FMSP Project R8196: Understanding Fisheries Associated Livelihoods and the Constraints to their Development in Kenya and Tanzania

Annex 1.1: Understanding Fisheries Livelihoods and Constraints to their Development, Kenya & Tanzania

Review Of Marine Fisheries for Tanzania

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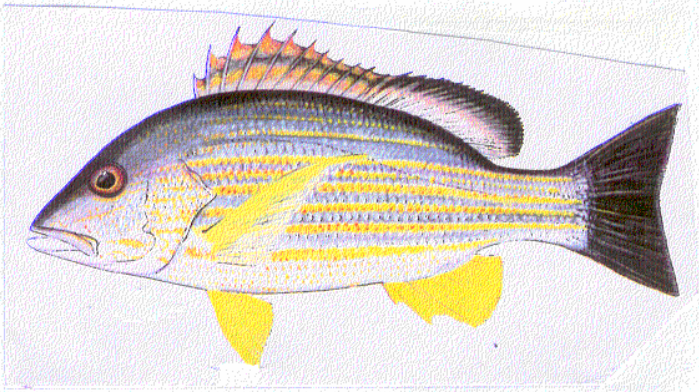

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1 Introduction

Tanzania is one of the greatest fisheries nations in Africa, ranking in the top 10 countries in Africa in terms of total capture fisheries production (FishStat, FAO). The country has an average annual fish landing of over 300,000 tons and an estimated production potential of 730,000 tons (Sawan Tanzania 2002; MNR&T/JICA 2002). The fisheries resource contributes 2.9% of the country's GDP (Planning Commission 2000). Fisheries products, mainly Nile Perch fillets, shellfish (shrimps and lobsters) and crabs, are important export products of Tanzania, bringing in 10% of the nations foreign exchange earnings each year. As of 2001 to the present Tanzania is a net exporter of fish products.

The Tanzania coast is home to a quarter of the country's population, contains 75 percent of the industries and includes Dar Es Salaam as the country's largest urban center. The 13 coastal districts on the mainland are, from north to south, Muheza, Tanga, Pangani, Bagamoyo, Kinondoni, Ilala, Temeke, Mkuranga, Rufiji, Mafia, Kilwa, Lindi and Mtwara (Figure 1). In most of the coastal districts, farming and fishing are the primary means of subsistence for the livelihoods of the poor communities. The marine fisheries directly employ about 19,000 full-time fishers according to the 2001 frame survey (Fisheries Division 2001b). Thus a stable supply of fish is considered important in the battle against poverty.

However, marine fisheries resources are under increasing pressure reflected by alarming declining catches in the areas frequented by the artisanal fishers due to population increase, habitat destruction, overexploitation, loss of biodiversity (Semesi et al. 1998) and other factors such as destructive fishing practices and pollution. The insufficient socio-economic data makes it difficult to determine what the effects of overexploitation of the resources are on those communities that depend on them. However, it is known that fishing comprises an important livelihood activity for large numbers of coastal people.


1
MUHEZA
2
TANGA
PEMBA
3
PANGANI
ZANZIBAR
INDIAN OCEAN
4
BAGAMOYO
DAR ES SALAAM
(KINONDONI, ILALA & TEMEKE)
{8, 9 10}
MKURANGA
5
7
6
MAFIA
RUFIJI
11
KILWA
12
LINDI
MTWARA
13
MOZAMBIQUE
4.5°
6.0°
7.0°
8.0°
10°
11°
38°
40°

1.1 Aims and objective of the review

The review is intended to provide a clear picture of the marine fisheries resource of mainland Tanzania through compiling existing bio-physical, fisheries and socio-economic data regarding:

- The biophysical characteristics of the fisheries;
- The quantity, status, trends and threats to the fisheries resources;
- The categories and numbers of stakeholders dependent on the fisheries for their livelihoods, their assets, and access to capital;
- The institutional arrangement, laws and policies governing the use of the fisheries resources.

The review also identifies the main information gaps, and provides information for the selection of the study site for the problem census workshop in Tanzania.

The rapidly increasing population growth, destruction of habitats and resultant loss of biodiversity in coastal areas exemplifies the need to for additional studies to provide the information needed for coastal management (Semesi et al., 1998)

This review therefore provides a general overview of the situation with regards to the role of fisheries in the livelihoods of the poor in coastal communities in Tanzania, and identifies certain key issues, constraints and opportunities for livelihood improvement. In addition to this overview, the project to which this review contributes has undertaken field studies to gather further information and verify some of these findings. A synthesis of the comparative analysis of this review and the fieldwork studies will draw conclusions on the potential for improved fisheries-based livelihoods in Tanzania.

1.2 Methodology

The main approach was to access literature on the marine resources in Tanzania from various sources including downloading from the Internet. Visits were made to various institutions or organizations involved in marine fisheries to undertake literature searches in their libraries, and hold discussions with relevant contributors. The institutions visited include: the Department of Fisheries in the Ministry of Natural Resources and Tourism; the National Environment Management Council; the Tanzania Fisheries Research Institute; the Tanzania Coastal Management Partnership; the Department of Zoology and Marine Sciences of the University of Dar es Salaam; and Mbegani Fisheries Training Institute.

The review team comprised of: Dr. Francis Shao, coordinator and Team Leader; Mr. Erasto E. Mlay, Senior Consultant FANRM Research Consultants; and Mrs. Valeria Mushi, Associate Consultant from the Fisheries Division Ministry of Natural Resources and Tourism.

2 The marine fisheries resource of mainland Tanzania

2.1 Marine biophysical resources, climate and currents

The low-lying coastal zone is narrow except around the Rufiji Delta where the river enters the sea through many deltas, causing extensive sedimentation. The zone rises in a series of short but wide steps forming the central plateau that is characterised by miombo woodlands and dry savannah grasslands. The highlands are the main sources of rivers flowing eastwards into the Indian Ocean. Climate in Tanzania is divided into coastal, central plateau, lake, and southern and northern highlands.

2.1.1 Coastal habitats

The coastal zone contains a wealth of coastal and marine habitats that include the ocean, coastal and mangrove forests, coral reefs, sea grass beds, inter-tidal areas, estuaries, coastal plains and sandy beaches. These habitats support various resources both living and non-living. Figure 2 shows the distribution of the most important resources that influence the performance of the marine fisheries and are utilized by the coastal communities for their livelihoods.

The rich coastal habitats sustain a diverse array of plant and animal life, which provide important sources of protein, building materials, source of energy and tourism potential. The use and potential of these habitats are discussed below.


MUHEZA
TANGA
PEMBA
Pangani River & Estuary
PANGANI
Zanzibar
Wami River & Estuary
Sadani Game Reserve
BAGAMOYO
Ruvu River & Estuary
DAR ES SALAAM
MKURANGA
MAFIA
Rufiji River
RUFIJI
Mafia Island Marine Park
Songo Songo Archipelago
KILWA
Selous Game Reserve
Matandu River
LINDI
Lukuled River
Mnazi Bay Marine Park
MTWARA
Ruvuma River
4.5°
6°
7°
8°
10°
11°
38°
40°

2.1.1.1 Coastal Waters

The Tanzania 800 km coastline (mainland) forms part of the Western Indian Ocean with a coastal zone of approximately 30,000 sq. km. Its continental shelf extends 4 – 35 km offshore, adding a further 17,500 sq. km. The Exclusive Economic Zone for Tanzania covers an estimated 223,000 Sq. km (Guard et al. 2002; MNR&T/JICA 2002).

The coastal waters have many uses. Almost the entire fisheries industry of the Tanzania coast is based within the inshore waters. The waters are also important for recreation activities, tourism development, aquaculture, have reserves of gas and gemstones and give access to international shipping routes.

2.1.1.2 Rivers

A number of major and minor river entrances indent the Tanzania shoreline. Permanent rivers draining into the Indian Ocean and forming extensive estuaries and deltas include, from north to south, the Pangani, Wami, Ruvu, Rufiji, Matandu, Mbwemkuru and Ruvuma Rivers (Fig. 2). The Rufiji River is the largest, and enters the sea through many deltas, causing extensive sedimentation, mainly sand and debris from the eroded lands in the hinterland, forming an exceptionally unique habitat of its kind on the Tanzanian coast. There are also a large number of smaller and seasonal rivers that empty into the Indian Ocean, forming important marine habitats and drainage systems. In addition, these seasonal rivers influence the seashore erosion and sedimentation processes.

The water flow and floods bring a lot of fresh organic materials needed for many fish species. The muddy deposits and mangrove forests at the river mouths are excellent breeding grounds for various species of fish including prawns. The richness of these species in the Rufiji Delta and other river estuaries along the coast are good examples. Fishing for crabs is an important activity in the Pangani river mangrove. It was estimate that the potential catch of the large mangrove crab, *Scylla serrata*, locally known as “magegereka” or “kaa ungo” was about 5-10 tones wet wt./month. The price for the crab in 1989 was 75 Tshs/kg and demand in foreign markets is high (Semesi 1991).

Many coastal communities live near river estuaries and some fishing activities take place in the river waters, providing protein for these communities. Surplus may be sold to non-fishers for income. Beside the river flood plains are used for farming, particularly during the end of the heavy floods.

Transport across and along the rivers through boats is a potential means of transportation to reach near-by towns and villages for supply of fish and agricultural produce to markets. However this means still requires development.

2.1.1.3 Mangroves

Coastal communities use mangroves to supply local needs for fuel wood, charcoal making, fences, house construction, boat building, fish traps, fishing stakes and medicines. Associated with mangroves are lagoons and estuaries, which are important habitats for aquatic organisms. The mangrove ecosystem is rich in molluscs, several species of which are gathered by local women and form an important source of protein in the diet of villagers. Commercial fisheries of crabs and prawns as well as fish are directly dependent on the mangrove ecosystems. Due to large mangrove areas, the Rufiji Delta is the most important prawn fishing grounds in Tanzania, from which about 80 % of the total commercial prawn catch is obtained (Annual Fisheries Statistics Repots

1993, 1994, 1995 & 1996; Semesi 2000). Mangroves also provide breeding grounds for various other types of open sea fish types moving into these areas for food, shelter and cooler temperatures. Other potential uses of the mangrove ecosystem of relevance to fisheries, but not yet fully exploited include aquaculture, prawns and algae

In Tanzania, mangroves occur along the coast from the border with Kenya in the north to that of Mozambique in the south and around the islands off the coast (Figure 2). According to the 1989 inventory (Semesi 1991) the mangroves of mainland Tanzania cover a total area about 115,500 ha. The largest area of mangrove is found in the Rufiji delta. Other key mangrove areas are found at Tanga, Kilwa and the estuaries of Ruvu, Wami (Bagamoyo), Pangani and Ruvuma (Mtwara) rivers. Table 1 gives the distribution of mangroves areas in the different districts and regions in mainland Tanzania (Semesi 1991). Eight common species of mangroves occur in mainland Tanzania, either in pure stands or in mixtures. These are presented on Table 2 with the species composition and area occupied by each group of species indicated. (Semesi 1991a, b).

Table 1: Mangrove areas in the different Administrative blocks in mainland Tanzania

Block	District/Region	Forested Area (ha)	Non-Forested Areas (creeks, salt pans, bare saline areas (ha)
1.	Tanga and Muheza D.	9,403	3,528
2.	Pangani D.	1,756	1,279
3.	Bagamoyo D.	5,636	3,548
4.	Dar es Salaam R.	2,168	1,045
5.	Kisarawe D.	3,858	2,193
6.	Mafia D	3,473	0,892
7.	Rufiji D.	53,255	14,357
8.	Kilwa D.	22,429	14,308
9.	Lindi D.	4,547	2,754
10.	Mtwara D	8,942	4,408
	TOTAL	115,467	48,312

(D=District, R= Region)

Table 2: The Species Composition and Area Occupied by Mangrove Trees in Mainland Tanzania

Classification	Area (ha)	% of the total area
Rhizophora dominant, with *Avicennia, Ceriops*, *Sonneratia, Bruguiera, Heritiera* and/or *Xylocarpus*.	55,549.9	49
Sonneratia – almost pure stands.	1,223.3	1
Sonneratia dominant, with *Avicennia, Bruguiera* and/or *Rhizophora*	6,123.2	5
Heritiera – almost pure stands	91.2	0
Heritiera dominant, with *Avicennia, Bruguiera*, and/or *Rhizophora*	8,188.4	7
Avicennia dominant, with *Rhizophora, Bruguiera*, *Heritiera*, *Ceriops* and *Xylocarpus*	17,141.6	15
Avicennia – almost pure stands	1,687.4	1

Mixtures of *Avicennia* and *Ceriops* *Ceriops* dominant, with *Rhizophora, Avicennia* and/or *bruguiera*	17,432.7 8,037.9	15 7
Total Mangrove	115,475.6	100
Water in Creeks	24,076.0	
Clear – cut areas	4,435.0	
Bare, Saline Areas	20,740.0	
Salt Pans	3,093.0	
Non – Mangrove Forest inside the reserve	5,069.3	
Total Reserve area	172,888.9	

2.1.1.4 Coastal Forests

Coastal forests can be defined as areas subjected to the monsoon climatic cycle from the Indian Ocean, which under natural circumstances are dominated by woody species, which regenerate successfully within mature forest. Mangrove habitats are thus excluded (Sumbi, 1991). With reference to fisheries, coastal forests are a source of energy (firewood for dry processing of fish) and timber for constructing planked canoes. In Tanzania, coastal forests are a source of valuable forest products, which are vitally important to the livelihood of the local fisher communities. They provide timber for boat building, fuel wood for dry processing of fish, charcoal, building poles and woodcarvings. They also help to reduce coastal erosion. In many areas, forests have been cleared for agricultural production. Large areas of the coastal forests have been replaced with coconut trees, cashew and fruit trees. Indirectly the clearing of coastal forests poses a threat to the mangrove forests as the local communities shift to these for firewood, timber and charcoal making.

In Tanzania, coastal forests occur in a narrow strip along the coast and on Mafia Island. Despite their limited size, Tanzanian coastal forests are recognized globally as major centers of species diversity and endemism (Howell 1981, Lovett, 1989, Kingdon, 1990). White 1983 observed that of the 190 recognized forest species in the coastal region, 92 are endemic to the area. Many of the coastal forests are situated on raised ground, which may be part of the bio-geographical explanation of their diversity and endemism. Over exploitation and clearing for other uses has led to reduction of these important forests. However several government controlled conservation forests exist. These include, among others, Bwili and Bamba in Muheza, Tongwe and Genda Genda in Pangani; Simbo, Kikoka and Mtakuja in Bagamoyo; Mtike, Ruvu and Nyumburuni in Kibaha; Kazimzumbwi and Masanganya in Kisarawe; Namakulwa and Lugoya in Rufiji; Mtundubaya and Mkanga in Kilwa; Mtakwa and Ndimba in Lindi and Ziwani in Mtwara District. (TCMP, 2001)

2.1.1.5 Coral Reefs

The warm tropical climate of Tanzania, with its long coastline and clear waters, has encouraged the growth and development of a chain of coral reefs that are probably the most extensive and most diverse in East Africa. Coral reefs are located along about two thirds (600 km) of Tanzania's continental shelf (Figure 2). Three main reef types are described and which include the outer fringing reef, inner fringing reefs and patch reefs. An almost continuous fringing reef (which form margins along the edge of the mainland and islands) follows the contours of the narrow continental shelf close to shore (1 – 5 km) (Horrill et al., 2001; TCMP, 2001), but it is broken in the vicinity of rivers. In these areas the absence of a firm seabed and excessive freshwater and sediment discharge

prevent the development of continuous coral reefs. Here, patch reefs (often extension of fringing reefs) predominate (Wagner, 2000). Inner fringing reefs and patch reefs are generally found in bays or behind the outer fringing reefs and are common at Tanga, Unguja, Pemba, Mafia, Songo Songo Archipelagos and Mnazi Bay in Mtwara. An outer fringing reef runs along the eastern side of both the Mafia and Songo Songo Archipelago. The reefs around Mafia are among the most diverse on the East African Coast (Semesi et al., 1999) and are now included within the first Marine National Park in the country.

Coral reefs are known to be the home of about 4,000 fish species as well as a variety of sponge, mollusks and other invertebrates. Coral reefs and associated habitats also support species such as marine turtles, dugongs, rays, whale sharks, and others (Bunting, 2001). Scientists have studied the known inventory of coral reefs for Tanzania for a number of years. Over 500 species of commercially important fish and other mammals such as lobsters, octopuses, bivalves, gastropods, and sea cucumbers are commonly found. Results indicate high diversity and productivity, however this is affected by local degradation and degree of fishing intensity (Horrill et al. 2001, Wagner 2000).

In Tanzania, coral reefs and the surrounding waters provide habitats for many important fish species that are hunted for the market. Some animals, which typically live in other coastal habitats such as the open sea, mangrove forests, and sea grass beds, are associated with coral reefs only during certain life phases or activities (e.g. reproduction, nursery or feeding). Lobster, grouper, and sea cucumbers are also important species that are found on healthy coral reefs (TCMP, 2001). These algae eating creatures help to maintain the balance in the reef ecosystem. It is also important to note that the coral reefs are thriving nurseries and the spawning grounds of the many commercially important species.

Given their high diversity and productivity, coral reefs are the main fishing areas for artisanal fishers throughout the coast of Tanzania. It is hard to ascertain the ratio of coral reef associated fish species and volumes of catch compared to other sources (deep sea, river deltas, and others) along the coast, but it is certain that the larger portion originates from coral reef associated environment. It has been estimated that the coral reefs support 70% of the artisanal fish production in Tanzania (TCMP, 2001; Ngoile and Horill, 1993), and that ninety five percent of the artisanal fishing is carried out on coral reefs.

2.1.1.6 Seaweeds

Seaweeds are benthic algae, which occur extensively on sand and mud inter-tidal flats, sand lagoons and at the base of shallow coral reefs. They grow attached to rocks, or to shells of marine animals, or grow as epiphytes on other marine plants. Most herbivorous fish depend on seaweed resources for food. On healthy reefs the biomass of seaweeds is kept low by grazers and thus contribute a major proportion of the total production (Mgaya 2000). Seaweeds also provide a protective habitat to prey fish. Seaweeds play an important role in the sustainability of the coastal ecosystem and livelihoods of the communities as a source of food and income.

Some species of the genus *Eucheuma* have been harvested for export trade for over four decades but supply from the wild stocks could not meet demand hence research was directed towards the culture technology of producing this genus (Mgaya 2000).

In Tanzania there are over 300 red, green and brown intertidal seaweeds (Mgaya 2000). Twelve species of seaweed are known from Mafia Island Marine Park (Horrill and Ngoile 1991). The red algal genus *Eucheuma J. Agardh (Gigartinales, Solierieceae)* is economically the most important seaweed in the western Indian Ocean region. Some of its species are produced and exported by Tanzania (Mshigeni 1973). In most cases the farms are located in wetlands and lagoons protected from sea waves by coral reefs. The commercial importance of Eucheuma in Tanzania has increased with the introduction and successful assimilation of its cultivation technology to the rural communities along the coast (Mshigeni 1992). Currently, seaweed farming is an important economic activity and provides an alternative livelihood to fishing in many coastal communities particularly Zanzibar, Tanga, Muheza, Pangani, Bagamoyo, Mtwara and Lindi, where women are the main producers. According to TCMP 2001, over 3,000 tonnes are produced annually.

In Zanzibar, apart from cloves, other main export products are seaweed, copra and a few non-traditional crops (Revolutionary Govt. of Zanzibar 2001). Msuya 1998 observed that in Unguja Island, where over 90 percent of the seaweed farmers are women, the number of children with malnutrition has decreased and women have gained economic power.

2.1.1.7 Seagrass

Seagrass beds are very productive areas and are high in species diversity and numbers of individuals (Semesi, A.K. et al., 1999). Besides providing shelter for juveniles of a variety of organisms such as fish and prawns, they are eaten by many animals such as invertebrates, fishes, and the endangered green sea turtles and dugongs. Seagrass also trap sediments and thus protect reefs from the deposit of excessive sedimentation. In terms of protection physical function is derived from the ability of the roots to bind sediments, there by reducing re-suspension and lateral movement of sand and mud along the shores. In this way coastal erosion is inherently reduced. Furthermore seagrass provide substrates for epiphytic algae. In seagrass beds nitrogen fixing micro-organisms are common.

There are about 12 known species of grasses found in Tanzanian coastal waters (TCMP 2001, Mgaya 2000). The sea grasses form dense beds that cover large areas of sandy and muddy coastal bottoms from the mid tide mark to a depth of 20m or more. They are restricted to shallow waters that allow sufficient sunlight to penetrate, and grow best in lagoons and protected areas on muddy or sandy substrates. Seagrass mapping in Tanzania coastal regions has not been done, however the University of Dar es Salaam (Marine Science Department) has long term plans to carry out this study.

