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Tanzania Coastal Management Partnership

INTEGRATED COASTAL MANAGEMENT FOR TANZANIA
ISSUE PROFILE

BACKGROUND DOCUMENT
FINAL DRAFT
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Prepared by:

TCMP Core Working Group

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A joint initiative between the National Environment Management Council, the University of Rhode Island/Coastal Resources Center and the United States Agency for International Development

PREFACE

The aim of this issue profile is to identify the important coastal and marine issues, which need policy attention whether at national or local level.

It is meant to serve as a starting point for addressing policy issues facing the coastal and marine environment and at the same time to inform and enrich the public discussion on the urgent need for developing a national policy which will specifically address effectively the coastal management problems in Tanzania. The issue profile will be used by the Tanzania Coastal Management Partnership (TCMP) in the process of formulating Integrated Coastal Management policy in Tanzania.

This report has been prepared by members of the Core (Policy) Working Group and the support unit of the TCMP. The Core Working Group is an intersectoral and inter-disciplinary group whose members are experts drawn from relevant government, private and public institutions including individuals having a stake in coastal and marine areas of the United Republic of Tanzania.

The preparation of this report involved collection of information, meetings and workshops, consultations and field observations.

The report has also been supplemented by the findings of other TCMP working groups and special teams especially the Mariculture Working Group, Social Economic Team (SET) and Policy, Legal and Institutional framework Team.

CHAPTER ONE

1.0 INTRODUCTION

ICM requires, as an initial step, the proper identification and assessment of key coastal management issues. This basic step is the focus of this report and is the fundamental genesis for effective national policy formulation. Concurrently, the issue identification process builds an ICM constituency that will guide and support ICM implementation in Tanzania.

This is an issue profile document that provides the necessary background information and detailed description of the issues to stimulate a deeper discussion and identification of the key aspects for the coastal management policy.

1.1 Objective

To provide an analytical background information for the integrated Coastal Management Policy formulation based on clearly and precisely described issues that were identified by the TCMP Working groups and further discussed by decision makers during the policy meeting.

1.2 Methodology

This issue profile was prepared by members of the Core (Policy) Working Group (CWG) and the support unit of the Tanzania Coastal Management Partnership (TCMP). The Core Working Group is an inter-sectoral and inter-disciplinary group whose members are experts drawn from relevant government, private and public institutions including individuals having a stake in coastal and marine areas of the United Republic of Tanzania (see page ii).

The discussion and analysis was done with stakeholders, representatives from national, regional, district and village levels, of government, resource users, private sectors and NGOs

This report also is supplemented by the findings of other TCMP working groups and special teams especially the Mariculture Working Group, Social Economic Team (SET) and Policy, Legal and Institutional Framework Team.

The preparation of this report started in February 1998 when the CWG group was officially formed by TCMP. The process included the following key events:

- Collection, review and synthesis of information available in and outside the country;
- Working Groups and special teams meetings, workshops and retreats enabled members share experiences and assess the issues;

- Consultations with relevant individuals and institutions at local, national and international levels

- Members of working groups visited all coastal districts for ground truthing of the identified issues. The visits were guided by the existing ICM field based programs and local government officials who enabled members to discuss issues at the grass-root level in coastal communities.

- High level policy meeting which discussed the identified issues and recommended mechanisms for the way forward

1.3 Overview

The Tanzania coast supports a diversity of natural systems and has important urban centers and villages.

The Tanzania Coast stretches 800km on the Western Indian Ocean. The coast has important urban centers and rural villages and is punctuated by palm fringed sandy beaches and remnants of ancient ruins and cultural relics. This strip of land and water supports a diversity of important natural systems, including rocky outcrops, coral reefs, sea grassbeds and extensive mangrove stands.

The Tanzania coastal area covers about 15 percent of the country's physical area (including the islands of Pemba and Unguja which constitute the state of Zanzibar) and is home to approximately 25 percent of the country's population.

