic fish, shells, octopus, sea cucumbers, prawns, squid, crab, and lobster.

Fishing use patterns presented in this section, relate to the equipment used, the timing and location of activities etc. (Bunce et al., 2000). Perceived changes and conflicting issues are also examined at the end of this section.

4.2.1 Boats

Fishing in the Marine Park is artisanal and mostly small scale and is done for food and income. The majority of fishing boats are dug out canoes (69%) and 'dau' (27%) as shown in Figure 5. Dug out canoes are made of a single tree trunk, these can be of several sizes (from one fisher up to 6). 'dau' are larger double ended sailing boats made from planks and are wider and usually longer than dug outs, up to about 30 feet long. Other boats used to a lesser proportion (4% of the boats used) are square ended sailing boats ('mashua') which tend to be the biggest boats (see photos). The few boats that are motorised (outboard engine) tend to be 'mashua'.

Most boats are sailed or poled. None of the fishers surveyed used motorized boats. Some motorized boats can be seen in the Marine Park but these are operated from outside the Marine Park, particularly from Mtwara.
Boats are used for most gears. A small number of net fishers and a large proportion of trap fishers were found not to use boats. ‘Tandilo’ fisher women do not need boats to fish but sometimes hire boats to get to islands where they stay in temporary fishing camps (in Bahasha and Litokoto islands in the River estuary for example). Similarly, tidal weir fishers do not need boats to carry out their activity.

The household survey showed that most fishing households use boats (see Figure 7).

Figure 7: Proportion of fishing households using boats

![Proportion of fishing households using boats](source: household survey)

Although most fishers have access to boats, a lower proportion of fishers use boats in Mngoji (23%) and Msimbati (38%) than in Litembe, Tangazo and Mahurunga. This may be due to the higher proportion of fishers who dive or use spears, tidal weirs and traps in Msimbati and Mngoji.

Boats may be fully or partly owned or rented. Commonly several fishers use one boat (2 or 3), the catch is divided amongst the crew and the boat and/ or gear owner. The total number of shares equals the total number of crew, plus the boat owner, plus one for the boat. Thus two out of the total number of shares are given to the boat owner. Other fishers, particularly ‘juya’ fishers in Msimbati, use boats owned by ‘tajiris’. ‘Tajiri’ employ fishers who get a share of the catch. In addition, agents (20 motorised boats) for an octopus exporter based in Mtwara, hire fishers in Msimbati to fish octopus in Mozambique 8 to 10 days a month on a regular basis.

Figure 8 illustrates the different type of boat ownership in proportion of fishing households.
The majority of households fully owned boats (mainly dugout) in Mngoji (75%), Litembe (70%), and Tangazo (55%) but not in Msimbati and Mahurunga where only 20% did. Renting boats is most common in Msimbati, Tangazo, and Mahurunga.

As shown in Table 11, most boat owners own dugout canoes, except in Msimbati (where 63% own a ‘dau’ and 13.6% ‘mashua’).

### 4.2.2 Fishing Gears and Methods

A wide spectrum of gear is used in the Marine Park such as set nets of various mesh sizes, beach seines, seine nets (‘juya’), hand lines, long line, spears, ‘tandilo’, traps and tidal weir etc. Fishers also dive to catch shells and sea cucumbers. Although Beach seines were common in the Marine Park, Marine Park authorities have recently started to enforce a ban on this gear, but some crews continue to operate, particularly from Nalingu village and one crew in Msimbati.

#### 4.2.2.1 Gear types

- **Nets**
  
  Set nets: of 3-4 ply and of 2.5-3 inch mesh from 50 to 100m long are usually set by boat, and left all night or day in deeper areas. Species targeted are mainly pelagic such as jacks.
Larger mesh size set nets (4-7 inches), also on average of 50-150 m in length, and 20m in depth are set all night in deeper waters by 4 to 6 fishers in. Target species are mainly larger pelagic including sharks. 4" mesh size nets are commonly referred to 'Mlimba' nets in the Marine Park in relation to one of the main target species: mullet.

**Active gear (‘juya’, Beach seine (‘kokoro/kavogo’, and ‘tandilo’)***

Beach seines are very small mesh size (some 0.5 inch) nets. Fishers based on a beach spread the seine over a large area encircling a group of fish, while the two extreme ends of the net are held by two groups of fishers who pull the net to the beach. These nets are non-discriminatory and mainly catch small fry, and juveniles of demersal and pelagic species as well as larger fish. Several fishers concentrate on releasing the net to prevent it snagging. Boats are usually large dugouts that carry 5-8 fishers each. Beach seines have been banned in the Marine Park but a number of groups still operate. Those whose gear has been confiscated have joined other net crews or use hand lines.

‘Tandilo’ are usually mosquito nets used by women to fish, by foot close to the shore. Three to six women drag the net parallel to the beach and target small fry (‘dagaa’). Women sometimes use their ‘kanga’ (traditional cloth). They target small fish (small fry and juveniles from other species). This is one of the most widely spread gear in the Marine Park.

‘Juya’: These are used as a seine, in shallow or deeper waters when a shoal of fish is spotted. Fishers encircle the net around fish, scraping the bottom if in shallow areas. A number of fishers snorkel around the net to ensure it does not snag on coral, and to guide the net around the fish. The net is then pulled closed at the bottom and the catch hauled onboard. The mesh size may be small (1-1.5") or larger (3").

**Traps***

Fence traps, traditional traps: These are not widely used in the selected villages. Fence traps (tidal weirs) can be fixed larger structures or light removable ones. Harvesting occurs at low tide when fish are trapped at the end of the fence. The larger structures are made of large poles and target demersal fish or prawns depending on the location. These are joined together using a synthetic or palm and bark rope.

Traditional traps are hexagonal woven baskets left overnight and target demersal fish mainly.

**Spears and sticks***

Spear, sticks, spear guns: These are home made. Divers use sticks or their hands to catch lobsters, octopus, sea cucumber and reef fish. Sticks are also used on shore, in the mangrove areas to catch crabs. Spear guns are mostly used in Msimbati and Mngoji. Scuba diving for sea cucumber has been reported but is banned in the Marine Park.
Lines

Handlines: Hand lines are very common and fishers often use them as well as nets. They are bought. They are mainly used from boats. Handlines are used individually but two or three people share a fishing boat.

Longline: A longline crew operates in the Marine Park, but it is a scarcely used gear. Long lines target large pelagics, particularly sharks. They are set in deeper waters.

Traps, sticks, spears, spearguns and some nets are homemade using bought or local materials. Otherwise, lines and nets are bought. Gear can be partly or fully owned, rented, borrowed or belong to ‘Tajiri’. Table 12 shows the most common types of ownership for each gear.

Table 12: Type of gear ownership (in %)

<table>
<thead>
<tr>
<th>Gear</th>
<th>Rented /borrow</th>
<th>Part owned</th>
<th>Fully owned</th>
</tr>
</thead>
<tbody>
<tr>
<td>Speargun</td>
<td>0</td>
<td>0</td>
<td>100</td>
</tr>
<tr>
<td>Handline</td>
<td>8.2</td>
<td>14.8</td>
<td>77</td>
</tr>
<tr>
<td>Trap</td>
<td>0</td>
<td>7.7</td>
<td>92.3</td>
</tr>
<tr>
<td>Tidal weir</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
<tr>
<td>Large nets</td>
<td>33.3</td>
<td>35.9</td>
<td>30.8</td>
</tr>
<tr>
<td>Medium nets</td>
<td>10</td>
<td>20</td>
<td>70</td>
</tr>
<tr>
<td>Small nets</td>
<td>7.7</td>
<td>30.8</td>
<td>61.5</td>
</tr>
<tr>
<td>‘Juya’</td>
<td>0</td>
<td>80</td>
<td>20</td>
</tr>
<tr>
<td>Beach Seine</td>
<td>0</td>
<td>100</td>
<td>0</td>
</tr>
<tr>
<td>‘Tandilo’</td>
<td>8.6</td>
<td>60.3</td>
<td>31</td>
</tr>
<tr>
<td>Longline</td>
<td>0</td>
<td>50</td>
<td>50</td>
</tr>
</tbody>
</table>

(Source: Household survey)

- Small nets: 1-1.5” mesh size
- Med (medium) nets: 2-2.5” mesh size
- Large nets: > 3” mesh size

As shown in Table 12, the majority of fishers own fully their spearguns, handlines, traps, medium and small nets. The majority of ‘tandilo’, beach seines, and ‘juya’ are owned by groups of fishers. Large nets are rented (to ‘tajiri’ usually), owned fully or partly.

4.2.2.2 Gear use in proportion of fishers

Out of the 643 households surveyed, 185 were involved in fishing, and represented 456 fishers. Overall, handline (except in Msimbi multi) and ‘tandilo’ are the most commonly used gears in seafront and mangrove villages. The percentage of fishers using ‘tandilo’ varies between 18 and 29%. Handline is the most common gear in Litembe (67% of the fishers), Mngoji (44%) and Tangazo (32%). In Msimbati,
large and medium size mesh nets are the most widely used gear (respectively by 27% and 19% of the fishers) along with ‘tandilo’. This is illustrated by Figure 9.

As shown in Figure 10, handlines (28% of fishers), ‘tandilo’ (23%), larger mesh size nets which over 3” and particularly Mlimba nets 4” (18%) and medium (2” to 2.5”) size mesh nets (10.5%) involve the largest proportion of fishers in the surveyed sea front villages. In Mangrove villages, handlines dominate (more than 50% of fishers), then ‘tandilo’ (25%). Small and medium nets come third (including ‘juya’ and beach seines) with from seven to 15% fishers in Litembe and Tangazo.

In Mahurunga, 50% of the fishers from the five marine fishing households use nets (medium and small meshed).

Few tidal weirs fishers were detected in the survey and those were located in Msimbati. Richmond (pers. comm.) observed 15 tidal weirs between Msimbati and Mngoji area. Tidal weirs are not widely used in the mangrove villages and no tidal weir fishers were sampled.

15% of the fishers surveyed in Mngoji used traps and less than 3% in Msimbati. None of the surveyed fishers used traps in mangrove villages, however these are used by a few fishers in mangrove villages (see picture) as was mentioned in the focus groups. A similar situation was found for tidal weirs these are used in the mangrove areas, however by a few fishers. Trap fishing was mentioned in Mitambo and Kilambo focus group discussions.

Hand/sticks are mostly used to collect sea cucumbers and catch octopus. This is carried out mainly in the seafront villages but by less than 5% of the fishers (with a higher percentage of fishers involved in Msimbati). Finally compared to other locations of the East African coast (Malleret King et al., 2003), the use of spear gun is not common in the Marine Park. Spear guns are used in Msimbati and Mngoji by less than 5% of the fishers.

The distribution of gear is illustrated in Figure 9. Figure 10 shows the distribution aggregated at area levels (mangrove and seafront surveyed villages).

*Figure 9: Gear use in % of fishers from surveyed households grouped per village*

(Source: Household survey)

*Note: the distribution of gear does not add to 100% as fishers often use more than one gear.*
Figure 10: Gear use in % of fishers from household surveyed grouped into areas

A wider spectrum of gear is used in the seafront villages than in mangrove villages. ‘Tandilo’ are used by a significant proportion of fishers in both areas, and handlines are widely used in both areas but with a much higher percentage in seafront villages. Fishers may use different types of nets; however, they often specialize in one gear.

4.2.2.3 Timing, location and species targeted per gear

Fishing activities vary according to daily and monthly tidal patterns as well as according to seasonal patterns.

Three significant seasons were identified by interviewed fishers:
- ‘kusì’ dominated by Southeast Monsoon (SEM) winds, from May to October
- ‘kaskazi’ dominated by Northeast Monsoon (NEM) winds from November to March
- ‘matalaì’ (MAT) which fishers identify as the time between monsoons when there is little wind, March April, October, November. This was had not been picked up in other studies (Guard, 2002; Malleret King, 2003).

Fishing in the Marine Park is usually done once or twice a day, and up to three times depending on tides, season and gear. Fishers spend 4 to 8 hours at sea. Table 13 summarises the main findings from the focus groups discussion on the daily, monthly and seasonal patterns of fishing according to gear. The main species caught and the type of areas fished is indicated for each gear. Small to large fish species are listed before the very small fish (‘dagaa’).
<table>
<thead>
<tr>
<th>Gear</th>
<th>Daily pattern</th>
<th>Monthly patterns and seasonality</th>
<th>Main species *</th>
<th>Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nets (2.5-7&quot;)</td>
<td>-Day and Night</td>
<td>Done: all year</td>
<td>Grunters</td>
<td>Around islands&lt;br&gt;Deeper waters&lt;br&gt;Channels between reefs&lt;br&gt;Outer reefs</td>
</tr>
<tr>
<td></td>
<td>-Going at low tide and coming back high tide</td>
<td>Peak season: NEM, MAT</td>
<td>Pursemouth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-6-7 hours at sea</td>
<td></td>
<td>Jacks</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Mullet</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Tuna</td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td>Red Snapper</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Groupers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>King fish</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Milkfish</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Shark</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Wolf herring</td>
<td></td>
</tr>
<tr>
<td>Nets (less than 2.5&quot;)</td>
<td>-Day and Night</td>
<td>Done: all year</td>
<td>Mackerels</td>
<td>Reefs, deeper waters, around islands (Mozambique)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peak season: NEM MAT</td>
<td>Prawns</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Small mullets</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>Half beaks</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Emperor</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘dagaa’:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sardines</td>
<td></td>
</tr>
<tr>
<td>‘Juya’</td>
<td>-Day</td>
<td>Done: all year</td>
<td>Small barracuda</td>
<td>Intertidal, sandy.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Peak season: NEM</td>
<td>Emperor</td>
<td>Islands (Bahasha, Litokoto)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Half beaks</td>
<td>River channels (Kilambo)</td>
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<td></td>
<td></td>
<td></td>
<td>Mackerel</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>‘dagaa’:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sardines</td>
<td></td>
</tr>
<tr>
<td>‘Tandilo’</td>
<td>-Day, evening, and night (full moon particularly)</td>
<td>Best: spring tide</td>
<td>‘dagaa’:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-May be done twice in a day</td>
<td>Done: all year</td>
<td>Anchovy</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Done at low or high tide depending on the area</td>
<td>Peak season: NEM</td>
<td>Small herrings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-2 to 4 hours spent.</td>
<td></td>
<td>Sardines</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Senda</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Silver silago</td>
<td></td>
</tr>
<tr>
<td>Beach seine (few)</td>
<td>-Mainly Day</td>
<td>Best: Spring tide</td>
<td>Emperor</td>
<td>Intertidal, muddy or, sandy mainly. (Fishers from Mkuburu go to Mafia)</td>
</tr>
<tr>
<td></td>
<td>-Low tide</td>
<td>Done: all year</td>
<td>Jacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-May be done twice</td>
<td>Peak:</td>
<td>‘dagaa’:</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Anchovies</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Herrings</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Synodontis?</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sardines (Jan-Aug)</td>
<td></td>
</tr>
<tr>
<td>Handline</td>
<td>-Day and/or night- day</td>
<td>Done: all year</td>
<td>Mullet</td>
<td>Reef, Sand, Seagrass, channels, Deep, shallow..</td>
</tr>
<tr>
<td></td>
<td>-High or low tide depending on areas</td>
<td>Peak season: NEM, MAT</td>
<td>Jacks</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Once or twice a day 5 to 7 hours</td>
<td></td>
<td>Snappers</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Pursemouth</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Grunter</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Shark</td>
<td></td>
</tr>
<tr>
<td>Traps (few) (mainly in Mkuburu Mngoji Mitambo)</td>
<td>-Day (difficult in windy days)</td>
<td>Done: all year</td>
<td>Emperor</td>
<td>Kilambo: done in the Estuary mainly (different species)</td>
</tr>
<tr>
<td></td>
<td>-Low tide</td>
<td>Peak season: NEM</td>
<td>Parrot fish</td>
<td></td>
</tr>
<tr>
<td></td>
<td>-Once or twice depending on tide</td>
<td></td>
<td>Goat fish</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Rabbit fish</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Catfish (E)</td>
<td></td>
</tr>
<tr>
<td>Gear</td>
<td>Daily pattern</td>
<td>Monthly patterns and seasonality</td>
<td>Main species</td>
<td>Areas</td>
</tr>
<tr>
<td>------</td>
<td>---------------</td>
<td>---------------------------------</td>
<td>--------------</td>
<td>-------</td>
</tr>
<tr>
<td>Kilambo)</td>
<td></td>
<td></td>
<td>Small tilapia (E) Prawns (E) caught) Sea grass areas Channels in mangroves</td>
<td></td>
</tr>
<tr>
<td>Tidal weir (few mainly Kilambo, Msimbati)</td>
<td>-Day -Low tide check -Once or twice depending on tides</td>
<td>Best: Springs Done: mainly SEM (prawn season) Prawns Demersal fish</td>
<td></td>
<td>Along river estuaries Around islands Intertidal areas.</td>
</tr>
<tr>
<td>Spear gun (Msimbati)</td>
<td>-Day time -Low tide</td>
<td>Done: all year Peak season: MAT</td>
<td>Jacks Grouper Squirrel Fish</td>
<td>Reef, sandy areas and sea grass</td>
</tr>
<tr>
<td>Spear, Hand, diving (Sea cucumbers)</td>
<td>-Day and night (with pressure lamps) -Not every day -Low tide for hand collection -Any tide for diving</td>
<td>Done: mainly in SEM No diving: when river high (muddy waters in Mkubiru)</td>
<td>Holothuria scabra Actinopyga mauritiania Thelenota. Ananas Thelenota. Anax Vipara’ ‘Limbo’</td>
<td>Sand, reef areas, not too deep.</td>
</tr>
<tr>
<td>Spear, Hand (Octopus)</td>
<td>-Day or night -Low tide</td>
<td>Mostly: Spring tides Done: All year round</td>
<td>Reefs, rocky areas</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Focus group discussions)
NEM: Northeast monsoon
SEM: Southeast monsoon
MAT: Calm period in between monsoons.
E: Estuary
‘NB Species’ common names need further checking. Names were collected in Swahili and Makonde, Mr Mwaisaka (Marine Park ranger) undertook a first translation in English however further cross checking should be done on the basis of the fisheries assessment being carried out for the Marine Park/Project under a separate ongoing consultancy. The temporary list of fish names is presented in Appendix 10.

Fishing is done day and night (with or without pressure lamps) depending on the tide. Most fishing is done all year round with some seasonal preferences. The calmer Northeast monsoon is often preferred by Marine Park fishers, it is less cold and sea conditions are calmer than in the Southeast Monsoon. This is found along the Tanzanian and Kenyan coast (McClanahan, 1988; Obura, 2001; King, 2000; Malleret King et al., 2003; Shao et al., 2003).

In contrast, sea cucumber fishers perceive their catch to be higher during the Southeast Monsoon, the catch increase is also perceived by agents buying sea cucumbers. This pattern also confirms findings of TRAFFIC (2001).

Fishing is mostly done at low tide and spring tides are often considered as the best tide. Octopus collection is done during spring tides, very few fishers go to catch octopus during other tides. This confirms Guard’s (2002) results and was further confirmed by an exporter based in Mtwara.

It takes fishers on average ½ hour to 2 hours to get to their fishing grounds (whether they are walking, sailing or poling). For a few months a year some fishers set camp on islands (e.g: Namponda, Bahasha, Litokoto) to access further, more productive fishing grounds. ‘Tandilo’ fisher women from Tangazo and Litembe also set camp in Bahasha or Litokoto for a few months of the year. Temporary fishing camps in Namponda, Bahasha and Litokoto have become permanent camps and fishers live with their families on the islands despite the lack of basic services and facilities such as fresh water.
Interviews suggest that for most gear a wide variety of species are caught. The diversity of the catch appears to be higher than in southern Kenya for example where few species dominated the catch (King, 2000; Malleret King, 2000; Obura, 2001).

4.2.3 Gear preference

Fishers were asked to rank the gears in order of preference and explain their choice. Table 14 shows how these were ranked by the focus groups. ‘Tandilo’ is not included in this table, being operated mainly by women, fishermen did not feel it appropriate to consider, and vice versa, women felt that ‘tandilo’ was the only gear available to them (except for handlines).

Table 14: Gear preference (results of the matrix ranking)

<table>
<thead>
<tr>
<th>Gear</th>
<th>Groups Interviewed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nets</td>
<td>1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 Median</td>
</tr>
<tr>
<td>Beach seine</td>
<td>2 3 1 4 1</td>
</tr>
<tr>
<td>Handline</td>
<td>3 3 2 1 4</td>
</tr>
<tr>
<td>Trap</td>
<td>4 3 2 5</td>
</tr>
<tr>
<td>Tidal weir</td>
<td>2 2 4</td>
</tr>
<tr>
<td>Shark net</td>
<td>1 3 2 3</td>
</tr>
<tr>
<td>Spear gun</td>
<td>5</td>
</tr>
<tr>
<td>'Juya'</td>
<td>1</td>
</tr>
<tr>
<td>Longline</td>
<td>4 3</td>
</tr>
</tbody>
</table>

The choice of gear was found to be determined by skill (knowledge), age (physical demands of the gear), catch and income expected, personal preference for group or individual fishing as well as traditions (e.g., gears are gender specific). Nets were generally the preferred gear, traps and spear gun came out as least preferred.

Despite preferences, gear choice is often determined by cost. This has been found in other studies in East Africa where the price of the gear and the need for other capital items to operate it was an important factor in the choice of the gear (Rubens, 1996; Malleret King, 2000). Table 15 shows the characteristics of the users per gear, the costs involved (as obtained through the focus groups), and the estimated catch.

Net are the preferred gears, but also the most expensive. One way to enter the net fishery without great investments is to join a ‘tajiri’ crew, which is what ‘juya’ fishers do. The remuneration will not be as high however as ‘tajiri’ may take a high percentage of the catch. Fishers can also join other fishers to buy the nets (usually 5 or 6 fishers pool their resources together).

The catch is divided between the fishers, captain and the gear (which is considered equal to a person). The gear/boat owner gets 3 shares of the catch one for the gear, one for the boat and one for his subsistence the other shares go to the rest of the fishers. For ‘tandilo’ fisherwomen, the share arrangement was found to be different. 3–6 women may fish together, the gear owner or owners get 50% of the catch and the rest is divided equally among the other fishers.

Similar arrangements are made when two or three fishers fish on a boat owned by one of them.

Boats are needed for most of the gear, particularly nets. Boat prices vary according to the type and size of the boats. As shown in table 16 boats represent an important part of the investment required to fish. The prices vary from 10 USD for a small dug out made of lesser quality wood to 700 USD for a larger ‘dau’ and to even 1700–2000 USD for a boat with an engine. Boats are sometimes rented on a daily basis, but then access to the boat is not guaranteed, it depends on the demand from other fishers.