The fish and shrimp communities associated with seagrass beds are important to both the artisanal and industrial fishery. Their most notable role is that they provide breeding, nursery, and feeding areas for many invertebrates and vertebrate species including commercially important species of finfish, and shellfish. They provide shelter and refuge for resident and transient animals e.g. shrimps (*Penaeus spp*.) (Mgaya 2000). Seagrass beds also support complex food webs through dead and living biomass.

2.1.1.8 Inter-tidal areas

Inter-tidal areas are those that lie between high and low tidemarks. On the mud and sand flats, women in particular carry out cucumber, shellfish and mollusc harvesting.

Fishing for baits (worms) is carried out in the inter-tidal waters. Fishers, particularly women, also collect shells for sale as souvenirs.

2.1.1.9 Stone/Coral rock

Much of the coastline of Tanzania is composed of quaternary formations, mainly unconsolidated raised beach sands, raised reef limestone and low-lying mangrove-covered sands. The raised reef limestone was formed through consolidation and fossilation of dead corals and other terrestrial fossils mainly composed of hard calcium carbonate rock. Many of the live coral reefs have bases built on hardened coral rock material formed as the coral reef develops.

2.1.1.10 Sandy beaches

Sandy beaches provide attractive environments for tourists all along the coast. The clear waters along the coast are attractive for swimming, particularly in areas that are easily accessible from tourist centers (Dar es salaam, Bagamoyo, Tanga, etc.). Coupled with this, many areas have white sand beaches resulting from coral deposits washed on shore by the ocean during tides.

Tourist activities and hotels have been established at various beaches. So far, these have provided limited employment and income to most local communities. Some conflicts between hotel developers and artisanal fishers have already arisen, for example at Bagamoyo. This is due to the fishers being denied access to the beaches fronting the hotels. At the same time, mangroves are being cleared for better views from hotels resulting to beach erosion (Semesi, etal, 2000). On the positive side, the hotels provide good markets for lobsters and fish from the artisanal fishers. Some hotels are supporting the districts through financing boat patrols to combat dynamite fishing and provide rescue operations. In highly developed tourist centers tourists may contribute to pollution of the coastal waters through fouling, but in the case of Tanzania, the industry is in its infant stage and does not pose such threat at the moment.

2.1.2 The coastal climate

The coastal climate is typical tropical with high temperatures and humidity and highly dictated by two distinct seasonal monsoon winds. Precipitation is 1,000mm to 1,500mm annually. The main rainy season is between March and May, and the short rainy season is in November and December. The average annual temperature in Dar es Salaam is 25.8 degrees Centigrade; the maximum and minimum average monthly temperatures are 19 and 30 degrees Centigrade respectively. The hottest period on the coast is during the Northeast Monsoon (Kaskazi) from November to March. It is typified by low wind speeds, maximum about 5m/s blowing from northeast. The Southeast Monsoon (Kusi) is from May to October and typically has higher wind speeds of average velocity up to 8m/s, which blow from the southwest, During this time, artisanal fishers' activities are limited by poor weather, in particular high waves.

2.1.3 Ocean currents

2.1.3.1 Occurrence

Ocean currents are driven by the rotation of the earth and prevailing winds. The main current that influences the Tanzania coastal waters is the South Equatorial Current that travels west across the Indian Ocean, reaching the coastline at the border between Tanzania and Mozambique (approximately 10 degrees south) where it splits into north and south flowing currents. The North flowing is referred to as the East Africa Coastal

Current (EACC) (WWP, 2000). The EACC is greatly influenced by the seasonal monsoon winds. During the Northeast Monsoon the flow of the EACC is as low as 1 knot (1.7 km/hr) and the sea is calmer. Upon reaching the Northern Kenya border its path is redirected eastwards where it merges into the Equatorial Counter Current. During the Southeast Monsoon the stronger southerlies increase the flow of the EACC to 4 – 5 knots (7 – 9 km/hr) resulting in rough sea situations.

The other related feature that affects coastal currents is the tides or the vertical movement of the coastal waters. The coast experiences a maximum tidal range of 3 – 4 metres with a tidal regime almost the same all along the coastline (WWF, 2000). The tides increase the strength of the tidal currents, and superimpose on the movement created by the much larger-scale long shore currents, resulting in increased movement and mixing of inshore waters.

2.1.3.2 Effect of currents on marine life

The EACC is important for larval dispersal and down welling particularly offshore. It is of greatest influence on inshore areas, open fringing reefs and inlets, where local semi-diurnal tidal currents combined with inputs from many rivers, (particularly the Rufiji and Ruvuma), provide the major source of food and nutrients to adjacent inshore waters. The currents mix and distribute the inshore waters with its sediments, plankton, and other floating marine life. Seeds of coconut trees, mangrove trees, sea grasses and many other coastal plants also rely on the currents as their means of dispersal. Other specialist swimmers use the currents to navigate and carry them to reach feeding and breeding areas. The mixing of these currents also enhances oxygen availability for the marine life.

2.2 Fisheries resources

2.2.1 Use of fisheries resources

The Tanzanian coastal fisheries combine the living marine and brackish-water resources, and have great species diversity characteristic of this tropical area (FAO, 1985). Recent catch levels have been between 40,000 – 50,000 MT (see Section 2.2.5.1), however it is estimated that Tanzania's marine territorial waters (inshore) fish potential is around 100,000 MT (MNRT Fisheries Division, 2001).

The marine waters have diversified fish types. Fish and molluscs combined form the most economically important group. The larger fish groups include the bony fishes, sharks, and batoid fishes. Other groups include the lobsters, shrimps, cephalopods and marine turtles. Most species are widely distributed throughout the western Indian Ocean. The common fish species caught in most areas of the marine waters of mainland Tanzania for 4 years are presented in
Table 3 and percentage ratios by region are presented in Appendix 1 for the same period. The sardines, parrot fish, rabbit fish, scavengers and the sharks and rays predominate catches throughout the five regions, indicating their relative abundance and availability. Catches from a particular area may include up to 60 different species (Horrill, 2001).

Table 3: Weight of marine fish caught by species; Source: Fisheries Division, Annual Fisheries Statistics (various years)

English/Scientific Name	Local/Swahili Name	Amount Caught (MT)			
		1993	1994	1995	1996
Sharks	Papa	962	1187	1399	1594
Rays	Taa	2511	2474	3327	4006
Octopus	Pweza	393	314	215	604
Prawns	Kamba miti	1044	390	193	267
Psattodes spp./Flat fishes	Gayogayo	40	27	144	148
Sardines/Anchovy	Dagaa	5472	8562	8514	14324
Nemipterus spp./Threadfins	Koana	191	123	591	937
Cat fish	Hongwe	947	456	1546	913
Hemiramphus spp./Half beaks	Chuchunge	1219	1066	1285	1483
Mackerels	Vibua	2542	3248	3779	4619
Parrot fish	Pono	2040	2583	3146	3725
Rabbit Fish	Tasi	2319	2537	3246	3816
Lethrinus/Scavenger	Changu	4308	4566	6024	7304
Scombridae/Kingfish	Nguru	594	544	697	734
Thunnidae/Tuna	Jodari	538	1001	945	801
Carngidae/Jacks	Kolekole/Karambisi	1015	8175	1026	1406
Rockods/Groupers	Chewa	278	335	599	652
Ponadasyidae/Silver biddy	Chaa	312	269	344	333
Mullets	Mkizi	436	234	503	619
Chanos chanos/Milk fish	Mtwiko	23	23	174	29
Rachycentron/Cobia	Songoro	198	144	120	51
Sword fish	Samsuli/Duaro	530	905	358	240
Istiophorus spp./Queen fishes	Pandu	201	199	1986	2263
Others		**6408**	**6112**	**8599**	**8639**
Lobsters	Kamba koche				
Barracuda	Mzia				
Wolf herring	Mkonge				
Total		**34227**	**37286**	**48760**	**59508**

Most of the fish caught in inshore waters by artisanal fishermen are mostly demersal species (Lethrinidae, Serranidae, Mullidae, Lutjanidae) followed by large and small pelagic species (Carangidae, Scombridae, Cluepidae, Engraulidae). Others include sharks, and rays, crustacea, octopus and squids (Gidawi, N.S. 2000; Appendix 2). Generally, the catch composition is multi-species without evidence of a dominant species, although in some areas sardines comprise about 25% of the catch (MNRT Fisheries Division, 2001).

The Coast Region has the continental shelf extending to the Islands of Zanzibar (Unguja) and Mafia, and the Wami, Ruvu and the Rufiji Rivers flowing into the sea. These conditions give good fishing grounds in the coastal areas, in particular the estuary areas. Areas where relatively high abundances of fish are observed include the areas between (i) Dar es Salaam, Bagamoyo and Zanzibar (Zanzibar channel), (ii) Areas around Mafia and Rufiji delta (Mafia channel).

Seasonal variations are noticeable in the months of March, April, May, and June possibly due to rougher conditions prevailing during the SE Monsoons. However overall monthly production data reports indicate only a slight drop in fish catches during these months (Appendix 2). Most of the artisanal fishing is carried out close to shore and protected areas allowing fishing activities to continue throughout except on a few days when conditions are particularly bad.

The main commercial fishing is carried out around the Rufiji Delta (fishing Zone II) and the Wami and Ruvu River entrances (Fishing Zone I) in Bagamoyo where conditions are good for the survival of the resource (prawns and shrimps).

There is serious information gap on fisheries statistics nationwide. Compiled and published fisheries information is only available up to 1996. Figures for 1984 to 2001 used in this report are very broad based; compiled in the form of water bodies (marine & fresh water), total values (national) and/or regional totals. The accuracy of fisheries data is hard to ascertain. The original base information is not traceable and after 1996 no data collection seems to have taken place, possibly due to shortage of data collectors. Informal discussions indicate most of the collectors were laid off at that period. New efforts are underway to revive the process under an improved programme design but results may take longer due to limited resources within the Fisheries Division.

2.2.2 Artisanal fishing industry

The artisanal fishing is carried out in fishing villages scattered along the entire coast and including Dar es Salaam. Approximately 20,000 fishers are engaged in the artisanal fisheries at 210 fishing villages and landing sites located in the entire 800-km coast (1998 Frame Survey). The 2001 Frame Survey reports 206 landing sites. Dar es Salaam, having the largest consumer market, is the most active landing site, used by the fishing fleets within the region and fish-buying boats from Mafia, Pemba, Unguja, Bagamoyo, etc.

Table 4 gives a summary of the characteristics of the artisanal fisheries in the five coastal regions of mainland Tanzania. The artisanal fisheries account for about 95-96% of the total catch (Fisheries Statistics 1993, 1994,1995; Semesi et al., 1998).

Table 4: Characteristics of the Artisanal Marine Fisheries in Tanzania

Region	Catches (tons)	Catch ratio (%)	No. of fishers	No. of fishing boats	Boats with outboard or diesel engines	Ratio of motorised boats (%)
Tanga	6,599	11.1	4,480	969	97	10.0
Coast	13,564	22.8	6,199	1,714	132	7.7
DSM	30,403	51.1	5,250	966	248	25.7
Lindi	4,292	7.2	2,640	620	24	3.9
Mtwara	4,649	7.8	2,056	859	17	2.0
Total	59,507	100.0	20,625	5,157	518	10.0

Source: Tanzania Fisheries Master Plan 2002 (Catch – 1996; No. of fishers – 1998 Frame Survey, No. of boats 1998 – Fisheries Division MNR&T, Appendix 3)

The fishing is carried out mainly in the shallow areas of coral reefs that are easily accessible from fishing villages and landing sites (near shore waters). Reef fish alone

account for almost one third of the overall fish catch indicating that shallow reef waters are the main fishing grounds. Fish catch is normally low per unit of effort and the shallow fishing areas tend to be over-fished. The types of fish caught include the pelagic, mid-water and few demersal species.

2.2.2.1 Fishing gear and methods

The main fishing methods used in the artisanal fishery are hand lines, gillnets, surrounding nets, purse seine/ring nets, long lines, traps, and fixed traps. Other methods used, but only to limited extent, include shark nets, scoop nets, spears, hand lining (hooks), madema (fish cage/trap) and spears. Beach seines are prohibited fishing gear under the Fisheries Act No, 6 of 1970; but in isolated cases they are still used illegally. Ring net fishing for small pelagic fish is the most productive methods in terms of catch volume, while hand line fishing is the most prevailed method in terms of number of fishers engaged. Appendix 3 gives the numbers of each gear type for the period 1984-2001. Further details are discussed below.

- **Ring nets with fish attracting lights**

This method is used to catch small pelagic fish such as sardines and small mackerel, using light to attract fish at night. Around 128 ring net fishing boats are based in Dar es Salaam, Tanga and Bagamoyo. These catch a large proportion of sardines and mackerel, which account for about one third of the total production of the marine artisanal fisheries (Fisheries Masterplan, 2002). This fishing method is thought to be the most efficient.

- **Daytime purse seine**

This method is used to target pelagic fish such as mackerels, jack, etc. The method is not very common.

- **Gill nets**

Gill nets are of various kinds. Small mesh nets (50 to 100mm) consist of bottom gill net and floating gill net, used around coral reefs and estuaries. Large mesh nets (150 to 200mm) such as shark nets are used as floating gill nets in offshore waters.

- **Hand line fishing**

Hand lining is generally conducted by using dugout canoes and outrigger canoes in coral reef areas and mangrove waters.

- **Seine nets/Surround nets/Pull nets**

There are various different types of seine or pull nets (the Swahili names for which are Nyavu za kuzungusha, Nyavu za kuvuta, Nyavu za kutanda). This method is used to catch reef fish such as scavenger, snapper, rabbit fish and parrotfish by surrounding fish with the net in shallow coral reef areas.

- **Fish traps**

Fish traps are usually made from bamboo, and can be of various shapes and sizes. In Dar es Salaam, large traps made from wire mesh are also used. Traps weighted with rocks and baited with cut fish or squid and seaweed are set in coral reef areas. Target fish mainly consist of rabbit fish, parrotfish and others.

- **Beach seine**

This net is deployed in shallow waters and pulled in on the coast or reef areas and the fish are taken in. When the nets are dragged on the bottom they damage the coral and seagrass areas, disturbing the spawning ground environment. For this reason, beach seines are prohibited as fishing method under the Fisheries Act of 1994.

Data on catch by gear types are scarce. Some work was compiled during the Master plan study from 1990 fisheries statistics, which are summarized in Table 5.

Table 5: Fish catches per boat per day in the main centers

Gear Type	Gill Net	Shark Net	Surroun-ding Net	Hand line	Fish Trap
Range of catches/boat/day	13-52	22-151	7-147	6-81	12-68
Average (kg)	31	52	63	24	28

Source: MNR&T/JICA 2002

In case of hand line fishing, which is most commonly conducted in outrigger canoes, catches per day were in the range of 20 to 30 kg at most. Since using engines can increase sailing distance and speed, motorisation of fishing boats will give advantage in terms of fishing capacity and production but operating costs of the engines have to taken into consideration (MNR&T/JICA 2002). In the case of gill net and shark net fishing, catch increase can be expected since it will increase sailing range, enabling fishers to reach better fishing grounds and operate with larger quantity of nets but these methods are not easily accessible to artisanal fishers.

2.2.2.2 Fishing vessels

The fishing boats used by the marine artisanal fishers are dugout canoes (50%), outrigger canoes (25%), and planked construction boats (consisting of mashua, dau and boats, 25%) (Fisheries Division 2000 1b; MNRT/JICA 2002). These are built using traditional skills in all major fishing villages and landing sites along the coast. They may or may not be motorized, obviously the motorized ones being more efficient. Of the 5,157 vessels recorded in Table 4, only around 10% are motorized, which is low compared with other African coastal countries. In the southern regions (Mtwara and Lindi) only 2 to 3 percent are motorized (Table 4). In spite of the low motorization rate, there are some fishing boats fitted with inboard engines (35 – 75 HP diesel). Skilled carpenters locally fit the engines, an innovation typical in Tanzania. These boats are common in Dar es Salaam where they sail to fishing grounds around Mafia and the Zanzibar Channel. Inboard engines are more durable and suitable for the large planked construction boats of Tanzania, which are of displacement type with heavy weight.

2.2.3 Commercial fishing industry

Commercial fishing is limited to prawn trawling adjacent to mangrove areas, and small-scale exploitation of pelagic resources offshore (deep-sea waters), fishing for finfish, shellfish and mollusks (Horril, C., et al., 2001, Swan Tanzania, 2002). In terms of production the commercial fisheries account for only about 5% of the total marine production. The commercial fisheries accounted for 1,300 tons in 1996 according to the frame survey of 1998.

The commercial prawn trawl fishery is basically for the export market. The most abundant and marketable types of prawns/shrimps include *penaeus monodon*, *penaeus*

japonicus, penaeus indicus and *penaeus semisulcatus* (Swan Tanzania, 2002). The most important prawn fishing grounds are found around the inshore reefs, deltas and mangrove forest areas mostly around Rufiji and Bagamoyo (TCMP, 2001). Other areas like Lindi and Mtwara are less productive.

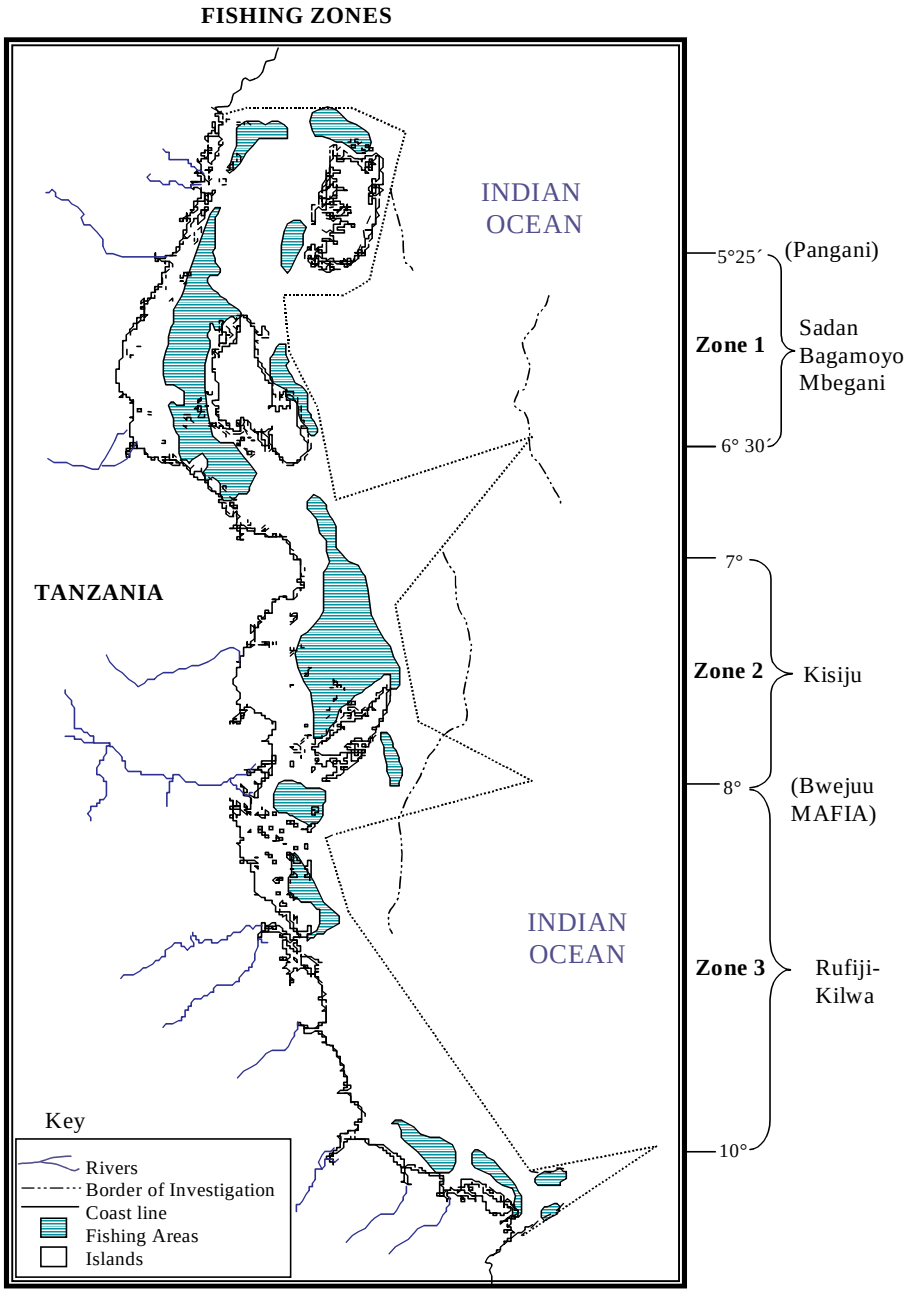
Total landings from the commercial prawn fishery increased from 1,081 tons in 1984 to 2,190 tons in 1988, with a corresponding increase from 10 to 13 trawlers. Landings dropped from 2,015 in 1990 to 1,119 tons in 1991 using same trawler effort indicating over-fishing in the trawling areas (TCMP, 2001). Currently about 23 prawn trawlers, 2 deep-sea trawlers and 11 long liners in the deep-sea carry out fishing operations.