There are various definitions of the coastal area (Box 1.1).

Box 1.1 Boundaries

Tanzania does not have a defined formal coastal area. Although there are several definitions of boundaries of the coastal area set on sectoral basis, no integrated boundary exists. This document does not intend to define the coastal area, instead it looks broadly at the coast and discusses the issues that affect the coast.

Boundaries are always a thorny issue for coastal programs, especially national programs. Only in the case of Sri Lanka does the National Coastal Management Act designate a legal coastal zone that is uniform throughout the country. In other nations, either the boundary is undefined (i.e. Ecuador) or the national program provides guidance and broad parameters under which local units (States, Districts, etc.) delimit specific geographic boundaries (United States, New Zealand). The setting of boundaries depends on what issues are being addressed and what is being managed.

This document addresses the coastal issues of mainland Tanzania, not those of Zanzibar. This is because the management of coastal resources is a non-union matter and each place has different mechanisms in place to address coastal issues.

Figure 1.1 shows coastal regions of Tanzania.

The coast is of critical importance to the development of the country.

Fishing, shipping, salt production, agriculture and industrial development are viewed by the national and local governments as important components of the economy. The coastal communities rely heavily on the coastal resources as a primary base for food and income. Coastal tourism, mariculture development and natural gas exploration, which are just beginning, are seen as potential activities in national economic development and the overall gradual improvement of the quality of life of the coastal communities.

Poverty levels in coastal communities are high and the coastal resource base is threatened by human based pressures.

This notwithstanding, much of the coastal areas remain relatively underdeveloped, with poor infrastructure. This has contributed to increased poverty levels in coastal communities. Moreover, in the more developed urban coastal centers that are experiencing rapid growth, the coastal resource base is increasingly threatened mainly due to human based pressures and, to a less extent, natural causes. The human pressures resulting from both rural and urban development include unplanned coastal development, increased unsustainable resource use practices, habitat destruction and degraded water quality from the disposal of wastes into the ocean. These issues are more evident in and around the urban centers of Dar es Salaam, Tanga, Zanzibar, Mtwara and Lindi, but are also increasing throughout the coast of Tanzania.

There is no mechanism for multi-sectoral approaches to face the complex challenges of coastal and marine management.

Many responsive measures are being taken at local and national levels, by central and local governments, companies, Non Governmental Organizations (NGOs) and local communities to manage coastal resources sustainably. However, these measures are often done independent of one another because Tanzania lacks clear mechanisms for multi-sectoral approaches to face the complex challenges of coastal and marine management. In an increasing number of cases, the sectoral approach has led to the transfer of problems elsewhere either within or even outside the country. There are inadequate feedback mechanisms between coordinating agencies, decision makers and implementing authorities at all levels of government and a lack of management capacity of relevant agencies, particularly at the district and village level.

In a move to arrest the situation, Tanzania is striving to put a system into place that balances development with the health of marine and coastal environments and the needs of local communities through the application of Integrated Coastal Management (ICM).

It is hoped that by applying the principles and practices of ICM, Tanzania can acquire maximum benefits of the coastal resources for its citizens' development without degrading the associated delicate environment.

Figure 1.1 Regional Administration map of Tanzania showing the coastal Regions

1.4 Tanzania and ICM Processes

Tanzania is committed to integrated coastal management (ICM) and has much experience upon which to build a national program.

The Government of Tanzania and the general public recognise the need for addressing management problems facing the coastal and marine areas. Through some of its activities, the Government of Tanzania embrace Integrated Coastal Management (ICM) as a tool to put in place effective coastal governance. Box 1.2 gives the definition and goal of ICM.

Tanzania is in the forefront within the Western Indian Ocean region in the field of coastal management as an active participant in key regional ICM processes and by testing the practices of ICM at several field programs within its boarders.