The cheaper methods of fishing are gleaning, using sticks, spear guns and traps or joining crews (nets and ‘tandilo’).
Table 15: Main users, estimated numbers, cost in USD of gear and average daily catch

<table>
<thead>
<tr>
<th>Gear</th>
<th>Gender, Age and Origin of users</th>
<th>Cost of gear in USD*</th>
<th>Further equipment needed and cost</th>
<th>Average daily catch per fisher</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Set Nets</strong></td>
<td>Men Middle age and Young Marine Park villagers (<em>Outsiders to the Marine Park in Msimbati</em>) N= 350 Park villagers</td>
<td>&lt;2&quot;: 5-10 3&quot;&lt;&gt;5: 50-100 &gt;5&quot;: 80-150</td>
<td>Some nets are set by foot, Usually: boats Dug out: 10-150  ‘dau’: 300-700 Fins, masks for ‘juya’ (In Msimbati, most net fishers are employed by ‘tajiri’)</td>
<td>8-20 Kg Higher: Kilambo Lower: Mngoji</td>
</tr>
<tr>
<td>‘Tandilo’</td>
<td>Women All ages Marine Park villagers N= &gt; 500</td>
<td>2 or 3 mosquito nets sown together: 12 to 14 USD</td>
<td>None</td>
<td>2-10 Kg 0.5 to 1.5 buckets Higher: Msimbati Lower: Mitambo</td>
</tr>
<tr>
<td><strong>Beach Seine</strong></td>
<td>Men Young and Middle age Villagers N= 40</td>
<td>300 USD</td>
<td>Dug out: 60-150</td>
<td>10-30 Kg</td>
</tr>
<tr>
<td><strong>Handline</strong></td>
<td>Men (<em>woman in Msimbati</em>) Young and Middle age Marine Park villagers (<em>Outsiders in Msimbati</em>) N= 200</td>
<td>From 60cts-1 to 6 USD</td>
<td>Renting: 0.2-0.3 per day Dug out from 15-60</td>
<td>High variation 8-30 Kg Higher: Madimba Lower: Mkubiru</td>
</tr>
<tr>
<td><strong>Traps</strong></td>
<td>Men Middle Age and Old Marine Park villagers N= 30</td>
<td>70cts-3 USD (depending on size) Last 3 months 2-12 per year Home made</td>
<td>Dug out: 70-150</td>
<td>2-15 Kg Higher: Mngoji Lower: Madimba</td>
</tr>
<tr>
<td><strong>Tidal weir</strong></td>
<td>Men Middle Age and Old Marine Park villagers N= 15</td>
<td>Home made</td>
<td>None</td>
<td>3-9 Kg</td>
</tr>
<tr>
<td><strong>Spear gun</strong></td>
<td>Men Young and Middle Age Marine Park villagers N= 40</td>
<td>5 USD (Home made)</td>
<td>Fins, Masks</td>
<td>15-20 Fish</td>
</tr>
<tr>
<td><strong>Spear, Hand, diving (Sea cucumbers)</strong></td>
<td>Men (diving) Men and women (foot) All ages (foot) Young and middle age (diving) [N= 80]*</td>
<td>‘dau’: 500-700 Dug out: 10-100 Fins, masks</td>
<td>1 kg</td>
<td></td>
</tr>
<tr>
<td><strong>Spear, Hand (Octopus)</strong></td>
<td>Men (diving) Women (gleaning) Marine Park villagers [N= 80]*</td>
<td>Dug out: 10-150</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- The price of the hand line depends on the weight of the line and on the number of hooks.
- The price of the nets depends on the size and the weight of the material used.
- The price of boats varies according to the size, quality and type of boats.
* Spear, hand, diving for octopus or sea cucumber was not separated in terms of numbers.
Fishing in the Marine Park is mainly done by Marine Park villagers, however outside fishers also come to operate in the Marine Park. For example, Msimbati focus groups mentioned that hand line and net fishers from Ngao, Naumbu, Mtwara and ‘juya’ crews from Mtwara and Mikindani fish in the Msimbati area. Marine Park fishers (including ‘tandilo’ fishers) are also highly mobile and fish in different areas in the Marine Park. For example, Mitambo and Madimba fisher women mentioned the fact that fisher women from Mngoji, Litembe and Tangazo fish in their areas. A number of Marine Park fishers (particularly from Mkubiru) join crews in Mafia and Kilwa on a seasonal basis, and other fishers fish in Mozambique waters (sea cucumber, octopus, nets fishers, and handline fishers). This is illustrated in Map 3.

Gears that are more physically demanding (hauling large weights, swimming or diving) are usually used by young and middle aged men. Elder fishers use traps and tidal weirs mainly. Women fish with ‘tandilo’, but also glean for sea cucumbers, and octopus at low tide.

The total number of fishers estimated from focus groups’ discussion could be up to 1100 people. This does not take into consideration people using several gears, but takes into consideration fishers who fish occasionally. Outsider fishers are not included in this figure.

Consistent catch information was difficult to obtain due to the high daily variability, this information will thus benefit from further detailed investigation from the fisheries assessment and catch data collected by the Marine Park. However, it appears from focus group discussion the largest catch (kg) per fisher comes from beach seine and other nets and handlines and the lowest catch from ‘tandilo’. However, fish and other marine organism prices vary significantly according to size and species which means that income from a high catch (kg) of beach seine (small fry) may be lower than for a lower catch (kg) from handline (pelagic or larger demersal fish). Similarly, the price of sea cucumber is high and thus the daily income on a small catch may be higher than for other gear.

Most focus groups mentioned that the catch varies according to season, the catch being higher in the Northeast Monsoon for most gear. In other areas of East Africa, the catch can vary by 100% (Obura, 2001). The reason for the difference in catch is often found to be the difficulty to access further offshore productive fishing grounds when the sea is rougher (hand lines and nets) during the Southeast Monsoon. The difference in catch between seasons was however not as significant in the Marine Park as it seems to be in other areas. This may be because in southern Kenya for example, the reef is a barrier reef and fishers need to go through channels that can be dangerous on windy days. This is not the case in the Marine Park area where the reefs are patchy and there is a large protected bay.

The Southeast Monsoon is preferred by sea cucumber fishers and by tidal weir fishers interviewed from the mangrove villages who target prawns that are more available during the rainy season.

Fishers operate individually or in groups. No fishers association or cooperative were found to operate in the Marine Park although an association for fishers in Mtwara region (Mtwara Fishermen Association) has recently been formed and is based in Mtwara. Mtwara Fishermen Association was not mentioned by any of the groups.

4.2.4 **Prices of fish and potential income according to gear**

Fish prices are highly dynamic and vary according to size, species, seasons, locations and the level of the demand. Prices of sea cucumber, octopus and lobsters are however determined by the agents and exporters and are relatively stable.

Fish is sold in buckets or baskets (particularly very small fish; ‘dagaa’), per piece or per pile/bundle, and very rarely by weight (per Kg). Sea cucumbers may be sold per piece or per Kg, but a price per Kg has been determined. Octopus is sold per Kg. . Table 16 summarises prices that fishers from the Marine Park may get.

It was found, when investigating fishers’ prices in larger markets such as Mtwara, that these can be twice as high as in the Marine Park. Similarly, prices in Mozambique were estimated by fish traders to be half of those in the Marine Park. Prices are also affected by the seasons, for example a bucket of ‘dagaa’ can be sold 3000-4000 TSh (3-4 USD) during the dry season and the price may drop by half during the rains (demand may be lower in the rains due to the difficulty to dry the fish). Thus, Table 16 can only represent a snap shot of indicative prices.
Table 16: Fish prices in USD (received by fishers)

<table>
<thead>
<tr>
<th>Type and size of Fish</th>
<th>Price per piece</th>
<th>Price per Bucket</th>
<th>Per Kg wet</th>
<th>Per Kg dry</th>
</tr>
</thead>
<tbody>
<tr>
<td>‘dagaa’</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Small fish</td>
<td>0.1-0.5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium fish</td>
<td>0.4-1</td>
<td></td>
<td></td>
<td>1.2-1.5</td>
</tr>
<tr>
<td>Large fish</td>
<td>0.8-10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Very large fish</td>
<td>10 up to 70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Octopus</td>
<td></td>
<td>0.25-0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Squid</td>
<td>0.5-0.9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prawns</td>
<td>1.8-2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lobster</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sea cucumber **</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Actynopyga mauritiania</em></td>
<td>4.5</td>
<td>17</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Holthuria scabra</em></td>
<td>3.5</td>
<td>16</td>
<td></td>
<td></td>
</tr>
<tr>
<td><em>Thelenota anax</em></td>
<td>0.8</td>
<td></td>
<td>10</td>
<td></td>
</tr>
<tr>
<td><em>Thelenota ananas</em></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
</tr>
<tr>
<td><em>Jongo uzi</em></td>
<td>0.2-0.25</td>
<td>3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Focus group, key informants)

Very small fish: ‘dagaa’
Small fish: a hand length
Medium fish: half an arm length
Large: an arm length
Very large: usually large pelagics above 10 Kg
* Prices were obtained from the exporters who mentioned that lobsters were brought mainly by local fishers in small quantities.
** Sea cucumber prices vary according to the species (the size of the species). The larger, the higher the price.

Sea cucumber prices were obtained mainly for dried sea cucumbers. Sea cucumbers are usually dried by the fishers themselves unless they collect very few and then they sell them wet. Traders dry them. Very rarely does the agent dry them him/herself. As shown in Table 16 however, agents have determined a price according to the species and size of the individuals in the species. Fishers can sell direct to the agents and then the price obtained is higher, however traders are the ones who commonly deal with the agents in Mtwara.

Fishers were also asked to estimate their average daily income from fishing. Findings are summarized in table 17. Catch and price information were also used to complement the information gathered from the group discussions.

Table 17: Daily income estimation

<table>
<thead>
<tr>
<th>Gear</th>
<th>Estimated income per day fishing. TSh and (USD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nets</td>
<td>1000-10000 (1-10)</td>
</tr>
<tr>
<td>‘Tandilo’</td>
<td>1000-4000 (1-4)</td>
</tr>
<tr>
<td>Beach seine</td>
<td>2000-3000 (2-3)</td>
</tr>
<tr>
<td>Handline</td>
<td>500-4000 (0.5-4) mostly 2000-4000 (2-4)</td>
</tr>
<tr>
<td>Traps</td>
<td>No consistent information was obtained</td>
</tr>
<tr>
<td>Tidal weir</td>
<td>4000-20000 (rare) (2-20)</td>
</tr>
<tr>
<td>Spear gun</td>
<td>7000-10000 (7-10)</td>
</tr>
<tr>
<td>Spear, Hand, diving (Sea cucumbers)</td>
<td>No average could be obtained. The income can vary from 200 to 16 000 (0.2 to 16)*</td>
</tr>
</tbody>
</table>

(Source: Focus groups)

*The income of sea cucumber fishers varies highly according to the catch, the species caught and whether they dry or not the sea cucumber themselves.
The daily income per fisher can be as low as 0.5 USD per day if fishing with handline on a bad day to 20 USD on a good day for a tidal weir or 10 USD with nets. However, a majority of fishers’ focus groups estimated their daily income to be between 1.5 to 3 USD. The highest catch and income being mentioned by the shark net fishers. This information can only give an indication of the income, and an order of magnitude of this income. An indirect indicator was used (see section 5) to investigate the socio-economic status of Marine Park fishers.

Although difference in income can be explained by the gear used, its potential catch, part of the variation can also be explained by skill (Rubens, 1996). Highly skilled fishers get larger catches than others do.

4.2.5 Fishing grounds
Map 3 below shows the main Marine Park fishing grounds for the different gears as identified and mapped by the fishing groups. Sea front villages and some of the mangrove villages fish around Namponda Island and all mangrove villages fish around Bahasha and Litokoto islands. The three islands represent the most intensely fished areas in the Marine Park as shown in the Map (blue circle).

It also shows that fishers go to Mozambique to fish and for some consider Swavu and Mauga islands in Mozambique as their best fishing grounds (the geographical location of Mozambique fishing grounds was unfortunately not obtained). The circled areas highlight the most used areas that will need attention from the Marine Park and where the pressure on marine resources is likely to be highest. The three areas are Namponda islands, the eastern side of Mnazi Bay, Reefs off Msimbati and Bahasha and Litokoto islands.
Map 3: Marine Park main fishing grounds and fishers’ main movements from outside and within the Park.

(Source: Focus groups)
4.2.6 Perceived changes in the last 10 to 20 years

Most fisher groups interviewed have perceived an increase in the number of fishers in the last 10 to 20 years (the increase was estimated to be 60% in Mkubiru for example). Explanation provided for this was the lack of employment opportunities for young people. For example in Mngoji the dramatic increase in ‘tandilo’ fisher women, was attributed to the lack of opportunities for women school leavers. Another explanation was the high mobility of fishers and the influx of outside fishers in the Marine Park areas.

The increase in the number of fishers is perceived to be accompanied by a drop in catches and income despite an increase of fish prices. Spear gun fishers estimate their catch to have dropped by half in the last 10 years (from 20 to 10 fish). Some groups explained the drop in catches by the wide use of beach seines as well as by the increase in fishers. Groups mentioned that an increase gear prices has contributed to reduce further fishers’ income.

Furthermore, fishers note the need for them to spend longer hours at sea and go further off shore to find the resources. This was mentioned by net fishers, handline fishers and ex beach seine fishers.

Interestingly however a number of fisher groups found that their catch had increased in the last 10 years. These were large nets fishers in Litembe and Kilambo (mangrove villages) who explained this increase by the effective ban on dynamite fishing in the late 1990s.

‘Tandilo’ fishing groups were divided in their perception of the evolution of the catch in the last 10 to 20 years. More than half perceived the catch to have dropped, but fisher women in Kilambo, Tangazo and Mngoji perceive the catch as having increased (up to 100% increase in Mngoji) despite the increase in the number of fisher women. Some groups have noted a positive difference in the availability of small fish since the number of beach seine crews has been reduced.

Sea cucumber catches are perceived as having dropped in the last 10 years and a change in the abundance of species (the smaller species being more available). Prices are considered to have increased significantly and over compensated the drop in catches. Income has thus increased. This has led to an increase in the number of fishers doing this activity except in Madimba and Mkubiru where the number of sea cucumber fishers has decreased.

Sea cucumbers are perceived as having dropped in the last 10 years and a change in the abundance of species (the smaller species being more available). Prices are considered to have increased significantly and over compensated the drop in catches. Income has thus increased. This has led to an increase in the number of fishers doing this activity except in Madimba and Mkubiru where the number of sea cucumber fishers has decreased.

The increase in the number of sea cucumber fishers is likely to intensify the pressure on the already declining resource. Sea cucumbers are often collected in Mozambique.

A number of fish species were mentioned as more difficult to find than 10 years ago and these include: ‘Kibangi bangi’, Milkfish, Parrot fish for example as well as ‘Fatundu’, ‘kapungu’. Anchovies have been perceived as difficult to get particularly by Mngoji and Mitambo groups whereas it is one of the preferred species and used to be abundant.

One of the main changes in this last year has been the ban on beach seining. Although beach seines still operate in the Marine Park despite its ban, some groups have stopped and converted to handlines, or joined other net fishing groups. The reduction in beach seining is considered to have had a positive impact on the catch of ‘tandilo’ fishers.

4.3 Seaweed farming

Seaweed farming is carried out in Mkubiru and Nalingu. It was briefly done Msimbati in 1997/1998 but was discontinued after the harvest was not collected by the buyer.

The activity is done throughout the year by men and women (about 20 people in Mkubiru). It takes about 2 to 2.5 hours per day of work, usually at low tide, with peak work requirements during the harvesting. 10 to 15 Kg of seaweed may be collected in a day during the harvest. Seaweed is harvested mainly during the dry season when drying the product is easiest.

The main buyer is a Zanzibar based company with agents along the coast of Tanzania. The buyer provides farmers with seedlings and ropes necessary to grow the seaweed and comes once or twice a year to collect the production. It takes one month to one and a half months for seedlings to be ready for harvesting, which occurs every two weeks.
Income derived from seaweed farming is relatively low with prices at 140-170 TSh (0.14-0.17 USD) a Kg of dried seaweed. This is consistent with information collected in the Mlingotini, Bagamoyo (Malleret-King et al., 2003). No information was obtained on the amount of seaweed sold by individuals.

Nalingu is the main seaweed producer of the Marine Park but no information could be gathered on this activity.

Interest in seaweed farming is declining due to low incomes.

4.4 Shell collecting and trading

Seashells are collected for a number of purposes in the Marine Park. The largest quantity of shells is collected for food (e.g. oysters, small gastropods, cockles etc.). Shells are also collected for ornamental purposes (e.g. helmets, leopard cowries, cowries, pen shells, conch shells, tritons, rock shells etc.), which are sold as curios for tourists along the coast and to markets around the world (Richmond, 2002; TRAFFIC, 2001), and for their operculum which is the cover protecting the gastropod’s entrance (e.g. Rock shells, tritons - small or large).

Agents believe that shell opercula are used in the perfume industry; however, few interviewed traders, fishers or agents could confirm the use of opercula. The TRAFFIC (2001) study had similar problems to uncover the use of opercula and suggested that they are used in the perfume industry and in incense production, mainly in India. An internet search revealed that sea shell opercula (including those of *Chicoreus Ramosus*) were traditionally used by Jews and Muslims over millennia to produce incense for religious purposes. Furthermore, an ancient Arab recipes recorded in a medical book of the 1930s shows that *Chicoreus Ramosus* opercula (among others) was an ingredient used in the production of incense for medicinal purposes, especially for curing stomach and liver ailments. Little is known as to whether these recipes are still in use. A more recent study suggests that opercula based incense is part of traditional hospitality in Oman; at the end of a meal, guests are offered a range of perfume and incense, some of which are opercula based. Finally, Turbo shell opercula have been and are being used to produce jewellery (pendants, earrings in Asia and Europe), and in religious practices in India (small turbo shell opercula are sold as 'Disc of the moon' to pilgrims) (Mienis).

Bivalves collected for food are also used to produce lime for household use or local level use.

4.4.1 Use patterns and users

Shells collected mainly for food are harvested at low spring tides in intertidal areas, by women and children who glean for them. Larger ornamental shells are collected in deeper waters, on reefs or sandy patches where men dive for them. Opercula come from both food and ornamental shells. Shells are usually collected and traded by the same individuals at the local level. Ornamental shells and opercula are then sold to agents and exporters in Mtwara.

Although the shells harvested by women are collected for home consumption, surplus is sold in the village. Shell meat is taken out, cleaned and usually boiled. It is then sold per spoonful (10-15 pieces of meat in one spoon). Larger shells such as pen shells, tooth pearl shells are usually cut in pieces and boiled or grilled and sold in piles. The meat of larger ornamental shells is usually cut in three or four pieces and sold grilled or boiled at the village level while the shell is traded.

Table 18 summarises the daily and monthly patterns of shell collection, species targeted and areas where these are collected. Table 19 concentrates on the type of users, the selling patterns and processing of these shells.
Table 18: Resource use patterns, species and areas - Shells.

<table>
<thead>
<tr>
<th>Main use</th>
<th>Daily pattern</th>
<th>Monthly patterns and seasonality</th>
<th>Main species</th>
<th>Areas</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornamental/</td>
<td>Day and Night (pressure lamps)</td>
<td>Done: mainly in SEM (except in Litembe where SEM is peak farming time).</td>
<td>Giant Tritons (op.) Helmet shells (horned, grey bonnet, and Bull Mouth)</td>
<td>Marine Park intertidal areas, reefs Mozambique (Tangazo)</td>
</tr>
<tr>
<td>Operculum</td>
<td></td>
<td></td>
<td><em>Chicoreus Ramosus</em> (op.) Leopard cowries Coral shells Harp shells Spider Conches Cone shells Giant Clams Black lip pearl oyster</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food</td>
<td>Day and night but mainly day</td>
<td>Done: All year during spring tides</td>
<td>Rock shells (including <em>Chicoreus Ramosus</em>) Clams Smaller conch shells ‘Ngovu’ Frog shells Pen shells, oyster, tooth pearl shells (F,L) Cockles and false cockles (F,L) Screw shells</td>
<td>Marine Park intertidal areas</td>
</tr>
<tr>
<td>Operculum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

L: Lime  
F: Food  
Op: Operculum  
SEM: Southeast Monsoon

Seasonality was confirmed by the agents consulted, who found that they were getting more shells (ornamental) during the Southeast Monsoon and Opercula at the end of the Southeast Monsoon and during the whole of the Northeast Monsoon. However, the best season (according to agents) for opercula was found to be September to December. Shell collection and trading is rarely a full time activity, often ornamental shells are also collected by fishers fishing for sea cucumbers.

According to the focus groups estimation, the total of shell fishers in the Park would be approximately 320.

Table 19: Resource users, selling patterns, processing – Shells.

<table>
<thead>
<tr>
<th>Shell type</th>
<th>Main Users</th>
<th>Selling</th>
<th>Processing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ornamental</td>
<td>Men Young Middle age</td>
<td>Local traders (few), Agents and exporters in Mtwara town Traders from Mtwara who go to Msimbati and Mngoji.</td>
<td>Shells are dried or kept or buried for 4 or 5 days until it is cleaned. For some, meat is eaten roasted or grilled.</td>
</tr>
<tr>
<td></td>
<td>Marine Park villages</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Food/Lime</td>
<td>Women Young and Middle age</td>
<td>Home consumption Village</td>
<td>Cleaned and boiled or grilled.</td>
</tr>
</tbody>
</table>

Shells (ornamental) and opercula are sold, ready for export, in Mtwara to agents/exporters often from local traders or directly from fishers. Mtwara agents are mainly from Zanzibar, Pemba or Dar es Salaam. Curio shells are then sold to hotels in Tanzania or Kenya. Findings from discussions with
agents in Mtwara showed that ornamental shells are sold in Dar es Salaam and Zanzibar to Chinese exporters, or hotels. Shells exported include cowries. It was also found from agents that some opercula were exported to or via Dubai.

Shell prices vary according to the species and seasons and thus prices given in Table 21 can only be considered as indicative. Prices are given per Kg or per shell in the case of large ornamental shells. Opercula are graded into small and large and are dried before weighing. This information was collected through the focus group discussions and complemented by key informant interviews. Fishers’ perception of price changes in shells is also summarised in Table 20.

Table 20: Ornamental Shell and opercula prices (fishers, local traders, and export prices when available), the use and the changes in the recent years

<table>
<thead>
<tr>
<th>Price of Shell and opercula</th>
<th>Price obtained by fishers, local traders in USD</th>
<th>Agent selling prices in USD (Agent)</th>
<th>Agent selling location</th>
<th>Change in prices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Opercula</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Large</td>
<td>13-18/Kg</td>
<td>26-33/Kg</td>
<td>Dubai. Exported directly</td>
<td>Increase in places</td>
</tr>
<tr>
<td>- Small</td>
<td>5-8/Kg</td>
<td>15-18/Kg</td>
<td></td>
<td>Decrease in places (Msimbati)</td>
</tr>
<tr>
<td>Triton</td>
<td>0.4-0.8/Kg</td>
<td>20/Kg</td>
<td>Sold in Dar es Salaam to Indian exporter</td>
<td>Decrease</td>
</tr>
<tr>
<td>Cowries</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Small white</td>
<td>0.1-0.15/Kg</td>
<td>0.35/Kg</td>
<td>Sold in Dar es Salaam to Chinese exporter</td>
<td></td>
</tr>
<tr>
<td>- Small yellow</td>
<td>0.2-0.25/Kg</td>
<td>0.35/Kg</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Leopard cowrie</td>
<td>0.15-0.2/Kg</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hofu</td>
<td>2.5-4 ppu</td>
<td></td>
<td></td>
<td>Increase</td>
</tr>
<tr>
<td>Helmets</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Larger Horned or Bull Mouth</td>
<td>1.5-2 ppu</td>
<td></td>
<td></td>
<td>Increase</td>
</tr>
<tr>
<td>- Smaller (Grey Bonnet, other small helmets)</td>
<td>0.8-1/Kg</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Focus groups, interviews with agents)
/Kg: price per Kilogramme
ppu: price per unit

Information on average catches are difficult to obtain as it seems that shell collecting is often an opportunistic activity. It is done along with fishing for octopus or sea cucumbers for example. Groups mentioned that 5 to 20 shells could be collected per day out, depending on the species (1-20 USD plus the meat price). However, as mentioned previously, shells are not collected everyday and are an opportunistic activity. This was found by in other parts of Tanzania (Anderson and Ngazy, 1998; TRAFFIC, 2001).

Furthermore, in a season, it was estimated by focus groups that on average 10 Kg of opercula are gathered per season per fisher (on average 5 months) which amounts to 130-200 USD per fisher per year.

An agent interviewed in Mtwara mentioned the fact that most of the opercula and shell traded came from Mozambique. Msimbati was considered as one of the main shell collecting areas in the Marine Park. Quantities exported by one trader in Mtwara were found to be on average 200-300 Kg of opercula per month and 500 to 1000 Kg of cowries in a similar amount of time. The trader interviewed appeared to be a small size operation, these figures potentially need to be multiplied by 10 (ten agents in Mtwara) to obtain an indication of the amount of shell products exported from Mtwara (including Mozambique waters). However, according to TRAFFIC (2001) agents/exporters specialize in certain shell species.
4.4.2 Perceived changes in shell resources

There was a consensus in all villages on the fact that larger ornamental shells are rarer now than they were before (particularly Giant Tritons and Helmet shells). The necessity to go further and deeper to find these shells was noted. A decline in the size of the ornamental shell found in the Marine Park was also mentioned. This information suggests that these resources are under high pressure. Some groups have even stopped going to Mozambique to collect shells because it is not worth their while anymore. A drop in ornamental shells availability (in the Marine Park and in Mozambique) was also mentioned by Mtwara agents.

Fishers perceive the beach seines as having had a negative impact on shell stocks. The number of traders/collectors of ornamental shells is said to have decreased, due to the drop in prices, which was noted in all villages except in Madimba. This has contributed to the fact that income for shell collectors has dropped but not in proportion to the reducing resource base.

In contrast, it seems that the opercula trade is booming. Prices have increased according to traders/collectors. In Mngoji, the group estimated that the catch per fisher had doubled in the last 10 years. According to the fishers, the increased availability of opercula comes from the fact that the number of *Chicoreus Ramosus* shell have increased, due to a high reproductive rate. Similarly, agents have confirmed that the trade in opercula is acknowledging a boom and that the quantities traded have increased significantly in the last 5 years. The increased availability of *Chicoreus Ramosus* may be due to the depletion of competitors (other widely used shells) or predators, this would need investigating further. The increased catch could also be the result of an increase in the demand in recent years, thus although shell opercula were exploited 10 years ago, other shells were preferred by fishers who now focus on *Chicoreus Ramosus*.

Less information was obtained from food shell collectors, particularly on changes. Indicative shell meat prices are summarized in table 21 below.