For management purposes, the Department of Fisheries has divided the prawn fishing areas into three zones namely Zone 1, Zone 2 and Zone 3. Zone 1 is located between Latitudes 5' 25' and 6' 30' S and includes the areas between Pangani, Saadani and Mbegani in Bagamoyo. Zone 2 is between Latitudes 7' and 8' S and includes the inshore areas around Kisiju, Bwejuu, Mafia Island and the northern part of Rufiji areas. This is the most productive of the three zones. Zone 3 lies between Latitudes 8' and 10' S and includes the southern part of Rufiji areas and Kilwa (Figure 3).

Management procedures and regulations control the activities of prawn trawlers operating in these designated areas. These include the enforcement of the prohibition of dumping by-catch from the prawn fishery overboard. Previous dumping of finfish bycatch was causing pollution of inshore waters. Following the strengthening of the Government's monitoring through improvement in the enforcement of the Fisheries Act, by-catch dumping has been greatly reduced. The by-catch is brought to landing sites on shore for the local market or processing.

Commercial offshore fishing is mainly done by long lining, with the main target species including tuna, tuna-like species and sailfish. However, this fishery is mainly undeveloped. Information about the potential of the offshore resources is lacking (Tanzania Fisheries Master Plan, 2002).

Figure 3: Location of commercial prawn fishing areas



2.2.4 Fishing Seasons

Fishing under the artisanal fishing industry is allowed throughout the year. Seasonal fluctuations are minimal in Tanzania and more related to marine water temperature changes, roughness of the sea due to weather and overexploitation in localised cases. Commercial fishing for prawns is allowed from 1st of March to 30th November each year. It is closed between 1st of December to 29th February to allow prawn breeding.

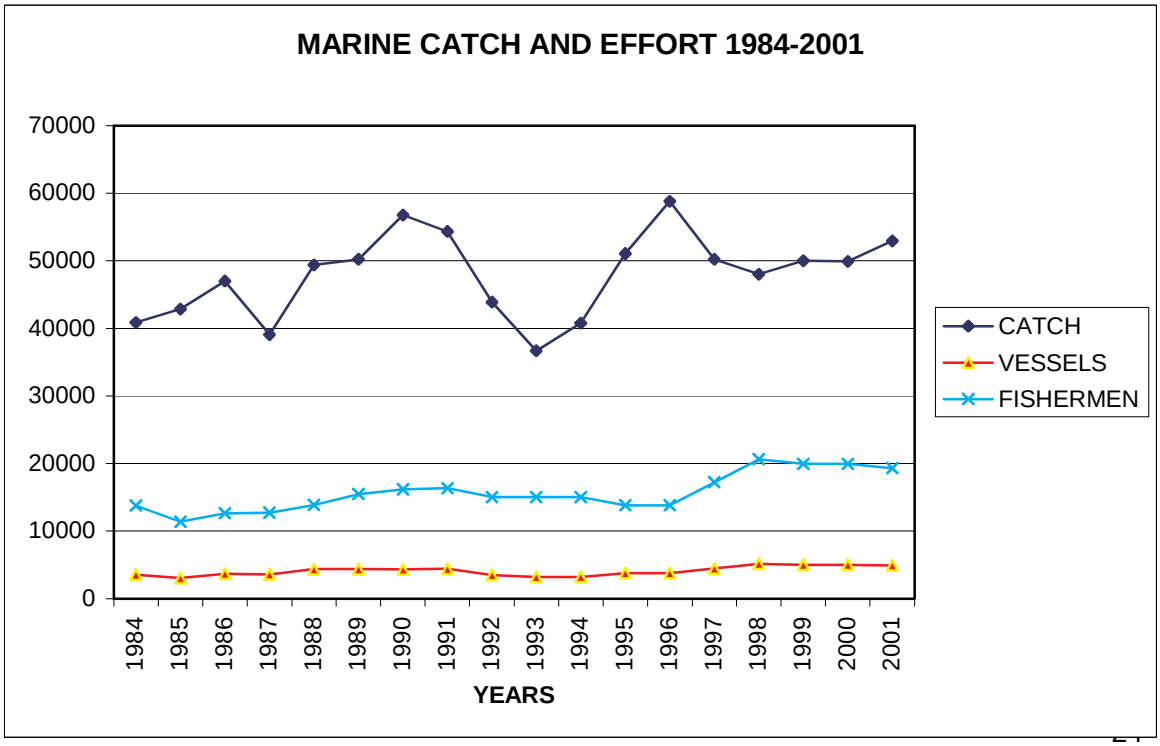
2.2.5 Fisheries resources: status, trends and threats

2.2.5.1 Current status of the fisheries resources

Data from 1984 to 2001 show the marine fish production trend as indicated in Figure 4. Appendix 2 gives marine capture production by coastal region for 1993 - 1996. Figure 4 indicates increasing and declining catches between years. Fish catches steadily rose until 1990 when they reached 56,779 tons. Catches dropped by 32% from 1990 to 1994 (40,78785 metric tons) while fishing effort remained the same (TCMP, 1999). From 1995 production picked up again reaching the highest peak ever recorded (58,780 metric tons) in 1996.

During this period the number of fishers dropped from 15027 (1994) to 13822 (1996). The number of vessels remained the same (3232). In 1997 and 1998 production dropped to 50,073 and 48,000 metric tons respectively. At the same time the number of fishers had increased sharply from 13,822 in 1996 to 20,625 in 1998. The number of vessels had increased also from 3,768 (1996) to 5,157 (1998). Since then, production has remained constant with insignificant increases (in 1999 50,210 MT and in 2001 52,935 MT). In 2001 the number of fishers was 19,293 and the number of vessels recorded was 4,927 indicating very slight drop from the 1998 effort. This trend indicates clearly the poor performance of production per unit effort, pointing to overexploitation of the fisheries resource in the fishing grounds frequented by the artisanal fishers.

Figure 4: Marine Capture Fisheries in Metric Tons and Effort 1984 – 2001
Source: Data from the Fisheries Division, Ministry of Natural Resources and Tourism



The marine fishery resource has reached the upper level of exploitation. This is believed to be due to fishermen continuing to exploit the same fishing areas, limitation of the range of their fishing vessels, which are not powered by motor engines and lack of proper management strategies.

Despite the previous destruction and/or overexploitation of the marine resource in the near shore waters, opportunities exist in the areas that have not been reached due to inefficient fishing gear used by the artisanal fishers. In addition, proper management of the existing common fishing sites is needed. Natural restoration and sustainable utilization are critically considered as important components of all conservation projects taking place in the coastal areas.

Other marine resources include seaweeds, sea grass, sea turtles and marine mammals. According to Mgaya (2000), the status of these resources has rarely been determined. Stensland et al (1998) expressed an urgent need for the status assessment of marine mammals. Newton et al (1993) noted that gastropods, notably cowries which have commercial value because of the shell trade are overexploited. Populations of cetaceans are over exploited and are endangered (Howell 1998). Mgaya et al 1999 observed that sea cucumbers stocks are declining and collectors are employing SCUBA equipment, thus depleting the resource further.

2.2.5.2 Trends and threats to fisheries resources

The main threats to the marine resources are listed in Table 6 and Table 7 below, and are discussed in the subsequent sub-sections.

Table 6: Threats to marine fisheries resources

Resource	Natural threats	Threats due to human activity	Impact on fisheries and hence on fisheries-based livelihoods
Fish	-Rising sea temperatures -Coral bleaching due to natural occurrences -Runoffs creating siltation around river mouths (El Nino) -Destruction of coral reefs by storms and waves	-Overexploitation with increased demand (population and tourism) -Destructive fishing (dynamite fishing, poison fishing, beach seines) -Destruction of habitats (indiscriminate mangrove cutting, lime making from live coral reefs, etc) -Marine pollution (domestic waste, oil spills/sunk ships, chemical dumping, etc)	- Depletion of fisheries resources - Destruction of fish thriving environments

Table 7: Threats to habitats that support the marine fisheries resource

Habitats supporting the fisheries resource	Natural threats	Threats due to human activity	Impact on fisheries and hence on fisheries-based livelihoods
Sea Water	-Temperature rising due to global warming -Sedimentation from coastal erosion and river sedimentation	-Pollution from domestic waste, industry, agricultural activities, oil and mineral prospecting, tourist activities, oil spills from ships, etc.	- coral bleaching, and secondary impacts on fish populations
Mangroves	-River floods alter water levels, (bank erosion and diversion of water courses resulting in death of mangroves) -Sand deposition (from sea and land cut off portions of mangrove from salt water leading to their death. This problem is pronounced in most parts of Bagamoyo district) -Predicted sea level rising due to global warming; may flood present mangrove areas -Drought occurrence which may affect ground water seepage	-Indiscriminate harvesting -Improper agricultural and forestry practices (causing flooding, pesticide poisoning, etc.) -Clearing for rice farms and around estuaries in Tanzania -Petroleum prospecting, oil pollution from ships, dumping of garbage, sewage, and industrial chemicals in to estuaries -Boat traffic that increase erosive boat wakes -Clearing for saltpans around intertidal areas	- reduced nursery habitats for fish populations -Increased beach erosion -Reduced wood supply for firewood, shipbuilding, building poles, etc, there by affecting alternative livelihoods and artisanal fishers' welfare.
Coastal forests	- None so far	-One of the most threatened habitats in East Africa due to over harvesting and clearing for human settlements, industrial and agricultural activities, charcoal making, lumbering for commercial purposes,	increased sedimentation, leading to impacts on corals and hence reef-associated fish; lack of wood for boat building, gear making, fish smoking, etc.
Coral Reefs	-Combination of factors leaving reefs vulnerable to periodic natural disturbances such as temperature extremes, hurricanes,	-Destructive or improper fishing effort (dynamite fishing is the most destructive) -Over fishing in the coral reef environment	- degraded reefs affect fish populations

	cyclones, and other natural events -Severe floods carrying tremendous loads of sediment washed out to sea can overwhelm nearby coastal reefs that require clean waters for their existence - In 1998 El Nino produced the warmest ocean temperatures on record, which killed the algae, and bleached corals white the world over.	-Excessive movement of boats and people -Pollution from waste, oil and chemical dumping -Coral mining for lime making and building blocks -Uncontrolled tourism -Use of agro-chemicals in agriculture especially rice farming may affect the green algae and other life forms around the coral reefs (coral bleaching)	
Sea weeds, sea grasses, algae and spongy beds	-Warming temperature of the sea (like the effects of El Nino)	-Any type of seawater pollution including raw sewage, oil from ships, pesticide traces from agricultural lands and even storm water tends to threaten seaweed production.	-impacts on fish culture, alternative livelihoods; -impacts on habitats –as fish nursery grounds. -Coral bleaching resulting from reduced light trapping green plants.

- **Increased pressure on fisheries resources**

Fishing pressure on the coast is increasing. Coastal dwellers choose to continue fishing for various reasons. According to a study in 1993 major reasons for continued engagement in fishing include tradition (32%) and economic reasons (27%) (Anderson, et al., 1998). Other reasons given were lack of alternatives; fishing is regarded as easily accessible and an easy job. Tradition provides comparative advantage through easier access and it also acts to provide security, familiarity and sense of identification. Anderson reported that a repeat of the same study in 1997 and 1998 indicated the number of individuals as a matter of tradition had decreased but a higher proportion were fishing due to economic reasons or lack of alternatives. Few coastal households have the capacity to successfully implement income diversification strategies to cope with poverty and income fluctuations, including income failure. In many cases, there are no alternatives locally to fishing and/or farming. Diversification between different production sources might not suffice if they rely on the same ecosystem. In such situations, artisanal fishers are forced to continue to work in fisheries, or to migrate to urban areas. The lack of access to alternative livelihoods and income sources adds to the exploitation of marine natural resources above the level that would occur if these were available. More and more people depend on the water and land to generate income and provide food. They are vying for the same limited resources; this competition, coupled with the desire to increase income has increasingly led to destructive fishing practices.

- **Habitat degradation**

Habitat degradation of coral reefs is occurring through destructive fishing practices such as dynamite fishing and trawling, pollution, seawater temperature rise, sedimentation etc. This is impacting on fish resources key to local users (TCMP, 1999). Some check has taken place through government action (tougher laws and regulations) and community involvement in the conservation of these resources e.g. the IUCN Tanga Coastal Management Project.

The present condition of coral reefs differs from region to region (Wagner, 2000). Degraded reefs environments are prevalent in the shallower depths of 1 – 10 meters, especially in the vicinity of urban centers like Dar es Salaam, Tanga, and Mtwara, where shallow reefs are almost completely destroyed (TCMP, 20001). The reefs in these areas have been extensively damaged by human impacts. Those that are adjacent to areas of high population density are the most damaged and are found to have the lowest abundance of commercially important fish species. A 1995 survey conducted in Tanga Region covering 58 reefs showed that 12% of the reefs were completely destroyed, 12% in poor condition, 52% in moderate condition and 24% in good condition. Most of the damage to reefs north of Pangani was attributed to dynamite fishing (Wagner 2000).

Coral reefs are also being impacted by non-fisheries activities, in particular the extraction of sand, gravel and limestone rock for construction purposes. Coral mining is conducted along the entire coastline. Mined coral is taken from living reefs at the land water interface or from ancient fossilised reefs on shore and a little distance inland. Both live and fossilised coral is used for building blocks and aggregate. Live coral is either used as building aggregate or is burnt in open kilns to produce white lime (chokaa in Swahili), which can be used as cement or to whitewash houses. Live coral is whiter than fossilised coral rock and is therefore preferred (Wagner, 2000).

Other important fisheries habitats are also being degraded. Mangrove forests are being cut and cleared, in particular near big population centers. The most degraded mangrove areas are those close to towns such as Mtoni, Kunduchi and Mji Mwema in Dar es Salaam or those close to Tanga and Mtwara towns. However some parts of Rufiji and Ruvuma Deltas have mangroves that are in good condition because it is difficult to access them (Semesi 2000). Pristine mangroves in Tanzania are none existent as a result of the long dependency of coastal communities on the mangrove resources.

- **Pollution**

Expanding coastal populations are exerting an ever-increasing pressure on coastal waters, thus negatively affecting water quality. Reports indicate that coastal waters fronting such cities and towns as Dar es Salaam, Tanga, Zanzibar and Mtwara are grossly polluted (Mohamed 2000). Other coastal towns could also be sources of domestic pollution.

Baseline studies on water quality and pollution have been carried out in Dar es Salaam, Zanzibar and Tanga (Mohamed, M.S., 2000). Dar es Salaam, particularly Msimbazi River and creek and the harbour are the most polluted water bodies. Pollutants include both domestic and industrial waste. Sources of industrial waste include dyes, paint wastes and strong alkalis from textile factories, heavy metals, chlorinated organic compounds from factories in Keko and Chang'ombe areas, and oil pollution from the Kigamboni refinery and fuel storage facilities in the area.

Other coastal areas of Tanzania outside the major cities and townships, though free from domestic and industrial waste, do suffer from other sources. They include heavy loads of sediment especially where major rivers enter the sea (Rufiji, Pangani, Wami, Ruvu), agricultural wastes (pesticides and fertilizers via rivers and streams) and land-based activities such as mineral exploitation.

Reduced water quality as a result of pollution affects the fish resource directly by chemical poisoning and or indirectly by interfering with its thriving environment (habitat degradation) on which the fish survive e.g. seaweeds and seagrass dying due to herbicide pollution, coral bleaching due to industrial chemical pollution, etc.

Despite the above grim situation various studies show that in general the coastal waters in many parts of Tanzania are in pristine condition outside the cities and towns (Mohamed 2000).

- **Tourism**

The sandy beaches have become centers of tourist activities more in recent years. Many tourist hotels have mushroomed along the cost (Zanzibar and mainland) and more are being built. In other areas not yet exploited, such as Bagamoyo, the potential exists for expanding the tourist attractions into the mangrove reserves south of Mlingotini to Changwehela. These reserves are bound by excellent sandy beaches and a large lagoon with wide areas of mud flats. Suitable camping sites are found both within and near the border of the mangroves. Since they are easily accessible and within an easy drive from both Bagamoyo and Dar es Salaam city they are excellent sites for educational and eco-tourism. Tourist activities are important for the national economy as it is a major source of foreign exchange and is becoming increasingly important. Except for markets for their fish and employment tourist activities could conflict with the artisanal fishers perspective.

Reef based tourism is becoming an increasingly important economic activity on the coast of Tanzania mainland, Unguja, Pemba and Mafia. Associated with this are coral and shell jewelry, tourism curios, and marine ornamentals. Collection and export of coral reef animals creates jobs and income for the coastal communities.

2.3 Marine resources important to artisanal fisheries: conclusions

The main marine fisheries resource of importance to the livelihoods of artisanal fishers are the inshore demersal species, although pelagics and other species are also caught. The artisanal fisheries are multi-species, with catches comprising as many as 60 different species. Major livelihoods are derived through utilization of the physical and biophysical resources of the land/water interface in particular the different types of fish and other marine animals. The climate, ocean currents and level of exploitation and management of the marine fisheries resource and habitats that sustain it influence the extent to which coastal communities achieve their livelihoods from these resources.

Information and data collected on the fisheries resources and reported by different authors indicate declining catches in the areas most frequented by the artisanal fishers. Due to limiting financial resources, artisanal fishers are unable to employ improved fishing methods to exploit the resources more effectively and in a sustainable manner, so as to improve their fish harvests and hence livelihoods.

The most important fisheries livelihood problems facing the poor artisanal fishers include poor and inefficient fishing gear and vessels, lack of capital, limited access to better markets coupled by poor handling facilities, poor infrastructure and high post-harvest losses. In order to improve the artisanal fisher livelihoods, two important areas have to be tackled. They are to increase the quality and quantity of catch, and to provide access to more competitive markets.

In order for the quality and quantity of fish to improve, the fisheries resources need to be better managed, particularly the areas most frequented by the artisanal fishers, such that the fishing pressure is reduced. Involving all the stakeholders in developing the management plans and implementation should be key to ensure success of any actions; either through encouraging moves to alternative livelihoods, or introducing management actions to allow regeneration.

Empowerment of artisanal fishers through facilitating the acquisition of improved gear and vessels will enable them to better exploit the fisheries resource through reaching alternative fishing areas, or through more efficient fishing operations.

Acquisition of modern handling and preservation facilities will enable the artisanal fishers to access better markets and improved prices. Dar es Salaam and other coastal cities are potential better markets, directly to consumers or to processors for export.

Aquaculture development is another option, but needs development and training.

Unreliability and incompleteness of fisheries data has been cited as a serious information gap. Planners and decision makers need reliable data to be able to project the needs and provide support to artisanal fishers so as to improve their livelihoods. Such data is also important to plan for conservation and sustainable management of the fisheries resource.

3 Fisheries stakeholders

3.1 Demography

The population of Tanzania in the year 2000, based on the 1988 census, was estimated at 33.95 million with a growth rate of 2.7% (Tanzania Fisheries Master Plan, 2002). The current population 2002/2003 has been estimated at 34.569 million (Mainland – 33,584,607; Zanzibar – 984,625) based on the 2002 census (preliminary results).

Maghimbi (1997a & 1997b) reported a rapid demographic change in the coastal zone but the population density and rate of increase are below the national average except in Dar es Salaam. He concludes that there is high level of out-migration to the big cities (Dar es Salaam, Tanga, Mtwara, etc). *According to the 2002 census, 4,453,080 people (13.26% of the mainland population)* live in the 13 coastal districts under study. Taking the five coastal regions together the current population is around 6,948,938 (20.2% of the population of mainland Tanzania).

3.2 Ethnic origin and culture of the coastal people

The main ethnic groups living in the villages along the coast are the Swahili of mixed origin; the Digo, Bondei, Zaramo, Rufiji, Yao, Makonde and Shirazi (Semesi 1991). The mobility of these populations is very high. In many of these coastal villages, inhabitants are a mixture of these tribes with also Arab, Shirazi and other influences. There are strong cultural and religious belief links with Islam (Horrill 2001).

Culture and historical influences play important role in the way communities behave and accept intervention programmes to alleviate poverty and environmental conservation. Tanzania's typical coastal society is heterogeneous and highly mobile. Migrants to coastal villages can gain acceptance by marrying a local woman. The coastal area had no traditionalized state systems. Traditional societal organization is based on kinship groups and authority traditionally exercised through the elders of the kinship group (Horril 2001).

The level of literacy is generally low among coastal communities, and is significantly lower for women than men. There seems to be large dropouts from primary school, particularly women (Semesi 1991, MNR&T/JICA 2002). However education levels for fishers and agriculturists in the coastal areas of Tanzania were equally low in the study carried out for both communities (FAO, 2001). There are signs of low levels of trust between communities members, possibly due to historical backgrounds. Collective endeavors seem to be few and none have been successful (Ochieng 2001).