Box 1.2 Definition and Goal of effective Coastal Governance

Definition of Integrated Coastal Management (ICM)
……a continous and dynamic process that unites government and the community, sciences and management, sectoral and public interest in preparing and implementing an integrated plan for the protection and development of coastal ecosystems and resources. (Source: GESAMP 1991)

Goal
……to improve the quality of life of human communities which depend on coastal resources while maintaining the biological diversity and productivity of coastal ecosystems.

At local level, several programs and other initiatives are attempting to put ICM principles into practice. The initiatives include the Tanga Coastal Zone Conservation and Development Program (TCZDP), the Rural Integrated Project Support (RIPS) in Lindi and Mtwara regions, Mafia Island Marine Park and the newly established Rufiji Environment Management Program. Marine and coastal environmental NGOs treading on community participatory approach are increasingly appearing on the scene.

At the national level, many government sectoral policy statements (including land, fisheries, environment, forestry, tourism, etc.) recognize the need for an integrated and participatory resource management approach to resolve conflicts related to resource use. To make progress on developing a national ICM Program, permanent secretaries of key government ministries with an important role in ICM convened at a national workshop in Zanzibar in 1995. Delegates to the meeting agreed to support the creation of a national ICM program that will effectively address coastal and marine problems. The proceedings of this national workshop is summarised in Annex 1.

Global experience can inform the Tanzania national ICM policy process.

At the regional and international level, Tanzania has actively participated in a number of activities which accept and support the concept of ICM. These include the UNEP Regional Seas Program for Eastern Africa 1985; the 1992 Earth Summit and its Agenda 21, particularly chapter 17 on the "Protection of the Oceans and Coastal Areas"; and the 1993 World Coast Conference held in Noordwijk - the Netherlands. Tanzania also hosted and chaired the first regional inter-ministerial conference on ICM for Eastern Africa and Island states held in Arusha (1993) and participated in the second conference on the same held in Seychelles (1996).

To promote regional and sub-regional ICM implementation, Tanzania has initiated and hosted a number of meetings and workshops for ICM practitioners in Africa such as the Workshop on Integrated Coastal Area Management for Eastern Africa and the Island States held in Tanga in 1996 and the Regional Workshop on Experiences in Local and Community Integrated Coastal Zone Management held in Zanzibar in 1998.

Tanzania signed resolutions resulting from these conferences that provided the basic roadmap for ICM development and implementation at the national level. Most recently, Tanzania participated in the Pan African Conference on Sustainable Integrated Coastal Management (PACSICOM) held in Maputo (1998) which recognizes the need for African countries to move towards more integrated policies and the practice of sustainable integrated coastal management for improving the quality of life for African communities.

To cement its commitment to ICM, Tanzania signed and ratified a number of International Conventions that endorse the importance of ICM as a tool to achieve sustainable use of marine resources. These include the Nairobi Convention and its Protocols, the Convention of Biodiversity, Convention on Climate Change and several others.

Tanzania is actively working to establish an effective national coastal management policy/program

In a move to connect these locally based programs and enhance integrated coastal management at the national level, the Tanzania Coastal Management Partnership (TCMP) was conceived in 1997. The TCMP strives to develop a national framework for ICM that builds and supports these local programs. Each of these programs is defined in more detail in Figure 1.2 and Box 1.3. More information on these programs and direct links to each program can be obtained on the internet at TCMP web site WWW.CRC.URI.EDU.

The underlying focus of these activities is to improve the quality of life of human communities whose livelihood depends on coastal and marine resources and contribute to the wise growth of the national economy. However, the challenges for successful implementation of ICM principles in Tanzania are many; they include:

- lack of management capacity;
- weak mandate for multi-sectoral approaches to face the complex challenges of coastal and marine management;
- inadequate feedback mechanisms between local, district, regional and national levels of government;
- inadequate though increasing awareness of coastal management issues.

In order to face these challenges and improve the quality of life of the coastal people, there is a need for an effective national policy to guide coastal management and the rational utilization of coastal resources.