### Table 21: Price of shell meat in USD

<table>
<thead>
<tr>
<th>Price of Shell Meat</th>
<th>Per spoon</th>
<th>Pile (1/4 Kg)*</th>
<th>Per piece</th>
</tr>
</thead>
<tbody>
<tr>
<td>Small gastropods</td>
<td>0.02-0.03</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(small conch shells, worm shells, small cowries etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Larger gastropods and bivalves</td>
<td>0.8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(maybe for ornament – pen shells, Cone shells, larger cowries, clams, Triton shells, coral shells, cockles etc.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Large gastropods</td>
<td>0.1-0.15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(generally for ornament – Helmet, triton shells, large clams, conch shells.)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Source: Focus group discussions and key informant interviews)

*Extrapolated on the basis of 1/4 Kg (250 g) piles

2 to 5 litre cooking pans (‘sufuria’), or 10 to 20 litre buckets of shells are collected per woman. No information was obtained on changes in recent years on the shells used for food. In Mngoji, the group has perceived a slight increase in the availability of oysters. In Mkubiru, collectors have perceived an increase in the number of people involved in collecting shells for food. The reason for this is believed to be the lack of employment opportunity.

The number of food shell collectors did not come out as high in the household survey as in focus group discussion (hundreds of women involved mentioned in the focus groups for Mngoji, Litembe,
Msimbati) in or in the occupational structure study (16% of households involved in shell collection in Madimba, 22% in Mngoji, 10% in Msimbati).

The reason for this may be that this activity is partly opportunistic and ornamental shell collecting is declining. Households may not depend on it sufficiently to consider it as a livelihood activity. However, large quantities of shells are collected by hundreds of women and children, this was also observed by Richmond et al. (2004). Increased knowledge on the status of the resources is needed because it is clearly an important contributor to household food security for a relatively large number of Marine Park households.

4.5 Trading of fish, cephalopods, crustaceans and holothurians

Trading marine products is an important activity in the Marine Park, it involves a large number of households. This emerged from the occupational structure study (15% of household involved overall for marine associated villages), particularly in Msimbati and this was confirmed by the focus group discussions.

<table>
<thead>
<tr>
<th>Patterns/Product</th>
<th>Sea cucumbers</th>
<th>Fresh fish and Fresh ‘dagaa’</th>
<th>Dried fish and Dried ‘dagaa’</th>
<th>Octopus, Squid Prawns, Lobster</th>
</tr>
</thead>
<tbody>
<tr>
<td>Users (gender)</td>
<td>Men</td>
<td>Men</td>
<td>Women</td>
<td>Men</td>
</tr>
<tr>
<td>Buying location</td>
<td>Marine Park fishers Mozambique</td>
<td>Marine Park fishers</td>
<td>Marine Park fishers Mozambique</td>
<td>Marine Park fishers Mozambique (if advance by middlemen)</td>
</tr>
<tr>
<td>Selling</td>
<td>Agents in: Msimbati Mkubiru Tangazo Mtwar</td>
<td>Local market Mtwar Outside traders</td>
<td>Local market Mtwar Other Districts (inland) Outside traders</td>
<td>Traders and Agents for Mtwar exporters. Msangamkuu Msemo Beach Namponda Local market</td>
</tr>
<tr>
<td>Best time</td>
<td>NEM (more fish) Cashew season (higher demand) Rice harvest (higher demand)</td>
<td>NEM more fish Dry season- easier to dry Cashew season (higher demand) Rice harvest (higher demand)</td>
<td>Spring tides MAT</td>
<td></td>
</tr>
<tr>
<td>Transport</td>
<td>In sacks Bicycles</td>
<td>Bicycle (baskets) Boat</td>
<td>Depending on location: Foot, bicycles, public transport (in sacks)</td>
<td>Hire Cars Motorbikes Bicycles (ice box for octopus provided by exporters) Exporter truck Sacks</td>
</tr>
<tr>
<td>Processing</td>
<td>Boiled and dried None. If surplus then gutted and dried, smoked, salted Fried</td>
<td>Sun dried Hot smoked Salted Cut in pieces if large fish</td>
<td>None Octopus may be cleaned, cut and boiled for local market</td>
<td></td>
</tr>
</tbody>
</table>

(Source: Focus group discussions, key informant interviews)
NEM: Northeast Monsoon
SEM: Southeast Monsoon
MAT: Matalai
The Marine Park marine products are traded both inside and outside the Marine Park and some are exported, most products are bought in Marine Park villages but some are also bought in Mozambique (especially dried fish – ‘ngonda’, or fish to dry). At the same time, a number of outside traders come to buy products in Marine Park villages. Table 22 summarises the characteristics of the main traders in Marine Park fishing villages. Maps 4 and 5 illustrate sea cucumbers and other products movements in the Marine Park area.

Trading is an important economic activity for all villages. Based on the focus groups’ discussions it was calculated that there could be up to 110 fresh fish and dried fish traders in the Park (a majority of fresh fish traders) nearly half of whom would be located in Msimbati. To this, 35 sea cucumber traders should be added and 25 octopus traders. Marine products are generally bought by local or outside traders directly from fishers, at landing sites. Traders also buy sea cucumber, dried fish, octopus, prawns or lobsters in Mozambique.

**Sea cucumbers** are sold to agents located in the Marine Park (Chinese exporters base themselves in the Marine Park for a few months to buy sea cucumber directly) or in Mtwara. Agents in Mtwara originate from other parts of Tanzania (e.g. Dar es Salaam, Zanzibar). Sea cucumbers are not consumed locally and are generally exported to Asia where they are a high value product. There are 3 sea cucumber agents in Mtwara. These agents buy sea cucumbers to Marine Park traders as well as other local traders for dealers/exporters in Dar es Salaam (mainly Chinese). According to agents, most of the sea cucumbers exported from Mtwara are caught in Mozambique (this was also found by TRAFFIC, 2001).

**Octopus, squid, lobsters:** The few lobsters that are caught (whether in the Marine Park or in Mozambique) are sold to traders in Msangamkuu (part of which is included in the Marine Park) who sell them to the exporter based in Mtwara. Lobsters can be sold live or dead. They reach a better price if sold live. Squid are sold on the local market (village level), or in Mtwara. A small proportion is sold to the exporter in Mtwara. Octopus is one of the larger export products. Marine Park octopus are sold to Marine Park traders where and are collected every few days in Msimbi by trucks and Namponda by the exporter by boats. Traders are provided with ice boxes to store the octopus. The octopus may have been fished in the Marine Park or in Mozambique waters. Lobsters, squid and octopus are then sent to Dar es Salaam where they are processed and exported (frozen) outside Tanzania. One exporter operates in Mtwara and another exporter has started to buy octopus in Northern Mozambique and has provided boats, engines, and iceboxes to agents.

**Prawns, Crabs:** Prawns and crab are bought from Marine Park fishers, and sold on the local market, in Mtwara or around Mtwara. They are also bought by outside traders (e.g. from inland or other coastal towns such as Masasi, Kilwa, Newala, Tandahimba as well as from Mtwara).

**Fresh fish and fresh ‘dagaa’** are sold in local markets as well as in Mtwara town market. It is also sold to outside traders who transport it to places such as Newala or Masasi. The surplus of fresh fish is dried, smoked, salted or fried. A large proportion of the ‘dagaa’ is dried rapidly or fried. Traders usually transport their fish by bicycles in sacks or baskets.
Dried fish (smoked, salted, sun dried) is an important trade and appears as a most profitable one. Fish is bought dry or wet from Marine Park fishers or dried from Mozambique fishers whose prices, according to traders, are much lower. Dried fish is sold on the local market, in Mtwar, and a high proportion is sold to outside traders who come from inland areas as far as Tunduru, Tandahimba, Newala, Mahuta or Nachingwea. Dried fish is also taken to outside markets by Marine Park traders (groups from Msimbati and Kilambo mentioned this). The fish is packed in sacks and transported by bicycle, lorry, or public transport, depending on the selling location.

Other products that are traded, but in lesser proportion were not mentioned in the groups but were discovered when interviewing Mtwar marine product agents, were shark fins, and fish swim bladders. Local traders sell these products, dried, to the agent who sends them to Dar es Salaam where they are exported to Asia, mainly China. A proportion of these may come from the Marine Park although it was not specified.

Swim bladders (see pictures) are recently exported from Mtwar. According to the agent, they are used for food, but this was not confirmed.

Due to the high demand for fisheries products, and the decrease of some products in the Marine Park area (particularly of sea cucumbers and shells), traders and agents mention that a higher proportion of the products traded came from Mozambique.
Table 23: Marine products - Quantities sold, margins, changes

<table>
<thead>
<tr>
<th>Products</th>
<th>Quantities</th>
<th>Margins/Income (USD)</th>
<th>Changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sea Cucumbers</td>
<td>Traders 10-20 Kg per week in season</td>
<td>Margin*: 20-30%</td>
<td>Less sea cucumbers Fishers need to go further and dive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2 to 8 USD per kg are made (depending on species)</td>
<td>Amount traded decreased by 60% between 1980s and 2000s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Higher prices</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased income</td>
</tr>
<tr>
<td>Fresh fish 'dagaa'</td>
<td>'dagaa': 1-4 buckets (20-80 Kg)</td>
<td>Margin: 20-60% up to 100%</td>
<td>More traders (except Mitambo where demand has decreased)</td>
</tr>
<tr>
<td></td>
<td>Fish: 10 to 60 Kg</td>
<td>Income: 0.25 to 0.4 per Kg 'dagaa'</td>
<td>Increase income (except in Msimbati)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Income: 0.3 to 0.6 on other fish</td>
<td></td>
</tr>
<tr>
<td>Dried fish 'dagaa'</td>
<td>Highest 80-120 Kg per trip 5-8 sacks per week</td>
<td>Net margin*: 40-100% Per trip: 20-100 USD</td>
<td>More fish More traders</td>
</tr>
<tr>
<td>Prawns, Lobsters, Octopus/squid</td>
<td>10-12 kg per day (octopus during Spring tides prawns and few lobsters)</td>
<td>Margin Prawns: 30-80% (0.4-1 USD per Kg) Margin Lobster: 100% (3 USD per Kg) Margin Octopus: 20-30% (0.2 to 0.3 USD per Kg) Margin octopus agents: 50-60%</td>
<td>Smaller prawns, lobsters, octopus</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Less prawns and Lobster More traders because more dealers' agents.</td>
</tr>
</tbody>
</table>

(Source: Focus group discussions, Key informant interviews)

Trading is done all year round, however most of the traders mentioned that Matalai and beginning of the Northeast Monsoon are the best seasons (higher quantities of fish available and prices higher). One of the reasons for this is that the dry season is best to dry fish and to conserve it. In the rains, fish rots quicker. In addition, the beginning of the Northeast Monsoon coincides with the cashew nut harvest seasons, which is when households purchasing power is highest (in the Marine Park area but also in Mtwar Region as a whole, Masasi, Lindi etc.) thus the demand for fish is highest and prices increase. A similar phenomenon is observed on a smaller scale during the rice harvest (June-August).
There are a high number of fresh fish (including ‘dagaa’) traders, this being the main product traded. Numbers vary according to the time of the year. Men sell fresh fish (not ‘dagaa’) and a large number of women sell fresh and dried ‘dagaa’. The number of women traders increases during the cashew season when demand for fish increases. Table 23 summarises findings on quantities sold, margins and perceived changes by the traders.

*Fish may be bought fresh and dried by the trader. The margins mentioned in Table 23 take account of the weight loss. To produce a kg of dried sea cucumber, on average 2 Kg of wet sea cucumber are needed, however this varies according to the species (Agent, pers. Comm.). To produce 1 Kg of dried fish, 2.5 Kg of wet fish was found to be needed. Traders noted that this was not so in Mozambique where fishers add a lot of salt to increase the weight, thus with 2 Kg of wet fish they produce 1 Kg of dried fish.

Amounts traded vary highly according to seasons and according to the buying capacity of the traders. Thus, figures mentioned are only indicative. Agents and exporters were able to provide figures that are more reliable. Figures were usually given per trip (that is 3-5 days) except for fresh products. The bulk of octopus is traded during spring tides.

4.5.1.1 Sea cucumbers
According to sea cucumber traders, the availability of sea cucumbers has dramatically decreased in the Marine Park and quantities traded have decreased by at least 60%. On average, a small sea cucumber trader will sell 10 to 20 kg of sea cucumbers per week to the agents. Depending on the species, the trader will make a profit of 20 to 30% (2 to 8 USD mark up depending on the species). The price at which the agents sell them to exporters was not known. Thus, traders’ income (not net) will amount to 20 to 60 USD a week, 3 to 9 USD a day. However, the most common species nowadays are ‘vipara’, smaller sea cucumbers on which the mark-up is more often 2 to 4 USD than 8 USD per Kg. Traders noticed that smaller sized sea cucumbers are now caught. This was observed by Richmond *et al.* (2004), a similar impression was given by the agents.

Although the agent consulted could not give a precise idea of how much of his sea cucumber came from the Marine Park, according to him a large proportion came from Msimbati. Quantities sent to Dar es Salaam from this one agent only were found to be 1500 Kg for February, March and April only. The rest of the year, 500-700 Kg are sent every 3 to 4 months. Thus, a total of 3000-5000 Kg of sea cucumbers are exported per year by one agent. The export price was not known.

Sea cucumber prices are perceived to have increased significantly. Groups mentioned that some prices had doubled or trebled in the last 10 years particularly for the *Holoturia Scabra* at 20-30 USD per Kg, *Actinopyga Mauritania* at 20-25 USD per Kg and smaller species or individuals at 5-8 per Kg dried. The number of traders has increased in some villages and decreased in others.

According to the sea cucumber trader groups, the price increase has offset the decrease in the quantity of sea cucumbers traded and incomes have increased. This particularly where number of sea cucumber traders has dropped (i.e. Mkubiru and Mitambo).
4.5.1.2  Fish and ‘dagaa’ (fresh and dried)

Fresh fish and ‘dagaa’ traders sell 10-80 Kg of fish per week. Their mark up was found to be about 0.2 to 0.4 USD per kg in general (30-80%) depending on the fish traded and the market targeted. Income was found to vary between 1.3 to 20 USD per day. Traders insisted on the fact that income was highly variable according to fish availability, season, and the capital available for them to buy fish.

The quantity of dried fish traded was found to be 60-120 Kg per week for a trader. On average traders make 20 to 100 USD per trip mostly between 60 and 80 USD depending on the market targeted. Traders get lower prices if their product is sold at the local market. Trips to distant markets are however seasonal and done by Marine Park traders mainly from May to December.

According to the fish and ‘dagaa’ traders, the number of traders (except in Mitambo) has increased in the last 10 years, as have the fish and the income. The demand for fish has increased significantly, except in Mitambo, which is the reason why the number of traders has decreased there in recent years.

For traders one of the reasons for the increase in fish available has been the end of dynamite fishing. However the increase in the number of traders, and particularly the increase of outside traders has lead to a situation where local traders have difficulties to get fish despite the availability. Outside traders’ purchasing power is often higher than that of the local traders. This influx of outside traders has also contributed to the fish price increase. This was raised as an issue (see section 4.6).

4.5.1.3  Other products traded

On average traders can sell 3-6 kg of prawns, 5-6 kg octopus/squid and very few lobsters per day, if any.

The mark up taken is between 20 and 30% for Octopus (octopus is bought for 0.25-0.35 USD from fishers, sold by traders to agents 0.4-0.8 USD, who then sell the octopus to the exporters for 1.2 USD who processes it). It emerged from discussion with the Mtwara based octopus exporter that about half of the octopus collected by the company in the Mtwara area is bought in the Marine Park (Namponda and Msimbi). There is no certainty that all octopus traded are caught in the Marine Park, a proportion may be caught in Mozambique. During spring tides, 800 Kg of octopus a week are collected from Namponda and 350 Kg from Msimbi. Other areas providing octopus are Ngao, Naumbu and Imekuwa. 20 agents with boats also operate in Mozambique providing each 350 to 2500 Kg of octopus per month (spring tide only) to the Mtwara based exporter.

35 to 50 mt of octopus are sent to Dar es Salaam every month, 10-15% comes from agents in the Marine Park. The processed octopus is then sold to wholesalers in Europe for 3-3.5 USD/Kg, the exporter’s profit is on average 0.8 USD/Kg of octopus sold, and 500 mt to 700 mt may be exported per year from Tanzania and Kenya. Mtwara based exporters only buy octopus above 0.5 Kg.

The mark-up on lobsters, which are also exported, may be up to 150% for the traders or agents. Lobsters are bought on average for four USD per Kg from the fisher and are sold to the exporter at 5.5 USD to 8 USD/Kg according to the size (from 0.3 to above 1.5 Kg, the optimum size being 0.5 to 1.5 Kg). Smaller size lobsters are generally sold by non Marine Park fishers direct to the exporter (Less than 0.3 Kg at a price of 2.5 to 3 USD per Kg). The exporter sends on average 150 kg of lobster to Dar es Salaam.

Prawns are mainly sold in Mtwara and around, some are sent inland. The mark-up is between 30 and 80% depending on the market targeted.

Traders are not organized into cooperatives but sometimes operate in groups of 2 to 4 (particularly for dried fish trading) and share the profit equally. Furthermore, informal agreements exist between traders and fishers; traders lend money to fishers with the understanding that the fisher will sell his catch to the trader. This is a source of conflict (see section 4.6).

4.5.2  Summary of perceived changes

Perceived changes were mentioned in the section above for each trade and this shows that except for sea cucumbers, most trader groups perceived an increase in the number of traders operating in the villages (whether from within or outside the Park villages). This was not the case in Mitambo where a drop in the demand has been noted by traders. The reason for this is believed to be an increase in poverty at the village level.
‘Dagaa’ traders (dried or fresh) have noticed an increase in the amount of fish available whereas all other trading groups mention that the fish available has decreased at the local level.

The size of prawns, octopus and lobsters is perceived to have decreased in the last 10 years and the availability of prawns and lobsters to have dropped.

Most traders mentioned that their income has increased due to the price increase. This was not the case for Msimbati, where competition (large numbers of traders) may be keeping prices down.

4.6 Conflicts, issues and challenges

Conflicts were investigated in the focus groups. The aim was to identify whether conflicts or issues existed between marine resource stakeholders and the reason behind these. No major conflicts were detected through the group discussions, however several issues emerged. These are presented in Table 24 below.

<table>
<thead>
<tr>
<th>Stakeholders</th>
<th>Marine Park Authorities</th>
<th>Government</th>
<th>Traders/Buyer</th>
<th>Fishers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishers</td>
<td>-Ban of gear (small mesh nets, beach seines, spear guns) without alternatives. Misinformed mention of handlines, and prohibition of youth to fish (Msimbati). -Lack of adequate consultation prior to enforcement of Marine Park rules. -Lack of adequate information on Marine Park rules. -Not enough discussion and use of force -Passive attitude towards hippos and croc which cause many casualties (Kilambo, Mitambo)</td>
<td>Fisheries Division: -Complex regulations. -Fishing licenses too costly and far to get (no outpost of fisheries Department in the Marine Park). Forestry Department: Allows cutting of mangroves whereas it is important for the fish.</td>
<td>Traders: -Low prices of products -Loan repayment obligations too demanding</td>
<td>Beach seines: depletion of fish stocks</td>
</tr>
<tr>
<td>Shell fishers</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Beach seines: depletion of fish stocks (Mitambo)</td>
</tr>
<tr>
<td>Seaweed farmers</td>
<td>-</td>
<td>-</td>
<td>Buyers: Low prices and unreliability</td>
<td>-</td>
</tr>
<tr>
<td>Traders</td>
<td>-Gear ban has decreased the availability of some fish. -Lack of knowledge of Marine Park plans thus fear of future</td>
<td>Fisheries Division: Introduction of a gate pass. Village government: (‘ushuru’) taxes even when they do not sell what they have bought</td>
<td>Outside traders: competition (increase prices and decrease fish available for local traders)</td>
<td>-Unreliable. Do not fulfil obligations attached to loans provided (sometimes sell to outsiders). -High prices -Low quality of some products (prawns and octopus)</td>
</tr>
</tbody>
</table>

(Source: Focus group discussions)
4.6.1 Marine Park related issues and conflicts

As expected, a number of issues were brought up by fishers in relation to the Marine Park’s presence. Fishers resent the Marine Park for enforcing the ban on beach seines in 2003 and confiscating some gear as well as for planning to ban small mesh size nets and spear guns. It also came out from the interviews that some user groups believed in Msimbati that hand line fishing and young fishers would be banned from fishing. Although this results from ill informed rumours, the Marine Park needs to be aware of the effects that the gear ban may have had on communities’ attitudes. These reactions may justify the Marine Park carrying out more information campaigns in the villages. The main complaints about the gear ban was the little warning, the lack of consultation and the lack of alternatives proposed. The perceived forceful approach taken by the Marine Park was also an issue raised by a few of the focus groups. In addition, groups highlighted the fact that despite the ban on small mesh size nets they are still sold in Mtwara where the gear shops are based. However, a number of groups mentioned their dislike of beach seines and see them as destructive and responsible for the decline of stocks (fish and shells).

Fishers feel there is little communication, and little education efforts from the Marine Park to the communities. Traders had similar concern and mentioned that they were not informed enough about the Marine Park activities and thus feared for the future of their activity.

Another issue raised by mangrove villages (i.e. Mitambo and Kilambo) is the disinterest of Marine Park authorities in relation to crocodiles and hippos attacks, which are frequent in these villages.

Again, this could be an opportunity for the Marine Park to increase information about wildlife and its importance. Further education on ecological processes and the functioning of ecosystems with all their components may be a way to increase communities’ understanding of the aims and objectives of the Marine Park. The Marine Park carries out educational and awareness activities, particularly through revising the school curriculum, however more efforts may need to be done to target villagers directly.

4.6.2 Costs, licenses and loan related issues

The other main issues focused on loans and licenses. Loan issues relate to informal agreements between fishers and traders. Traders advance money to fishers who in turn have to sell their fish to them. This is a strategy for the trader to ensure access to some of the catch despite the high competition, and it also ensures that the fishers can operate. However, On the one hand, fishers complain that loan conditions are constraining and difficult to meet. On the other hand, traders complain that fishers do not abide by the agreement and sell to other traders. Traders mentioned that they are occasionally left without any fish to buy, or that fish sold to them by the fishers are of poor quality. This issue was raised in a number of other locations on the coast of East Africa (Malleret King et al., 2003) where these types of agreements are common.

The increase in the demand for fish in the Marine Park, particularly due to the influx of outside traders and dealers in recent years has led to a situation where fishers’ production cannot satisfy traders’ demand, even more so since beach seines have been banned (according to traders). Local traders find themselves unable to buy fish occasionally.

The difficult access to funds (e.g. to buy more sea worthy boats) was often mentioned as a constraint by fishers, forcing them to concentrate their fishing inshore where the pressure on resources is already highest. The escalating prices of raw materials (e.g. wood, boat making, fishing gear etc.) contribute to this situation.

The cost of operating was one of the issues raised by traders and fishers, particularly the cost of licenses. One of the fishers’ main complaints is that in order to get their fishing licenses they need to go to Mtwara as there is no fisheries outpost based in the Marine Park. This is perceived to add a cost to the license itself. As a result few fishers get a license at all. Traders complain about the trading taxes imposed by village governments.
4.6.3 Other issues

Other issues raised by the focus groups were:

- Complex and difficult fisheries regulations to understand, thus difficult to apply.
- Fishers resent the Forestry Division for the fact that mangroves are perceived as being destroyed, whilst they have an important role for the fishery (this role was confused when investigated). Natural Resources Department/Forestry Department (Mangrove Management Project) at the District level are responsible for licensing mangrove cutting. Some responsibilities are also devolved to Village Environment Management Committees.

4.7 Summary

MBREMP marine resource stakeholders are numerous and varied. They include fishers (residents of the Park, from outside the Park who fish in the Park, and residents of the Park who fish in Mozambique), traders (from the Park and from inland areas who operate in the MBREMP, in Mtwara, inland and in Mozambique), agents based in Mtwara, exporters based in Mtwara or Dar es Salaam. Stakeholders also include (in lesser proportion) net menders, boat builders, seaweed farmers. Local and village government are also stakeholders of MBREMP marine resources as well as the MBREMP authorities. Fishers and traders (men and women) are the most numerous stakeholders in the Park and thus were the focus of the use pattern research.

A wide number of gears and methods are used in the MBREMP, which include nets (set and active), spear like gear, lines, traps, and diving. Target species vary according to gear and fishing methods. Species fished include demersal fish (e.g. rabbit fish, emperors, snappers, juvenile fish), near shore pelagics (e.g. anchovies, sardines, mackerel, jackfish, sharks, king fish etc.), and prawns, particularly in the mangrove villages. Fish is sold fresh or dried, whole or in pieces, to local and regional markets. Sea cucumbers, octopus and lobsters are also targeted, mainly for export (to Europe for octopus and lobsters, and Asia for sea cucumbers). Sea cucumbers are boiled and dried then exported. Octopus and lobsters are exported frozen.