Compared with women from other regions of Tanzania, those of the coastal villages are more confined to their houses. There is also a high rate of divorce and remarriage, with women often residing in a number of villages during their married life. Culturally, women are not often included in decision-making undertakings. Polygamy among coastal communities is relatively higher than in other regions, and most households are male-headed (MNR&T/JICA 2002). The men make most decisions, and are involved in almost all community decision-making forums. However, recent studies carried out in two fisher communities (Jibondo and Juani in Mafia) indicate that the involvement of women in decision making levels for the conservation project in the area improved the performance and efficiency considerably (Chando 2002).

3.3 Income and poverty level

The government's "Poverty Reduction Strategy Paper" targets a reduction in the proportion of the population under the poverty line from 48% to 24% by 2010 and this includes the artisanal fishers. Nationally it was reported that about 800,000 people were directly employed in the fisheries industry from 1999 onwards. No accurate statistics on the number of personnel employed in processing and fish marketing are available, however this number is estimated to be five times greater than the number of fishers (MNR&T/JICA 2002).

It is unfortunate that the 2002 census analysis is still in progress, and results of the proportion of household members engaged in fishing in the coastal districts are not yet out. Similarly, the reporting for the household main income by source in the Household Budget Survey 2000/01 has been lumped as one source (Agriculture, Livestock and Fisheries), which makes it difficult to separate the fishing income from the three sources. The results are also reported by regions instead of districts or lower levels. The results from the House Budget Survey (2001) presented in Table 8 give an indication of the household income sources proportionally. The highest proportion of income contribution from fisheries is in Lindi Region (7%), followed by Tanga Region (4%). It has also been reported that fishery data and consequent poverty and welfare levels information analysis is insufficient or non-existent (VPO 1999).

In general the economy of the coastal districts depends mainly on artisanal fishing, smallholder farming and seaweed farming and to limited extent subsistence forestry, lime and salt production and small-scale trade in handicrafts (TCMP 1999, Semesi et al,. 1998). Most families are involved in more than one economic activity so that if one income for the household fails, e.g. fishing, the family still has other sources of food and income. For the majority of the coastal fishing villages the fisheries resource (fishing and associated activities) is the major economic determinant. Fish and prawns are an important source of income not only for artisanal fishers but also for many people engaged in their processing and trading (Semesi 1991).

Most coastal communities in Tanzania are poor. The 2001 Household budget Survey results show the following poverty and welfare indicator levels in the five coastal regions (Table 8 to Table 11).

Table 8: Percentage of households below the food and basic needs poverty lines and food share of household expenditure for the coastal regions of Tanzania

Indicator/Re	Tanga	Coast	D'Salaam	Lindi	Mtwara	National*
%BFPL	11	27	7	33	17	19
%BBNPL	36	46	18	53	38	36
PCEF - U	60	63	N/a	62	62	59
PCEF - R	71	71	N/a	77	68	67
PCEF - T	70	69	54	74	66	65

*Tanzania mainland

Key: Re=Region; %BFPL=Percent below the food poverty line; %BBNPL=Percent below the basic needs poverty line; PCEF=Percentage of consumption expenditure on food (U=Urban, R=Rural, T=Total)

Table 9: Per capita household monthly income for the coastal regions of Tanzania (Nominal Tshs)

Indicator/Re	Tanga	Coast	D'Salaam	Lindi	Mtwara	National*
MnHMI - U	32,473	25,599	N/a	39,266	34,643	33,241
MnHMI - R	10,494	16,594	N/a	11,629	20,795	14,128
MnHMI - T	12,210	18,210	40,767	16,268	23,252	17,922
MdHMI - U	14,000	9,700	N/a	13,560	13,960	14,404
MdHMI - R	6,988	7,925	N/a	7,804	10,992	7,513
MdHMI - T	7,160	8,102	16,473	7,902	11,517	8,323

*Tanzania mainland

Key: Re=Region; MnHMI=Mean per capita household monthly income (U=Urban, R=Rural, T=Total); MdHMI=Median per capita household monthly income (U=Urban, R=Rural, T=Total).

Table 10: Contribution of Households main source of cash income (%) for the coastal regions of Tanzania

Source/Re	Tanga	Coast	D'Salaam	Lindi	Mtwara	National*
Sales of FC	41	35	3	23	25	41
Sales of L	12	0	0	1	0	3
Sales of LP	2	3	0	2	0	1
Sales of CC	19	15	1	37	46	17
Buss. income	7	15	31	10	11	13
Salaries cash	8	9	41	6	6	9
Other CCE	3	13	15	5	4	6
Cash Remit	3	6	5	3	3	4
Fishing	4	3	1	7	1	2
Other income	1	1	3	6	4	4

*Tanzania mainland

Key: FC=Food crops; L=Livestock; LP=Livestock products; CC=Cash crops; Buss.=Business; CCE=Casual cash income

Table 11: Mean and Median monthly consumption expenditure per capita for the coastal regions of Tanzania (Tshs, nominal prices).

Cons Exp/Re	Tanga	Coast	D'Salaam	Lindi	Mtwara	National*
MnCEPC - U	15,015	12,372	N/a	15,399	15,203	16,612
MnCEPC - R	8,802	9,922	N/a	8,263	11,712	8,538
MnCEPC - T	9,261	10,454	21,949	9,452	12,374	10,120
MdCEPC - U	12,052	9,514	N/a	12,143	13,227	12,699
MdCEPC - R	7,450	7,684	N/a	6,274	8,913	6,860
MdCEPC - T	7,645	8,172	16,349	7,069	9,421	7,523

*Tanzania mainland

Key: Re=Region; MnCEPC=Mean consumption expenditure per capita (U=Urban, R=Rural, T=Total); MdCEPC=Median consumption expenditure per capita (U=Urban, R=Rural, T=Total).

Source: Household Budget Survey 2000/01 (National Bureau of Statistics Tanzania)

Contrary to the common belief that fishers are the poorest group of the rural population in coastal areas, a study carried out in five countries (Bangladesh, India, Malaysia,

Tanzania and Senegal) found out that, in the case of Tanzania, the average annual household income was found to be significantly higher than that of households in neighbouring agricultural villages (FAO, 2001). This is supported by the fact that the coastal zone offers a larger number of production alternatives derived from a larger number of ecosystems as opposed to those who depend on farming only (Anderson, et al., 1998) The survey carried out during the preparation of the Fisheries Master Plan Study 2002 indicates the levels of income of coastal communities as detailed in Table 12.

Table 12: Percentage distribution of respondents' responses by monthly household income from fishing in coastal regions of Tanzania

Monthly household income from fishing only	No. of respondents (%)
Less than 10,000.00	35 (9.5)
11,000.00 – 20,000.00	38 (10.3)
21,000.00 – 30,000.00	49 (13.3)
31,000.00 – 60,000.00	129 (35.0)
61,000.00 – 100,000.00	72 (19.5)
101,000.0 – 150,000.00	37 (10.0)
151,000.00 – 200,000.00	7 (1.9)
201,000.00 – 300,000.00	1 (0.3)
301,000.00 – 500,000.00	-
Above 5000,00.00	-
Reluctant to divulge	1 (0.3)
Total	369 (100.0)

Source: MNR&T/JICA 2002 (Tanzania Fisheries Masterplan Study)

As indicated in the table there is still a significant number (35 respondents or 9.5%) who earn less than TAS 10,000.00 per month. Very few earn more than TAS 201,000.00 per month (7 out of 369 respondents or 1.9%). None earn above TAS 301,000.00. Those leading the group fall in the 31,000.00 to 60,000.00-income bracket (35.0%).

3.4 Livelihood earning activities

The coastal people are involved in a diverse range of activities that exploit the rich biodiversity of the coast for their livelihoods (WWF, 2001; TCMP, 2001). In most of the coastal districts, farming and fishing are the primary means of subsistence for livelihood of the poor communities. Other secondary alternatives exist, some of which are related to the fisheries resource, but many others are not.

3.4.1 Contribution of the fisheries resource to the livelihoods of the poor

The importance of marine fisheries resources to the livelihoods of the coastal communities is highlighted by the following factors:

- Provision of nutritional requirements
- Creation of job opportunities
- Income generation among the communities

To local communities, fish is an important source of protein, and constitutes about 30% of the animal protein consumed by the national population. The national per capita fish consumption volume is at 5.9 kg/year (value estimate for 2000) (MNR&T/JICA 2002).

However due to cultural reasons and the underdeveloped distribution system, fish products only fulfill a high ratio of the nutritional demand of the urban and particularly coastal regions.

All communities living along the coast except the cities and municipalities attach high value to fishing. The many fishing villages scattered along the five coastal regions base their livelihood on fishing. It is a major source of food, employment and income. For coastal populations, fish accounts for 60% of the animal protein consumed. Also income from fishing supports other livelihood earning activities particularly farming and small businesses. Studies carried out in Unguja, Pemba and Mafia Islands indicated that households engaged in both fishing and farming generated more income and also produced more agricultural output than those which only farmed because the later had lack of capital and missed opportunity to increase their capital resources for improving farm productivity (Anderson, et al.,1998).

The number of artisanal fishers along the coast has increased considerably in the last 10 years (Appendix 3) and is estimated at 19,293 according to the 2001 Frame Survey results, which is about 0.433 % of the coastal districts population. Accurate statistics on the number of personnel employed in fish processing and fish marketing are unavailable but this number is estimated to be five times greater than the number of fishers (MNR&T/JICA 2002). This raises the ratio of fisheries and related livelihoods dependent population in the coastal districts to 2.60 % (19,293 fishers and estimated 96,465 processors and sellers).

There is a concentration of artisanal fishers in Dar es Salaam, Coast and Tanga regions. Mtwara and Lindi have fewer fishers (Department of Fisheries 1998, Maghimbi 1997). Nationally, there has been a rapid increase in the number of artisanal fishers, which has not been matched by the increase of output in marine fish production. Table 13 gives the regional distribution of artisanal fishers in the five regions of mainland Tanzania. Apart from inaccuracies in the records compiled by the Department of Fisheries, the rapid change of the artisanal fishers is also explained by the presence of young men who join and leave fishing rapidly (Maghimbi 1997).

Table 13: Regional distribution of artisanal fishers in the coastal regions of mainland Tanzania

Year	Number of Artisanal Fishers											Av. Chan-ge (%)
	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	
Tanga	2879	3332	3486	3314	4191	2926	3311	3200	3955	3887	4437	54.1
Coast	2530	2718	2906	2129	3848	2644	2594	2977	3390	4011	3750	41.8
DSM	2146	2383	2920	2858	2072	2568	3421	3043	3093	4080	3389	31.9
Lindi	1952	1711	1799	1232	1938	1403	1475	1426	1324	1765	2351	20.4
Mtwara	402	2642	2705	2820	1522	1851	1818	2093	2093	1746	2211	45.0

Source: Maghimbi 1997

The consistency of the data is also complicated by the fact that many of the artisanal fishers are very mobile, moving from one region to another for better fishing grounds or certain types of fish or tidal currents. Other factors include the varying numbers of aquaculture workers, fishers who do not operate from boats, and occasional fishers who may rent fishing gear with none of their own.

In Pangani district in Tanga region, half of the men in the coastal villages are fishermen who use traditional fishing sailing boats in relatively shallow waters. Fishing supplies the basic protein requirements and earns them some cash. In addition to selling some of the fish, a few of them derive more income from trade with Mombasa and Zanzibar (Semesi, 1991). Kipumbwi, a major fishing village in Pangani is reported as the richest fishing ground in the region. According to Semesi (1991), the number of fishermen, vessels and their catch in 1986/87 was on average 565, 114 and 1095 metric tones respectively. While the number of fishermen and vessels increased slightly in the two years, the amount of catch decreased by almost a half from 1402 tones in 1986 to 789 tones in 1987. No reason was given for this drastic decrease.

Though fisher households vary depending on type of fisheries and gear, the most usual situation consists of boat owners possessing fishing boats and fishing gear, with crew members carrying out actual fishing work. In the case of canoe and outrigger canoe fisheries, it is common for boat owners to go fishing by themselves and take part in the fishing operation. In the case of large boats, boat owners rarely take part in fishing trips and master fishers conduct fishing operation, commanding crewmembers (Fisheries Master plan 2002). A way to divide income from catches is arranged in advance between boat owner and crewmembers, which could be as high as 50% for the owner in most cases.

As well as being an important livelihood activity for many coastal communities, fisheries also plays an important role in export earnings for the Tanzanian economy, thus indirectly affecting livelihoods.

The Tanzania Government gives high priority to the promotion of exports. In 2000, the total value of exports increased by 21.9 % to US $ 662.2 million from US $ 453.3 million recorded in 1999 (The Economic Survey 2000). The improved performance was mainly on the account of increases in the exports of non-traditional commodities (minerals such as gold and diamonds, fish and fish products and horticultural products), which went up by 52.2% from US$242.2 million to US$369.3 million. The improved export performance was also attributed to increase of some of the traditional exports, mainly coffee, cotton and tea. The value of export earnings from fish and fish products increased by 34.6% from US$56.7 million in 1999 to US$76.3 million in 2000 (The Economic Survey 2000). During the same period, the Fisheries Master plan study report 2002 indicated an increase of 38% from US $ 61.8 million in 1999 to US $75.6 million in 2000. The export of fisheries products has grown rapidly since 1990 to become an important export product, contributing 12.3 percent of the total export value in 1998, and 11.4 percent in both 1999 and 2000 (Table 12). The Nile perch fillets from Lake Victoria and shellfish (lobsters, crabs and shrimps) from the marine waters form the bulk of the exports.

Table 12: Macro economic index for fisheries sector

Item	1996	1997	1998	1999	2000
Fisheries GDP (1,000 US$)	-	165,232	189,787	211,704	
Fisheries GDP/Total GDP (%)	-	3.0	2.9	2.9	
Employment (full-time fishers)	75,621	-	-	78,682	
Fisheries exports (million US$)	61.8	70.1	72.5	61.8	75.6
Fish Exports/Total exports (%)			12.3	11.4	11.4

Source: Tanzania Fisheries Master Plan 2002

3.4.2 Gender division of fisheries dependent livelihoods

Women fishers are not many, and are mostly engaged in shell collection along the beach during low tides. However, a few also fish on shallow waters for octopus on rocky beaches ("kuchokoa pweza'), and beach seine for small shrimps ("kutanda uduvi"). During the long rains, which is the best season for shrimps, a day's catch can fetch up to 4,000 Tshs. Women also dig for molluscs such as cockles, and *Anadana spp* in those areas where fish is not plentiful and therefore expensive to purchase. In some areas seaweed farming is becoming an important livelihood activity, particularly for women. Studies in 1997-98 indicated that out of the number of fishers who shifted to alternative livelihood activities for economic reasons since 1993, 25% were women previously engaged in collecting inter-tidal products such as octopus, seashells and sea-cucumbers and had changed to seaweed farming. (Anderson et al., 1998).

Some coral reefs are located near the seashore and on shallow waters. This makes them more easily accessed by women fishers and collectors. Although fishing has been considered a male dominion, women perform shallow water fishing around coral reefs using 'kangas' or hand-held seine nets, the type of fishing called "kutanda" in Swahili. They hunt for octopus and pick molluscs, fish out shrimps and "dagaa" for home consumption. Excess may be sold at the local market but on very small scale and gives very low income.

3.4.3 Other fisheries related livelihoods

A large number of coastal community members are engaged in various activities that support the fisheries industry. As per the Fisheries Master plan the number of personnel employed in fish processing and marketing is estimated to be five times the number of fishers, which would be about 96,465 people or 2.17 % of the population in the coastal districts.

The most important fisheries-related livelihood is the auctioneering and distribution of fish by traders (men and women) who retail the fish to the consumers. The fish trader may sell the fish fresh or after drying. Processing may include smoking, sun drying, and sun-salt drying. Many retailers, particularly women, fry the fish first before selling. This is more convenient for the customers and after-harvest losses are minimized in this form.

Other support activities include fishing crew, boat building, fishing net mounting, fishing net mending, ice blocks supply/distribution, fresh fish cleaning, making fish traps and others. Boat building and repairs is a specialized carpentry trade. Mbegani Training Institute conducts courses in boat building and repairs. Many boats are built on timber lumbered from specific hard woods selected from the mangrove forests and/or coastal forests. Boat repair shops are located in most fishing districts.

Seaweed farming is becoming an important income generating activity, particularly for women. Important areas for this activity include Tanga, Pangani, Bagamoyo and Mtwara districts. In a few cases, men seaweed farmers are also participating, as an alternative to fishing. After harvesting, the seaweed is dried before being sold to exporting companies.

3.4.4 Alternative activities

3.4.4.1 Farming

Agriculture is the most important primary livelihood earner for the coastal communities. The majority of the population is engaged in some type of agriculture, either subsistence production of food crops (rice, cassava, sweet potatoes, peas, cow peas, traditional vegetables, okra, etc,) or production of cash crops (coconuts, cashew nuts, fruits, oil seeds, and others). Agriculture provides an important complement to many marine based activities and it is gaining more importance as people diversify risks between separate ecosystems (Anderson, et al., 1998). With the exception of the cities and towns, where farming land is limited, all coastal districts grow crops for food and income. Coastal communities are not traditionally herders, but many now keep livestock (milk cows – Tanga, Dar es salaam; goats – Mtwara, Lindi and Coast; chicken – all districts).

It is a common feature that farming is integrated with fisheries in most fisheries communities. Fishers are often farmers at the same time and own 1 to 2 ha of farming land (MNR&T/JICA 2002). Farming is done as main activity especially during the rainy season when it is difficult to go for fishing.

3.4.4.2 Carpentry/Masonry/ Lumbering

These are trades attained through vocational training schools or experience gained by working with family member/relative or any local trainer with perfection in the reference trade/profession. It is unlikely that fishers would be associated with any of these trades other than in exceptional cases, for example, a carpenter working as boat builder or repairer could be a fisher as well. The trades create relatively important job opportunities for villagers and town dwellers in the construction sector. In the poverty alleviation strategies training in these trades is being encouraged as means of self-employment particularly for youth. Boat building and repairs is a specialized carpentry trade. Mbegani Training Institute conducts courses in boat building and repairs. Many boats are built on timber lumbered from specific hard woods selected from the mangrove forests and/or coastal forests. Boat repair shops are located in most fishing districts.

3.4.4.3 Small businesses

Retail shops and kiosks supply fishers and other villagers with essential commodities and are found in all coastal villages and landing sites. They supply household needs (rice, flour, cooking oil, kerosene, matches, soap etc.). The traders may have other livelihood earning activities including fishing. Few rely solely on retailing to make their living. The small businessmen and women are also engaged in selling fish at their villages or market centers, particularly dried fish.

3.4.4.4 Firewood collection and charcoal making

All rural communities in Tanzania depend on wood or charcoal as their main source of energy (cooking, heating, etc.). The coastal communities are no exception. Women throughout the country are engaged in firewood collection for their households. Men may be engaged in firewood cutting/collection for sale to other users, or making charcoal, or for salt making and lime making where heat processing methods are used. The source is the mangrove and coastal forests. The lime and salt heat processing methods utilize a lot of firewood, hence are very destructive. Drying fish is basically done on the sun but the larger ones are dried on open fire using firewood. Fish frying is done using charcoal or firewood as source of energy.

3.4.4.5 Wood carving (local craftsmen)

Wood carving employs a reasonable number of coastal inhabitants. Whilst it is unlikely any fisher would undertake carving, a member of the fisher's family would, as an additional source of the family's income. They make their living through sale of the carvings by selling to tourists or for export. The carvings are made out of special trees selected from the coastal forests. The good carvers earn good income, better than fishers. Many carvers are found in several places along the coast, particularly Dar es Salaam, and Mtwara Regions.

3.4.4.6 Salt making

Common salt (Sodium Chloride) is essential for human nutrition and is in great demand for industrial purposes. Most salt production along the coastal districts is by solar evaporation but in some places boiling seawater is also carried out. Solar evaporation is the least expensive way of obtaining salt. Individuals, groups of people or formally the state Mining Corporation own the salt works. Most are located near mangroves, which have been cleared of trees. Salt production demands substantial hired labour. Many saltpans are located in Mtwara, Lindi, Kinondoni (Kunduchi) and Bagamoyo Districts. Occasionally fishers may seek temporary employment to work in the salt production when not fishing but this is not regarded as an important fisher's alternative source of livelihood. However the saltpans form an alternative fishing ground in the rainy season when fishing in the open sea is not possible and salt production stopped until the dry season commences.

3.4.4.7 Lime making

Individuals or groups of people own lime processing kilns and as salt making requires substantial hired labour input. Wood is required as source of energy, to the detriment of the mangrove forests. Lime making is not an important fisher's alternative livelihood activity, as fishers are very rarely engaged in lime making. As in the case of the other non-fisher related activities, a member of the fisher's family employed in the lime making activities would contribute as an additional income for the family. Occasionally the salt makers use live corals or consolidated lime material underlying live corals, which requires diving to obtain the raw material. In most cases, experienced divers are fishermen.