Figure 1.2 Integrated Coastal Programs in Tanzania

Box 1.3 ICM Programs in Tanzania

Tanzania Coastal Management Partnership (TCMP)
TCMP is a joint initiative between the Vice-President's Office through the National Environment Management Council (NEMC), the United States Agency for International Development (USAID) and the University of Rhode Island Costal Resource Center (URI/CRC).

It aims at supporting the efforts of the government of Tanzania in partnership with ongoing coastal management programs working at regional and district levels, private sectors and the NGO community to establish an effective coastal governance system. TCMP strives to work with existing ICM programs, all practitioners and relevant sectors to facilitate a participatory, transparent process that will put in place integrated coastal management along the entire coastline of Tanzania.

TCMP's targeted results include:

- Formulating meaningful ICM policy that is effectively applied to coastal problems at both the national and local levels;
- The Defining and application by government, business, and communities of sustainable practices for emerging coastal economic opportunities;
- Putting in place a mechanism to facilitate national support to effective local ICM;
- Increasing institutional and human capacity for ICM; and
- Tanzania coastal management experience informing by and contributing to global ICM.

Tanga Coastal Zone Conservation Development Programme (TCZCP)
The largest pilot project is the Tanga Coastal Management Programme which, through the regional fisheries office, is working at the district and village levels to address critical coastal management issues such as dynamite fishing and the development of alternative sources of livelihood. This programme has demonstrated that management of coastal resources and development activities can be effectively undertaken at the local level. The Tanga Programme has placed a heavy emphasis on capacity building and awareness.

Kunduchi Integrated Coastal Area Management Project (KICAMP)
This project has already completed an extensive "listening phase" where coastal issues were identified and a strategy for addressing those issues was developed. Priority issues identified include coastal tourism development, erosion and dynamite fishing.

Mafia Island Marine Park (MIMP)
This Park was established in 1995 under the National Legislation Marine Parks and Reserves Act of 1994. MIMP has been managed by the Fisheries division with assistance from the World Wildlife Fund. The initial work of the MIMP has been to focus on the problem of dynamite fishing in the Park area. In the next several years, the MIMP plans to work closely with Mafia Island communities to revise the Park management plan and operationalize the Park Management Council.

Rural Integrated Project Support (RIPS)
This project for Mtwara and Lindi is working with coastal communities to reduce dynamite fishing and raise awareness about the importance of coastal resources. Although RIPS is a broad development project with a wider focus than just coastal management, the experience being generated by the project's activities have importance for national ICM.

Rufiji Environment Management Project (REMP)
REMP's Goal is to promote the long-term conservation through 'wise use' of the lower Rufiji forests, woodlands and wetlands, such that biodiversity is conserved, critical ecological functions are maintained, renewable natural resources are used sustainably and the livelihoods of the area's inhabitants are secured and enhanced.
The project area is within Rufiji District in the ecosystems affected by the flooding of the river (Floodplain and Delta), downstream of the Selous Game Reserve and also including several upland forests of special importance.

CHAPTER TWO

2.0 STATUS OF COASTAL AND MARINE ENVIRONMENT

2.1 Geographical Setting

Tanzania's coastline is characterized by geographical areas of concern including critical habitats.

The United Republic of Tanzania is located on the eastern coast of Africa, lying about 1^0 - 11^0 48' S and 29^0 30'- 40^0 30' E. It is composed of mainland Tanzania and the islands of Zanzibar (Unguja and Pemba). The Indian Ocean bounds the country on its entire eastern frontier. Tanzania has an estimated total land area of 945,200km^2 with Tanzania mainland covering an area of 942,800km^2. The Zanzibar islands cover an area of 2,400km^2.