A huge variety of shells is fished for a diversity of purposes and markets (local, Asia, Europe, USA). Small gastropods and bivalves are gleaned in the intertidal areas of the Park for food and lime production for the local market (e.g. cockles, oysters, pen shells etc.). Larger ornamental shells (e.g. Giant tritons, helmets etc.) are fished for their shells (e.g. for tourists, shell collectors) and usually exported. Shells are also fished for their opercula (e.g. rock shells) which are exported. All shell meat is consumed locally, either boiled or grilled.

Fishing is carried out inshore mainly with small dug out canoes that are poled or sailed. Motorised boats are scarce in the Park and all belong to owners who are based outside the Park. The size and quality of the boats constrain fishers to inshore waters. Boats are owned by 'tajiri', by the fishers themselves, are rented or borrowed, but most fishers have access to boats. More than 60% of fishers (individually, or in group) own a boat except in Msimbati where only 30% do and most use 'tajiri' boats.

Similarly fishing gears may be owned by one fisher or a group of fishers, by a 'tajiri' who employs a crew, rented or borrowed. Nets are often owned by groups of fishers, whereas lines, spears etc are owned by one individual. In Msimbati however it was found that most nets were owned by 'tajiri' who. In the surveyed villages, the most widely used gears were found to be handlines (27% of fishers in seafront villages and more than 50% in mangrove villages), 'tandilo' (23 or 27% of the fishers in both areas), other nets (18% use large nets in surveyed seafront villages). In terms of numbers of people and household involved, 'tandilo': handline, shell collecting are the most important activities.

Marine product trading in the Marine Park include fresh fish and dried fish (including 'dagaa') which represent the most number of traders, octopus, potentially shells particularly opercula and sea cucumbers. The presence of agents and exporters of octopus, shells and sea cucumber in Mtwara and sometimes in the Marine Park provides traders with secure markets.
Fishing is dominated by men, except for ‘tandilo’ fishing, which is almost exclusively carried out by women. Similarly trading is dominated by men except for trading ‘dagaa’ (fresh or dried) which is also done by women. Gear choice is mainly driven by costs (the most expensive gear being nets) but also skills and age.

The best fishing areas, and thus most pressured are Litokoto, Bahasha and Namponda (see Map 3). However for a number of net fishers and line fishers, Mozambique is considered to provide the best fishing grounds. Mozambique was found to be an important source of marine resources, particularly for shells, sea cucumbers, octopus, either directly by fishers or by traders who buy products from Mozambican fishers at the border. In relation to the overall trade of sea cucumbers and shells, agents considered that most were coming from Mozambique.

Although fish trading is mainly local, an increasing number of fish traders come from inland (as far as Tunduru) to buy fish in the Park on a seasonal basis. Similarly, local traders sell their products inland.

As in other areas of the East Africa, fishing was found to be affected by seasons and tides. Three seasons were identified, the Southeast Monsoon, Northeast Monsoon and ‘Matalai’ between the two main monsoons. Other studies usually identify two main seasons, the Northeast and Southeast monsoons (King, 2000; Obura, 2001). The preferred seasons for fishing are usually the Northeast monsoon and ‘matalai’ when the wind is less. However it was found that for sea cucumber fishers (this was confirmed by the agents), the Southeast Monsoon is the best fishing time. Tides affect fishing. Fishers mostly go out at low tide and come back with the high tide. Spring tides are considered as most productive and this is when the bulk of octopus are caught. Shell fishing is occasional and mainly carried out at low spring tides.

Seaweed farmers are now few in the Marine Park, and their activity is also best during the Northeast Monsoon.

An interesting phenomenon was detected in the Park area. As mentioned above, the Northeast Monsoon is considered as the best period by fishers. This is the case also for traders for a number of reasons, first more fish area available to buy, but also prices are higher due to the increased purchasing power of households who harvest cashews. This is an interesting point and may contradict the idea that when income increases, marine resource exploitation may reduce. Fishers indicated that during the cashew harvests, they reduce their fishing time and contribute to farming activities, however at the same time, that some hand line fishers enter the fishery as the demand increased dramatically. Trading activities increase significantly and women trade just for the season. Similarly, outside traders come to the Marine Park to get fish, as purchasing power also increases in inland districts where cashews are cultivated. Prices increase, for example, ‘dagaa’ may double as. The dry season is also prefered due as fish dries better and quality is highest.

Prices are affected by demand (larger markets such as Mtwara fetch higher prices than those in the Park); by the season, which affects both the quality of the product and the demand. Fisher prices vary mainly according to the type and size of fish, but also location. Trader prices depend on the product, the time of the year and the demand. Prices have increased in the recent years particularly sea cucumber prices for both the fishers and the traders.

Although information on catch and income were difficult to get from fishers, it came out that nets, spear guns, sea cucumber fishers got more income on average. Traders’ margins vary between 30 and 150%. The sea cucumber traders were probably the better off.

Discussion with focus groups revealed that resources are considered under pressure, the number of fishers has increased and resource are perceived to have decreased, particularly sea cucumbers and
ornamental shells, and some fish. For agents, Mozambique sea cucumbers and shells are also declining and it takes agents much longer to get the quantity they need to transport to Dar, than it used to 10 years ago.

The only production that has been perceived as increasing is the opercula. ‘Tandilo’ fishers and large net fishers have also noticed an increase in their catch in the last 10 years, which they attribute to the effective ban on dynamite fishing. Other fishers have observed a drop in the catch. At the same time trade has increased, and prices have increased. The drop in catches has not always been compensated by the increase in prices except for sea cucumber fishers.

No specific conflicts were detected between users, except a general dislike of beach seines, which are perceived to be destroying the resources. Resentment was also found against the Park, particularly against the MBREMP approach to gear bans, and feel that there has been little communication between the Marine Park authorities and the communities. Resentment was also detected against the village government, who is perceived to allow resources to be destroyed (i.e. mangroves). Finally a conflictive relationship between traders and fishers has been found. Fishers need capital, traders provide them with loans in order to secure products to buy. However, the competition is high and fishers sell to the best bidders with little consideration to the trades who lent them money, and may find themselves without fish to buy.

There are no organisations of traders or fishers at the Park level. The lack of trust between fishers and traders was found to constrain opportunities for individuals involved in fisheries activities. The informal agreements described above are ways to reduce the lack of access to funds for fishers, which is characteristic in the region (Malleret King et al., 2003).
5 SOCIO-ECONOMIC STATUS

5.1 Measuring socio-economic status

5.1.1 Material Style of Life data indicator

One of the objectives of the socio-economic assessment was to investigate Marine Park households’ well being and explore the link between activities and socio-economic status, particularly of households involved in the exploitation of marine resources. This was done using a material style of life (MSL) indicator rather than calculating incomes.

MSL was used rather than income because income is one of the most difficult and data intensive measures to obtain. It requires lengthy studies that often do not produce adequate results (Maxwell, 1996). Indirect indicators have been developed to measure wealth, or relative wealth (Maxwell and Frankenberger, 1992). Material Style of Life (MSL) data was used in this study to give an indication of wealth across Marine Park communities. This indicator uses household assets as indicators of wealth/poverty. A list is determined by local stakeholders who also rank them according to the wealth status they indicate (Pollnac and Crawford 2000; Berkes et al., 2001?). Each item was given a score that was expressed as a proportion of 10. The MSL score (out of 50) was calculated by adding these scores.

The MSL data collected was adapted from previous studies (Pollnac and Crawford, 2000; Malleret King, 2003). Because MSL wealth criteria were investigated through interviews, the assets taken into consideration (see table 25) for the calculation of the MSL score are based on local specific criteria (as perceived by communities). Assets considered are: housing (roof and wall material) and their condition (bad to good), livestock (number and type of livestock owned from none to cows), ownership of transport (type of transport), access to water (from public to private wells), access to power (none to private owned generator), land ownership. The higher the score, the wealthier the household is (see table 25).

Households could own several houses, in which case each house was given a score by the interviewer according to the predefined criteria (see table 25). Interviewers noted the number of houses with each identified item (wall material and roofing) and an average house score was determined for each household. This average score was weighted by the house ownership score then added to the score obtained by the other items.

(1) House score= (Score material and condition for roofing and walls*number houses/total number houses)*house ownership score.

In order to be able to take account of both the number and type of livestock owned in the household MSL scores, a simplified equivalence system based on the price of livestock was used. 10 chickens were found to be equivalent to 1 goat or sheep and 10 goats or sheep were found equivalent to 1 cow. (1 chicken is worth 1 to 1.5 USD, 1 goat or sheep is worth 15-20 USD on average, and a cow is worth 150-200 USD).

Access to water was in the end not taken into consideration in the calculation of the household MSL score as no variation of the scores could be attributed to this item as all households had access to wells or village pumps. Some households were found to buy fresh water as none is available in their area (Litembe particularly), however this did not indicate wealth.
### Tables 25: Components of the households MSL index

<table>
<thead>
<tr>
<th>Walls</th>
<th>Score</th>
<th>Number houses</th>
</tr>
</thead>
<tbody>
<tr>
<td>No house</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Thatch bad condition</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Thatch good condition</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Mud bad condition</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mud good condition</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Stones or Mud bricks (partial)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Stones or Mud bricks (all the house)</td>
<td>6</td>
<td></td>
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<tr>
<td>Cement blocks (partial)</td>
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<tr>
<td>Cement blocks (all)</td>
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<td></td>
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<tr>
<td>Plaster and paint (partial)</td>
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<tr>
<td>Plaster and paint (all)</td>
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<tr>
<th>Roofs</th>
<th>Score</th>
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</tr>
<tr>
<td>Thatch bad condition</td>
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<td>Corrugated iron good</td>
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<th>Livestock</th>
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<td>None</td>
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<td></td>
</tr>
<tr>
<td>Chicken/duck</td>
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<td></td>
</tr>
<tr>
<td>Goat/Sheep</td>
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<td></td>
</tr>
<tr>
<td>Cows</td>
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<td></td>
</tr>
</tbody>
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<table>
<thead>
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<tr>
<td>Bicycle</td>
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</tr>
<tr>
<td>Car</td>
<td>2</td>
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<table>
<thead>
<tr>
<th>Access to power</th>
<th>Score</th>
</tr>
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<td>None</td>
<td>0</td>
</tr>
<tr>
<td>Battery/solar</td>
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</tr>
<tr>
<td>Generator</td>
<td>2</td>
</tr>
</tbody>
</table>

All categories (e.g. livestock, power, house etc.) were given the same weight in the household’s total MSL score as was done previously (Malleret King, 2000).

Basic statistics as well as ANOVA, Ttest and Pearson correlations were used to analyse the survey results. In order to determine the Pearson correlation coefficient for the different parameters investigated, data was aggregated at the village and quarter level. A Bonferroni statistic test was performed to detect significant correlations (using Systat 10.2).

### 5.1.2 Investigating income derived from Fishing

Despite the difficulty to get income information, a rough estimate of income derived from fishing was sought (see questionnaire Appendix 7). This was an attempt to get an indication of the monetary value of fishing at the household level and had potential to complement the information obtained through the MSL data. Households specified the bracket that reflected best their income from fishing according to seasons. A rough average yearly household fishing income was determined according to:

- Number of days fishing per week (see Table 8)
- The number of months fishing per year (see Table 8)
- The number of fishers in the households.

Basic statistics as well as ANOVA and Ttests were used to investigate the links between income estimation, location and fishing systems (gear, boats, etc).
5.2 Results: Asset distribution

5.2.1 House characteristics
Most houses are made of mud walls and thatch roofs. A few houses are made of cement blocks, have tin roofs and are plastered and painted. The largest categories in most villages are good or bad condition (disrepair) mud walls, and good and bad condition thatched roofs, except in Mahurunga where grass roofs are more numerous. Tin (corrugated iron) roofs were least in Litembe and most in Mahurunga (28% of the houses sampled) and Msimbati (20%) as shown in Figures 11 and 12.

Figure 11: Different wall types as a % of households per village

Figure 12: Different roof types as a % of households per village

5.2.2 Transport
As shown in Figure 13, the majority of households did not own any transport (60.7% of the total sample) but a large percentage owned a bicycle at least (38%). Ownership of motorbike and car was only encountered in households sampled in Msimbati. The pattern was relatively homogeneous throughout the villages.
5.2.3 Access to power
98% to 100% of the households sampled had no private access to power. Very few households were found to have generators or solar batteries. The few that did were located in Msimbati and Tangazo.

5.2.4 Access to water
Most houses had access water at village pumps or wells. However it was found that a number of households had to buy fresh water, particularly in Litembe (67% of the households sampled). Private access to water was in the end not considered as a good component to indicate wealth and thus was not taken into consideration in the total household MSL scores.

5.2.5 Livestock
Results of the household survey confirm those of the occupational structure (see occupational structure attached -Malleret and Simbua, 2004) which showed that not more than 10% of households had livestock as a business. 43% of households sampled owned livestock, mainly chickens (20 to 30% households), goats and sheep in a much lesser proportion (2 to 6% households) and a few households owned cows in Mahurunga and Msimbati (see Figure 14).
5.2.6 Ownership of land

The socio-economic vulnerability of a household is determined by the past (e.g. past crisis and strategy used by the households to cope with the crisis) and by the present (Swift, 1989). In coping with crisis (e.g. food or financial crisis), selling assets is a common strategy used by the households. The sale of productive assets, such as land, is often the last resort and is the strategy that affects most the capacity of households to go back to a pre-crisis condition; it increases their vulnerability highly (Nyborg and Haug, 1995). Information on land ownership was thus considered as an interesting insight in to the Marine Park’s households’ socio-economic vulnerability, and thus their capacity to cope with crisis (e.g. marine resource depletion or changes in natural resource management regime).

It was found that households borrow or rent plots to farm, particularly in seafront villages (24% in Mngoji and 26% households in Msimbati). Five % of all households surveyed did not farm and a higher proportion in Msimbati and Tangazo (8-9% of households in both villages). Similarly, a small percentage of households rent or borrow houses, the highest percentage of households living in rented or borrowed houses was found in Mngoji (14% of households).

Most households considered they owned the land they were farming (78%) or living on (85%). However, out of these only a few were found to have title deeds and they were mainly located in Tangazo (12% for farm and 14% for houses) and Mahurungu (3% for farmland, 2% of houses). 0.5% of households have a title deed for their farmland in Msimbati.

Figures 15 and 16 show the different type of land ownership in proportion to the number of households.
5.3 Investigating links between wealth and activity

5.3.1 Factors taken into consideration
The link between activities and MSL scores were explored according to a number of factors (Table 26) such as the household’s main source of income (highest rank), the main source of food, whether the activity was marine related or not. For households whose main source of income was a marine resource associated activity, the impact of factors such as the type of fisheries related activity carried out, the number of activities were also explored. This was also done for households whose main source of income was found to be “other” natural resource related. Demographic and geographic parameters were also taken into account.
For fishing households, the link between MSL score and boat use, gear used, type of boat used were investigated. Factors likely to affect the MSL score are presented in Table 26.

**Table 26: Factors taken into consideration for the analysis of MSL scores**

<table>
<thead>
<tr>
<th>Factors</th>
<th>All households</th>
<th>Marine dep. Households</th>
<th>Fishing dep. households</th>
<th>Other natural resource dep. Households</th>
</tr>
</thead>
<tbody>
<tr>
<td>Geographic</td>
<td></td>
<td>Village</td>
<td>Village</td>
<td>Village</td>
</tr>
<tr>
<td>Demographic</td>
<td></td>
<td>Household size, Gender of the Head of Household (HH)</td>
<td>Household size, Gender of the HH</td>
<td>Household size</td>
</tr>
<tr>
<td>Main activity</td>
<td></td>
<td>Number of activity, income, marine/non marine, crops, Marine dependence only.</td>
<td>Type of marine dep. activity, Sole dependence on Marine res.</td>
<td>Number of activities</td>
</tr>
<tr>
<td>Fishing system</td>
<td></td>
<td></td>
<td>Gear, boat use, boat ownership.</td>
<td></td>
</tr>
</tbody>
</table>

Only significant results are presented in this report, these are summarized in Tables 27 to 29. Results are considered significant for p<0.05.

**Table 27: Significant variations detected using ANOVA**

<table>
<thead>
<tr>
<th>Factors</th>
<th>All households</th>
<th>Marine dep. Households</th>
<th>Fishing dep. households</th>
<th>Other natural resource dep. Households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  F  p</td>
<td>N  F  p</td>
<td>N  F  p</td>
<td>N  F  p</td>
</tr>
<tr>
<td>Village</td>
<td>620 2.7 0.003</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Only source of livelihood</td>
<td>210 3.6 0.002</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of activity</td>
<td>150 4.4 0.00</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type of boat</td>
<td>72  3.5 0.03</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Gear 2</td>
<td>174 2.5 0.02</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 28: Significant variations detected using simple T test.**

<table>
<thead>
<tr>
<th>Factors</th>
<th>All households</th>
<th>Marine dep. Households</th>
<th>Fishing dep. Households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N  t  p</td>
<td>N  t  p</td>
<td>N  t  p</td>
</tr>
<tr>
<td>Gender HH</td>
<td>634 5.4 0.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Marine resources only source of livelihood</td>
<td>220 4.7 0.00</td>
<td>158 2.7 0.02</td>
<td></td>
</tr>
<tr>
<td>Area (excluding Mahurunga)</td>
<td>169 2.5 0.02</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 29: Significant Pearson correlation

<table>
<thead>
<tr>
<th>Factors</th>
<th>All households</th>
<th>Marine dep. Households</th>
<th>Fishing dep. households</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N</td>
<td>r</td>
<td>p</td>
</tr>
<tr>
<td>Number of activities</td>
<td>640</td>
<td>0.104</td>
<td>0.02</td>
</tr>
<tr>
<td>Sole dependence on Marine resources</td>
<td>220</td>
<td>4.7</td>
<td>0.00</td>
</tr>
<tr>
<td>Area (excluding Mahurunga)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3.2 At a general level

Results of the analysis of variance show that there is a significant difference in the scores across the villages. On average, households in Msimbati and Tangazo are better off than in other villages (Table 30).

Table 30: Average MSL score per village and rank according to the score

<table>
<thead>
<tr>
<th>Village</th>
<th>Average MSL</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Msimbati</td>
<td>7.8</td>
<td>1</td>
</tr>
<tr>
<td>Mngoji</td>
<td>6.9</td>
<td>3</td>
</tr>
<tr>
<td>Litembe</td>
<td>6.7</td>
<td>5</td>
</tr>
<tr>
<td>Tangazo</td>
<td>7.7</td>
<td>2</td>
</tr>
<tr>
<td>Mahurunga</td>
<td>6.8</td>
<td>4</td>
</tr>
<tr>
<td>All</td>
<td>7.4</td>
<td></td>
</tr>
</tbody>
</table>

This may be due to the fact that these villages were largest and possibly main trade centres, thus provide a wider spectrum of opportunities for households. The slight positive correlation of the Scores with the number of activities a household carries out may confirm this (Table 31).

Table 31: Significant correlation between number of activities carried out by a households and MSL score

<table>
<thead>
<tr>
<th>Number activities</th>
<th>MSL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.143</td>
</tr>
</tbody>
</table>

Widow headed household were found to be poorer than other households on average (Table 32) as shown by the results below with an average score of 5.2 against 7.6 for other activities. This is similar to findings of other studies (Haddad et al., 1994).

Table 32: Significant difference in MSL scores between widow headed households and others.

<table>
<thead>
<tr>
<th>Group</th>
<th>Average MSL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non Widow HH</td>
<td>7.6</td>
</tr>
<tr>
<td>Widow HH</td>
<td>5.7</td>
</tr>
</tbody>
</table>
5.3.3 Wealth and activities

No significant relations were found between the activities and the household scores. However further investigations were carried out for two groups of particular interest to the Marine Park:

- Households whose main source of income is “other” natural resources for their livelihood,
- Households whose main source of income is provided by marine resources.

Results are presented in Tables 33 and 34.

**Table 33: Average score according to main “other” natural resource activity**

<table>
<thead>
<tr>
<th>Activity</th>
<th>MSL score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Salt</td>
<td>18.4</td>
</tr>
<tr>
<td>Traditional Doctors</td>
<td>6.6</td>
</tr>
<tr>
<td>Carver</td>
<td>6.4</td>
</tr>
<tr>
<td>Charcoal</td>
<td>5.5</td>
</tr>
<tr>
<td>Weaving</td>
<td>4.7</td>
</tr>
</tbody>
</table>

On average households whose main source of income was weaving were found to be the poorest of the group with charcoal producing households slightly better off. Households whose main source of income is salt production were by far the wealthiest. This category though included mainly saltpan owners and managers.

**Table 34: Average score according to main Marine dependent activity**

<table>
<thead>
<tr>
<th>Activity</th>
<th>MSL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trader Sea cucumber</td>
<td>10.3</td>
</tr>
<tr>
<td>Fish Trader</td>
<td>9.0</td>
</tr>
<tr>
<td>Fisher</td>
<td>6.8</td>
</tr>
</tbody>
</table>

Results presented in table 34 show that sea cucumber traders are on average wealthiest of households whose main source of income are marine resources while fishers are worse off.

Although no significant differences could be detected in wealth according to whether households were involved in marine associated activities or not, results show that marine households whose only source of livelihood is based on marine resources are significantly worse off than other households (respectively a score of 4.9 and a score of 7.8 in Table 35). This confirms previous studies that show that households relying on one activity only were usually poorer and more vulnerable than other households were due to the low risk spread (Anderson and Ngazy, 1998; Malleret King et al., 2003)

**Table 35: Average score according to whether a marine dependent household depends only on marine resources for its livelihood or not**

<table>
<thead>
<tr>
<th>Activities</th>
<th>MSL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marine resources and other</td>
<td>7.8</td>
</tr>
<tr>
<td>Only marine resources</td>
<td>4.9</td>
</tr>
</tbody>
</table>

Investigations were carried out at the fishing household level, particularly to detect whether wealth varied according to the characteristics of households’ fishing systems (e.g. gear, boats, days fishing etc.)

As for other households fishing households’ status is positively affected by the number of activities a household has. The poorer fishing households were found to be those whose only source of livelihood is fishing (see tables 36, 37).
Table 36: Average MSL score of fishing households according to whether fishing is their only source of livelihood or not

<table>
<thead>
<tr>
<th>Activity</th>
<th>MSL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>More than fishing</td>
<td>7.0</td>
</tr>
<tr>
<td>Only fishing</td>
<td>5.3</td>
</tr>
</tbody>
</table>

A significant positive correlation was also found between the number of activities carried out in the households and the MSL score.

Table 37: Significant correlation between the number of activities and fishing households MSL score

<table>
<thead>
<tr>
<th>MSL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of activities</td>
</tr>
</tbody>
</table>

Marine dependent only households were also found to be smaller than the sample average with 2.5 household members on average rather than 4.2. No age pattern was found despite the suspicion that households depending only on marine resources for their livelihood (smaller sized households) could be households of younger fishers, just establishing themselves as was found in previous studies (King, 2000). However this was not confirmed statistically in this study. The majority of these households were located in Msimbati (63%) and Tangazo (30%), the largest villages sampled.

A significant difference was found in the scores of households dependent on one activity according to this activity (N=210, F=3.6, p<0.01). The wealthiest households were those exclusively dependent on other businesses (builders, shop owners, wine traders and other small businesses), the poorest were found to the artisans. Farming households came second (see Table 38). If one only takes account of categories where the number of households exceeded 5 (1 or 2 households may not be representative enough), households exclusively dependent on marine resources (of which 70% are fishing dependent only) and on other natural resources (weavers and carvers) were the worse off.

Table 38: MSL score comparison according to exclusive source of livelihood

<table>
<thead>
<tr>
<th>Only source of livelihood</th>
<th>MSL Scores</th>
<th>Rank</th>
<th>N household</th>
</tr>
</thead>
<tbody>
<tr>
<td>Other business</td>
<td>9.028</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Farming</td>
<td>6.877</td>
<td>2</td>
<td>189</td>
</tr>
<tr>
<td>Other Natural resources</td>
<td>4.913</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>Marine Resources</td>
<td>4.5</td>
<td>4</td>
<td>14</td>
</tr>
<tr>
<td>Employment</td>
<td>3.571</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Artisan</td>
<td>1.786</td>
<td>6</td>
<td>2</td>
</tr>
</tbody>
</table>

5.3.4 Socio-economic status of fishing households and fishing systems

The MSL scores were tested against a number of fishing systems components. Few of these components were found to affect household wealth. Significant differences were not found between fishing households who did not use a boat and those who did contrary to previous studies such as Malleret King et al. (2003). This may be because the large majority of fishers use boats in the Marine Park.