3.4.4.8 Stone quarrying

This activity employs a large number of people as individuals (small aggregate crushers) or groups working on industrial stone crashing factories. Workers at centers near cities earn more. Men and women are engaged in aggregate breaking by hand. Fishers may be involved in stone quarrying for sale or for building own houses when they are not fishing. Alternatively if the fisher's piece of land has some stone outcrops, he may contract crushers who will pay him royalty bringing in additional income to the fisher's family.

3.4.4.9 Cooked food supply (Mama Lishe)

The activity employs a number of women in working places and market centers. The "Mama lishe" play an important role to feed the fishers in the fish market centers and fish landing sites. Most times they use fish as source of protein in the meals they prepare, thus forming part of the fish market channel.

3.4.4.10 Tourist support services

In resent years there has been a sharp rise in the number of tourists arriving in Tanzania, with many visiting the coastal towns, beaches, and historical sites. This has resulted in an increased demand for tourist services including accommodation, food and beverage services, transportation, guide support, sale of souvenirs, etc. These services employ a substantial number of people within those tourist centers and any member of the fisher's family working in any of these activities would bring in additional income to the family. Fishers find good markets for their fish and prawns at the tourist hotels. In addition, fishers earn additional income by selling shells and other marine souvenir directly to the tourists. However negative externalities caused by increased tourist activities have been mentioned. Notable costs in the form of social, cultural and environmental degradation have been reported in Unguja and Bagamoyo together with the fact that although the tourist industry provides employment opportunities, local people are excluded from participating in most of the activities (Anderson, et al., 1998; Semesi, et al., 1998).

3.5 The importance of fisheries in coastal communities livelihoods: conclusions

Artisanal fishers are the major marine fisheries stakeholders, accounting for about 95% of the fish production along the coast of mainland Tanzania. Out of the population of 4,453,080 in the 13 coastal districts, about 19,293 are artisanal fishers (0.43%) and another 96,465 people (2.17%) are engaged in fish processing and marketing.

The fisheries resource and related activities are vital for the livelihoods of the people living in the coastal districts. In particular, artisanal fishers depend on the resource for food (provision of nutritional requirements), creation of job opportunities and income generation. Any deterioration of the resource would threaten the livelihoods of these communities.

Although socio-economic studies have indicated that fishers are economically better off compared to purely agricultural dependent communities, it has been noted that the number of fishers has been increasing steadily over the last 10 years, while production (fish catch) is decreasing. This trend calls for the need to improve the management of the fisheries resource for sustainable fish supply, and also develop alternative livelihood earning activities.

Among the alternative livelihood earning activities, farming is common to all fisher communities. Others include stone quarrying, shell and other marine souvenirs collection; seaweed farming and cooked food supply which are more important for women. Aquaculture is an important alternative livelihood earning activity, but has not been developed and requires training and resources.

Less important livelihood earning activities for fishers include firewood collection and charcoal making, which can be environmentally disastrous if planned forest harvesting is not executed.

Other activities which are economically important but not directly linked to the fishers livelihoods and alternatives are lime making, salt making, wood curving and tourist support services. However, where a member of the fisher's family is engaged in any of these activities, it means additional income source for the family.

The diverse cultures and mobility of the coastal communities may pose a problem to implementation of development programmes. Cultural differences also become a hindrance towards formation of group ventures or co-operatives.

Socio-economic information regarding the contribution of the different livelihoods discussed above for fishers is hard to find. Such information would be important to planners of support programmes aimed at improving artisanal fishers' livelihoods and resource management/conservation plans.

4 Assets and access to capital

4.1 Assets

The assets of the marine fisheries are either privately owned or Government/Public property. The personal or private assets include the fishing gear and vessels, details of the numbers of which are given in Appendix 3. Also privately owned are the land-based fish storage facilities, ice making factories and a few processing plants. The large fishing companies process their catch (prawns) directly on board the fishing ships. Public assets include the fish landing stations and the fish markets.

Fisheries dependent communities have been mentioned to be economically better off than purely agricultural dependent livelihood earners as earlier discussed. Yet determination of profit margins for fishers and related activities requires complex analysis involving many variables and assumptions. This is complicated by the different gear types used, the use or non-use of boats, whether or not boats use are motorised. Whereas men go out to fish in boats, women mostly glean the intertidal areas for gastropods, bivalves and sea cucumbers (Jiddawi 2000). There is no periodic survey programme for management of fisheries households and therefore no official information of fishers' income other than data collected in the preparation of the Fisheries Master Plan Project. Survey outcome showed that the income of fishers is approximately US $ 1 per day, which exceeds the national average, with incomes of up to Tshs 120,00o/= per month for a boat owner with a circle net in the marine waters being categorised as one of the highest income generating groups engaged in fishing activities (Table 13a). There is a distinct difference in income between boats with and without engines, though both practice the same fishing methods. Obviously fishers without boats earn little, basically for home consumption.

Table 14: Comparison in monthly incomes and profits per sales among different fishing methods for marine fishers

Fishing method	Night purse seine with engine	Circle net with engine	Gill net without engine
Income for crew (Tshs)	46,940	21,250	28,250
Income for a boat owner (Tshs)	120,483	191,389	39,750
Profit per sale (%)	5.2 %	18.2 %	18.9 %

Source: MNR&T/JICA 2002

A low motorisation ratio for boats (10%) in Tanzania has been identified. Engine powered mobility is required for moving to fishing grounds and landing sites and conducting rapid operations. Among fishing boats that carry out net fishing, quite a few lease out outboard engines at rental charges between Tshs 5,000 to 20,000 per fishing trip (MNR&T/JICA 2000). Motorisation has to be selected with care as the cost of the engine and running costs have to be matched by increased catch. It is therefore important that the right size of engine for the particular vessel and fishing gear (method) be selected. Economically, some vessels and fishing gear may not necessarily require motorisation at all.

4.2 Fish handling facilities

These are publicly provided facilities to support fishers in their day-to-day operations. These facilitate marketing of the catch and reduce post harvest losses. The users are charged in terms of taxes or rent and in other cases pay on service. Users of any of the above assets have to pay for the services. If the fishing gear is hired, the owner gets a share of the catch (up to 15 %). Renting vessels is not common but it is more common to rent outboard engines. The lease conditions are harsh for the fishers as rental charges may vary between Tshs 5,000 to 20,000, or fishers may be required to pay 15 % of sales and to sell all their catch to the engine owner (MNR&T/JICA 2002). These tough conditions are meant to protect the owner. Other services are payable at cost, e.g. supply of a block of ice 30 cm x 50 cm x 70 cm (about 10 kg) may cost as much as Tshs 2,000. Payment of public services is usually done through taxes or levies. Up to 5 % of production may be charged for offloading fish at the Dar es Salaam market to be auctioned (MNR&T/JICA 2002). Public taxes/levies include boat registration fees, fishing licenses, landing/market fees and others.

These facilities include:

- Fish receiving stations & Markets (Landing Sites)
- Land based fish storage facilities (cold rooms)
- Ice making facilities
- Processing plants

In addition to paying for the services that support fishing, taxation is another cost that should not be ignored. Although no tax is charged on fishing gear, some other taxes and levies are still loaded on the fishers. They include boat registration fees, fishing licences, market/landing fees, and other (local levies). Too many taxes may pose a problem due to the small amount of catch the fishers are able to get, hence tend to force them into improper procedures (tax evasion) that may not be favourable to the fishers' livelihood development, and in this case the many taxes need harmonization.

4.2.1 Important Landing Sites

Fish landing sites are an important part of the fishing industry as they play a major role in the fish marketing chain. Fish landing sites are specific areas, which are selected to suit the intended purpose. The criteria used for selecting a fish landing site are:-

- The area must not be a fish breeding area
- The area must be sheltered against strong winds
- The area must have a reasonably deep water to allow for anchoring of different sizes of fishing vessels
- The area must be easily accessible
- The area must be reasonably large enough to allow for expansion, construction of land-based fish processing/storage facilities.

There are over 200 permanent fish landing sites along the coast from Tanga in the north to Mtwara in the south as detailed in Table 13b.

Table 13b: Number of fish landing sites observed in each of the coastal districts

Region	District	Permanent landing sites	Temporary landing sites	Total landing sites
Tanga	Muheza	18	0	18
Tanga	Pangani	12	0	12
Tanga	Tanga	25	0	25
Coast	Bagamoyo	13	0	13
Coast	Mafia	32	2	34
Coast	Mkuranga	10	0	10
Coast	Rufiji	12	3	15
Dar Es Salaam	Ilala	1	0	1
Dar Es Salaam	Konondoni	5	0	5
Dar Es Salaam	Temeke	8	0	8
Lindi	Kilwa	17	1	18
Lindi	Lindi	18	0	18
Mtwara	Mtwara	29	0	29
Total		**200**	**6**	**206**

Source: Fisheries Frame Survey Results, May 2001

Generally the fish landing sites that are utilized by fishing boats are natural sandy harbours. There are no fish landing sites that are dedicated exclusively for fishing boats, with the exception of the Dar es Salaam harbour and the TAFICO jetty located in the Kigamboni area. At the landing sites along the Indian Ocean where the tidal differences are large (about 4 meters), fishing boats are forced to moor several hundred feet away from the anchorage site due to the sandy harbour and access to the boats is difficult during high tides (Fisheries Masterplan 2002). Additionally, due to lack of mooring facilities, fish catches are often unloaded onto a small canoe and landed in the harbour.

4.2.2 Land based fish storage facilities (markets)

These facilities are an important component of the fish marketing chain. Fish is a product that can spoil very fast particularly in the tropical heat along the coastal districts. Many of the markets along the coast are located within the landing sites and are not facilitated with cold room facilities for longer period storage. The fish landed is kept fresh by using water or ice blocks in insulated boxes. Fish is sold on the same day is better, as prolonged storage, particularly without ice, results in deterioration hence low retail prices and sometimes complete loss.

4.2.3 Ice making facilities

Many of the fresh fish retailers in the landing sites depend on ice to store the fish that is not sold immediately. In most cases the ice is provided by private processors outside the fish market and supplied through trucks. The ice blocks are sold in different sizes to suit the customer demand. An ice making plant is planned for the Dar es Salaam fish market at Kigamboni.

4.2.4 Processing plants

Presently there are two types of processing facilities in Tanzania. Processing plants that produce export products,.and the processing operations of small-scale processors who produce traditional processed products for the local market. Most of the processing plants for export are located in Mwanza, to process Nile Perch catches. There are a few in Dar es Salaam and Tanga to service the marine fishery. To combat the unreliable

energy (electricity) and water supplies, these processing plants have invested in facilities that will ensure secure energy and water supplies. The larger industrial fishing companies operating along the coast have processing facilities within their fishing vessels, and all the processing is done on board.

There are many small-scale processing plants, but most require improving. They process products like sardines (dagaa) and other dried fish products for local distribution. The major issues that need to be improved include development of tap and drainage water facilities, electricity supply, sanitation and improved working environment. Most of the small scale processing is done either by sun drying, or salt and sun drying or smoking.

4.2.5 Transportation

To facilitate proper function of the above services an efficient transportation system is required. Customers wanting to buy fish need easy access to the fish market center. Often times the fish is transported on trucks or bicycles to reach the buyer. Many of the roads that connect to fisheries communities are unpaved and become impassable during the rainy season. This has negatively affected the marine fishery, being a major factor behind the complex marketing system connecting the middlemen, the buyer and the artisanal fisher. In addition, the time loss incurred transporting the fish over poor roads is another factor contributing to the drop in freshness.

4.2.6 Fish Marketing and Constraints

Internal (local) and external (export market) characterize fish marketing of Tanzania. The internal market includes the local production areas and other parts of the country.

The overall flow of fish supply from the coast can largely be divided into three channels

- Fisheries production and marketing centered around Dar Es Salaam
- Production and marketing in northern areas such as Tanga, Pangni, etc.
- Production and marketing in southern areas such as Lindi, Mtwara, etc.

Dar Es salaam has the largest consumer market along the coast. Fishing boats based in Dar Es Salaam and some from other areas of Bagamoyo, Mafia, Zanzibar, Lindi and Mtwara land their catches at the city's modern fish market situated at Kivukoni area.

Local fish marketing in the other coastal regions is a daily transaction but on smaller scale. Markets remain undeveloped and fish transactions are carried out by a small number of retailers at the fish landing sites. Processed (basically dried) fish from these areas also find its way to inland markets and into neighboring countries but through traders.

Most of the shellfish, mollusks, crabs, cephalopods and sea cucumber are mainly for the export market.

Fish marketing constraints include:-

- Low and irregular (unreliable) fish prices;
- A poor distribution network;
- High post harvest losses, resulting from the generally poor infrastructure (both fresh and dried fish);
- Opportunity loss of fresh fish trade;
- Poor fishing technology and inferior fishing gear;

§ Inadequate fish post-harvest handling knowledge.

4.3 Access to Capital

Rural financial services accessible by fishers are few and inadequate. A few programmes supported by donors have provided credit to fishers along the coast. They include Swiss Aid in Mtwara, Pride Tanzania in Tanga and Dar es Salaam, Rural Integrated Programme Support (RIPS) in Mtwara, UNDP community-based initiative (CBI) in Mtwara, Lindi, Kilwa and Dar es Salaam and Poverty Africa in Tanga Region. It has been reported that these credit facilities have not been very favourable to fishers as the interest rates were high, and the application process very cumbersome.

Full-time fishers rarely go to search for credit from the above listed credit organizations. Those who do are involved in trade for fish and fish related products. Creditors are afraid of giving out loans for purchasing boats and engines for fear the borrowers may sell them and claim they were stolen. Bank managed credit facilities feel that fishing is risky, and are hence wary of issuing credit to artisanal fishers. They set stringent conditions that detract artisanal fishers from applying.

4.3.1 Co-operative ventures

Co-operatives are meant to be the means through which poor individuals can access capital facilities for investments and development. However the experience of Tanzania's government-formed co-operatives has not been very successful, and many have collapsed. The Government's effort to replace these with voluntary member controlled Savings and Credit Cooperative Societies (SACCOs) has not picked up speed. Currently, there are few fisheries-related SACCOs. Those that exist can be divided into three major groups, according to their objectives as follows:

- Those intending to achieve economic benefits through joint activities;
- Those intending to secure business and land usage rights; and
- Those wanting to receive assistance from external sources such as NGOs or donors.

The Mikingamo Fishing Group, which operates in Mafia Island, Coast Region, is an example of fisheries cooperative with economic goals. Fishers with limited access to credit were able to raise contributions and obtain a loan to purchase fishing equipment and a second-hand fishing boat. The incomes of members have increased. In addition to direct economic benefits, there has been added welfare type benefit based on mutual assistance of members taking over the work of another during illness.

Cooperatives that were formed to secure business and land usage rights are limited in areas such as Dar es Salaam fish market where potential government pressure exists. Vusha is an example of such a group, and is comprised of small fishers and retailers to conduct activities in the Dar es Salaam fish market. Formed in 1980, its initial founding motivation was to protect their activities from external pressure. The construction of the new fish market at the Dar es Salaam recently attracted more members to the cooperative, an indication that the motivation to secure business had stimulated membership in the organization.

There are many cooperatives that were formed with the objective to receive assistance from external sources in other areas of Tanzania but fewer on the coast. The Mikingamo Fishing Cooperative Society in Mafia Island is an example of such a society. They received a free loan for fishing equipment from Fisheries Division, and using the capital

they managed to repay the loan, purchased new equipment from the profits generated and expanded their activities. When organizations are dependent solely on assistance from external sources, there is the danger that the activities of the organization will cease when the assistance ceases. However, the Mikingamo Fishing Cooperative Society is a successful example of how external assistance was utilized as a base to achieve sustainable development. Others have not been successful and have collapsed when the external support ceased.

Many fisheries cooperative groups have been formed along the coast and elsewhere some registered, others are not. Appendix 5 lists those formed in the coastal districts, their major objectives and status. Most of these are very new, unregistered and their performance is yet to be reported. Most were formed to attract external assistance.

More fisher cooperatives need to be started and the existing ones strengthened. However almost all need support in terms of training on how to manage them to avoid the bitter experience many have had to the disappointment of its members.

4.4 Assets and access to capital for artisanal fishers: conclusions

Assets of importance to the marine artisanal fishers include fishing gear, vessels and marketing infrastructure. Most fishing is carried out in shallow areas around coral reefs that are easily accessible from fishing villages and landing sites using different types of gear (hand line, gill net surrounding net, purse seine, long line and fish traps).

The majority of fishers use boats, mostly dug out and outrigger canoes (75%). Of the total number of boats in the marine waters, about 10% are motorized. Motorisation improves fishing efficiency and enables fishers to access more distant, less exploited areas, but should be selected carefully to ensure the additional costs are recovered though increased catch and fish quality, hence the need to properly consider the gear type, and size and type of vessel. The most easily reached sites are facing serious fishing pressure and overexploitation with no time given for natural recovery.

Profit margins vary according to fishing method and vessel used, but it has been estimated that most fishers earn about US $1 per day an income higher than the national average.

Artisanal fishers are subject to a variety of taxes and levies, including boat registration fees, fishing licenses, market/landing fees, and other (local levies). Too many taxes are a hindrance to the fishers' livelihood development, and in this case the many taxes need harmonization.

The marketing of the artisanal fishers' catch depends on the connection to the middlemen who transport the fish to the major consumer markets. Many of these landing sites are located in remote areas where transportation is rather difficult, thus depriving the fishers of better prices.

The artisanal fishers wish to improve their catch through acquisition of better fishing gear and motorized vessels. This requires capital, which they do not have. Credit facilities to the artisanal fishers are not easily available because creditors categorise fishing as high-risk investment. This dilemma could be overcome though formation of viable fisher co-operative organizations where collective effort may culminate to acquisition of working capital and member credit schemes with better conditions can be accessed. In addition

through these community based organizations donor and/or government support could be channeled.

Reliable information on the fishers' household income and expenditure is limited. As an information gap, this is an area that needs further study. The data is important to enable planners to project the needs and support required to improve the livelihoods of these artisanal fishers.

5 Institutional arrangements, and legal and policy issues

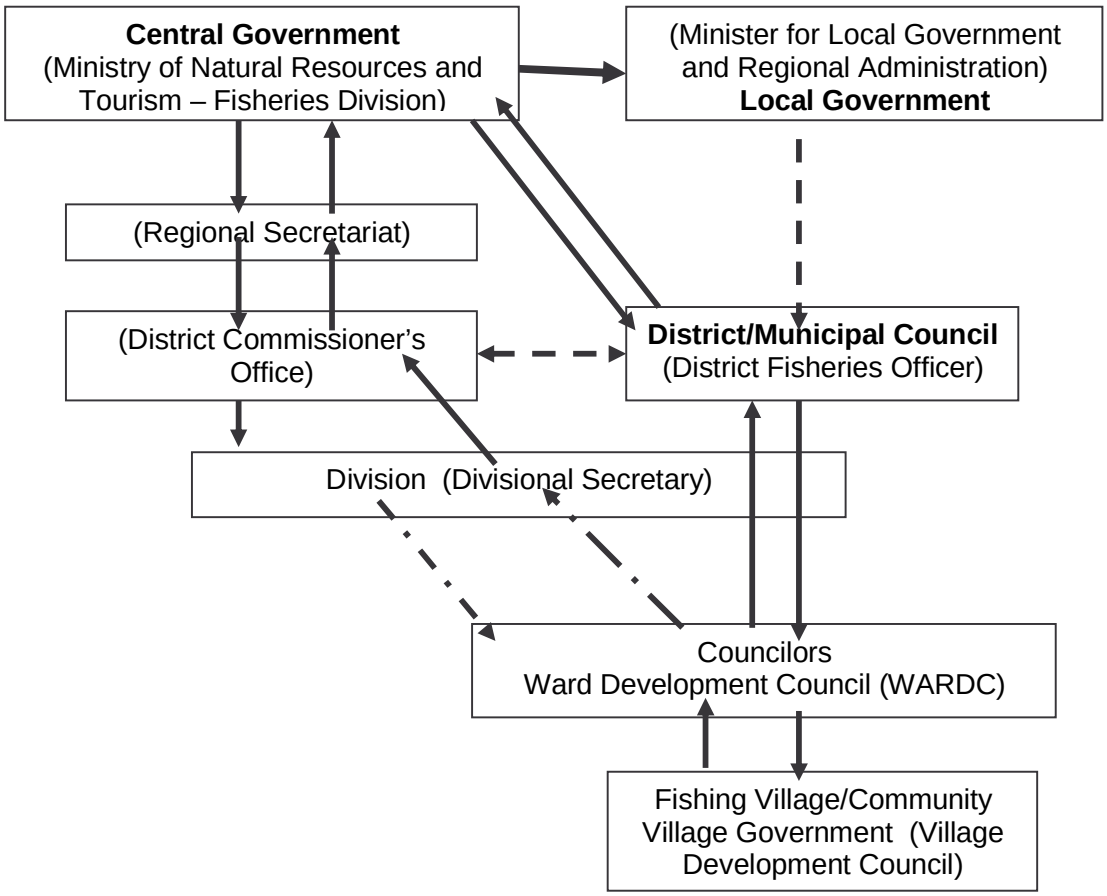
5.1 Institutional arrangements

5.1.1 General Administration

Government administration is conducted at both regional and district levels, with more functional powers at district level under the current decentralised system. There are five coastal regions on the mainland, three on Zanzibar Island and two on Pemba. The 13 coastal districts on the mainland are, from north to south: Muheza, Tanga, Pangani, Bagamoyo, Kinondoni, Ilala, Temeke, Mafia, Mkuranga, Rufiji, Kilwa, Lindi, Mtwara, (Figure 1).