Tanzania has a coastline, which stretches for 800km along the western Indian Ocean from the Mozambique border in the south to the Kenya border in the north. The coast includes all the areas bordering the ocean in the five regions of Tanga, Coast, Dar es Salaam, Lindi and Mtwara as well as the three large islands of Unguja and Pemba (which make up Zanzibar), Mafia and numerous islets. About two thirds of the coastline has fringing reefs, often close to the shoreline, broken by river outlets like the Rufiji Delta, Pangani, Ruvuma, Wami and Ruvu (Figure 2.1). It is characterized by a very narrow continental shelf which is 5.8km wide except the Zanzibar and Mafia channels, where the continental shelf reaches a width of about 62km. Most of the continental shelf bed is covered with coral outgrowths and some parts of the coastal margin have extensive mangrove stands. The continental shelf has an estimated area of 17,500km^2. The Exclusive Economic Zone (EEZ), (shared with Zanzibar) has an estimated area of 223,000km^2.

2.2 Demography

A significant proportion of the Tanzania population is found on the coast due to prevailing social and economic opportunities.

The five coastal regions encompass about 15 percent of the country's land area and are home to approximately 25 percent of the country's population. Recent estimates indicate that the population of the five coastal regions has increased to about 8 million, with a growth rate ranging between 2 and 6 percent (Linden and Lundin, 1996). The overall growth rate for mainland Tanzania overall, according to 1988 census data, is 2.8 percent. Data on population in coastal regions is shown in Table 2.1.

Figure 2.1 Coastal area of Tanzania showing rivers and mangroves

Table 2.1 Population density and annual population growth rate by region

Region	Land Area Km²	1988			1996		2000	
		Actual Population	Annual Growth Rate %	Population Density per Km²	Population Estimates	Population Density per Km²	Population Estimates	Population Density per Km²
Tanga	27,348	1,280,262	2.1	48.1	1,485,812	54.0	1,644,849	60.0
Dar es Salaam	1,350 (city)	1,360,900	4.7	1,008	2,700,000	2,000	3,000,000	2,222
Coast	*32,450*	*638,000*	2.1	59.1	*769,466*	23.7	822,489	25.4
Lindi	67,000	646,345	2.0	9.6	744,402	11.1	803,938	12.0
Mtwara	16,710	875,977	1.4	53.2	1,005,405	60.1	1,078,845	64.5
Mainland Tanzania	883,590*	22,486,000	2.8	32.8	30,490,000* (includes Zanzibar)	--	--	--

Source: Bureau of Statistics, modified from 1988 census. *World Bank, African Development Indicators, 1997. Unless stated otherwise, year 1996 and 2000 estimates are extrapolated from 1988 population and growth rates.

Among the largest country's urban areas and industrial activities are located in the coastal regions, including Dar es Salaam, the national capital. Statistics show a significant rural-urban migration pattern, particularly to the city of Dar es Salaam (Table 2.1). Major reasons are the lack of communication and transportation infrastructure in coastal regions, especially in southern regions; lack of livelihood opportunities; and poor performance of agriculture and fishing. The failure of the agricultural sector in terms of production of both food and cash crops discourages would be potential farmers. Also availability of arable agricultural land is an issue for coastal areas. Most of the arable land is owned by "customary law". For example, in Mtwara and Lindi regions, cash crop plantations such as coconut and cashew nuts occupy large expanses of land leaving nowhere for the young to farm. Fishing along the coastline provides little attraction due to the low level of technology and the poor condition of gears. Incomes generated do not meet the economic needs of fishermen throughout the year.

2.3 Biodiversity

The coast and marine areas are rich in biodiversity that require intensive, proactive planning and management.

The coast and marine waters contain some of the richest resources in the country, including some excellent coral reefs and valuable species of both land and water based life. The diversity of coastal and marine habitats supports a wide range of important and valued species of finfish and shellfish. Those critical to the marine environment are:

- **Sea grasses**
  Sea grasses are found on soft sea bottom in the shallow waters of back reef lagoons, estuaries and inter-tidal areas. Sea grass beds support valuable fisheries resources, as well as providing feeding grounds for turtles. There is a total of 12 species of sea grasses in Tanzania coast.