Boat owners however were found to be wealthier than other fishers were, and the type of boat owned reflected the wealth of the fisher (Table 39). Thus fishing households who owned ‘mashua’ were found to be significantly wealthier than those who owned ‘dau’ and dug out canoes. This was also found by Malleret King et al. (2003) elsewhere in Tanzania.
Table 39: Average MSL score of fishing households according to the type of boat owned

<table>
<thead>
<tr>
<th>Type of boat owned</th>
<th>MSL Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dug out</td>
<td>6.8</td>
</tr>
<tr>
<td>'Dau'</td>
<td>8.1</td>
</tr>
<tr>
<td>'Mashua'</td>
<td>9.0</td>
</tr>
</tbody>
</table>

Significant variations of the MSL score were not found in relation to gear.

However, the estimated yearly income of fishers was found to vary according to the gear used. Only households using one gear were taken into consideration for this investigation due to effects of multiple gear use and to reduce the complexity of the analysis. Results are presented in Table 40.

Table 40: Estimated yearly income in USD per fisher according to gear

<table>
<thead>
<tr>
<th>Gear</th>
<th>Yearly income per fisher</th>
<th>Rank</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spear and hand</td>
<td>1000</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Handline</td>
<td>344</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Traps</td>
<td>717</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Net. Mesh &gt;= 3&quot;</td>
<td>242</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Net. Mesh 2-2.5&quot;</td>
<td>106</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Net. Mesh 1.5&quot;</td>
<td>257</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>'juya'</td>
<td>1305</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Beach seine</td>
<td>400</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>'tandilo'</td>
<td>169</td>
<td>8</td>
<td></td>
</tr>
</tbody>
</table>

Gear shaded in grey are gears that were represented by only one household in the selected sample (fishing households, with only one gear) thus results for these may be dubious. All the rest were represented by 5 to 20 households.

Results of the ANOVA on the yearly income per fisher suggest that income varies according to the gear used. Fishers who fish with 'juya' appear to earn most, are get more income that other fishers on average (1000 USD per year), second come traps and (700 USD) then handline, and nets (3, and 1.5"). Income derived by fishers using 'tandilo’ only and medium mesh size nets earn significantly less than other fishers. These results do not confirm fishers’ perceptions that net fishers earn more than others do. Although a number of households use two to four gears, 73% of the fishing households were found to use one gear only. This sample should thus be representative.

5.4 Summary

Measuring well being and/or wealth is difficult because both are a complex make up of various entities that have not yet been fully grasped. As a result, a large array of indirect indicators have been developed in recent years, focusing on households assets, health, food security, access to services etc. In this study a simple index based on household assets (known as Material Style of Life - MSL - data) was chosen as an indicator of households’ socio-economic status. A similar indicator has been used in the context of coastal communities in Asia and in East Africa (Crawford and Pollnac, 2000; Malleret King et al., 2003). Although not comprehensive, this indicator can provide information on the relative socio-economic status of households.

On the basis of local based wealth/poverty criteria, the MSL index was established. This index took into consideration, housing (material and condition) and land/house ownership, livestock (type and number owned), private access to power, private transport. Basic analysis of these items showed that the majority of surveyed household live in mud houses with thatched roofs, that very few have private access to power. It also showed that a majority of households have no private transport but that a third and more have at least one bicycle. Households rent or borrow plots to farm, especially in Msimbati, otherwise the majority consider they owned the land used. Houses and plots are also considered as owned by the majority of households. However, very few have title deeds. These
households are located in Mahurunga and Tangazo. One household was found to have a title deed for farming land in Msimbati as well.

Factors affecting the households’ socio-economic status were tested. Results show that the socio-economic status of households did not vary with the activities per se, however, it was found that the more activities the households depend on, the better off they are.

Fishing households or marine dependent households were not found to be poorer than others were. However, households depending mainly on fishing (fishing as main source of income) were found to be significantly worse off than other marine dependent households were, sea cucumber traders being best off for marine dependent households. Similarly, households dependent mainly on weaving were found to be the worse off of the ‘other natural resource dependent’ households, whereas saltpan owners and traditional Doctors were better off in this category.

Confirming the fact that households with spread risks (dependent on a variety of activities) are better off than others was the result that households solely dependent on marine resources for their livelihood were worse off than other households (overall) were. They were also worse off than households dependent on only one activity that was not marine resource related.

Significant effects of the fishing systems were not detected (that is, gear used, access to boats) on households’ socio-economic status. Boat use was not identified as a significant factor contrarily to other studies in East Africa (Malleret King, 2000; Malleret King et al., 2003). However the type of boat owned (if owned) reflected the general socio-economic status of the household. Households who own a boat (‘mashua’) are better off than those who own a ‘dau’ who are better off than those who own a dug out canoe.

From this investigation it comes out that households solely dependent on marine resources are one of the most vulnerable groups in the Park. The size of these households tends to be smaller on average than other households, houses tend to be in bad condition, and often they rent or borrow land.

On a more general note, differences were found between communities with Msimbati and Tangazo better off and Litembe worse off of the surveyed villages. Reasons for this were not found, except that opportunities may be greater in larger villages that are the main trading centres in the Park. Widow headed households were found to be more vulnerable compared to other households which is common and often widow headed households are considered as a particularly vulnerable group.

Results of impacts of gear on estimates of yearly income per fisher suggest that ‘tandilo’ fishers earn significantly less than others, followed by net fishers (2-5”). The largest incomes were found for smaller meshed sized nets and traps. This does not confirm fully the focus groups’ perceptions that in terms of income nets are best and traps one of the worst gears.

<table>
<thead>
<tr>
<th>Factors</th>
<th>Wealth +</th>
<th>Wealth -</th>
<th>Worst off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Msimbati, Tangazo</td>
<td>Litembe</td>
<td></td>
</tr>
<tr>
<td>Gender</td>
<td>Men</td>
<td>Widow headed households</td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>Several</td>
<td>Only one</td>
<td>Solely on marine resource</td>
</tr>
<tr>
<td>Marine dependent</td>
<td>Fishing</td>
<td>Trading</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Several activities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Boats</td>
<td>Dug out canoes</td>
<td></td>
<td></td>
</tr>
<tr>
<td>‘juya’, traps, handlines</td>
<td>Tandilo, large nets</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6 DISCUSSION AND RECOMMENDATIONS

6.1 Issues and suggestions for management and livelihood development

This baseline assessment provides a good knowledge base and a foundation to understand MBREMP communities and their socio-economic context. It provides a broad understanding of the threats on marine resources, the way in which these resources are exploited, and which resources could be under most pressure. This assessment also shows how wide the spectrum of people (local, national and international based) who are involved directly or indirectly in marine resource extraction in the Park is.

A summary of the main issues uncovered by the socio-economic assessment is presented below. Section 6.2 focuses on recommending a socio-economic monitoring process for the Marine Park.

6.1.1 Main sources of threat to MBREMP marine resources

Most fisher and trader groups interviewed have perceived a decline in the marine resources in general or in specific species. This would indicate that the marine resources in the MBREMP are under high pressure, which confirms the findings of the biodiversity assessments carried out in the MBREMP (Obura et al. 2004; Richmond, 2004). On the basis of the findings of this socio-economic assessment, the main sources of pressure on marine resources are:

- The number of people involved in marine resource extraction
- The dependence of the communities in general and specific households in particular on marine resources for their livelihoods
- Poverty/lack of access to funds
- The demand for marine products and the volume of trade for specific marine products
- Destructive fishing methods.

Although these points are presented separately, they are interlinked (e.g. volume of extraction responds to the demand etc.).

6.1.1.1 On numbers of users, household dependence on marine resources and vulnerability

The volume of people extracting marine resources on a full time or occasional basis in the area is high particularly in seafront villages and Tangazo (estimation from the focus groups suggests that the total number of fishermen and fisherwomen, including shell fishers could be more than 1400 people). These include all types of fishing or resource extraction. Similarly a large number of individuals are involved in the trading of marine products (approximately 160), particularly in Msimbati. The demand and corresponding trade results in high pressure on specific resources that are already perceived as heavily depleted in the Marine Park, particularly ornamental shells and sea cucumbers.

The relatively high dependence on marine resources at the community level (particularly for seafront villages) as well as at the household level perpetuates the threat on marine resources. Fishing households’ main source of income is fishing and time commitment to fishing is high. Although no specific analysis was done at the individual level, it is suspected that fishing may be an important source of income, and one of the sole sources of income for women who are involved in ‘tandilo’ fishing.

Although dependence is high, few households depend solely on marine resources for their livelihood. However the ones who do will deserve special attention from the Marine Park when implementing new marine resource management regimes, because they emerged as the most vulnerable households.

When the zoning process starts as part of marine resource management, the high dependence of some villages on marine resources will have to be taken into consideration to avoid depriving these areas of their main livelihood activities. More effort may need to be made in developing additional livelihood opportunities in these areas (mainly the seafront villages, and Tangazo, see Map 4). It is worth emphasising that stakeholders and villages are heterogeneous in their relative dependence on
marine resources, and this will have to be taken into consideration in the zoning process. Map 4 highlights areas where dependence on marine resources is the highest (blue circles on the Map shows where pressure on marine resources comes from) and areas where fishing pressure was found to be the highest (red circles on the Map, based on this study).

Map 4: Highest dependence on marine resources and heavily fished fishing grounds
6.1.1.2 On shell extraction and trading

Shell trading and collecting may not emerge as significant as fishing in the Marine Park however it involves hundreds of people, especially women. The decline of some species may have significant impacts on the reef ecosystem (TRAFFIC, 2001). Based on observation, the quantity of shells collected for food is extremely high compared to other places in Tanzania (Richmond, pers. comm.). Shells may provide a significant and cheap source of animal protein for the Marine Park villagers. The level of use, the sustainability of the exploitation, the impacts of this use on the habitats, the contribution to households’ diet may need further investigation, the results of which the Park should take into consideration when regulating the shell fishery.

6.1.1.3 On destructive methods

The impact on habitat and indiscriminate catch of small mesh size nets, and monofilament nets used in Litembe are considered as one of the most significant threats to the Park resources (Obura et al., 2004). Small mesh size nets are widely used in the Marine Park, they include ‘tandilo’, beach seines and some of the ‘juya’.

Actions have already been taken by the Marine Park management to ban beach seines, and some crews have stopped operating while others still operate illegally. Although the initial forceful approach taken by the Marine Park in banning and confiscating gear without suggesting alternatives was not appreciated by Park communities, this study showed that a number of fisher groups admitted they disliked beach seines and consider them destructive.

The situation for ‘tandilo’ fishing is however very different. Difficulties for the Marine Park to regulate this activity may be numerous. ‘Tandilo’ fishing is carried out by women, and may represent one of the only direct sources of income for women in the Marine Park. ‘Tandilo’ did not appear to be perceived as fishing per se and certainly was not perceived as destructive by any of the groups interviewed. Furthermore, due to the cultural and social context, finding alternative sources of income for fisherwomen may prove difficult. It would be essential that a gender and cultural study investigates further the importance of ‘tandilo’ fishing for women as well as for their households’ well being. With this knowledge the Marine Park would be in a better position to seek appropriate ways of regulating the activity in partnership with fisherwomen. Taboos, traditions, social pressure, time and financial commitment are all aspects that have to be taken into consideration when investigating alternative sources of income for this group.

It was found through the group discussion that a woman used a handline. It may be worth investigating this further as it may be represent a way of suggesting alternatives to ‘tandilo’ fisherwomen.

6.1.1.4 Lack of organisation/lack of funds

No fisher or trader associations, cooperative or any form of user based organisation was detected in the Marine Park during the socio-economic assessment. At the same time, although access to funds was not discussed specifically in this study, the difficulty for fishers to access funds to maintain, upgrade or buy fishing gear (including boats) was mentioned by a number of fishing groups. This was perceived as constraining gear choices, and forcing fishers to fish in inshore areas. Conflicts detected between fishers and traders in relation to loans also reflect this issue, which is common in East Africa (King, 2000; Malleret King, 2000; Malleret King et al., 2003). Lack of funds also contributes to the weak position of local fish traders in comparison to outside fish traders operating in the Marine Park area.

Avenues such as providing an enabling environment for fishers and traders to organise themselves may be explored by the Marine Park in order to strengthen stakeholders’ position for increasing their chances of accessing funds such as loans. Similarly, in the light of successful experiences in the region (Ireland (ed), 2004), encouraging micro credit schemes may be a way for the Park to contribute to reducing pressure on marine resources by alleviating financial constraints and increasing livelihood choices and opportunities for stakeholders.
6.1.1.5 The Mozambique issue

This socio-economic assessment shows that Mozambique is an important source of marine resources for the Marine Park fishers (net fishers, hand lines, octopus fishers), particularly in mangrove villages and even more important for Marine Park and Mtwara traders. Traders compensate the decline of MBREMP marine resources by buying fish, sea cucumber and shells harvested in Mozambique. Processed products may be of lower quality than in the Park, but they are much cheaper. Agents interviewed estimated that most of their products came from Mozambique. This was also found by TRAFFIC (2001) particularly for sea cucumbers and shells.

As resources decrease in the Park, trade and fishing in Mozambique have increased. However, pressure on Mozambique marine resources has already been detected by the traders and agents interviewed in this study.

The attention of the Marine Park management needs to be drawn to this issue. Depleting marine resources in bordering Mozambique will have an impact both on Marine Park stakeholders and on Mozambicans. Impacts will be both biological and socio-economic due to the natural and social interactions between the two areas. Thus controlling resources use inside the Park may not be sufficient for achieving sustainable use of Marine Park resources as the area south of the border is naturally part of the buffer zone and the political border is effectively artificial. This transfrontier aspect of resource use and dependence will be an important issue to deal with when the process for a transfrontier MPA with Mozambique is initiated (King, pers. Comm.).

6.1.2 Community relations and Park Management

Without community support, it will be difficult for the Park to achieve its objectives, both from a biodiversity conservation and socio-economic perspective. This is made obvious for example by the violent refusal of Nalingu, one of the Marine Parks’ largest fishing villages, to be involved in Marine Park activities or abide by the Park’s rules. No information could be gathered on this village for this study.

Although no strong conflicts were detected between Marine Park stakeholder groups in this study, a general resentment against the Park was expressed by most user groups. It was found that miscommunication, misinformation, ill informed rumours as well as the approach taken initially to stop beach seining were the source of this resentment. Resource users’ fear for their livelihoods and lack of information on the Marine Park’s intentions may prevent communities’ to participate and support the Marine Park. These findings suggest that it would be worth the Marine Park increasing efforts in communication, education and awareness on the Park’s objectives so that rumours are nipped in the bud and stakeholders reassured. A community based planning process will be a large step towards increasing communities’ participation and informing them of the Marine Park’s intentions.

Furthermore, efforts in developing communities’ knowledge of marine ecological processes as was done in Comoros before establishing the Moheli Marine Park (Malleret, 2004), may contribute to increase communities’ capacity to manage marine resources, make informed decisions and understand better the aims and objectives of having a Marine Park.

6.1.3 On integrating management

This study suggests that marine resources in the MBREMP are affected by a wide spectrum of aspects which, if the Marine Park is to achieve its goals of protecting marine biodiversity and achieving sustainable use of resources, will have to take into consideration in its planning and enforcement processes. The Marine Park resources are subjected to global/international, national, regional and local influences. Although the Marine Park will not have the power to impact all these sources of influence, it is necessary that the Park is aware of their diversity.

6.1.3.1 A broad spectrum of stakeholders and a complex network of influences

MBREMP marine resources are the basis of livelihoods for fishers, local traders, agents, and exporters. These 'users' respond to local (e.g. fresh fish, dried fish, shell meat), regional/national (e.g. dried fish) or international demand (e.g. sea cucumber, octopus, shells and opercula). The demand
for MBREMP marine resources is guided by basic food needs (e.g. local and national markets), and by more complex needs in international markets based on aesthetics (e.g. use of ornamental shells), taste (e.g. octopus consumption in Europe), and culture and religion (e.g. consumption of sea cucumbers, shark fin, swim bladders in Asia, use of shell opercula in the Arab, Hebraic, and Indian worlds).

Stakeholders who affect marine resource uses are thus located in a variety of places, including the Marine Park itself, Mtwara, Dar es Salaam, Asia, Europe and so on. In order for the Park to control and steer resource uses in the Park, it will be of critical importance for the Marine Park to work in partnership with the whole spectrum of most directly involved stakeholders (e.g. from the fishers, traders, agents exporters whether they are based locally, in Mtwara or in Dar es Salaam) and raise their awareness on the impacts of their activities on the local Marine Park environment. It is also important for these stakeholders to understand that their activities will be impacted by the Marine Park’s management decisions. By working in partnership both the Marine Park and these stakeholders will have significant control on how and how much of the marine resources are extracted. In addition, such partnerships can potentially contribute to influencing international consumer tastes away from marine products that are biologically threatened in the region (sharks, rays, certain shell species, certain sea cucumber species…).

Similarly, the Mozambique issue needs to be taken into account. This study shows that many Marine Park stakeholders are also stakeholders of Mozambican marine resources. It thus may be important to involve Mozambican fishers, local government, and other similar marine resource related groups in the Marine Park planning process so as to combine efforts on both sides of the borders to achieve sustainable use of the resources that are not bounded by the political boundary.

6.1.3.2 Seasonality and the impact of non-marine based activities

The level of supply of marine products is affected, for example, by the status of marine resources, by seasons, by local conditions in response to demand, which in turn affect prices, and which in turn will affects stakeholders’ behaviour. Prices also vary according to the quality and type of products.

MBREMP marine resource exploitation is also affected by non-marine based activities that affect the demand for marine products. Indeed, one of the main influences mentioned by traders was the increase in local purchasing power during the cashew and rice harvest seasons, which result in an increase in demand for fish, and a consequent increase in fish prices. This event also triggers a seasonal fish trading activity, particularly for women. Furthermore, this is also when peak numbers of outside traders operate in the Park and when local traders go inland to sell their products. Some fishers mentioned that they reduce their fishing activities during peak farming seasons, and others have mentioned increasing their fishing activity in order to respond to the increased demand.

Understanding this is of high importance for Park management because it may challenge the assumption that if income from a household’s non-marine based activities increases, there may be a decrease in marine resources use, and eventually the pressure on marine resources may reduce. This study suggests that the contrary may be the case due to increases in purchasing power and the high demand for marine products.

6.2 Recommendations for monitoring

On the basis of the socio-economic assessment findings and on the basis of the regional experience in socio-economic monitoring by CORDIO SEMP accumulated in the recent years, the following monitoring process is suggested. The General Management Plan review process and the donor funding support to the Park until at least 2006 are also taken into consideration in the monitoring schedule proposed.

Parameters to monitor will fall into six categories: occupational structure of the Park communities, resource-use patterns, well being, attitudes, trade and prices.
The aim of the monitoring will help the Park management to:

- Identify trends relating to the pressure on marine resources
- Determine the impact of the MBREMP on Park communities
- Adapt management based on information from monitoring
- Ensure the sustainability of the conservation process

Although regular monitoring will provide key information on the Park communities, it will not provide in-depth information on the processes that trigger the changes detected. Reasons for changes will have to be investigated through specific in-depth research.

It is important to note that the baseline assessment was very comprehensive and some information to monitor could not be determined prior to carrying out this assessment. Recommendations for monitoring are thus more specific and targeted than the data that was collected in the socio-economic assessment. Time and financial constraints are also taken into consideration. Some information appeared important in the light of this socio-economic baseline assessment and thus appears as core to monitoring whereas it may not have been central to this report.

6.2.1 Occupational structure

6.2.1.1 Why monitor the MBREMP communities’ occupational structure?

The occupational structure of a community shows the diversity of livelihood activities in a community and the proportion of households involved in these livelihood activities, whether carried out for income or subsistence. From the point of view of the Park, the most important information that the occupational structure of MBREMP communities can give is an idea of the dependence on marine resources (fishing, marine products trading) at the community and Marine Park levels. By monitoring the communities’ occupational structure, the MBREMP will be able to determine whether the pressure on marine resources is likely to increase (e.g. an increased proportion of households depend on fishing) or decrease. Another key aspect which will be measured by the occupational structure is the uptake of MBREMP ‘AIGs’ when these are established, and their potential for reducing pressure on marine resources.

6.2.1.2 Which communities and what information needs to be monitored?

It emerges from this socio-economic baseline assessment that Mkubiru, Msimbati, Tangazo and Mngoji are the most marine resource dependent MBREMP communities. It is suspected that Nalingu is as highly dependent. These communities represent the core threat areas to marine resources. Information on these communities’ dependence on marine resources will thus be critical for the MBREMP to determine its success in reducing pressure on resources. The suggestion is thus to concentrate on monitoring the occupational structure of these four communities (Mkubiru, Msimbati, Tangazo and Mngoji, and when it becomes possible, Nalingu), and focus on getting information on:

- Fishing
- Trading of marine products
- Sea weed farming
- ‘AIGs’ when these have been established.

In this first baseline assessment all activities were investigated, these may be investigated on a less frequent basis.

6.2.1.3 Method

Methods to collect information on communities’ occupational structure is described in this report and in the training notes provided (see Appendix 2). Key informant interviews are used at the quarter level in the largest villages. These informants are selected based on their good knowledge of their neighbourhood, and include men and women. Informants are asked to go through the households of their quarter (mentally) and for each of the households list activities carried out by the households (whether for income or for subsistence) throughout the year. The occupational structure established for this report has provided a list of households of the MBREMP, this list will be used and the informants would have to update the information on each household’s activity. This will accelerate the process.
Prompting will be used in order to:

- Ensure that fishing, fish trading, seaweed farming and AIGs are not forgotten.
- Ensure that Seasonal activities are not forgotten
- Ensure that Women’s activities are not left out
- Get further information on which marine products are traded (fresh fish, dried fish, fried fish, sea cucumbers, octopus, prawns etc.).
- Ensure that fishers selling their fish to traders are not included in traders.
- Which AIG is carried out, if any.

The information will be entered in the MBREMP data base, grouping the activities according to the categories determined in this report. The only detailed categories will be marine product trading and AIGs.

The analysis will provide information on the percentage of households involved in each village in fishing, trading of various marine products, AIGs, sea weed farming, and marine resource dependence (including fishing, marine resource trading and seaweed farming). If desired other information may be obtained.

6.2.1.4 How frequently should the occupational structure be monitored?

The occupational structure information is invaluable but data intensive. It is thus recommended that this be monitored every 3 to 4 years for the four most dependent communities, or when AIGs are established. An occupational structure of all the Park communities may be done every 10 years so that changes in other communities are detected.

6.2.1.5 Who contributes to monitoring the occupational structure of the MBREMP?

The suggestion would be that the data collection is coordinated by the MBREMP, and community key informant. Data entry is a labour intensive exercise, it is suggested that external data enterers are used as well as MBREMP staff. The analysis can be done at the MBREMP level, simple queries such as what percentage of the communities depend on marine resources? can be pre-determined in the data base. MBREMP will benefit from support from CORDIO for this monitoring exercise on a needs basis. Support will be provided by CORDIO on a needs basis.

6.2.2 Communities’ attitudes towards MBREMP

6.2.2.1 Why monitor communities’ attitudes towards MBREMP?

A good relationship between the MBREMP and communities within the Park is essential for the MBREMP to achieve its objectives, ensuring participation of the communities and the sustainability of management. By monitoring communities’ attitudes and perception of the Park, MBREMP will be able to react to negative attitudes rapidly and take into consideration communities’ concerns. Often negative attitudes are based on misunderstanding. This needs to be avoided.

6.2.2.2 Which communities, how frequently and what information needs to be monitored?

Attitudes may change fast, it is thus suggested to monitor this on a yearly basis in all communities. This is a short exercise which can be done at the same time as monitoring resource use patterns where monitored.

It is suggested to focus on two aspects when monitoring attitudes:

- How do the communities’ perceive the Marine Park, and why
- Understanding of the Marine Park’s activities and objectives.

Attitudes were monitored differently in the socio-economic baseline assessment, however examples of questions to ask may be:

- What did the Marine Park do this year? What else?
- How did this affect your activity? Why?
- Is the Park a positive or negative/positive/neutral influence for your activity and why?
6.2.2.3 Method

Focus groups are most appropriate to monitor attitudes of user groups towards the Park. For communities where use patterns will be monitored on a regular basis, questions will be asked during the use pattern focus groups. These groups, as presented in this report and in the training notes (Appendix 3) are user based (e.g. fishers according to gear or species - sea cucumber and shells, traders according to the marine products traded etc).

For communities where use patterns will not be monitored yearly, focus groups will have to be established. It is suggested that fishers’ focus groups according to gear (e.g. nets including large mesh and small mesh size, ‘tandilo’, other methods including sea cucumber, shells), and trading (fresh fish dried fish, other products) are established. Informants may be selected randomly from the occupational structure list or purposively selected at landing sites. However, it is essential to ensure that in the focus groups (4 to 10 individuals) a variety of gender when appropriate and ages are represented as specified in the methods described in this report.