Under decentralization, the central Government does not link directly with activities at the grass roots level. Rather, the Government's role is to make policies and regulations, which are implemented indirectly through the District/Municipal Councils but the supervision role is still direct through the Regional Secretariat and the District Commissioner's Office. The chain of command is as detailed in Figure 5.

Figure.5 : Organisation of Central and District Governments in a fisher community environment



NB: The Decentralization Structure is still under Reform

The Fisheries Division in the Ministry of Natural Resources and Tourism administers the fisheries sector. However, with the on-going decentralization the operational officers are now working at District Fisheries Offices, and limited number are working at Headquarters. Headquarters fisheries officers formulate policies and overall co-ordination, and fisheries related services are carried out by the fisheries officers in the districts. The District Fisheries Offices and their administrative tasks are under the management of the District Executive Director. The districts can establish and collect landing fees for their own revenue. In Figure 5 the continuous arrows indicate direct linkage and flow of information for implementation at the different levels, where as the dotted arrows indicate indirect link with little implementation enforcement (basically for coordination purpose only). The role of the district fisheries offices is to carry out policies formulated by the fisheries Division Headquarters. Extension services in fisheries are the most important responsibility of the district level office. Other responsibilities include monitoring of fishing activities in accordance to the law and collecting information from the fishing villages to be fed to headquarters for processing and co-ordination. The data collection requires training and facilitation to overcome the weaknesses that have already been identified.

The Local Government (District Council) is the policy implementer and enforcer of the Fisheries Act and Regulations. The local government functions through the Village Councils. Under the village council there are five committees, which address various issues of public interest at community level. These have been established under the constitution of the United Republic of Tanzania. The committees include Security, Environment, Community development, Health and Finance. The Village Environment Committee (VEC) is responsible for the management and conservation of the marine resources. However the effectiveness of this important committee has been low due to limited resources. The Environment Committee is one of the five committees responsible for the day today operation of the village government. All issues pertaining to environmental management have to be passed by the committee, and if any action is to be taken to discipline offenders, this committee will sanction it. It is the advisory arm of the village government on matters related to the environment. The committee meets regularly to deliberate on issues pertaining and report to the village government for actions that need implementation. Usually the village chairman will accept their decisions unless it is contrary to the interests of the villagers.

5.1.2 Beach Management Units (BMUs)

Beach Management Units (BMUs) have been formed to complement the fisheries conservation and management activities of the Environment Committee, but such BMUs have only been formed and operational in Lake Victoria under the Lake Victoria Environmental Management Project funded by the World Bank. Also, modalities for establishing similar units for the marine fisheries resource along the coast are still in the pipeline, and efforts are being made to learn from the experiences of the lake zone establishments. One major experience from the Lake Zone formation is one of conflict in roles between the BMUs and the Village Environmental Committees in the same fishing villages. It is hard to draw a distinction between the functions of the two entities. The VECs have legal powers as they are formed under the Village Government establishment laws, whereas the BMUs have only been formed under specific programmes (World Bank Funded). Now that the Fisheries Division intends to extend the BMUs ideas to the marine waters, the intention is to merge the functions of the two and to ensure the BMUs are legally recognized.

5.1.3 Non Governmental Organisations

A considerable number of NGOs are operating through the District Councils and village committees in development and conservation programmes in various areas along the coast. Such NGOs have national networks or locally based. Activities include studies to map out the biodiversity and characteristics of the resource so that, through better understanding of the issues at stake, better planning for its management can be done. Others are involved in training and stakeholder sensitization on the need for sustainable utilization of the resource. Others still support conservation programmes and connectivity at local (district), national and regional levels.

5.1.4 Other partnerships for coastal management

The marine coastal area is an integrated resource, and its management requires an integrated inter-sectoral management approach. The activities along the coastal area are those falling under the sectors such as Fisheries, Agriculture, Forestry, Tourism, Minerals, Water, Transport and Communications, Antiquity and Trade.

In order to have a sustainable utilization of the coastal marine resource, the need to have an integrated management approach is inevitable. This outlook has resulted to the establishment of The Integrated Coastal Management Partnership, a joint initiative between the National Environmental Management Council (NEMC) and technical support form the University of Rhode Island's Coastal Resource Center and the United States Agency for International Development that is looking at various ways of sustaining the coastal environment including the marine resource. Some of the effort includes awareness creation among the coastal communities over alternative ways of income generation, such as provision of tree seed nurseries, handcrafting, beekeeping, etc. Other activities include collaborative work with other institutions, both local and regional.

5.1.5 Functions of the Fisheries Division and affiliated institutions

The Fisheries Division is the implementer of technical matters related to fisheries. It is the overall authority, having the mandate to utilize and conserve the fisheries resource from both fresh and marine waters, and to oversee the necessary policy-making process and legal functions. It is also involved in research support and setting up the training of technical staff (fisheries officers) at diploma and certificate levels, through both financial support and the development of training materials. The Division under the Fisheries Policy and Strategy Statement of 1997 has designed strategic conservation measures geared towards sustainable utilization of the marine fisheries resources. Such measures include setting up regulations and procedures attached to licensing of large fisher companies, and co-management principles for the resource so as to safeguard the interests of all stakeholders, with special safeguards for artisanal fishers.

5.1.5.1 Management related activities

The following lists some of the management tools set up by the Fisheries Division to ensure compliance to the management of this vital resource:

- Limiting the number and size of fishing vessels;
- Restricting the fishing time for commercial fishing to 12 hours a day;
- Issuing fishing licenses;
- Coordinate with other divisions and International cooperation and joint activities;

- Zoning of the prawn fishing grounds in order to monitor and control the fishing pressure over the resource;
- Provision of observers (Fisheries personnel) onboard the fishing vessels during fishing time;
- Imposing a closed fishing season for the prawn fishing with the aim of allowing the prawn stocks to breed;
- Creation of awareness among the fisher communities on the importance of sustainable utilization of the fisheries resource;
- Introduction of co- management strategy approach;
- Amendment of the Fisheries Act and Her Principal Regulations to keep pace with the growth of the Fisheries industry;
- Training of Fisheries Officers on Prosecution Procedures;
- Provision of involvement of stakeholders in fisheries for workshops and other forums to censor their opinion and involvement in the management of the resource;
- Marine Parks and Reserves Unit - responsible for the management and conservation of the Marine Reserves. Currently co-management approach is being instituted involving communities living in areas surrounding these resources.

5.1.5.2 Research and Training activities

The following institutions are under the Fisheries Department, either directly or affiliated, providing service and support to the marine fisheries sector.

- **Fisheries Training activities**
  - Technical Training – Kunduchi, Mbegani and Nyegezi
    - Ø Kunduchi: Originally offering Diploma courses in Fisheries Sciences. Recently the institute has been handed over to the Faculty of Science, University of Dar es Salaam.
    - Ø Mbegani: Offers four specialised courses (Certificate and Diploma levels) in Fish Processing and Marketing; Boat Building; Master Fishermen (Marine Engineering & Refrigeration); and Gear Technology; **plus** short courses under tailor made arrangements.
    - Ø Nyegezi: Offers Diploma courses in Fisheries Sciences particularly for fresh water, and short courses under tailor made arrangements.
  - Vocational Training Centers – Pangani (marine), Liuli (fresh water) and Musoma (fresh water)
  - Young Fishermen's Center – Kijichi (marine); occasionally offers short courses in fishing technology.

- **Fisheries Research activities**
  - Tanzania Fisheries Research Institute (TAFIRI) – a semi-autonomous institution responsible for carrying out fisheries oriented research in both marine, brackish and fresh water fisheries.
  - University of Dar es Salaam
    - Ø Offers degree courses in Marine Biology and fisheries related sciences
    - Ø Conducts fisheries research through the Institute of Marine Sciences based in Zanzibar.

- National Environment Management Council (NEMC) (not directly linked to the fisheries sector but to all other sectors) – oversees all the environmental issues including those related to marine resources. The following activities are related to fisheries:-
    - Ø Conducting Impact Assessments (EIA) prior to any investment in the fisheries sector, and others.
    - Ø Overseas the conservation measures required over the marine resources
    - Ø They function in collaboration with the core sectors e.g. Fisheries, Industry, Agriculture, etc.

- **Collaborative Activities**
  The national research and training institutions collaborate with both regional and international institutions/organizations such as:
    - The Southern African Development Cooperation (SADC)
    - Indian Ocean Tuna Commission (IOTC)
    - World Wide Fund for Nature (WWF)
    - Food and Agriculture Organisation (FAO) of the United Nations
    - International Union for the Conservation of Nature (IUCN)

These are collaborators to the fisheries sector for the Assessment, Management and Conservation of the fisheries resource. They also finance local fisheries related activities and programmes.

5.1.6 Non-Governmental and Private Sector participation

5.1.6.1 Non-Governmental Organisations

A number of Non-Governmental organizations are supporting activities in the conservation of the marine resources and working with communities in coastal villages. They include such NGOs as

- The Tanzania Coastal Management Partnership – Coastal development, mangrove conservation, marine pollution, etc.
- Care International (Tanzania) – Conservation and management of coastal Forests

5.1.6.2 Private Sector (Processors & Exporters)

The private sector also offers services/support to fisher communities through provision of inputs on contractual arrangement e.g. sea weed farmers being provided with inputs and in return selling seaweed to the investors. Some of the processors include Sea Products Tanzania Ltd., TANPESCA Mafia, Plant Fruits Delamer Ltd., Royal African Lobster Tropical and VIC Fish Ltd.

5.2 Legal and Policy issues

The fisheries sector has a National Fisheries Policy and Strategy Statement endorsed in December 1997. The implementation of the policy and strategy statement is done under a well-set up legal framework.

The enforcement of the Fisheries Act No. 6 of 1970 and the Regulation was accomplished in collaboration with other Institutions under the objective geared towards a sustainable utilization of the fisheries resource. The partner Institutions include:

- Ministry of Home Affairs (Marine Police Section)
- Ministry of Defense (Navy)
- Ministry of Justice and Legal Affairs
- Fisher communities
- Other Fisheries Stakeholders (Fishing trawlers Association, Fish Processors Association).

5.2.1 Fisheries Laws of Tanzania

5.2.1.1 Historical Development of Tanzanian Marine Zones

From 1884 to 1918, Tanzania (then Tanganyika), Rwanda and Burundi formed German East Africa. Following the defeat of Germany in World War I, Tanganyika became a British Colony and Rwanda and Burundi passed to Belgium. Tanganyika then did not include Zanzibar, which was separate entity under Arab Sultanate until 1964, when it merged with Tanganyika to form the United Republic of Tanzania. The British favoured a narrow territorial sea of 3 miles in its colonies, which applied also to Tanzania. The three-mile breadth appeared in the Tanganyika Shipping Ordinance of 1938. Upon Independence on 9th December 1961, Tanganyika inherited a 3-mile territorial sea. It was extended, by declaration to 12 miles on August 1963. Unification with Zanzibar on 26 April 1964 necessitated delimitation of the United Republic's territorial sea to include the islands of Zanzibar and Pemba.

Two other important Proclamations were made in 1967 and 1973. The first provided that the territorial waters of the new United Republic of Tanzania extend to 12 miles from the "mean low water line". The second extended the limit to 50 miles, this time measured from the "appropriate baseline along the coast and adjacent islands of Zanzibar and Pemba. The 50-km breadth proclamation was done contrary to international practice at that time but the defense was for security reasons (Schafer 2002)

5.2.1.2 The Territorial Sea and Exclusive Economic Zone Act

In 1989, the Territorial Sea and Exclusive Economic Zone Act was passed, which had the effect of reducing Tanzania's Territorial Sea from a breadth of 50 miles to 12 nautical miles from the "Coastal low water line" of the United Republic, including the coast of all islands. This was in line with the implementation of the provisions of the 1982 Convention on the Law of the Sea, which was ratified by Tanzania in 1985.

5.2.1.3 The Fisheries Act No. 10 of 1994

Present fisheries law and regulation system consists of the "Fisheries Act No. 6 of 1970" as a base, amended by Act No. 10 of 1994 and other related acts such as the "Territorial and EEZ Acts of (1989)" discussed above and the "Marine Parks and Reserves Act 1994". The Fisheries Act is now being reviewed applying National FAO standards and the new international Act established in 1996. This new Fisheries Act takes consideration of the responsibility of the district Offices under the decentralization system. The draft of new law has 10 parts covering (i) Preliminary, (ii) Administration, (iii) Development of the fishing industry, (iv) Aquaculture development, (v) Management and control of the fishing industry (vi) Fish quality control and standards (vii) Financial provisions (viii) Enforcement, (ix) General provisions, and (x) Offences and penalties.

5.2.1.4 The Marine Parks and Reserves Act No. 29 of 1994

Establishes the Marine Parks and Reserves Units, which isresponsible for the management, rational utilisation and conservation of the Marine Reserves, which are areas that have been found to be rich in marine biodiversity and important for marine resource development. Currently co-management approaches are being instituted, involving communities living in the areas surrounding these resources. The first marine park to be established under this law is the Mafia Marine Park. The second one, which is more recently formed, is the Mnazi Bay Marine Park.

5.2.2 Policies governing the marine Fisheries Resource

5.2.2.1 The National Fisheries Sector Policy and Strategy Statement (1997)

The need for the Fisheries Sector Policy statement was felt in the mid 1980s the time when the country had embarked on policy and institutional reforms in order to revamp the national economy and facilitate the wholesome growth. A series of stakeholder workshops that followed in 1988, and 1991 together with the 1992 Rio Declaration on Environment and Development contained in Agenda 21 expanded the scope of the Fisheries Policy of 1998 (The Fisheries Policy 1997, Tanzania Strategy Profiles, Planning Commission, 2000). The overall goal of the National Policy is to promote conservation development and sustainable management of the fisheries resources for the benefit of the present and future generations. The Policy emphasizes the need to improve involvement of the fisher communities in the planning, development and management of fishery resources.

5.2.2.2 The National Environmental Policy (1997)

Environment commands very broad meaning and includes air; land and water; plant and animal life (including humans); the social, economic, recreational, cultural and aesthetic conditions and factors that influences the lives of human beings and their communities. The Environmental Policy Statements on fisheries are contained in Section 60, which states: In order to preserve the environment and at the same time, provide nutrition to the people and enhance their income from fish sales, the following policy objectives shall be pursued:

- Fisheries shall be developed in a sustainable manner, by using appropriate fishing gear and processing methods;
- Destructive fishing and processing methods shall be controlled by regulation and support i.e. making available appropriate fishing gear at affordable prices for fishers; specifically, dynamite fishing and the use of poisonous chemicals in fishing shall be severely combated;
- Alternative fish processing methods shall be promoted to avoid deforestation due to fish smoking;
- On the basis of stock assessment, fish stocks shall be conserved to maximize sustainable yield;
- Introduction of non-indigenous species shall be controlled;
- Post-harvest losses will be reduced through improved processing and preservation techniques;
- Fragile ecosystems and endangered species will be protected through proper fisheries management, mitigation/prevention of coastal and waterways degradation, and control of industrial pollution; and

- Integrated fish farming methods and other environmentally beneficial means of tapping the productivity of the environment through fish farming shall be pursued.

5.2.2.3 The Fisheries Master Plan 2002

The Government of Tanzania announced the current fisheries policy in December 1997. Under the new policy the government has been working for construction of infrastructure, reduction of post harvest losses, fisheries management etc. focusing on four targets of the fisheries development:

- Increased supply source of protein to the people and increased employment opportunities
- Increased export of fish products
- Activation/upgrading/development of fisheries industry by sustainable use of fisheries resources and
- Increased fish production and income of artisanal fishers.

The Master Plan aims at operationalising the National Fisheries Sector Policy and Strategy Statement (1998) and the overall objectives to develop a feasible integrated development strategy that will stimulate sustainable economic growth of the sector, in terms of food security, fishery environment and economic/social welfare of the fisheries communities. The Mater Plan states that the beneficiaries will be artisanal fisheries groups, small-scale traders, fish processors and their communities. The fisheries staffs of the central and local governments, other related service institutions and NGOs are also included as beneficiaries. The Master Plan aims to provide plans for 10 years starting from the year 2002.

The master Plan provides 15 priority programmes in order to achieve basic concepts and development strategies. These include:

- Marine fisheries sub-sector Capacity building
- Dar es Salaam Fisheries Infrastructure Improvement Programme
- Lake Victoria Fisheries sub-sector Capacity building Programme
- Lake Victoria Fish Marketing Improvement Programme
- Lake Tanganyika Dagaa Fisheries Development Programme
- Lake Nyasa Planked Canoe Extension Programme
- Aquaculture Extension Programme
- Fisheries Financial Support Programme
- Fisheries Co-management Programme
- National Fish Export Promotion Programme
- Lake Victoria Major Landing Beach Improvement Programme
- Fisheries Communities Development Programme
- Fisheries Information System Improvement Programme
- Fishing Training Institute Improvement Programme
- Fisheries Master Plan Implementation Training Programme

Brief descriptions of the priority programmes that touch on Marine Fisheries resource directly or indirectly are summarised below.

Programme One: Marine fisheries sub-sector Capacity building Programme will involve strengthening fisher groups/co-operatives, field training on fishing techniques and

promotion of marketing within Dar es Salaam, Mafia and Bagamoyo as target areas in the first phase of implementation.

Programme Two: The Dar es Salaam Fisheries Infrastructure Improvement Programme will involve expansion of the fish market and expansion of the mooring area in Kivukoni Front, activities which are now at advanced stage (nearing completion).

Programme Eight: Fisheries Financial Support Programme aims at establishing credit system with low interest rates for small-scale fishers for the purchase of capital goods such as fishing boats, outboard engines, and fishing gears. Target areas – Phase I: Mafia Island; Phase 2: Kigoma district.

Programme Nine: Fisheries Co-management Programme will establish co-managed systems on fisheries resource at Model communities, through strengthening resource management education for fishery co-operatives and assisting the fisheries community's environmental project that will be implemented by the fishery co-operatives or community organisation. Target project sites include 78 landing sites in Dar es Salaam and Coast Region.

Programme Ten: National Fish Export Promotion Programme comprised of two components; a marketing survey and the construction of quality control inspection center. The marketing survey will be conducted nationwide while the survey on product quality will be conducted at Dar es Salaam, the marketing base of the country. The quality inspection laboratory is expected to be built in Mwanza.

Programme Twelve: Fisheries Communities Development Programme aimed at eradicating poverty in fishing communities through an approach based on community resident participation and organised community leadership in contrast to traditional government development leadership. Target area – Three districts in southern part of Coast Region.

Programme Thirteen: Fisheries Information System Improvement Programme basically to strengthen the statistics section, Fisheries Division in the Ministry of Natural Resources and Tourism.

Programme Fourteen: Fishing Training Institute Improvement Programme; strengthening the capabilities of private sector fishery related personnel and government fisheries officers through educational and training programmes in order to improve public fisheries services and to conduct effective fisheries extension activities. Though nationwide the programme site will be in Nyegezi, Mwanza.

Programme Fifteen: Fisheries Master Plan Implementation Training Programme to efficiently implement the Master Plan nationwide.

5.2.3 Management Plan to Mangrove Ecosystem of Mainland Tanzania

According to the Management Plan for the Mangrove Ecosystem of Mainland Tanzania Vol. 1-3, existing Forest Ordinance, which prohibit cutting of mangroves, seems to be applicable to villagers only. Local Authorities continue to issue licenses to commercial groups to cut poles and to clear mangroves to construct saltpans. This implies that the present legislation and level of enforcement does little to manage or conserve mangroves. The Coastal zone Management programme in Tanga is working with

villagers to empower them to enact new by-laws for the management of their coastal resource.

5.2.4 Control of Illegal Fishing and Marine Pollution

The Fisheries Act No. 6 of 1970 and Her Principal Regulations addresses all the issues concerning the illegal fishing practices. The Act has been amended to match with the growing Fisheries Industry. In the amendment the rates of penalties have been reviewed to give offenders tougher penalties when convicted of an offence under this Act.

5.3 Institutional arrangements, and legal and policy issues: Conclusions

The Fisheries Division is the legal arm of Government in charge of overseeing the fisheries activities in Tanzania. The mandate of the division can be summarized by the functions of its four sections:

- Monitoring and Monitoring Guidance (fisheries patrol, administration and issuance of fishing licences, policy making, monitoring and enforcement);
- Management of Quality and Standards (conducting tests and ensuring quality);
- Surveying, Training and Statistics;
- Fisheries Development (marine culture and extension, publicity activities, formulating sector plans and budgets).