- **Corals**

  There are about 127 species of coral in 13 families in Tanzania coast. Coral reefs comprise caves, crevices, cracks, overhangs and other hideaways that provide shelter and nurseries for fishes, invertebrates and other animals. The spectacular beauty of coral formation and reef communities is a principal attraction to many tourists.

- **Other invertebrates**
  There are about 8,270 species of invertebrates (NEMC 1995) of which mollusks account for 73.3 percent, echinoderms 11 percent, and arthropods 6.5 percent.

- **Mangroves**
  Mangrove forests are an extremely important part of the tropical coastal ecosystem. They serve as a nursery for many species and provide habitat for numerous fish, crustaceans and other coastal species. There are eight species of mangroves in Tanzania in six families of Rhizophoraceae, Sonneratiaceae, Combretaceae, Meliaceae, Aviceneaceae and Sterculiaceae.

- **Coastal forests**
  These wooded areas contain a wide variety of habitats that support rich biological communities. They have remarkable biodiversity and high levels of endemic species.

- **Marine turtles**
  Five species of marine turtles are found in the Tanzania waters. These are the green turtle (*Chelonia mydas*), the hawksbill turtle (*Eretmochelys imbricata*), the leather back turtle (*Dermochelys coriacea*), olive ridley turtle (*Lepidochelys olivacea*) and loggerhead turtles (*Caretta caretta*). Turtles are among threatened marine species and are protected by law; however, they are exploited illegally for their shells, eggs, meat and leather. The present population of turtles has gone down probably due to over hunting, particularly the killing of females before they have a chance to lay eggs as observed at Somanga in Kilwa district.

- **Fish**
  There are over 1,000 species of fish in the coastal waters of Tanzania, seven of these are endemic to Tanzania (Benbow, 1976).

- **Birds**
  Mangrove swamps and rivers adjoining estuarine areas are habitats for many waterfowls. Rock cliffs along the mainland coast and many of the small offshore islets are breeding and sheltering areas for seabirds. Common species of birds found on the coast include sooty tern, noddy tern, fairy tern and frigate birds. Studies of coastal water birds in Tanzania are few, but Latham Island, located 65km southeast of Dar es Salaam, is said to be the most important seabird breeding ground along the entire East African coast and the only known breeding ground of the masked booby and crested tern.

- **Mammals**
  Hippos and monkeys are common large mammals in the coastal wetlands. Sea grass beds especially in Kilwa and Mafia were habitats of the endangered dugong, which are feared to have disappeared, as there are no reports on recent sightings. Migratory whales have also been sighted along the coast. A significant population of dolphins is found in the Rufiji Delta, Saadani, around Latham Island, Mafia Island, Tanga, Lindi and Mtwara (Chande *et al* 1994).

  Selous game reserve (50,000km^2), the second largest in the world and Sadani game reserve (300km^2), both found on Tanzania coastal area harbor a magnificent variety of wildlife.

2.4 Socio-economic Activities

The main large scale economic activities of Tanzania are concentrated on the Coastal Urban areas. However, people who live in the coastal communities belong to the poorer section of the Tanzania society. This is an indication of lack of mobilizing and integrating social and economic planning at local and national levels.

2.4.1 Existing economic activities

The five coastal regions contribute one third of the national GDP The informal sector is becoming an increasingly substantial component of the coastal economy though its contribution to the official GDP is overlooked.

The main large-scale coastal economic activities are largely concentrated in Dar es Salaam and Tanga. These include industries (70 percent of the whole country), commerce/trade, construction, fishing, recreation, tourism and other activities of modern economy. Harbours are centers for national, regional and international trade and transportation.