Results will be coded and entered in the data base. The analysis will be qualitative and show which user groups or village, have a better understanding of the MBREMP activities, which groups (whether users or villages) express a dislike of the MBREMP and the reasons for this.

6.2.2.4 Who contributes to monitoring MBREMP communities’ attitudes?

It is suggested that the data is collected by the Park community conservation officers when collected separately from use pattern information. This will enable them to have direct feedback from key stakeholders. Data will not be lengthy to enter and could be entered by the MBREMP staff. The data collected in this report was more comprehensive and thus interview guides for attitudes may have to be redesigned with the support of CORDIO or another regional institution with strong socio-economic knowledge. Similarly coding should be developed on the basis of the results, with assistance from such an institution for the first monitoring exercise.

Analysis can be done at the MBREMP level, using the database. Simple analysis can show the frequency of different attitudes and the level of understanding of the different groups or communities. Queries to the data base will be pre determined with assistance if needed from the expert institution and potentially the data base specialists.

6.2.3 Monitoring resource-use patterns

6.2.3.1 Why monitor resource-use patterns?

As stated in this report, marine resource use patterns relate to who and how many use the resources, how, where and when these resources are exploited and which resource are targeted. Monitoring this will help the Park detect changes in methods, location, timing and numbers of people using the resources. This will give information on the likely decrease or increase in pressure on resources, and adaptive strategies of fishers for example. Changes in preferred fishing grounds may reflect the recovery of the resources in some areas, the Park may also detect the changes in the importance of Mozambique to Marine Park fishers and traders.

Changes in the perceived resource status can also be detected. It is suggested that some items of the resource use patterns are monitored more frequently than others (see below).

6.2.3.2 Which communities and what to monitor and how frequently?

It is suggested that the monitoring focus on:

- **Who (according to season)**
  - Numbers and gender of fishers and traders (e.g. fishers per gear, traders per marine products),
  - Origin of fishers and traders operating in the Park (i.e. Park villagers, outsiders).
- **Location (according to season)**
  - For fishers: - most used fishing grounds in relation to the number of fishers operating there,
    - preferred fishing grounds and why,
For traders: - where they buy their products (e.g. Local fishers, Mozambique).
- where they sell their products (Local/Park markets, Mtwara market, inland markets, outside traders, agents, exporters etc.)

- **Species targeted (according to season):** which are the main species caught.
- **Timing:** the peak times of the year for fishers and for traders.

Attention will be drawn to seasons. Thus all items will be monitored according to season. It is recommended that the above should be monitored every two to three years in the four most important fishing villages in the Park Mkubiru, Msimbati, Mngoji and Tangazo. It should be also monitored in Nalingu when this becomes possible. After external funding support to the MBREMP reduces a routine of collecting the information every three to four years would be recommended for the longer term.

Every five years an added aspect should be monitored:

- **Perceived Changes:** in catch (species and amount), in income in the last five years.

### 6.2.3.3 Method
The method suggested for monitoring resource use patterns is as described in this report and in the training notes (Appendix 3). User based focus groups (fisher groups according to gear, shell fishers, sea cucumber fishers, traders according to products) would be used, the participants would be selected randomly according to the list of households provided by the occupational structure. They could also be selected purposively ensuring that gender and age diversity is represented.

Analysis is qualitative and quantitative. Simple analysis can show changes in numbers of Park fishers and traders, as well as the number of outsiders (a ratio for example), changes in locations, peak seasons and species mostly targeted.

### 6.2.3.4 Who contributes to monitoring resource-use patterns?
Carrying out the focus groups (as many as 6 or 7 in each village) is time consuming, it is thus advised that a team of locally based facilitators assist the MBREMP staff in this exercise as was done for this study. The team will be provided with training and interview guides/forms designed by the MBREMP with support from CORDIO. The data can be entered by MBREMP staff or the facilitators themselves in the database according to a pre determined format.

Pre determined queries entered in the database will show the main changes per groups or villages.

### 6.2.4 Trade

#### 6.2.4.1 Why monitor trade of sea cucumbers, shells and octopus?
Trading of shells, sea cucumbers, and octopus appeared as an important activity in the Park and is influenced by local markets as well as by foreign markets. Monitoring the trade in the Park and outside the Park will enable the Park to monitor where pressures on the resource come from. This may be monitored by the fisheries monitoring programme, care will be taken to harmonise the two processes if this is the case.

#### 6.2.4.2 What to monitor, where and how frequently?
It is suggested that agents for sea cucumbers, shell and octopus should be counted every year and the amounts traded of each product identified. Agents should be counted in Mtwara, as well as in Msimbati, which is often where some exporters base themselves.

#### 6.2.4.3 Method
It is suggested to do this through observation and semi structured interviews with the agents. Focus will be to try and identify what proportion of the various marine products sold comes from the Park. Prior to establishing the monitoring it would be worth visiting the agents and informing them of the process, particularly of MBREMP's interest to identify Park resources that are exported.
6.2.4.4 **Who contributes to the monitoring of trade of specific products?**

It is suggested that the data collection and entry is done by the MBREMP. An interview guide will have to be designed by MBREMP with support from CORDIO if required.

Simple analysis will be carried out to see the variation in trade and numbers of agents and of the proportion of trade coming from the MBREMP area. Queries will be pre determined in the database. This could require assistance from database experts.

**6.2.5 Prices of fish and other marine products**

6.2.5.1 **Why monitor prices?**

Marine Park policies of zoning activities or banning specific gear uses or specific activities may affect marine product supply. This in turn may affect fish and/or other marine products’ (e.g. shell meat) prices and thus local access to animal protein. It is suggested that to be aware of this, the Marine Park monitors fish and shell prices. Similarly an increase in sea cucumber prices may attract more traders and thus put further pressure on sea cucumber resources.

6.2.5.2 **Which communities and what to monitor?**

If possible, fish and other marine product prices should be monitored in all sea front and mangrove villages (Nalingu when possible, Mkubiru, Mngoji, Msimbi, Mitambo, Madimba, Litembe, Tangazo, and Kilambo). Fish prices per kg should be determined or average fish prices per size according to three or four categories of sizes should be monitored seasonally. Prices for shell meat, for ornamental shells, and prices per kg for different types of sea cucumbers should also be monitored. Market prices may be chosen as they would reflect prices paid by customers. However it may be more convenient to monitor fishers’ prices for example if those are monitored within the context of the fisheries monitoring programme.

6.2.5.3 **Method and frequency**

It is suggested that depending on the fisheries monitoring programme, either fishers’ prices or traders’ prices are monitored, seasonally every year. If it is decided that fishers’ prices are monitored, then it is suggested that market prices (if not possible for products such as sea cucumber and shells, use agents’ or exporters’ prices) are monitored in all seasons (Southeast Monsoon, Northeast Monsoon, and possibly ‘Matalai’ every three years).

Methods to collect fishers’ prices would be observation, and key informant interviews at fish landing sites. To collect market prices, observation and key informant interviews where fish are sold at the village level is suggested. A comprehensive list of prices should be gathered two or three times every season. Prices of shell meat should be collected at the market level. Prices of sea cucumbers, ornamental shells, opercula should be collected through interviews with agents in Mtwara.

6.2.5.4 **Who contributes to the monitoring of fish and other marine products prices?**

It is suggested that marine product price information should be collected and data entered in the MBREMP data base by the Marine Park staff. Seasonal and yearly trends can be calculated by the data base on the basis of pre-determined queries.

The Marine Park could benefit from support on establishing the sampling strategy for price data collection from CORDIO or the fisheries assessment team.

**6.2.6 Household survey (communities’ socio-economic status and household level fisheries information)**

6.2.6.1 **Why monitor Park communities’ socio-economic status?**

Monitoring the relative socio-economic status of specific groups will help the Park determine whether well being is improving or not, and whether this is due to changes in the resource base, up-take of alternative livelihood activities and so on.
6.2.6.2 Why more monitor more information on fisheries

The Park will benefit from monitoring further information on fisheries at the household level. This will provide more precise information on the dependence on fishing at the household level as well as on gear distribution.

6.2.6.3 Which communities and what to monitor?

The focus of the wealth monitoring should be on the most dependent communities on marine resources (Mkubiru, Mngoji, Msimbati and Tangazo, when possible Nalingu) as well as communities where AIGs have been developed when these are established.

It is suggested that for specified villages the monitoring focuses on:

For all households:
- Material style of Life data (as per this study) - wealth measure
- Fish and marine product consumption (per season, this was not explored in this study but could provide interesting insights on the demand and consumption of marine products at the local level)
- Households’ activities ranked in order of importance with particular focus on marine associated activities and AIGs introduced.

For households involved in fishing or on the trade of marine products:
- How many fishers
- Gears and numbers of fishers per gear (including ‘tandilo’ fisherwomen)
- Type of boat owned
- How many months off fishing, what reasons
- How many traders per product
- If fishing is the most important or sole activity of the household
  → Does fishing bring more, same, less income (according to season) than 5 years ago
- If trading marine products is the most important or sole activity of the household
  → Does trading bring more, same, less income (according to season) than 5 years ago?

This information will be more comprehensive and will enable the triangulation (verification) of other information collected more regularly through the monitoring of resource use patterns and occupational structure.

6.2.6.4 Method and frequency

It is suggested that a household survey is used as was done in this baseline assessment. Data will be entered in the MBREMP data base. It is suggested that this is done every 3 to 4 years at first to strengthen the knowledge base and inform the General Management Plan review during the Project period and to take opportunity of available funding. In the longer term this should take place every 5 to 6 years in the longer term. Households are selected in the villages of concern in a random way on the basis of the occupational structure household list. A new questionnaire based on the one used in this study should be designed focusing on the items specified above.

6.2.6.5 Who contributes to the monitoring of socio-economic status?

A household survey is a complex and time consuming exercise. It is thus suggested that an external team is used to assist the Park carry out the household survey and analyse it with the participation of MBREMP and community members as was done in this study.

Finally it is suggested that a comprehensive socio-economic assessment is carried out every 10 years in order to update information on all communities in the Park.
### 6.2.7 Proposed monitoring schedule

#### 6.2.7.1 Monitoring cycle

**Table 42: Socio-economic monitoring cycle proposed**

<table>
<thead>
<tr>
<th>Year</th>
<th>Villages</th>
<th>Attitude</th>
<th>Use patterns</th>
<th>Trade</th>
<th>Prices*** (seasonally)</th>
<th>Household survey Socio-Eco status</th>
</tr>
</thead>
<tbody>
<tr>
<td>2005</td>
<td>All villages</td>
<td>Seafront villages</td>
<td>Seafront villages</td>
<td>Mtwara Msimbati</td>
<td>Fishers’ prices in Mangrove Sea front villages</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>Seafront villages* Tangazo</td>
<td></td>
<td></td>
<td></td>
<td>Market prices Mangrove, sea front villages and Mtwara agents</td>
<td></td>
</tr>
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<td>2007</td>
<td>Seafront villages Tangazo</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td>2008</td>
<td>Seafront villages Tangazo</td>
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<tr>
<td>2009</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>2010</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Market prices Mangrove, sea front villages and Mtwara agents</td>
<td></td>
</tr>
<tr>
<td>2011</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Seafront villages Tangazo</td>
<td></td>
</tr>
<tr>
<td>2012</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2013</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2014</td>
<td>All villages</td>
<td>All villages</td>
<td>All villages Changes**</td>
<td>Mtwara Msimbati</td>
<td>Fishers and market prices in all villages and Mtwara</td>
<td></td>
</tr>
</tbody>
</table>

*Seafront villages: Mkubiru, Mngoji, Msimbati and Nalingu if possible

**Changes: investigation of perceive changes in income and catch.

*** Prices: depending on whether fishers’ prices or market prices are chosen as the main data to be collected, the main prices will be collected every year and the other every 3 or 4 years.
7 CONCLUDING REMARKS

Apart from increasing the MBREMP's knowledge base on the social and economic context of Park communities, one of the purposes of this study was to show the diversity of aspects that have to be taken into consideration when establishing the MBREMP management plan. These aspects relate to the enormous diversity of actors in a number of locations who affect the exploitation of marine resources in the Park, the seasonality of the activities in the Park and the way in which non-marine based activities impact marine resource exploitation.

This study does not claim to provide an insight to all aspects mentioned here but it aims to provide the reader with a better understanding of the communities in the Park and of their complexity. It also provides elements to explore further in order to make informed decisions regarding resource use and marine resources.

It is important to note that getting Nalingu ‘on board’ will be essential to achieve the sustainable use of marine resources in the Marine Park.

Monitoring the occupational structure, resource use patterns, regional trade, well being, and prices will all contribute to help the Marine Park follow the communities’ socio-economic evolution and its likely impact on the status of the marine resources. However, a regular comprehensive assessment (each decade) will be needed to grasp changes in the complexities of these communities.
8 REFERENCES


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APPENDICE 1: TRAINING MATERIAL FOR THE OCCUPATIONAL STRUCTURE
(INCLUDING INTERVIEW GUIDE)

INVESTIGATING: OCCUPATIONAL STRUCTURE
(MBREMP)

1. Aim

The aim is to map the activities on which communities located in Mnazi Bay Ruvuma Estuary Marine Park (MBREMP) depend on. The occupational structure will indicate the relative dependence, at the community level, on different activities (sources of food or sources of income).

2. Use

The information gathered will contribute to develop management strategies for the Park. Increasing the knowledge on livelihood strategies of communities located inside the park will help the park to understand and work effectively with these communities. It will help the park target the appropriate user groups when investigating ways to reduce pressure on the natural resources inside the Park.

3. How is the information collected?

Collecting data on occupational structure is done through key informant interviews. Two or three informants are asked to list all the households in their area and for each household they are asked to provide information on the number of household members, the number of household members contributing to the households’ income or food bases and list activities carried out (for food or income).

4. Process

4.1. Identify key informants

Informants have been identified in partnership with the Village Liaison Committees and Village Government.

- The informants need to be from the area researched
- They need to know their neighbourhood well (usually middle aged or elder people)
- There needs to be gender balance: Informants should include men and women.

4.2. Introduction to key informants

Before starting the interviews it is important to introduce the research well and reassure the informants about the objectives of the research as they might be suspicious. Thus, the research team members will:

- Introduce themselves.
- Introduce the research: a starting point to working together, understanding the communities better, and help the Park contribute towards livelihood development.
- Introduce what will be expected from the informants: list the households in their neighbourhood and list activities carried out by these households. Insisting on the fact that all activities (food or income) are of importance to the research.
- Make sure that informants and research team have the same understanding/definition of what a household is.
4.3. Interviewing

4.3.1. Information required from the informants for each household will be:
- The name of the head of household (HH)
- Number of household members,
- Number of the households members contributing to the households income or food base and
- The activities carried out by the household members (more details will be asked on some of
  the activities is required, see table 1).

4.3.2. Listing households

In order to help the informants not forget households, researchers will work out with the informants a systematic way of listing households. This will be done by following streets, lines or other features that the informants consider appropriate. The households will then be listed systematically following the physical feature chosen.

4.3.3. Questions and prompting

- Open-ended questions
  Ask open-ended questions so that no information is missed and informants are able to provide broad range of information. For example for each household first:
  ➔ Ask: what activities household members are doing for living?
  ➔ NOT "do people in this household fish?"

- Prompting
  However, it will be important to prompt the informants to make sure that all activities of the households are mentioned.
  Prompting questions include questions such as "what else? Are there other activities? ...
  If an activity which is very widespread such as farming was not mentioned, it might be worth for the researcher to prompt and ask a close ended question such as "so...no one farms in this household?".

- Activities and details
  Table 1 lists activities identified by the research team during the training session and the details required from the researcher for some of these activities. The list of activities is not final, other activities will be added according to findings.

<table>
<thead>
<tr>
<th>Marine related</th>
<th>Farming related</th>
<th>Business related</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish trading: type (e.g.: dagaa, fresh fish, jongoo, kamba...)</td>
<td>Farming: food, business.</td>
<td>Business: which business?</td>
<td>Mganga</td>
</tr>
<tr>
<td>Fishing: number of fishers in the household, fishing method used ➔ (madema, mshipi, bunduki..nyavu: prompt for kokoro)…</td>
<td>If farming for business: ➔ which crops are cultivated for business (e.g. prompt for koroshe)</td>
<td>(e.g. selling mandazi, duka, hoteli, pombe selling, wood selling, chokaa making and selling, mkaa making and selling...)</td>
<td>Employed: where? Retired Transport (by bicycle)…</td>
</tr>
<tr>
<td>Shell collecting: food, or selling</td>
<td></td>
<td></td>
<td>Etc…</td>
</tr>
<tr>
<td>Sea weed farming</td>
<td></td>
<td>If wood selling is mentioned: ➔ ask whether it is mangrove wood or other wood.</td>
<td></td>
</tr>
</tbody>
</table>
4. Note taking

- **Write information fully**

Notes need to be clearly written so to make work easier for the person who will enter the data. In the first stage of the research, the information will be written in full. Coding will be developed at a later stage.

- **Note format**

The following format is suggested for note taking

**Table 2: Format in which information will be written down and examples**

Note: Informants' name, activity, age, gender

<table>
<thead>
<tr>
<th>Date</th>
<th>Village</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Location (Kitongoji)</th>
<th>Name HH*</th>
<th>Number people</th>
<th>Number of &quot;contributors&quot;</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kondo</td>
<td>Said Hussein</td>
<td>5</td>
<td>2</td>
<td>- Fishing (2, mshipi, kokoro, nyavu inch 2)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Farming (food)</td>
</tr>
<tr>
<td></td>
<td>Suleiman (w)**</td>
<td>2</td>
<td>1</td>
<td>- Farming (food and business: korosho, mahindi),</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Business (chokaa, selling mangrove wood)...</td>
</tr>
</tbody>
</table>

*: Head of Household (HH)

**: If the head of household is a woman note (W).
APPENDIX 2: TRAINING MATERIAL FOR THE RESOURCE USE PATTERNS
FOCUS GROUPS

INVESTIGATING: RESOURCE USE PATTERNS AND RESOURCE BASED CONFLICTS
(MBREMP)

1. What are "Resource use patterns" and "Conflicts"?

- **Resource use patterns** tell us the way in which people use the resources we are interested in, here the marine and coastal resources. Resource use patterns relate to who use the resources, what resources they use, where, when, how they use these resources, how much.

- **Conflicts** in our case relates to existing conflicts/negative attitudes between groups of people involved in marine and coastal resource use.

The four main uses which we will be interested in are:

- Fishing (using lines, beach seines-kokoro, nets, traps, spear guns etc)
- Fish and other marine products trading (fresh fish, dried fish, sea cucumbers, octopus, prawns...)
- Shell collecting (for food, ornamental)
- Seaweed farming.

We will carry out the research in 8 villages of the Park: Kilambo, Tangazo, Litembe, Mitambo, Madimba, Misimbati, Mngoji and Mkubiru.

2. Why investigate this?

- **Good** and **up to date** understanding of the way people use the resource will contribute to develop adapted management strategies for the area.
- The information will help focus on particular groups when investigating ways to reduce pressure on the marine resources inside the Park area.
- Up to date information on **conflicts and attitudes** between groups using marine and coastal resources will be important for management to be effective.

3. How will the information collected?

- Collecting data on resource use patterns is done through **focus group and/or key informant interviews**. Focus groups are group discussion where themes of discussions are pre determined.
- In the Focus Group, we will discuss with 6 to 12 informants who carry out similar activities their activities, evolution and choices related to these activities, and conflicts with other groups.
- If the activity is less widespread, then key informant interviews will be used (semi-structured interviews with 1 or 2 people)

**FOR FISHERS:** ➔ **Maps** will be used to visually represent the areas where fishers and shell collectors operate..

➔ **Ranking**, preferably **Matrix Ranking** will be used to determine why fishers prefer certain gears.
4. Interview Preparation

4.1. Authorisations and informant selection

→ Authorisation to carry out the research will have been obtained by the fieldwork coordinators (Jennifer and Samson from MBREMP) before the fieldwork starts.
→ Informants for this research were selected on the basis of a list of households obtained through a baseline survey carried out in the Park and in consultation with the Village Liaison Committees (VLC). VLC are an intermediary between the Park and local villagers. The informants are all from the villages investigated and will include ladies and men according to activities investigated.

4.2. Focus groups and Key informant interviews

There are a number of types of fishing and of types of fish trading in each village. Informants will be grouped as follows (KI refers to Key Informants, FG to Focus Groups):

<table>
<thead>
<tr>
<th>Fishers grouped per gear</th>
<th>Traders per product traded</th>
<th>Shell collecting</th>
<th>Mwani</th>
</tr>
</thead>
<tbody>
<tr>
<td>FG: Kokoro/Juya/Kavogo</td>
<td>FG: Fresh Fish, dagaa, dried fish</td>
<td>FG or KI</td>
<td>FG or KI</td>
</tr>
<tr>
<td>FG or KI: Mshipi/Madema/Wando</td>
<td>FG or KI: Sea cucumber</td>
<td>FG or KI</td>
<td>FG or KI</td>
</tr>
<tr>
<td>FG or KI: Kuchokoa/Bunduki/Njoro</td>
<td>FG: Octopus</td>
<td>FG or KI</td>
<td>FG or KI</td>
</tr>
<tr>
<td>FG: Tandillo</td>
<td>FG or KI: prawns</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.3. Preparing the interviews

It is important to PREPARE so that:
• Nothing is forgotten
• The interview is good.

This means that you KNOW:
• What you are going to discuss with the group, before meeting.
• How you are going to start the discussion

5. Content of the interviews...

5.1. Introduction to informants

Before starting the interviews introduce the research well and reassure the informants about the objectives of the research as they might be suspicious. Thus:
• Introduce yourself briefly..
• Introduce the objective of the session: we are keen to discuss your activities, so that the Park can take better account of these activities when planning...
• Tell the informants how long the session is expected to be (max 3 hours)
• Ask the participants to introduce themselves and their activity (name, age, gear used if fishers, product traded if traders ...). TAKE NOTES

5.2. The INTERVIEW

REMEMBER:
→ Marine activities are often seasonal, we will need to be aware of this and make sure that we ask questions for the different seasons.
→ The groups were selected to REPRESENT a large number of people. It is essential that you, as the interviewer make sure that you get information on all the people the group represents.
5.3. List of Themes to be discussed with the Groups or Key Informants (example of questions for the different groups):

- What are the different seasons (name and months) for the activities, Which is the peak season?
- **Who and How many people carry out:** How many men, how many women- How many young (men and women), how many middle age (men and women), how many old (men, women)... how many from the village, from the local area, how many resident immigrants, how many outsiders (see below for the list of categories).

| Age: Young | (up to 30 years old), Middle | (31-50), Old | (more than 50). |
| Origin: Village | (from the village for a long time), Res. Immigrant | (recently settled in the village), Local area | (from the neighbouring villages), outsiders |

- If we cannot get a number for each category, then the informants could **rank** the information. (1: the most numerous category, 2, and 3 or 4 for the least numerous). If the informants are not able to rank the categories according to the number of people, ask which is the Most numerous category

- **Where do users carry out their activity (FOR BOTH SEASONS): This may be done last..**
  - Where do the different fishermen fish usually → MAP
  - Where do shell collector collect shells → MAP

**MAP:** For fishers and shell collectors we will ask the informants to draw a map of the places they fish or collect shells. The Map will show:

- The main coastal features of the village (beach, mangrove, what the villages think important to note ...), The main marine features (reefs, sand bars, channels...or what they think important to note)
- Circles of dots where the fishing places are/collecting with:
  - The name of the place/reef
  - The characteristics (e.g. inside/outside the reef, in deep or shallow water, on sand/rocky/sea grass bottom/reef/other).
  - Which season it is used
  - How long it takes to reach it? (in both seasons)

- **When does the activity happen** (e.g. day or night, full moon or no moon, tide, specific time of the year, how long at sea, how many times a day etc.). **Is it the same in both seasons?**
- **What species/Product are caught or sold in each season:**
  - For fishers: the four main species of fish in order of importance (according to season)
  - For shell collectors: the four or five main species for food and for ornament (according to time...)
  - For seaweed: species farmed
  - For traders: what products do they sell, and how processed are these products (fresh, dried, cooked...)

- **How do they carry out the activity:**
  - How the fishermen go to where they fish. If they use boats, how many fishermen use boats for each activity, and how many fishermen use boats with engines for each gear. Characteristics of boat ownership, characteristic of gear ownership (how many share?...)
  - Traders (do they use ice, what type of transport do they use to get to the selling place etc., how do they conserve the product they sell?)
  - Seaweed farmers (what equipment do they need, transport etc...)

- Where do the fish traders buy and sell their fish/to whom (in the village, outside the village, in a market, door to door, to hotels etc)
- Where to the seaweed farm (name of places, and characteristics of the place), where do they sell the seaweed (to whom)...