These functions are carried out directly by the Ministry staff and sometimes through and/or in collaboration with affiliated institutions (Research and Training) and non-governmental and private organizations working in fisheries.

Major functions that benefit the artisanal fishers include:

- Formulation and monitoring of regulatory laws to protect the fisheries resource, often in favour of the artisanal fishers;
- Training in fishing technology and boat building;
- Extension services and collection of data from fishers carried out by the district fisheries officers or research and training institutions.

Fisheries co-management is provided for by the establishment of the Village Environment Committees (VECs), which will be strengthened by establishment of Beach Management Units (BMUs). Other partnerships are expected to reinforce conservation and management aspects, the most active currently being the Tanzania Coastal Management Partnership (TCMP). Regional and international institutions contribute to the generation of information and new fishing technologies applicable to artisanal fishers.

The Territorial Sea (12 nautical miles) and the Exclusive Economic Zone area (50 nautical miles) beyond the coastal low waters, both of which are protected by the Territorial and Exclusive Economic Zone Act, form a wide fishing area for the fishing communities. Due to limited capital and low fishing technology, artisanal fishers have utilized little of this vast area. The open sea is ventured by larger fishing companies, which sometimes do not register within the country leading to loss of revenue.

The National Fisheries Sector Policy and Strategy Statement of 1997, and the National Environmental Policy of 1997 both stress the need to promote conservation development and sustainable management of the fisheries resource for the present and future generations. Implementation of the Fisheries Master Plan of 2002 is geared

towards supporting those initiatives so that the resource contributes more to the livelihoods of the fishers.

The activities planned for the marine artisanal fishers in Phase I of the Master Plan include strengthening fisher co-operatives through:

- training and promotion of marketing within Dar es Salaam, Mafia and Bagamoyo;
- financial support to establish credit system for fishers in Mafia;
- establishment of co-management systems on fisheries resources in 78 landing sites within the coast and Dar es Salaam Regions; and
- fisheries community programme support based on resident participation and organized community leadership in Mkuranga, Rufiji and Mafia Districts.

Active participation of the artisanal fishers in these programmes will benefit the poor, hence improving their livelihoods. However, extension personnel in these districts have a challenge to sensitise these communities to the activities of the plan, thus may need empowerment through workshops and visitation to the project areas. This gap has to be filled before the project starts to give it proper footing.

6 The Study Site Selection Process

The review has covered 13 coastal Districts of mainland Tanzania (in 5 regions). The information gathered indicate within these regions the following coastal districts surround important fishing grounds at their land-water interfaces important for the livelihoods for the local communities:-

(i) Districts whose fisheries activities are centered in the northern coastal regions of Tanzania - Tanga, Muheza and Pangani
(ii) Districts whose fisheries activities are centered in the central coastal regions including Dar es Salaam – Bagamoyo, Kinondoni, Ilala, Temeke, Mkuranga, Rufiji and Mafia
(iii) Districts whose fisheries activities are centered in the southern coastal regions – Kilwa, Lindi and Mtwara.

In accordance to the Terms of Reference we needed to select one district in which to undertake the livelihoods study. Out of the 13 districts we set out to select one on the basis of the agreed criteria as follows:

Step 1: The fisheries data and information discussed in the main text was summarized in tabular form as indicated in Appendix 4. The information was arranged in four categories as shown depicting:

(i) Distribution of major fisheries resources;
(ii) Assets available to the fishers;
(iii) Resource use and contribution of the fisheries sector to the livelihoods of the coastal people; and
(iv) Poverty indicators for these communities.

Each criterion was given a number name and scores assigned to each depending on the strength or level of the attribute as detailed below (Table 14).

Table 14: Site selection criteria and score definition

Criteria/(No.)	Level	Score
(i) Major resource patterns that determine the survival and development of the fish resource and livelihoods of the people		
(1) Fishing area (extent/size)	Large/ wide inshore waters Medium narrow water body Limited areas /town dev interference	3 2 1
(2) Coral reefs	Fringing/Outer/Patchy (Plenty) Fringing/ Patchy (Noticeable) Patchy and limited	3 2 1
(3) Areas of mangrove forests	Extensive (10.1-50+ha) Medium (1.1-10.0ha) Patchy (0.1-1.0ha)	3 2 1
(4) Significant areas (estuaries, bays, sand, mud)	Estuaries/bays/major rivers Some estuaries/bays Minor estuaries/bays	3 2 1
(ii) Assets influencing efficiency of catch and income		
(5) Landing sites	21 to 30+ 11 to 20	3 2

	1 to10	1
(6) Kilns	3 – 5+ 1 - 2 None	2 1 0
(7) Fish markets	Many (11-20) Medium (5-10) Few (I-4)	3 2 1
(8) Fishing vessels	Many (500+) Medium number (201-499) Few vessels	3 2 1
(9) Fishing gear types	1-5 types 6-10 types 11-15+ types	1 2 3
(10) Fishing gear shops	4-5+ 1-3 Not available	2 1 0
(11) Boat repair shops	6-10 1-5 None	2 1 0
(iii) Resource use and contribution to livelihoods		
(12) Annual catch (1996)	5,001-10,000 MT (large catch) 1,001-5,000 MT (medium catch) 100-1,000 MT (small catch)	3 2 1
(13) %Contribution to household main cash income from fishing	Above National average National Average (2%) Below National Average	3 2 1
(14) Number of fishers	Many (2,500-3,000) Medium (1,001-2,500) Few (100-1,000)	3 2 1
(15) %Fisher (of current total district population)	High (1.1-2.0%) Medium (0.2-1.0%) Small (0.01-0.1%)	3 2 1
(iv) Poverty indicators		
(16) %Below food poverty line	Above National average National Average (19%) Below National Average	3 2 1
(17) %Below basic need poverty line	Above National average National Average (36%) Below National Average	3 2 1
(18) Mean per capita household monthly income (nominal Tshs)	Above National average National Average (Tshs 17,922/=) Below National Average	1 2 3
(19) Median per capita household monthly income (nominal Tshs)	Above National average National Average (Tshs 8,323/=) Below National Average	1 2 3

Step 2: Each district was scored based on the information discussed in the review. Using the criteria presented in Table 14 the scores were entered against each district. The results are presented in Table 15.

Where information was given for regions, the average figure for that attribute was used in the relevant districts. The scores were added up to obtain the ranking.

Table 15: Score results for coastal districts of Tanzania based on selection criteria

Crtr /Dst	**Ta**	**Mu**	**Pa**	**Kn**	**Ila**	**Te**	**Ba**	**Mk**	**Ru**	**Ma**	**Kl**	**Li**	**Mt**
1	2	2	3	1	1	1	3	3	3	1	2	2	3
2	2	3	2	2	1	2	3	2	2	3	2	2	3
3	2	2	2	1	1	1	2	2	3	2	3	2	2
4	2	2	3	1	1	1	3	1	3	1	1	2	3
ST	**8**	**9**	**10**	**5**	**4**	**5**	**11**	**8**	**11**	**7**	**8**	**8**	**11**
5	3	2	2	1	1	1	2	1	2	3	2	2	3
6	2	1	2	0	0	1	2	0	1	2	0	1	1
7	3	3	2	1	1	1	2	0	1	2	0	1	1
8	2	2	2	2	2	2	2	1	2	3	2	2	3
9	2	2	2	2	2	2	2	1	1	3	2	2	3
10	2	0	1	0	0	0	1	0	1	1	1	0	0
11	2	1	1	0	0	1	1	1	1	2	0	1	1
ST	**16**	**11**	**12**	**6**	**6**	**8**	**12**	**4**	**9**	**16**	**7**	**9**	**12**
12	2	2	2	3	3	3	2	2	2	2	2	2	2
13	3	3	3	1	1	1	3	3	3	3	3	3	1
14	2	2	1	2	2	2	2	1	1	3	2	2	3
15	2	2	2	2	2	2	2	2	2	3	2	2	2
ST	**9**	**9**	**8**	**8**	**8**	**8**	**9**	**8**	**8**	**11**	**9**	**9**	**8**
16	1	1	1	1	1	1	3	3	3	3	3	3	1
17	2	2	2	1	1	1	3	3	3	3	3	3	2
18	1	1	1	1	1	1	1	1	1	1	1	1	1
19	3	3	3	1	1	1	3	3	3	3	3	3	1
ST	**9**	**9**	**9**	**4**	**4**	**4**	**10**	**10**	**10**	**10**	**12**	**12**	**5**
OT	**42**	**38**	**38**	**23**	**22**	**25**	**42**	**30**	**38**	**44**	**36**	**38**	**36**
Rnk	*2*	*3*	*3*	*7*	*8*	*6*	*2*	*5*	*3*	*1*	*4*	*3*	*4*

Crtr=Criteria; Dst=District; Ta=Tanga; Mu=Muheza; Pa=Pangani; Ba=Bagamoyo; Kn=Kinondoni; Ila=Ilala; Te=Temeke; Mk=Mkuranga; Ru=Rufiji; Ma=Mafia; Kl=Kilwa; Li=Lindi; Mt=Mtwara; ST=Sub-Total; OT=Overall Total; Rnk=Rank

The results indicate Mafia ranked number one overall (44 points), followed by Bagamoyo and Tanga districts (42 points each). The districts in Dar es Salaam Region scored the least (Ilala - 22 points, Kinondoni – 23 points and Temeke – 25 points) despite being the largest fish market center in Tanzania. This was expected as most of what is sold in the Dar es Salaam Fish Markets is brought from the other fishing areas.

Mafia seemed to be the favourable area for the study but its accessibility is difficult. It is only accessible by boat or small planes, mostly on hire, thus difficult to operate there for a small project. Besides the district is an island and its environment may not represent

the larger coastal areas of either Tanzania or Kenya. The next choice was either Tanga or Bagamoyo District. During the gray literature review it was noted that although the marine fisheries in Tanzania seem to be widely studied, most studies are conducted in areas where research institutions exist or where there are projects, thus majority of the reports come from Zanzibar, Mafia, Mtwara, Tanga, Dar es Salaam and Songo Songo (Jiddawi 2000). Hence there is gap in Bagamoyo. Besides, although Tanga and Bagamoyo are equally rich in the marine resources, assets and resource use patterns Tanga district seem to be better off in terms of poverty levels (9 points) compared to Bagamoyo (10 points) and our study was targeting the poor. Finally the distance of travel from Dar es Salaam to Tanga is much greater compared to Bagamoyo. With these findings and affirmed by the visit to the site it was decided that we select **Bagamoyo** for the study as it passed all the criteria tests applied.

6.1 Bagamoyo District as an Important Marine Fishing Area

Administratively Bagamoyo is one of the six districts under the Coast Region. The district extends over an area of about 9,842 square kilometers. The population is currently 230,164 people by the 2002 Census. Poverty among the people is rated high and there is serious unemployment, especially among the youth (Magimbi, 1999).

Bagamoyo Town is the district headquarters, which is located about 70 km north of Dar es Salaam. The town has a long history dating back to the early decades of 1800. The town is reported to have grown and prospered during 1830 – 1890 following Sultan Seyyid Said of Oman economic interests to develop the eastern coast of Africa as the economic power house of his empire (Kombe, 2002). Gradually the town became the harbour and center of the ivory and slave trade caravans to and from the interior. Because of the good agricultural hinterland and a suitable harbour, and the proximity and link to Zanzibar, during 1800 – 1830, Bagamoyo grew into a rich agricultural, fishing and trading center. The town is accessible by both road and sea from Dar es Salaam City and only by sea from Zanzibar, Pemba and Mombasa.

Wazaramo, wakwere, Wazigua, Waluguru and Wadoe dominate the local ethnic groups.

The economy of the coastal communities in Bagamoyo combines fishing, agriculture, trade and handicrafts (Semesi, et al., 1998)

Agriculture leads as the main occupation for the majority of the people. Many households consider farmland an important and main source of their livelihoods. The crops grown include coconuts, cashew nuts, rice, maize, vegetables, fruits and in the 1980s cotton. Other important income generating activities include fishing, boat making, small-scale salt works and petty trading.

The fishing industry is second to agriculture. The environment has favoured the development of the marine resource, which includes river estuaries in the north (Wami and Ruvu), mangroves, extensive undamaged coral reefs (Mwambakuni and Mshingwi), sea grass areas and the Zanzibar Channel, all of which are good fishing grounds (Semesi, et al., 1998).

Most fishing is artisanal but commercial fishing is important. The area has 13 permanent landing sites and forms the major part of prawn fishing (Zone 2). Like other areas the artisanal fisheries faces a number of problems leading to its poor performance.

During the visit to the district we identified 3 villages, which the Fisheries Officer of Bagamoyo agree will be suitable for the study. The villages include Dunda, Mlingotini and Kondo. Mlingotini and Dunda are adjuscent and Dunda has two important Landing Sites - Custom and Nchipana. The details of the study villages/sub-villages are shown in Table 16 and Figure 6.

Table 16: Communities, demography, dependent on marine resources

LOCATION OR SUB-LOCATION: Bagamoyo

Demographic details (population) in location or sub-location	Names of fishing communities (villages)	Size based on demographic data	Identify main economic or livelihood activities in order of importance for each community or village	Source of information or reference
286	Dunda-Custom	Large	Fishing, trading, fish processing agriculture	District Fisheries Office and site visits
192	Dunda-Nchipana	Large	Fishing, trading, fish processing agriculture	-do-
105	Mlingotini-Mlingotini	Medium	Fishing, boat repair, fish auctioning, agriculture	-do-
37	Mlingotini-Kondo	Small	Fishing, boat repair, fish auctioning, agriculture	-do-

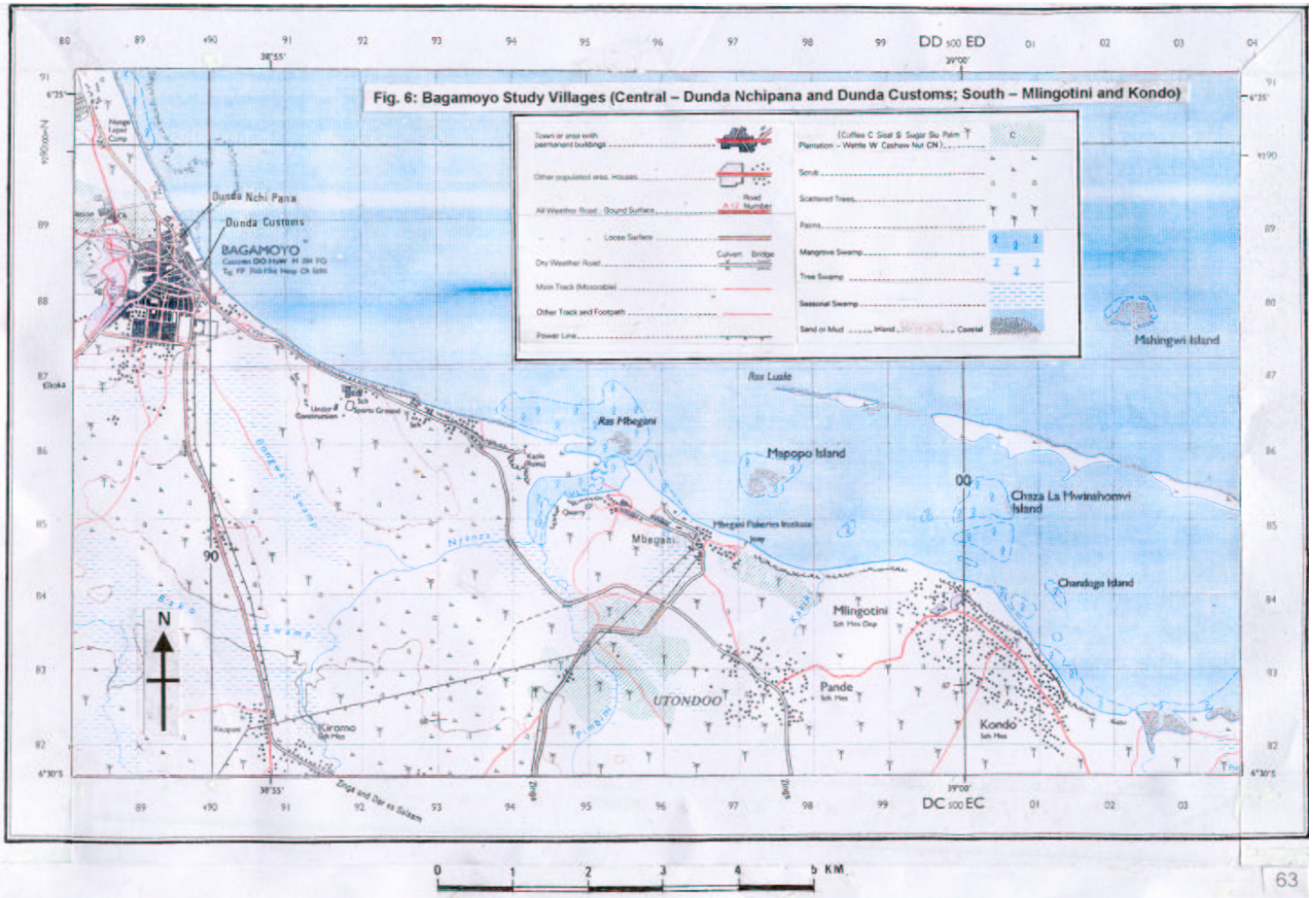


Fig. 6: Bagamoyo Study Villages (Central – Dunda Nchipana and Dunda Customs; South – Mlingotini and Kondo)
Dunda Nchi Pana
Dunda Customs
BAGAMOYO
Ras Luale
Ras Mbegani
Mapopo Island
Chuza La Mwinshomvi Island
Mbegani
Mlingotini
Chandoga Island
Pande
Kondo
UTONDOO
Kiromo
Mshingwi Island
Boma wa Swamp
Nyanza
Bako Swamp
Ziwa
N
0 1 2 3 4 5 KM

7 General conclusions and recommendations

The artisanal fisher communities living on the coastal districts of Tanzania realize their livelihoods through utilization of the physical and biophysical resources of the land/water interface, in particular the different types of fish and other marine animals. The artisanal fishers form the major marine fisheries stakeholders, and contribute about 95% of the fish production along the coast of mainland Tanzania. Out of the population of 4,453,080 in the 13 coastal districts, about 19,293 are artisanal fishers (0.43 %), and an additional estimated 9,6465 people (2.17 %) are engaged in fish processing and marketing. The fisheries resource is vital for the livelihoods of these people. In particular, the artisanal fishers depend on the resource for food (provision of nutritional requirements), creation of job opportunities and income generation. Any deterioration of the resource would threaten the livelihoods of these communities.

The climate, ocean currents and level of exploitation and management of the marine fisheries resource and habitats that sustain it influence the extent to which the coastal communities achieve their livelihoods from the resource. Other factors limiting the fishers ability to exploit the resource sustainably include poor and inefficient fishing gear and vessels, lack of capital, limited access to better markets coupled with poor handling facilities, poor infrastructure and high post-harvest losses.

Reliable information on the fishers' livelihood activities and household income and expenditure is limited. As an information gap, these are areas that need further study.

Although socio-economic studies have indicated that fishers are economically better off compared to purely agricultural dependent communities, the review has revealed that the number of fishers has been increasing over the last 10 years while production (fish catch) is decreasing.

The above limitations and trends call for the need to improve the management of the fisheries resource for sustainable fish supply, access to more competitive markets and identification of alternative livelihood earning activities.

In order for the quality and quantity of fish to improve, the fisheries resource needs to be better managed, particularly the areas most frequented by the artisanal fishers, such that the fishing pressure is reduced. The planning and management process should involve all the stakeholders. Sustainable management and utilization of the resource should encourage expansion to unexploited areas, planned exploitation to allow regeneration and moves to alternative livelihoods.

Empowerment of artisanal fishers to acquire improved fishing gear and vessels will enable them to exploit better the fisheries resource through being able to access more distant areas and/or being more efficient in their operations. Bank credit facilities to the artisanal fishers are not easily available because creditors categorise fishing as a high-risk investment. This dilemma could be overcome though formation of viable fisher co-operative organizations where member credit schemes with better terms may be accessed and through which donor and/or government support could be channeled. In recent years, many fisheries cooperative groups have been formed in the coastal districts following the policy of voluntary member controlled and managed cooperatives principles. Some of them are registered others are not. Most of these cooperatives are

new, small and unregistered and their performance is yet to be assessed. They need to be supported.

Among the alternative livelihood earning activities, farming is basic to all fisher communities. Others include stone quarrying, shell and other marine souvenirs collection; seaweed farming and cooked food supply which are more important for women. Aquaculture is a potential alternative activity, but has not been developed and it requires training and resources.

Less important livelihood earning activities for fishers include firewood collection and charcoal making, but these can be environmentally disastrous if planned forest harvesting is not executed. Other activities, which are economically important but not directly linked to the fishers' livelihoods and alternatives, are lime making, salt making, curving and tourist support services. However, where a member of the fisher's family is engaged in any of these activities, it means an additional income source for the household.