- **Origin:** Village (from the village for a long time), Res. Immigrant (recently settled in the village), Local area (from the neighbouring villages), outsiders (from outside the local area).
• Shell collectors (what equipment do they use to collect, conserve, how do they process the shells for food, for ornament)

• **Resource and income changes:**
  - How has the catch/resource available changed in the last few years, and how has the income evolved?
  - For traders and seaweed farmers, income and profit margins will be discussed.

• **Gear selection (Fishers only):**
  - Rank according to preference the gears, reason for preferences (Matrix Ranking if you are familiar with it).

<table>
<thead>
<tr>
<th>Example of Matrix ranking</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Kokoro</strong></td>
</tr>
<tr>
<td>Kokoro</td>
</tr>
<tr>
<td>Mshipi</td>
</tr>
<tr>
<td>Jarife</td>
</tr>
<tr>
<td><strong>Number of times preferred</strong></td>
</tr>
<tr>
<td><strong>Rank</strong></td>
</tr>
</tbody>
</table>

The Jarife is the preferred gear because more income than all. But expensive to buy. The least preferred gear is Mshipi.

• **Conflicts**
  - *Which groups* are in conflicts with the groups represented in the Focus groups (we are not interested in personal conflicts!) and *why*. This will include, other activity groups but also other stakeholders such as (mangrove cutters for example, the Park, Forestry Department)

6. **Interviewing skills**

• **Prompting:** It will be important to prompt the focus group participants to make sure that they give information on all the people involved in the activity and not only on the people who are in the focus group.
  - For this, ask questions like "do all bunduki fishermen fish inside the reef?", "do all fish traders sell their fish at the Msimbari market?" Etc. If not, "who sells elsewhere? And where do they sell?"
• **LISTEN:** listen to what people have to say, they know more about their activities than you do, this is why you are interviewing THEM.
• **Everyone has to speak.** Make sure that all the people in the group speak and that the person involved in the activity we are discussing speaks (if the group is mixed).

7. **Note taking**

7.1. **Write information fully in the forms provided**

• Notes need to be clearly written so to make work easier for the person who will enter the data. Write the information in full.
• Forms will be provided to make sure no themes are forgotten. The forms will serve as an interview guide.
• It might be worth taking on a notebook so than comments and all relevant information is captured. Then to fill the form.
7.2. Example of form

The following format is suggested for note taking (several examples are provided). A space for comments is left.

| Comments: Comments will be very important to evaluate whether the data gathered was the best possible or not. "Comments" should include information such as whether there was a good representation in the group, whether everyone spoke or not, if there were some disturbances etc. |
At the beginning of each sheet: List informants': name, activity, age, gender

Date:
Village: Mngoji
Name of interviewer

Example of notes from interview with a group of fish traders:  Seasons= Kusi (March to August)  Kaskazi (September to February)

<table>
<thead>
<tr>
<th>Who/how many per season</th>
<th>When? During the day</th>
<th>Where (this season)</th>
<th>Species (this season)</th>
<th>How (this season)</th>
<th>Income/Resource</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 men, 2 women</td>
<td>Buy fish in morning</td>
<td>Men buy fish from village fishermen and sell in hotel, houses in all seasons. The ladies sell in the market in Msimbati only in Kaskazi, otherwise they sell in the village.</td>
<td>Men buy tasi, pono and sometimes big fish (tuna) in kaskazi Ladies buy octopus only in all season</td>
<td>Mainly they keep the fish in baskets and go and sell on bicycles. One man who sells to hotels has a cool box. Ladies go on foot Fish and octopus are sold fresh, no processing. Same in all seasons</td>
<td>Less fish to buy in both season in the last 5 years. Because so many fish traders. Income has increased, fish can be sold more expensive because more hotels and less fish..</td>
</tr>
<tr>
<td>all: middle age</td>
<td>Peak time in the year is kaskazi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>all: village</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(same in all seasons)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Conflicts with who and reason

Conflicts among dagaa traders because less fish to buy.
Conflicts with Fisheries Division because they increase the price of license and there is less fish to buy..

Comments:
### Example of notes from interview with a group of Nyavu (>3") Seasons=

<table>
<thead>
<tr>
<th>Activity</th>
<th>Who/how many (this season)</th>
<th>When</th>
<th>Where (see Map)</th>
<th>Species</th>
<th>How</th>
<th>Evolution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nyavu kurambaza</td>
<td>16 men, Mostly Young. Rank: 1 Village 2 outsiders outsiders only come for kaskazi</td>
<td>Day/Night Tide, months, moon</td>
<td>Inside/outside reef Sand/rocky/grass Deep/shallow Distance (per season) Name</td>
<td>in kaskazi: 1. Kingfish, 2 shark, 3. Tuna Kusi: 1. Tuna 2. Kole Kole 3. Kingfish 4. Shark</td>
<td>All use boats with engines (there are 2 boats with engine). 6 per boat. Gear is shared among 5 or 6 fishers usually. Cost of nyavu = 50000 Tsh Boat owned by one person and rented by crew. Boat with engine = 500 000 to 2.000.000 (Use boats in all season)</td>
<td>Catch has decreased in all season too many people fishing (use to catch 20 to 100 kgs in kaskazi now only 20 to 50 kgs). In kusi use to catch 10-20 kg same now. Income same because price of fish has increased a lot (was 500 Tsh a kg in 1995, now 1000 kg) but 500 Tsh in Kaskazi</td>
</tr>
</tbody>
</table>

### Gear preference (Matrix ranking) and reason

1. Nyavu because more catch and income but tiring
2. Wando good catch and income less tiring than nets
3. Kokoro cheap to start (one person owns the net) but catch small and very tiring...

### Conflicts (who and why)

Conflict with Park: banning fishing in Mkamba Mkubwa our only king fish area. Also banning shark fishing (most income for us)

Comments:
APPENDIX 3: DATA ENTRY TEMPLATE (FOR EASE OF PRESENTATION THE CATEGORIES HAVE BEEN COPIED UNDER EACH OTHER, INSTEAD OF STAYING IN ONE ROW)

This is a template but You as a Data entry person you will have to adapt the categories to the research findings!

**OCCUPATIONAL STRUCTURE - TEMPLATE**

<table>
<thead>
<tr>
<th>Type of entry-- &gt;</th>
<th>Name</th>
<th>Number</th>
<th>Name</th>
<th>Name</th>
<th>Number</th>
<th>NAme</th>
<th>Yes=1</th>
<th>Number</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Interview</td>
<td>Name</td>
<td>Key informant s</td>
<td>Village</td>
<td>Kitongoji</td>
<td>Household Number</td>
<td>Head Household</td>
<td>Woman</td>
<td>Household</td>
<td>Contributors</td>
</tr>
<tr>
<td></td>
<td>interview</td>
<td></td>
<td>Village level</td>
<td>Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Example**

<table>
<thead>
<tr>
<th>Date</th>
<th>Name</th>
<th>Number</th>
<th>Village</th>
<th>Informant</th>
<th>Number</th>
<th>Household</th>
<th>Yes=1</th>
<th>Number</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>7/21/03</td>
<td>Innocent</td>
<td>3</td>
<td>Mtwara</td>
<td>Kondo</td>
<td>1</td>
<td>Hadidja Mwanamkuu</td>
<td>1</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

**ACTIVITIES**

<table>
<thead>
<tr>
<th>activities</th>
<th>Fishing</th>
<th>Seaweed farming</th>
</tr>
</thead>
<tbody>
<tr>
<td>FISHERMEN</td>
<td>Beach seine, Mshipi, Nyavu, Kutanda, Madema, Wando</td>
<td>diving</td>
</tr>
</tbody>
</table>

<p>| Yes=1 No=0-- -----------------------------------------|</p>
<table>
<thead>
<tr>
<th>Seaweed farming</th>
<th>Shells collection</th>
<th>Fish/marine product trading</th>
<th>Other fisheries dep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food</td>
<td>Business</td>
<td>Fresh Fish, dagaa, Sea cucumber, Octopus</td>
<td>Prawns, Canoe builders, Nyavu makers</td>
</tr>
</tbody>
</table>

| Yes=1 No=0-- -----------------------------------------|
| Trading and exploitation of other natural resources | Natural resource dependent artisans |

96
<table>
<thead>
<tr>
<th>Mangrove w</th>
<th>Non mangrove wood</th>
<th>Charcoal</th>
<th>lime</th>
<th>Carvers</th>
<th>Weaving</th>
<th>Trad beds</th>
<th>Trad dr</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Farming food</th>
<th>Farming for business</th>
<th>Livestock</th>
<th>Business (own) non natural resource dependent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cashews</td>
<td>coconut</td>
<td>fruits</td>
<td>groundnuts</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Food vendor</th>
<th>duka</th>
<th>Pombe shop</th>
<th>Honey</th>
<th>Transport</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Yes=1 Not=0</th>
<th>---------------------------------------------------------------</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Artisans non NR</th>
<th>dependent on natural resources</th>
<th>Casual labour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Builder</td>
<td>Carpenter</td>
<td>General</td>
</tr>
<tr>
<td></td>
<td>Taylor</td>
<td>Mkwezi</td>
</tr>
<tr>
<td></td>
<td>Msusi</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Radio</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Pottery</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Smith</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Employed (Private)</th>
<th>Employed (Government)</th>
<th>Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>Locally</td>
<td>Outside</td>
<td>Teacher</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Dancers</th>
<th>Retired</th>
<th>musician</th>
<th>Religious leaders.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| 0      | 0      | 0       | 0        | 0                  |
APPENDIX 4: INTERVIEW GUIDES RESOURCE USE PATTERNS

5.A. FISHING INTERVIEW GUIDE/ FORM

Village: Date:

Name of researcher:

List of participants:

<table>
<thead>
<tr>
<th>Name</th>
<th>Kitongoji</th>
<th>Gear</th>
<th>Age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMINDER:

- All the information should be for each GEAR represented in the group and each SEASON.
- LOCATION of activities (including: name of the site, characteristics (deep/shallow, reef/sea grass/sand/other, distance in mn, season of use) have to be summarised in a MAP. When the group represents several activities (e.g: mshipi/madema), make clear which area is for which gear.
- We want information on all the people who are involved in the activity represented not only the participants.
- Categories:

  - Age: Young (up to 30 years old), Middle (31-50), Old (more than 50).
  - Origin: Village (from the village for a long time), Res. Immigrant (recently settled in the village), Local area (from the neighbouring villages), outsiders (from outside the local area).

PLS WRITE COMMENTS ON THE INTERVIEW AT THE BACK OF THIS SHEET.
<table>
<thead>
<tr>
<th>Fishers numbers and characteristics per season per gear represented in the group.</th>
<th>Timing</th>
<th>Species: Main fish species (Swahili name) in order of importance (1 most and 5 least)</th>
<th>Ownership of gear and boats</th>
<th>What has changed in the last ten years in (in relation to their activity):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number: Gender (men, women) Age (old, middle, young) Origin (res. imm, outsider, village, local)</td>
<td>Seasons? Peak season? Daily pattern (night, day), tide (low, high), how many times a day? How long?</td>
<td>How many use boats (type of boats) How are boats owned? Indicative cost of boat. How is the gear owned (is it shared, how many people share, indicative cost?)</td>
<td>Amount of people doing this? Why? Amount of fish caught (more, less..indicative kgs per PERSON) Size of fish (bigger, smaller) Species of fish (which more, which less) Income (more, less, indicative income from fishing per person Price of fish</td>
<td></td>
</tr>
</tbody>
</table>

| Gear Preference (Matrix ranking?) | | | Conflicts: List of other groups (e.g.: other gears, mangrove cutters, Park authorities, Fisheries Division, Forestry Department, specific trader groups…) with which the user groups are in conflict and REASON for the conflict. |
| List of gear in order of preference | Reason for preference (skills needed, time at sea, physical demand, cost of gear, use of boats, catch, income…) | | |

99
5. B SEA WEED FARMERS: INTERVIEW GUIDE/FORM

Village: ___________________________ Date: ___________________________

Name of researcher: ___________________________

List of participants:

<table>
<thead>
<tr>
<th>Name</th>
<th>Kitongoji</th>
<th>Age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMINDER:

- We want information on all the people who are involved in the activity represented not only the participants.

- Categories:

  - **Age**: Young (up to 30 years old), Middle (31-50), Old (more than 50).
  - **Origin**: Village (from the village for a long time), Res. Immigrant (recently settled in the village), Local area (from the neighbouring villages), outsiders (from outside the local area).

PLS WRITE COMMENTS ON THE INTERVIEW AT THE BACK OF THIS SHEET.
<table>
<thead>
<tr>
<th>Farmers numbers and characteristics <strong>per season (if relevant)</strong>. Number:</th>
<th><strong>Timing</strong></th>
<th><strong>Species/Location:</strong></th>
<th><strong>How:</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender (men, women)</td>
<td>When is the seaweed grown? How long before harvest? When did they start doing this? How many hours a day/days a month needed? Month a year?</td>
<td>Species farmed Characteristic of area where they farm (name, distance, beach/sand?)</td>
<td>How is it farmed? How is it processed? Who is it sold to? How are they organised (is there any association? Cooperatives…)?</td>
</tr>
<tr>
<td>Age (old, middle, young)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Origin (res. imm, outsider, village, local)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Conflicts:** List of other groups (e.g.: fishers (which), mangrove cutters, Park authorities, Fisheries Division, Forestry Department, specific trader groups …) with which the user groups are in conflict and **REASON** for the conflict.

101
5. C. SHELL FISHERS INTERVIEW GUIDE/FORM

Village: Date:

Name of researcher:

List of participants:

<table>
<thead>
<tr>
<th>Name</th>
<th>Kitongoji</th>
<th>Type of shell (food, other-ornamental, lime)</th>
<th>Age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMINDER:

- All the information should be for each type of shell trade (food shell, ornamental shells) represented in the group and each SEASON or other time factor.
- **LOCATION** of activities (including: name of the site, characteristics (deep/shallow, reef/sea grass/sand/other, distance in mn, season of use) have to be summarised in a MAP. When the group represents several activities (e.g.: food/ornamental shells), make clear which area is for which shells.
- We want information on **all the people who are involved in the activity** represented not only the participants.
- Categories:

| Age: Young (up to 30 years old), Middle (31-50), Old (more than 50). | Origin: Village (from the village for a long time), Res. Immigrant (recently settled in the village), Local area (from the neighbouring villages), outsiders (from outside the local area). |

PLS WRITE COMMENTS ON THE INTERVIEW AT THE BACK OF THIS SHEET.
| Shell collectors numbers and characteristics per season type represented in the group. | **Number:**
- Gender (men, women)
- Age (old, middle, young)
- Origin (res. imm, outsider, village, local) | **Timing**
- Seasons?
- Peak season?
- Daily pattern (night, day), tide (low, high), how many times a day? How long?
- Monthly patterns (name of time in Kiswahili?) | **Species:**
- Main shell species (Local name) in order of importance (1 most and 5 least) according to time (month, season...relevant).
- According to type of trade | **Equipment, organisation, processing and aim**
- What equipment do they use
- Do people sell shells? Proportion? Which species?
- How do they process the shells they sell?
- Indicative selling price (per kg, per type of shell).
- Where are they sold? What for... (lime, ornamental, food...)
- How are the shell collectors organised (e.g. indiv., association, cooperatives...?) | **What has changed in the last ten years in (in relation to their activity):**
- Number of people doing this?
- Why?
- Amount of shells collected (more, less... indicative kgs per person) for which shells?
- Size of shells (bigger, smaller)
- Species (which more, which less)
- Income (more, less, indicative income from shell collecting per person)
- Price of shells |

**Conflicts:** List of other groups (e.g.: mangrove cutters, Park authorities, Fisheries Division, Forestry Department, specific trader groups....) with which the user groups are in conflict and **REASON** for the conflict.
5.D. TRADERS INTERVIEW GUIDE/FORM

Village: Date:

Name of researcher:

List of participants:

<table>
<thead>
<tr>
<th>Name</th>
<th>Kitongoji</th>
<th>Type of product traded</th>
<th>Age</th>
<th>Gender</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

REMINDER:

- All the information should be for each type of marine product traded (trade, sea cucumber, octopus, prawns/crabs) represented in the group and each SEASON or other time factor.

- We want information on all the people who are involved in the activity represented not only the participants.

- Categories:
  - **Age**: Young (up to 30 years old), Middle (31-50), Old (more than 50).
  - **Origin**: Village (from the village for a long time), Res. Immigrant (recently settled in the village), Local area (from the neighbouring villages), Outsiders (from outside the local area).

WRITE COMMENTS ON THE INTERVIEW AT THE BACK OF THIS SHEET.
<table>
<thead>
<tr>
<th>Traders numbers and characteristics per season per product represented in the group.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number:</strong></td>
</tr>
<tr>
<td>Gender (men, women)</td>
</tr>
<tr>
<td>Age (old, middle, young)</td>
</tr>
<tr>
<td>Origin (res. imm, outsider, village, local)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Timing/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the best times?</td>
</tr>
<tr>
<td>Where do they sell their products or to whom (e.g: local market, Mtwara market, street, houses, hotels…)?</td>
</tr>
<tr>
<td>Where do they buy product (e.g. direct to fishermen, to someone else, cooperative, bandari?)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Species:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main species sold (Local name) in order of importance (1 most and 5 least) according to time (month, season…relevant).</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>How:</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do they process the products?</td>
</tr>
<tr>
<td>How do they conserve the products?</td>
</tr>
<tr>
<td>How do they transport the products?</td>
</tr>
<tr>
<td>How are they organised (is there any association? Cooperatives…)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What has changed in the last ten years in (in relation to their activity):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount of people doing this?</td>
</tr>
<tr>
<td>Why?</td>
</tr>
<tr>
<td>Amount of fish sold per day/week? (more, less..indicative kgs)?</td>
</tr>
<tr>
<td>Size of fish (bigger, smaller)</td>
</tr>
<tr>
<td>Species (which more, which less)</td>
</tr>
<tr>
<td>How much do they buy? How much do they sell? How have the prices evolved?</td>
</tr>
<tr>
<td>Income (indicative profit, more, less than before?)</td>
</tr>
</tbody>
</table>

**Conflicts:** List of other groups (e.g.: other traders, mangrove cutters, Park authorities, Fisheries Division, Forestry Department, specific trader groups, nyavu fishers….) with which the user groups are in conflict and **REASON** for the conflict.
APPENDIX 5: EXAMPLES OF MAPS OF VILLAGE FISHING GROUND (DONE BY FOCUS GROUPS)

Map 1: Madimba fishing grounds (all gears)
Map 2: Mitambo fishing grounds (nets, handlines, traps)

Map 3: Litembe fishing grounds (nets)
Map 4: Litembe Fishing grounds (handlines)

Map 6: Tangazo fishing grounds (Beach seines and other nets)
Map 7: Kilambo fishing grounds (nets, traps, tidal weirs, handlines)

Map 8: Mkubiru fishing grounds (sea cucumber fishing)
Map 9: Mkubiru fishing grounds (handlines, traps)

Map 10: Mngoji fishing grounds (Nets, traps, tidal weirs, handlines)
Map 11: Msimbati fishing grounds ('tandilo')

Map 13: Msimbati fishing grounds (nets)
APPENDIX 6: QUESTIONNAIRE (SOCIO-ECONOMIC STATUS, HOUSEHOLD DEPENDENCE ON MARINE RESOURCES AND FISHING SYSTEM).

7. A. DODOSO (Kiswahili)

Namba ya Dodoso ........

Tarehe:...................... Jina la Msaili:.............................. Kijiji:..............
Kitongoji:......................

[UTANGULIZI]

SEHEMU A: Maswali ya Jumla (Kwa yeyote)

Jina la Mkuu wa Kaya:................................. 1. * Jinsi ya mkuu wa kaya?  Ke / Me

2. Kama Mkuu ni mwanamke : (a) Ameolewa Ndio (N)/ Hapana (H) au (b) ni Mjane N / H

(c). KIM (Kaya inayoongozwa na mwanamke)?  N/ H

3. Watu wangapi wanaishi kwenye kaya hii (wanaoshiriki kipato chao mfano fedha, chakula n.k.)?

4. Mkuu wa kaya ana umri gani? .......

NYUMBA: Mwabie Msailiwa akuonyeshe nyumba anayoishi (wanazoishi) yeye na kaya yake, tazama jedwali zifuatazo hapa chini, zungushia mdura kwenye alama sahihi kwa kulinganisha uonayo kwenye nyumba na jedwali

5. Kuta za Nyumba

<table>
<thead>
<tr>
<th>Ukuta</th>
<th>Alama (a)</th>
<th>Idadi ya Nyumba (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Makuti Dhaifu</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Makuti Imara</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Udongo Dhaifu</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Udongo Imara</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mawe/matofali kuchoma Sehemu Chache</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Mawe/matofali kuchoma Nyumba Nzima</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Matofali cement Sehemu Chache</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Matofali cement Nyumba Nzima</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Plasta/ Rangi Sehemu Chache</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Plasta/Rangi Nyumba Nzima</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

6. Paa la Nyumba

<table>
<thead>
<tr>
<th>Paa</th>
<th>Alama (a)</th>
<th>Idadi ya Nyumba (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hakuna Paa</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Nyasi Dhaifu</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Nyasi Imara</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Makuti Dhaifu</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Makuti Imara</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Mabati Dhaifu</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Mabati Imara</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

RASILIMALI MTAJI: (Tazama majedwali yaifuatayo hapo chini. Zungushia penye alama sahihi inayolingana na habari anazotoa msailiwa na kisha andika idadi ya wanyama aliyonayo msailiwa)
Watu wa kaya hii:

### 7. Wana mifugo?

<table>
<thead>
<tr>
<th>Wanyama</th>
<th>Alam (a)</th>
<th>Idadi (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hakuna</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Kuku/bata</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Mbuizi/kondoo</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Ngombe</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 8. Wana Usafiri binafsi?

<table>
<thead>
<tr>
<th>Usafiri</th>
<th>Alam (a)</th>
<th>Idadi (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hakuna</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Baiskeli</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Piki piki</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Gari</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

### 9. Wanapata Wapi

<table>
<thead>
<tr>
<th>Maji</th>
<th>Alam (a)</th>
<th>Idadi (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mto/kisima/Bomba la Bure la Umma</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Wananunua maji</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Wana Kisima binafsi</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Wana Bomba nje wao binafsi</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Wana Bomba ndani ya nyumba Wao Binafsi</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Wana tangi lao Binafsi la kuhifadhi maji Wana</td>
<td>5</td>
<td></td>
</tr>
</tbody>
</table>

### 10. Wanapata umeme?

### 11. Wanamiliki Shamba?

### 12. Wanamiliki Nyumba?

<table>
<thead>
<tr>
<th>Umeme</th>
<th>Alam (a)</th>
<th>Shamba</th>
<th>Ukubwa /Ek (b)</th>
<th>Nyumba</th>
<th>Alam (a)</th>
<th>Idadi (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hakuna</td>
<td>0</td>
<td>Hawanashamba/ hawanali mi</td>
<td>0</td>
<td>Wanakaa nyumba ya ndugu</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>1</td>
<td>Wanaazima shamba</td>
<td>1</td>
<td>Wanakodi nyumba</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Solar/Generator</td>
<td>2</td>
<td>Wanakodi shamba</td>
<td>2</td>
<td>Wanamiliki Nyumba</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wanamiliki shamba</td>
<td>3</td>
<td>Wana hati miliki</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Wana hati miliki</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**SEHEMU B: SHUGHULI ZA KUJIKIMU ZA KAYA**
13. Tafadhali orodhesha shughuli zote ambazo wana-kaya wanazifanya kwa ajili ya kujikimu na kwa faida zingine (kwa mwaka mzima). Andika kufuatana na umuhimu kwa kuweka namba 1 mpaka 7. Andika kwanza ile shughuli iliyo muhimu zaidi ikifuatiwa na zile ambazo zina umuhimu kidogo (Tazama Kielelezo namba 1 hapo chini)

Shughuli | Umuhimu wa shughuli kwa mahitaji ya kaya | Faida ni pesa | Faida ni Chakula
--- | --- | --- | ---

KIELELEZO NAMBA 1:
1 = Hii ni shughuli muhimu sana inayochangia karibu fedha au chakula zote zitumikazo ndani ya kaya
7 = Hii sio shughuli muhimu sana. Kipato chake kinachangia fedha au chakula kidogo tu kinachotumika ndani ya kaya

14. Je, Kaya hii, ina wafuatao:

<table>
<thead>
<tr>
<th>Wavuvi (samaki, majongoo, kamba, pweza)</th>
<th>Mama wanaotanda</th>
<th>Wachokoaji wa makome</th>
<th>Wakulima wa mwani</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wachuuzi wa makome</td>
<td>Mama wachuuzi (dagaa, samaki, kamba, pweza)</td>
<td>Wanaume wachuuzi wa samaki, kamba, pweza</td>
<td>Wachuuzi wa majongoo</td>
</tr>
</tbody>
</table>

Kama wapo wavuvi andelea na maswali (kama hawapo, maliza dodoso).

SEHEMU C: Habari za wavuvi

15. (a) Wavuvi wa kaya hii, wana shughuli zingine pia? N / H (b) Kama ndio, ni shughuli gani? 

16 (a). Wavuvi hawa wanatumia chombo? N / H (kama Hapana andelea swali 17)
(b). Kama Ndio:

<table>
<thead>
<tr>
<th>Wana tumia chombo cha tajiri</th>
<th>Chombo cha ina gani</th>
<th>Viombo vingapi</th>
<th>ngapi kwenye ingini - (iv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wana tumia chombo cha tajiri</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wanakodisha</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wanamiliki pamoja na weniwe</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wanamiliki yao peke yao</td>
<td>4</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
17. Ni mitego gani ambayo wavuvi katika kaya hii hutumia?

<table>
<thead>
<tr>
<th>No</th>
<th>Mitego (a)</th>
<th>Idadi (wavuvi ya kaya) (b)</th>
<th>Wanakodish a Idadi (i)</th>
<th>Namiliki Pamoja wenziwe (ii)</th>
<th>Wanamiliki iki yao Peke yaa (iii)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kuchokea majongoo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Mkuki</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Bunduki</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Mshipi</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Madema</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Wando</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Nyavu &gt;= 3”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Nyavu inch 2” - 2.5”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Nyavu inch 1.5”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Nyavu inch 1”</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Juya</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Kokoro</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Tandilo</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Zulmati</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. Tafadhali elezea mfumo wa wavuvi wa wana-kaya.
   (a) Kuna siku au wiki au mwezi yeyote wavuvi hawaendi kuvua? N / H
   (b) Kama Ndio ni:
      i. Ni siku ngapi katika wiki ambayo hawaendi kuvua (kila wiki)? ......kwa nini?.................
      ii. Ni wiki au siku yeyote ngapi katika mwezi ambayo Hawavui (kila mwezi)?
          Siku/wiki............................. Kwa nini:......................................................
      iii. Ni mwezi au miezi gani katika ya mwaka Hawavui (kila mwaka)?..........Kwa nini?.....

19. Hiki wakiletacho wavuvi hawa kinatosheleza mahitaji ya kaya?

| Kinatosheleza mahitaji ya pesa ya kaya na ziada inabaki | 1 |
| Kinatosheleza mahitaji ya pesa ya kila siku | 2 |
| Ni pesa kidogo zinazoletwa na hazitoshelezi lakini kinatosheleza mahitaji ya kaya ya samaki | 3 |
| Hazitoshelezi mahitaji ya pesa au mahitaji ya samaki ya kaya | 4 |
20: wavuvi au mvuvi wa kaya hii analeta/wanaleta pesa ngapi :

<table>
<thead>
<tr>
<th>Ngapi</th>
<th>Alama (a)</th>
<th>(b). Kwa muda/msimu gani? (wiki?mwezi/?bamvua? Kusi, kaskazi, matalai....). Andika msimu.</th>
<th>(c). kwa mvuvi/wavuvi ngapi? (mmoja, wote?)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chini ya 5000</td>
<td>1</td>
<td>1.......................... 2............. 3............</td>
<td></td>
</tr>
<tr>
<td>5000-10000</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10000-15000</td>
<td>3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15000-20000</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20 000-30000</td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>30 000-50000</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>50000-100000</td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>150 000 - 200000</td>
<td>8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>200 000-300 000</td>
<td>9</td>
<td></td>
<td></td>
</tr>
<tr>
<td>400 000-500 000</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>&gt;500 000</td>
<td>11</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

21. (a) Shughuli muhimu nyingine ya kaya ni ipi?…………………………………………

(b) Fedha kutokana na uvuvi ni :

<table>
<thead>
<tr>
<th></th>
<th>alama</th>
</tr>
</thead>
<tbody>
<tr>
<td>Zaidi kuliko shughuli hii nyingine</td>
<td>1</td>
</tr>
<tr>
<td>Kiasi sawa kuliko shughuli hii nyingine</td>
<td>2</td>
</tr>
<tr>
<td>Kidogo kuliko shughuli hii nyingine</td>
<td>3</td>
</tr>
</tbody>
</table>

7. B. QUESTIONNAIRE (English translation)

Questionnaire Number ...........

Date:....................... Name of interviewer:...................... Village:.............
Quarter:.................

SECTION A: Household characteristics

Name of Household Head (HH) :............................... 1. * Gender of HH?  F / M
2. If HH is a woman is she : (a) married Y / N or (b) spinster Y / N
(c). Widow?  Y/ N
3. How many people belong to this household (share food and income)?

4. How old is the HH? ……

**HOUSE MATERIAL:** Observe the houses/ ask the person to show you the houses which belong to her/his households (circle the appropriate score and write the number of houses)

<table>
<thead>
<tr>
<th>Walls</th>
<th>Score (a)</th>
<th>Number houses (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thatch bad condition (b)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Thatch good condition (g)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Mud (b)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Mud (g)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Stone/ Mud bricks</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Stone/mud bricks whole house</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>Cement blocks Part house</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>Cement blocks Whole house</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Plaster/ Paint Part house</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>Plaster/ Paint Whole house</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Roof</th>
<th>Score (a)</th>
<th>N house (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>No roof</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Grass (b)</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Grass (g)</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Thatch (b)</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Thatch (g)</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Tin (b)</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>Tin (g)</td>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

**ASSETS/CAPITAL:** (circle appropriate score and write numbers for livestock)

In this household, do people:

<table>
<thead>
<tr>
<th>Livestock</th>
<th>Score (a)</th>
<th>Number (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Chicken/duck</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Goat/sheep</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cows</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Transport</th>
<th>Score</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Bicycle</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Motorbike</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Car</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Water</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>River/Well/Pump, free access</td>
<td>0</td>
</tr>
<tr>
<td>Buy water</td>
<td>1</td>
</tr>
<tr>
<td>Own private well</td>
<td>2</td>
</tr>
<tr>
<td>Have their own tap outside</td>
<td>3</td>
</tr>
<tr>
<td>Have their own tap in the house</td>
<td>4</td>
</tr>
<tr>
<td>Have a water tank</td>
<td>5</td>
</tr>
</tbody>
</table>
10. Do they get power?  
11. Do they own farmland?  
12. Do they own their house?

<table>
<thead>
<tr>
<th>Power</th>
<th>Score</th>
<th>Farm land</th>
<th>Score (a)</th>
<th>Acre (b)</th>
<th>House</th>
<th>Score (a)</th>
<th>N (b)</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>0</td>
<td>Don’t farm</td>
<td>0</td>
<td></td>
<td>Borrow house</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Battery</td>
<td>1</td>
<td>Borrow land</td>
<td>1</td>
<td></td>
<td>Rent house</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Solar/Generator</td>
<td>2</td>
<td>Rent land</td>
<td>2</td>
<td></td>
<td>Own house</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Own land</td>
<td>3</td>
<td></td>
<td>Have title deed</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Have title deed</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

SECTION B: HOUSEHOLD ACTIVITIES

13. Please list then rank all activities of the households according to their importance (income and subsistence - tick where appropriate). The list of activities relate to the whole year (full time or seasonal activities)

<table>
<thead>
<tr>
<th>Activities</th>
<th>Importance of the activity for the household’s livelihood</th>
<th>Done for income</th>
<th>Done for subsistence</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

RANKING:
1 = This represents the most important activity, the one which brings most food or income to the household; 7 = This represents the least important activity in terms of food or income for the household.
14. Do any of the household members carry out the following activity (for each ask how many?)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fishers (fish, sea cucumber, lobster, octopus etc.)</td>
<td></td>
</tr>
<tr>
<td>‘Tandilo’ fisherwomen</td>
<td></td>
</tr>
<tr>
<td>Shell fishers</td>
<td></td>
</tr>
<tr>
<td>Sea weed farmers</td>
<td></td>
</tr>
<tr>
<td>Shell traders</td>
<td></td>
</tr>
<tr>
<td>Woman trader (all marine products)</td>
<td></td>
</tr>
<tr>
<td>Man trader (fish, prawns/lobster, octopus)</td>
<td></td>
</tr>
<tr>
<td>Sea cucumber trader</td>
<td></td>
</tr>
</tbody>
</table>

It some of the household members are fishers, carry on. If none are, the questionnaire finishes here.

SECTION C: FISHING SYSTEMS

15. (a) Do fishers in this household carry out other activities?  Y / N
    (b) If yes, what other activity do they have?  

16  (a). Do these fishers use boats?  Y/ N  (if not, go to: 17)
    (b). If Yes:

<table>
<thead>
<tr>
<th>Use of Boat</th>
<th>Score (i)</th>
<th>Boat type (ii)</th>
<th>How many (iii)</th>
<th>How many with engine (iv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>They use ‘tajiri’ boats</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They rent boats</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They own the boat with other fishers</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>They own the boat individually</td>
<td>4</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

17. Which gears do this household’s fishers use?

<table>
<thead>
<tr>
<th>No</th>
<th>Gear / Method (a)</th>
<th>Number (Household fishers) (b)</th>
<th>Rent Number (i)</th>
<th>Part owned (ii)</th>
<th>Individual owned (iii)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Diving for sea cucumber</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Spear</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Spear gun</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Hand line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Basket trap</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Tidal weir</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Net &gt;= 3&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Net 2&quot; - 2.5&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Net 1.5&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Net 1&quot;</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Ring net</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Beach seine</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>‘Tandilo’</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Long line</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
18. Please ask about this household's fishers' schedule.

(a) Are there any days, weeks or months that fishers of this household do not fish?

Y / N

(b) If Yes:

i. Which days of the week do they NOT go to sea? Why?

ii. Which/ how many days or weeks per month do they NOT go to sea? Why?

iii. How many and which months do they NOT go to sea? Why?

19. Are the income and subsistence derived from fishing enough to fulfil the household's needs?

<table>
<thead>
<tr>
<th>Income from fishing is more than sufficient for the household and provides a surplus</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Income from fishing is just enough for the household needs</td>
<td>2</td>
</tr>
<tr>
<td>Income from fishing is not sufficient but the fish brought back home fulfils the</td>
<td>3</td>
</tr>
<tr>
<td>household's fish needs</td>
<td></td>
</tr>
<tr>
<td>Income from fishing and fish brought back do not fulfil the household needs</td>
<td>4</td>
</tr>
</tbody>
</table>

20: How much money do the fishers/fisher of this household bring

<table>
<thead>
<tr>
<th>Tsh</th>
<th>Score (a)</th>
<th>(b). per day/week/month (specify)?</th>
<th>(c). this income for how many fishers?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5000</td>
<td>1</td>
<td>1..........................</td>
<td></td>
</tr>
<tr>
<td>5000-10000</td>
<td>2</td>
<td>2..........................</td>
<td></td>
</tr>
<tr>
<td>10000-15000</td>
<td>3</td>
<td>3..........................</td>
<td></td>
</tr>
<tr>
<td>15000-20000</td>
<td>4</td>
<td>4..........................</td>
<td></td>
</tr>
<tr>
<td>20 000-30000</td>
<td>5</td>
<td>5..........................</td>
<td></td>
</tr>
<tr>
<td>30 000-50000</td>
<td>6</td>
<td>6..........................</td>
<td></td>
</tr>
<tr>
<td>50000-100 000</td>
<td>7</td>
<td>7..........................</td>
<td></td>
</tr>
<tr>
<td>150 000 - 200000</td>
<td>8</td>
<td>8..........................</td>
<td></td>
</tr>
<tr>
<td>200 000-300 000</td>
<td>9</td>
<td>9..........................</td>
<td></td>
</tr>
<tr>
<td>400 000-500 000</td>
<td>10</td>
<td>10........................</td>
<td></td>
</tr>
<tr>
<td>&gt;500 000</td>
<td>11</td>
<td>11........................</td>
<td></td>
</tr>
</tbody>
</table>

21. (a) Which activity do you consider the most important for this household?  

(b) The income from fishing is:

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Higher than the income derived from activity (a)</td>
</tr>
<tr>
<td>Similar</td>
</tr>
<tr>
<td>Lower</td>
</tr>
</tbody>
</table>
APPENDIX 7: LIST OF LIVELIHOOD ACTIVITIES (HOUSEHOLD SURVEY)

1. Fishing
2. Farming (cash and subsistence mainly rice, cassava, millet, fruit, peas, coconuts, sorghum…)
3. Trading agricultural products
4. Trading coconuts
5. Wine tapping and selling
6. Animal husbandry (chicken, goats, sheep, cows),
7. Trading fish (fresh, dried, octopus, prawns)
8. Trading sea cucumber
9. Trading shells (ornamental)
10. Trading shells (food)
11. Shell fishing (food)
12. Netenders
13. Boat builders
14. Charcoal making and trading
15. Hunting
16. Wood trading
17. Wood cutting
18. Carving
19. Weaving mats
20. Weaving thatch
21. Trading thatch
22. Small businesses (prepared foods, cigarettes, tobacco, paraffin, hoteli)
23. Hair dresser
24. Laundry (wash laundry and ironing)
25. Tailor
26. Black smith
27. Carpenters
28. Masons
29. Potter
30. Brick making
31. Builders
32. Bicycle menders
33. Transport provider
34. Water transport and selling
35. Trading clothes
36. Trading general goods (mobile)
37. Shop owner
38. Kiosk owner
39. Casuals (farm labour, coconut cutter, salt pans)
40. Salt pan owner
41. Religious leader
42. Employed government (teachers, nurses, police)
43. Employed in private sector (guards)
44. Traditional Doctors
45. Drummers
46. Dancers
47. Musicians
48. Circumciser
49. Stone crushing
50. Village representatives
APPENDIX 8: TRAINING NOTES ON THE HOUSEHOLD SURVEY

8.A. HOUSEHOLD SURVEY- TRAINING ON THE QUESTIONNAIRE.

1. Introduction (15 mn)

This study is carried out by the Park authority to understand better the livelihood of the people living in the Park area, this is to help the Park develop opportunities which are adapted. We will carry out this household survey in 5 villages.

The training will have 4 components:

- Basics on courtesy, presentation and asking questions
- Understanding the questionnaire and how to fill it
- What to do when a problem arises
- Logistics

2. Courtesy, presentation and asking questions (20 mn)

- The interview needs to introduce himself/herself and explain what he is going to do.
- The interviewer will want to talk to the head of the households or to someone who knows very well what happens in the household. (no children, active adults)
- The purpose of this survey is to understand better how people in the park are doing. This will help the park understand better the people who live there and this will help to develop activities and opportunities and rules which are more suited to the situation of the people…..
- The survey will take no more than 20 mn, there will be no remuneration (this needs to be made clear, as this is to help the park help the communities better).
- We will talk about the situation of the households and we have set questions.
- The interviewer has to speak CLEARLY, POLITELY, LISTEN to the answers.
- The interviewer will be dressed appropriately.

Other advice when role playing is done....

3. Understanding and learning to fill the questionnaire (1 hour)

- We read the questionnaire together.
- Each question we stop and say what is the aim of the question, how it is expected to be filled
- We fill the questionnaire together (1 asks the questions and the other one fills the questionnaire)
- (when listing the activities, if trading comes up, we want to know what type of trading, what type of business etc)

Questions and exercises....

4. What do we do when a problem arises? (1/2 hour)

- What kind of problem can arise. Ask the question?. Then we look together for solution.
• If there is no one who can answer the questionnaire in the household where the interviewer is, the interviewers should come back later if they stay in the area. If no one again, then they should interview the next household. This should be noted.
• However: Planning needs to be done. And CHOOSING the right time is sometimes essential. For example: when the interviewers know that there are fishermen in a household, the interviewers should choose a time when they know the fishermen are back to do the interview. Ask a few people if the fishing times are not known. It is better if a fisher answers when fishing concerned. In the meantime interview households who are not fishing.
• If people are in the fields and you know where they are, go there if the fields are not far.  

➤ To avoid problems like this, the interviewer needs to have a strategy, according to the areas where the households are located. Interviewers need to share the work.
• If people refuse to answer the questions: the interviewers is to try and convince them (we will discuss what they can say in the trainint)… if the refusal is very strong, then he/she should go to the next household.
• If the interviewer thinks that the person is lying, then he should note it on the questionnaire and why he/she thinks so.

5. Logistics (1/2 hour)

• A list of households to interview will be distributed at the end of the training session, the interviewers can then plan how they are going to share the work.
• Every interviewer will have to interview 45 households
• We expect the work to be finished in 5 days.
• The interviewers will test the questionnaire on 5 people this afternoon/tomorrow and we will come and discuss with them the results, how they have filled the questionnaires, what problems they have encountered.
• Questionnaires will be distributed during the week end
• The survey will start on Monday.
• They will start on their own and we will meet them during the day to make sure that everything is all right, that they do not have problems, that we are satisfied with the way things are going.
• They will be paid at the end of the work and amount of 20000 Tsh.
• When we visit we will collect the questionnaires that have been filled. We need to arrange meetings.

8.B. Notes on data entry of household survey

**POINTS TO REMEMBER FOR THE DATA ENTRY**

**ENTERING THE DATA**

For each of the groups carried out 3 files need to be filled:
• Group participants sheet
• Fishing or Shell collecting or Trading or Seaweed Farming data (following the templates)
• Conflicts (traders, fishers, seaweed farmer, shell collector) sheets
FILLING THE SHEETS AND SAVING THE DATA

- The name of the data file should include: General activity, village, specific activity.
  
  **Save as**  
  E.g.: - *Fishing Kilambo Kokoro*  
  - *Trading Kilambo dried fish*

- The name of the group participant sheet you fill in should include your name. For example the file should be **Save as:** *Group participants Jen* or *Group participants Samson*

- Remember to fill in the village name, researcher name, Group title and date at the beginning of EACH table.
  
  -→ **Group title** refers to the Detailed activity.
  
  E.g. Nyavu, dried fish trading, fresh fish trading, fishing madema/mshipi/wando etc.

QUALITY CONTROL

- Check that the forms are well filled in by the researchers at the end of each day's fieldwork. It might be better if they take their notes home so that they can add things and read their notes carefully before handing them over.

- Check that all the data included in the form has been entered. It might be worth ticking each column with a red pen when the data has been entered.

- Don't forget to check BOTH sides of the forms as some researchers will have written complementary information on the other sides.

- For the maps, tick each fishing ground with a pencil (this mark will be erased when the maps will be scanned) so as not to forget some of the information.

- When points need to be clarified, ask the researcher to clarify. If he/she cannot, please write it in the comments.
## APPENDIX 9: PRELIMINARY FISH LIST

<table>
<thead>
<tr>
<th>Swahili/Makonde</th>
<th>Common name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agamu/Mayonga</td>
<td>Barracuda</td>
</tr>
<tr>
<td>Bocho</td>
<td>Blue spotted sting ray</td>
</tr>
<tr>
<td>Busara</td>
<td></td>
</tr>
<tr>
<td>Chaa</td>
<td>Pursemouth</td>
</tr>
<tr>
<td>Chamchozi/Kangaja</td>
<td>Surgeon</td>
</tr>
<tr>
<td>Changu/Shairi</td>
<td>Emperor</td>
</tr>
<tr>
<td>Chewa</td>
<td>Grouper</td>
</tr>
<tr>
<td>Dam Dam</td>
<td>Tuna</td>
</tr>
<tr>
<td>Doda (juvenile)/Mkizi/Mlimba</td>
<td>Mullet</td>
</tr>
<tr>
<td>Fimanyo</td>
<td></td>
</tr>
<tr>
<td>Johari</td>
<td>Tuna</td>
</tr>
<tr>
<td>Jolwe/Kolekole</td>
<td>Jack</td>
</tr>
<tr>
<td>Kambare</td>
<td>Catfish</td>
</tr>
<tr>
<td>Kelela</td>
<td>Snapper</td>
</tr>
<tr>
<td>Kibangi bangi</td>
<td>Butterfly fish?</td>
</tr>
<tr>
<td>Kilyelye</td>
<td>Anchovy</td>
</tr>
<tr>
<td>Kitapwi/chewa</td>
<td>Grouper</td>
</tr>
<tr>
<td>Kole Kole/Jolwe</td>
<td>Jack</td>
</tr>
<tr>
<td>Kungu</td>
<td>Red snapper</td>
</tr>
<tr>
<td>Lendekaya</td>
<td>Tiger shark</td>
</tr>
<tr>
<td>Likunguviku/ Makunguwiku</td>
<td>Tilapia</td>
</tr>
<tr>
<td>Litoria</td>
<td></td>
</tr>
<tr>
<td>Lukiwu</td>
<td></td>
</tr>
<tr>
<td>Lukumbu/Lukwimbu</td>
<td>Anchovy</td>
</tr>
<tr>
<td>Lupapa</td>
<td>Sardine</td>
</tr>
<tr>
<td>Machena</td>
<td>Sea bream</td>
</tr>
<tr>
<td>Makunguwiku/ Likunguviku</td>
<td>Tilapia</td>
</tr>
<tr>
<td>Mangona</td>
<td></td>
</tr>
<tr>
<td>Matiko</td>
<td>Milkfish</td>
</tr>
<tr>
<td>Mayonga/Agamu</td>
<td>Barracuda</td>
</tr>
<tr>
<td>Mchozi/Namichori</td>
<td>Tiger tooth cronker</td>
</tr>
<tr>
<td>Mchwichwi/Mkundaji</td>
<td>Goat fish</td>
</tr>
<tr>
<td>Mgolokolo</td>
<td>Synodontis</td>
</tr>
<tr>
<td>Mikiti</td>
<td>Crab</td>
</tr>
<tr>
<td>Mkizi/Mlimba</td>
<td>Mullet</td>
</tr>
<tr>
<td>Mkundaji/ Mchwichwi</td>
<td>Goat fish</td>
</tr>
<tr>
<td>Mkupi</td>
<td>Silver silago</td>
</tr>
<tr>
<td>Mkwalu</td>
<td>Tilapia (juvenile)</td>
</tr>
<tr>
<td>Mluvuma</td>
<td>Snapper</td>
</tr>
<tr>
<td>Mnendele</td>
<td>Wolf-herring</td>
</tr>
<tr>
<td>Msone/Mchone</td>
<td>Sweet lips</td>
</tr>
<tr>
<td>Mzira</td>
<td>Needle fish</td>
</tr>
<tr>
<td>Nalwayo/Nariwayo</td>
<td>White sardinella</td>
</tr>
<tr>
<td>Namamba</td>
<td>Round herring</td>
</tr>
<tr>
<td>Namichori/Mchozi</td>
<td>Cronker</td>
</tr>
<tr>
<td>Ngalange</td>
<td>Half beak</td>
</tr>
<tr>
<td>Ngalawala/changu doa</td>
<td>Thumb print Enperor</td>
</tr>
<tr>
<td>Ngamba/Kamba</td>
<td>Lobsters/Prawns</td>
</tr>
<tr>
<td>Nguru</td>
<td>King fish</td>
</tr>
<tr>
<td>Nile</td>
<td>Squirrel fish</td>
</tr>
<tr>
<td>Fish</td>
<td>Description</td>
</tr>
<tr>
<td>--------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Ntuvituvi</td>
<td>Catfish</td>
</tr>
<tr>
<td>Nyumdo</td>
<td>Catfish</td>
</tr>
<tr>
<td>Osala/Chaa</td>
<td>Silver biddy/Purse mouth</td>
</tr>
<tr>
<td>Pandupandu</td>
<td>Queen fish</td>
</tr>
<tr>
<td>Pengusi (papa)</td>
<td>Hammerhead shark</td>
</tr>
<tr>
<td>Pono</td>
<td>Parrot fish</td>
</tr>
<tr>
<td>Roba</td>
<td>Small tooth emperor</td>
</tr>
<tr>
<td>Sala/Chaa</td>
<td>Purse mouth</td>
</tr>
<tr>
<td>Sapesape</td>
<td>Leather back</td>
</tr>
<tr>
<td>Senda</td>
<td></td>
</tr>
<tr>
<td>Shairi/Changu</td>
<td>Emperor</td>
</tr>
<tr>
<td>Sim Sim</td>
<td>Sardine</td>
</tr>
<tr>
<td>Songole</td>
<td>Cobia</td>
</tr>
<tr>
<td>Taa</td>
<td>Sting ray</td>
</tr>
<tr>
<td>Tasi</td>
<td>Rabbit fish</td>
</tr>
<tr>
<td>Too</td>
<td>Grunter</td>
</tr>
<tr>
<td>Tundu</td>
<td>Tiger fish</td>
</tr>
<tr>
<td>Vibua</td>
<td>Mackerel</td>
</tr>
<tr>
<td>Vibua ngosi</td>
<td>Scad</td>
</tr>
<tr>
<td>Vibunda</td>
<td>Grunter</td>
</tr>
<tr>
<td>Vilima</td>
<td>Herrings</td>
</tr>
</tbody>
</table>