Acquisition of handling and preservation facilities will enable the artisanal fishers to access better markets and improved prices. Dar es Salaam and other coastal cities are potential better markets, directly to consumers or to processors for export.

Government policy framework is already in place to address the major issues. The National Fisheries Sector Policy and Strategy Statement of 1997 and the National Environmental Policy of 1997 both stress the need to promote conservation development and sustainable management of the fisheries resource for present and future generations. The policy stresses increased involvement of the fisher communities in the planning, development and management of fishery resources. Implementation of the Fisheries Master Plan of 2002 is also geared towards supporting those initiatives so that the resource contributes more to the livelihoods of the fishers.

The Master Plan establishes the base line of the status of all the fisheries resources and emphasizes immediate priorities and necessary actions for accelerating growth of the sub-sector and improvements of the fishers' livelihoods in the next decade. Brief descriptions of the priority programmes that touch on marine artisanal fisher communities are:

- Marine fisheries sub-sector Capacity building Programme - will involve strengthening fisher groups/co-operatives.
- Fisheries Financial Support Programme - aims at establishing credit system with low interest rates for small-scale fishers for the purchase of capital goods such as fishing boats, outboard engines, and fishing gears.
- Fisheries Communities Development Programme - aimed at eradicating poverty in fishing communities through an approach based on community resident participation and organised community leadership in contrast to traditional government development leadership.
- Fisheries Information System Improvement Programme - basically to strengthen the statistics section, Fisheries Division in the Ministry of Natural Resources and Tourism.

On their part, the artisanal fishers are expected to co-manage the fisheries resource, which is vital for their livelihood. The organizational structure in place for this function is

the Village Environment Committees (VECs) that will be strengthened by establishment of the Beach Management Units (BMUs). Other partnerships are also working with the communities to reinforce conservation and management aspects. Currently, the most active is the Tanzania Coastal Management Partnership (TCMP).

During this review, information gaps, particularly on fisheries data, were found. Other information gaps included inconsistent distribution of information related to the marine fisheries, and uncoordinated studies, sometimes leading to duplication of effort. Regional and international institutions working in the country contribute to generation of information and new fishing technologies applicable to fisheries resource and artisanal fishers. The Universities and the Fisheries Division also generate data and information on fisheries. It would be very helpful if a central Fisheries Information Centre could be established.

On the basis of the review information, it was possible to select the study site for this project. Bagamoyo was selected on the basis of marine resource abundance, dependence on the resource for the livelihoods of the fisher communities, varied gear types and fishing methods used by the local communities, geographical gap existing on studies carried out in the area, and higher poverty level measured against the other comparable coastal districts.

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9 Appendices

Appendix 1: Marine Fish Distribution by Region and by Species (Average % caught)

SPECIES/REGIONS	TANGA			COAST				DAR ES SALAAM			LINDI			MTWARA		
	1993	1994	1995	1993	1994	1995	1996	1993	1994	1995	1993	1994	1995	1993	1994	1995
SHARKS	3.09	1.71	2.26	2.66	3.89	2.78	1.17	0.61	0.45	0.53	3.23	6.37	6.16	4.81	2.57	6.65
RAYS	7.86	8.09	10.38	8.96	7.77	8.38	7.36	1.89	1.92	1.33	7.91	7.49	9.57	9.80	6.40	5.94
OCTOPUS	0.41	0.21	2.18	3.51	0.93	0.00	0.01	0.14	0.05	0.05	0.67	1.38	0.00	0.99	1.15	0.42
PRAWNS	0.26	0.13	1.37	11.45	4.85	0.69	0.38	0.14	0.06	0.08	2.91	0.00	0.00	0.00	0.00	0.00
FLAT FISH	0.20	0.06	1.37	0.36	0.29	0.30	0.09	0.01	0.01	0.01	0.00	0.00	0.00	0.00	0.00	0.00
SARDINES	20.07	22.38	28.49	16.94	31.93	27.65	49.86	29.25	25.11	25.24	6.73	24.61	3.92	5.09	5.17	4.44
THREAD FISH	0.91	0.59	0.34	1.12	0.61	1.33	2.99	0.35	0.20	0.21	0.00	0.00	0.00	0.45	0.15	4.30
CAT FISH	0.54	0.61	0.90	6.83	3.79	12.96	6.83	1.26	0.84	0.26	0.38	0.93	0.00	0.17	0.00	0.00
HALF BEAKS	0.09	0.36	0.12	2.19	3.67	4.42	3.82	1.87	2.51	1.31	5.99	1.97	1.66	8.19	6.66	7.03
MACKERELS	0.64	1.60	0.79	2.02	3.31	5.16	1.45	5.02	8.71	4.25	13.47	6.89	15.95	16.94	23.58	12.64
PARROT FISH	12.41	14.30	12.05	8.65	10.51	8.53	10.38	5.06	5.17	4.37	1.17	0.42	1.62	2.64	2.54	6.79
RABBIT FISH	5.32	5.20	8.64	5.92	7.40	5.78	5.09	6.34	6.52	7.09	5.66	4.39	7.42	11.47	9.05	3.57
SCAVENGERS	10.14	8.76	6.28	4.16	5.35	3.88	3.20	20.73	18.81	22.01	12.79	14.28	25.20	15.76	14.14	5.72
KING FISH	1.23	1.07	1.23	3.49	2.36	3.55	1.63	2.16	2.11	2.04	1.41	1.27	1.00	0.27	0.48	0.00
TUNA	1.29	1.77	1.79	0.30	0.14	0.65	0.11	1.64	1.90	1.02	0.69	0.56	1.47	4.05	9.53	2.57
JACKS	3.81	2.73	2.93	2.22	1.24	1.52	0.61	2.20	2.46	2.21	3.59	2.29	1.54	3.03	1.98	2.35
ROCK CODS	0.74	0.68	0.55	1.22	0.75	0.60	0.22	0.31	0.41	0.23	1.26	2.33	1.02	0.52	0.17	3.63
SILVER BIDDIES	0.26	1.34	0.22	1.01	1.03	1.00	0.02	0.36	0.50	0.24	2.62	0.40	2.74	0.22	0.46	1.34
MULLET	0.21	0.23	0.19	2.52	0.36	0.30	0.01	0.18	0.14	0.31	3.29	2.49	1.8	0.08	0.17	2.84
MILK FISH	0.05	0.02	0.25	0.02	0.08	0.10	0.00	0.06	0.00	0.10	0.17	0.00	0.00	0.06	0.23	0.20
COBIA	0.82	0.36	0.30	0.90	0.51	0.79	0.05	0.19	0.17	0.12	0.86	0.67	0.09	0.11	0.07	0.07
SWORD FISH	1.34	1.47	1.53	0.04	0.00	0.03	0.00	0.54	0.83	0.49	1.18.0	0.96	1.59	4.80	8.24	12.85
QUEEN FISH	1.13	0.10	0.10	1.12	1.08	2.03	0.76	0.26	0.24	0.77	3 0.31	1.08	0.88	0.19	0.18	17.41
OTHERS	27.21	26324	18.99	12.53	8.14	7.58	3.97	19.49	20.87	25.91	23.71	19.25	22.93	10.34	7.06	15.86
TOTAL (%)	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100

Appendix 2a: Weight of Fish Caught in Marine Waters (Metric Tons) by Region and by Month for 1993

REGION	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
TANGA	306.7	341.9	445.7	548.7	229.8	328.9	414.3	436.1	322.3	530.2	522.0	428.0	4856.7
COAST	763.3	593.6	649.8	753.7	871.3	822.1	582.1	600.0	651.0	737.2	807.6	777.5	8609.0
DSM	1264.2	1221.0	1159.5	863.6	1142.9	1343.0	1769.5	1178.7	1222.2	981.5	1477.5	1243.5	14867.3
LINDI	380.6	353.6	300.1	259.6	248.7	219.2	215.0	247.3	208.8	305.6	285.2	246.9	3270.8
MTWARA	194.9	229.9	223.3	288.2	283.3	151.8	156.2	122.7	222.6	194.9	289.4	286.6	2623.8
Sub-Total	2909.7	2740.0	2778.4	2694.8	2776.0	2865.0	3137.1	2584.8	2626.9	2749.4	3381.7	2982.5	34226.6
Industrial													2458.2
Total													36684.8

Appendix 2b: Weight of Fish Caught in Marine Waters (Metric Tons) by Region and by Month for 1994

REGION	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
TANGA	356.8	482.9	427.9	482.5	442.5	292.0	466.5	278.5	500.7	499.5	285.1	458.6	5373.5
COAST	913.7	757.4	693.0	799.4	606.8	805.4	777.1	686.6	868.7	855.0	807.6	777.5	9147.9
DSM	1488.8	1777.3	1074.7	963.7	1433.0	1295.5	1413.9	1410.1	1538.4	1264.3	479.1	2477.1	16615.9
LINDI	200.9	172.8	187.6	208.3	183.2	223.7	320.6	335.8	919.2	462.1	410.3	281.4	3605.9
MTWARA	288.1	277.8	241.2	239.9	153.2	232.4	151.2	189.5	158.4	197.7	243.6	171.7	2542.7
Sub-Total	3248.3	3468.2	2624.4	2693.8	2818.5	2749.0	3129.3	3200.5	3683.4	3278.6	2225.7	4166.3	37285.9
Industrial													3499.5
Total													40785.4

Appendix 2c: Weight of Fish Caught in Marine Waters (Metric Tons) by Region and by Month for 1995

REGION	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
TANGA	312.7	368.5	361.4	365.0	368.1	532.2	657.0	690.2	627.2	456.0	564.2	568.9	5871.3
COAST	622.3	687.5	696.0	696.1	583.2	908.9	576.2	505.8	679.7	569.8	614.8	620.0	7760.1
DSM	2349.7	2311.5	2040.6	1614.2	2323.8	2364.1	2187.8	2184.9	2062.8	2236.7	2136.2	2376.5	26188.9
LINDI	301.7	303.6	351.9	372.6	360.2	306.7	314.9	419.0	457.0	429.1	329.2	348.3	429202
MTWARA	315.8	365.7	360.8	368.9	327.5	342.9	368.0	381.8	378.9	456.9	321.5	360.7	4649.2
Sub-Total	4102.2	4036.8	3810.7	3416.8	3962.8	4454.8	4103.9	4181.7	4205.6	4148.5	4065.9	4272.4	48761.7
Industrial													2311.6
Total													51073.3

Appendix 2d: Weight of Fish Caught in Marine Waters (Metric Tons) by Region and by Month for 1996

REGION	JAN.	FEB.	MARCH	APRIL	MAY	JUNE	JULY	AUG.	SEPT.	OCT.	NOV.	DEC.	TOTAL
TANGA	592.6	694.4	483.4	365.0	368.1	532.2	656.1	690.2	627.2	456.0	564.2	668.9	6599.2
COAST	719.1	1105.8	1414.7	853.4	1048.8	1172.5	1462.9	723.3	987.0	1367.9	1015.7	1688.0	13564.1
DSM	3375.2	2384.6	2007.5	2750.2	2442.1	2647.3	2377.0	2110.3	1847.9	2307.2	2103.6	2536.5	30403.4
LINDI	301.7	303.6	351.9	372.6	360.2	306.7	314.9	419.0	457.0	429.1	320.1	346.3	4292.2
MTWARA	515.8	365.7	330.8	368.9	327.5	342.9	368.0	381.8	378.9	456.9	421.5	360.7	4649.2
Sub-Total	5504.4	4854.0	6118.3	4720.1	4546.7	5001.6	5178.9	4333.6	4298.1	5017.1	4434.1	5500.4	59508.1

Appendix 3: Marine capture fisheries and effort (1984-2001)

Year	Vessels	Fishers	Shark nets	Traps	Fixed traps	Beach seines	Hooks	Ring nets	Cast nets	Scoop nets	Gill nets	Catch (MT)
1984	3556	13783	2342	9418	2182	371	6757	0	408	462	6955	40890.1
1985	3045	11392	3093	9159	6418	1288	12351	0	622	1288	4943	42847.3
1986	3690	12619	3590	9159	3159	1003	13478	0	216	1013	8842	46984.7
1987	3595	12739	3193	7888	3052	1087	10708	0	516	1087	9549	39094.7
1988	4390	13855	3751	6351	176	832	7088	56	653	832	7810	49382.0
1989	4399	15491	3649	2056	233	588	5786	56	645	690	5022	50242.0
1990	4354	16178	2856	5873	167	1189	7083	96	374	1225	5887	56779.4
1991	4402	16361	2530	4736	234	665	6721	104	398	615	6018	54342.7
1992	3514	15027	3427	5183	34	537	5672	92	124	70	3388	43886.2
1993	3232	15027	3427	5593	34	537	5672	92	124	70	3388	36684.8
1994	3232	15027	3427	5593	34	537	5672	92	124	70	3388	40785.4
1995	3768	13822	3351	3390	25	350	7839	221	49	75	4120	51073.3
1996	3768	13822	3351	3390	25	350	7839	221	49	75	4120	58780.2
1997												50210.0
1998	5157	20625	3463	5299	254	319	9383	128	0	0	9125	48000.0
1999												50000.0
2000												49900.0
2001	4927	19293	2852	5557	72	485	13382	224	173	5138		52934.9
2002												

Source: Fisheries Division, MNR&T

Appendix 4: Summary of Criteria used to determine the site of study

Crtr/Dstr	Tan	Muh	Pan	Kin	Ila	Tem	Bag	Mku	Ruf	Maf	Kil	Lin	Mtw
Fishing Ar	Large	Large	Large	Small	Small	Small	Large	Large	Large	Large	Large	Large	Large
Coral Reef	FO&PR	FO&PR	F&P R	F&P R	P R	F R	F&P R	F R	F&P R	P&F R	F R	F R	P&P R
Mangroves	9.4ha	→	1.8ha	2.2ha	→	→	5.6ha	3.9ha	53.3ha	3.5ha	22.4ha	4.5ha	8.9ha
Estuaries/Bays	Est&Ba	→	PangR	Est&Bay	→	→	W&RR	Bays	RufDel	Est&Bay	Bays	Bays	RuvumR
Assets LS	25	18	12	5	1	8	13	10	15	34	18	18	29
Assets Kln	4	1	4	-	-	1	4	-	1	5	-	1	1
Assets FMkt	14	14	10	1	1	2	10	1	2	23	3	2	10
Assets FVessl	415	292	209	481	207	230	270	200	219	728	453	329	894
Assets FGT	9	9	8	9	8	7	9	5	4	11	9	7	12
Assets FGS	4	-	1	-	-	-	1	-	1	3	1	-	-
Assets BRS	13	1	4	-	-	1	2	1	1	8	-	1	3
Catch (1996)	6599	→	→	30403	→	→	13564	→	→	→	4292	→	4649
%CHMSCI (F)	4	→	→	1	→	→	3	→	→	→	7	→	1
Demography	243580	279423	44107	1088867	637573	771500	230164	187428	203102	40801	171850	257313	297372
No. Fishers 01	2125	1105	456	2357	1219	1430	1493	624	441	2597	1607	1131	2708
% Fisher	0.87	0.40	1.03	0.22	0.19	0.19	0.65	0.33	0.22	6.37	0.94	0.44	0.91
%BFPL	11	→	→	7	→	→	27	→	→	→	33	→	17
%BNPL	36	→	→	18	→	→	46	→	→	→	53	→	36
MnPCHMI- (TS)	12210			40767			18210				16268		23252
MdPCHMI- (TS)	7160	→	→	16473	→	→	8102	→	→	→	7902	→	11517

Crtr=Criteria; Dstr=District; Tan=Tanga; Muh=Muheza; Pan=Pangani; Bag=Bagamoyo; Kin=Kinondoni; Ila=Ilala; Tem=Temeke; Mku=Mkuranga; Ruf=Rufiji; Maf=Mafia; Kil=Kilwa; Lin=Lindi; Mtw=Mtwara; Ttl=Total

Ar=Area; LS=Landing sites; Kln= Kilns; FMkt=Fish markets; Vessls=Fishing vessels; FGT=Fishing gear type; FGS=Fishing gear shops; BRS=Boat repair shops; CHMSCI (F)=Contribution of households main source of cash income (Fishing); BFPL=Below food poverty line; BBNPL=Below basic need poverty line; MnPCHMI- (TS)=Mean per capita household monthly income (nominal Tshs); MdPCHMI- (TS) Median per capita household monthly income (nominal Tshs)

Appendix 5: Cooperative Groups Formed Among Fisher Communities in the Coastal Districts

District	Name of Coop Group	Gender	Main activity/Purpose	No. of members	Registration status	External support
Tanga & Muheza	MOFIP - MOA	Men	Fishing	24	Not registered	VDP
	Akiba na Mikopo - MOA	Men	Fishing	19	-do-	-do-
	Kazi ni Uvuvi – MOA	Men	Fishing	5	-do-	-do-
	Sasa Kazi - MOA	Men	Fishing	5	-do-	-do-
	Maendeleo ya Uvuvi Patukiza	Men	Fishing	10	-do-	-do-
	Subira (A) – MOA	Women	Fish frying and sale	5	-do-	-do-
	Subira (B) - MOA	Women	Fish frying and sale	5	-do-	-do-
	Muungano – MOA	Women	Fish frying	5	-do-	-do-
	Motomoto Nkinga	Men&Women	Sale of sardines	7	-do-	-do-
	Siasa – MOA	Women	Fish sale	5	-do-	-do-
	Monga Vyeru Kwale	Men	Fishing	35	-do-	-do-
	Monga Vyeru	Women	Seaweed farming	30	-do-	-do-
	Intermillan	Men	Seaweed farming	20	-do	-do-
	Wafugacheza Mwandusi	Women	Women	21	-do-	-do-
	Ugambo Women Group	Women	Fishing	10	-do	-do-
Bagamoyo	Mianitanic Fishing Group	Men	Fishing	30	Not Registered	-
	Kondo Rangers	Men	Fishing	50	-do-	
	Mangesami Fish Processing and Marketing	Men & Women	Harvesting, Processing and selling fish	40	Registered	
Mafia	Jibonde	Men and Women	Sea weed Farming	17	Not Registered	
	Ujirani Mwema Kirongwe	-do-	-do	33	-do-	
	Kilindoni A	Men and Women	Seaweed Farming	18	Not Registered	
	Kilindoni B	-do-	-do-	10	-do-	
	Juan A	-do	-do-	20	-do-	
	Juani B	-do-	-do-	25	-do-	
	Bwejuu	-do-	-do-	45	-do-	

	Kipandeni Kipingwi Saliboko Kanga Chemchem Bweni Wachewaseme (Chemchem) Ukombozi Bwejuu	-do- -do- -do- -do- -do- -do Women -do-	-do- -do- -do- -do- -do- -do- Fish Processing Fishing (Kuchokoa pweza)	10 15 12 20 8 15 35 14	-do- -do- -do- -do- -do- -do- -do- -do-	
Lindi	Mtama Ndawa Mbuyuni		Seaweed farming Fish farming Fish farming		-do- -do- -do	
Kilwa	Zafanana Yanamwike Maendeleo Kumekucha	Women	Seining (Kutanda) Fishing Fishing Fishing	5 5 5 5	-do- -d0- -do- -do-	
Rufiji	Mwanzo Mgumu Mwomba Mungu Songosongo Mashariki Songosongo Magharibi		Fishing Fishing Fishing (lobsters) Fishing (lobsters)	3 10 20 20	-do- -do- -do- -do-	
Mafia Island	Mikingamo Fishing Group Jibondo Ujirani Mwema, Kirongwe Kilindoni A Kilndoni B Juani A Juani B Shauri Moyo	Men	Fishing Seaweed farming Seaweed farming Seaweed farming Seaweed farming Seaweed farming Seaweed farming Seaweed farming	20 17 33 18 10 20 25	Registered Not Registered -do- -do- -do- -do- -do- -do-	
Dar es Salaam	Vusha	Men & Women	Fish Marketing & Usage Rights (Dar main fish market)	30	Registered	
Mtwara	Mwimbaa Ushirikiano	Men Men	Fishing Fishing	2 14	Not Registered -do-	RIPS -do-

	Twende Pamoja	Men	Fishing	4	-do-	-do-
	Hali ngumu	Women	Fishing	7	-do-	-do-
	Mwatiko	Women	Fishing	4	-do-	-do-
	Pono	Women	Fishing	15	-do-	-do-
	Kuchakuni	Men	Fishing	8	-do-	-do-
	Jitegemee Magao	Women	Fishing	12	-do-	-do-
	Tunajiamini	Women	Fishing	9	-do-	-do-
	Jinasue	Men	Fishing	9	-do-	-do-
	Vilima	Women	Fishing	5	-do-	-do-
	Umoja ni nguvu	Women	Fishing	6	-do-	-do-
	Over 20 others not listed	Men& Women	Fishing & seaweed farming	5 - 10	-do-	