The economy of coastal communities is based on artisanal fishing, subsistence farming, small-scale trade, handicrafts, salt works and services to tourism. The small-scale trade involves selling fish, mangrove poles, coconut, salt, lime, charcoal and firewood. Common activities to all coastal areas include:

- **Agriculture**
  In the coastal regions overall, agriculture is the most important sector in terms of employment and income. Most men and women are farmers. The agricultural potential needs to be harnessed, as the productivity is quite low. The main constraints relate to the need for appropriate technology, including reliable low-cost implements; extension service support; inputs, including fertilizers, fuel and seeds; and rural infrastructure, including transport and water resources. Rural farmers need advice on sound farming practices.

- **Fishing**
  Fishing is the major livelihood activity and source of income for inhabitants of coastal villages. A large percentage of the male population in coastal villages or towns is composed of artisanal fishermen using traditional, labor intensive techniques. Artisanal fisheries contribute more than 96 percent of total marine fish landings. Fish and mollusks (mollusks are collected by women and children) are the main source of protein for coastal people. Fishing is also an important activity and source of income not only for the fishermen but also for many others engaged in the processing, frying and trading of fish.

- **Forestry products**
  The demand for forestry products in coastal regions is growing rapidly, especially due to population growth and wood product needs of the city of Dar es Salaam. Timber cutting for a variety of uses is an important economic activity for villagers. The revenues from timber product licenses are also important district authorities. Forests in coastal regions are cut for fuelwood used in the production of lime, salt, and for domestic use. Timber is also in construction and boat building. Moreover, forests are cut to clear land for agriculture. Wood and charcoal are the source of energy for most residents of coastal regions in Tanzania in both urban and rural areas. Hardwood species are exploited for woodcarvings and woodwork.

- **Small scale businesses and Informal sector**
  In coastal regions, particularly in urban areas, the small scale businesses and informal sector are becoming increasingly substantial components of the economy. The number of people involved in this economic activity has grown while the economic situation has worsened and real wages have declined. The sector has expanded faster than official GDP, but is not measured by official statistics. The informal sector has an important role to play because it provides income-earning opportunities for large numbers of unskilled and jobless people.

- **Extraction of resources**
  Mining accounts for less than 2 percent of national GDP, but the actual potential for expansion is considered to be enormous (World Bank, 1996). Small-scale mining is growing, but large-scale mining performance has been limited by inadequate management, poor physical infrastructure and poor technology for exploring, extracting and processing mineral resources. Small-scale mining offers an opportunity to increase income in coastal regions.

2.4.2 Emerging economic opportunities

There is a substantial and untapped potential for agriculture, mariculture, deep sea fisheries, tourism, shipping, mining and gas exploitation.

- **Mariculture**
  In Tanzania, mariculture is in its infancy stage, with seaweed farming showing substantial growth. The potential for culturing other marine organisms such as prawns and oysters exists as an alternative economic opportunity for the coastal people to

improve their livelihood. The main producer of mariculture products in Tanzania is Zanzibar where farmers harvested about 200 tonnes of dry algae/week and earned an average of 36,000 Tshs/family/month in 1994. The dried seaweed is exported to Europe where it is refined and polysaccharide is extracted for use in food and pharmaceutical industries.

Currently there are attempts for fish and shrimp farming along the coast of Tanzania. Several projects for shrimp farming have been proposed. Constraints related to mariculture development in Tanzania are lack of clear guidelines and limited market outlets for some of the products.

- **Shipping**
  Tanzania is located within the main route of transit oil tankers from the Middle East to America and Europe. It is estimated that about 470,000,000 tonnes of oil are transported across east African waters annually. In addition to transit vessels, Tanzania mainland has three ports, these include Dar es Salaam, Tanga and Mtwara. The ports handle both local and transit goods to the neighbouring countries including Zambia, Malawi, Burundi, Rwanda, Uganda and the Democratic Republic of Congo. About 50% of the total cargo at Dar es Salaam port is transit cargo.

- **Tourism**
  The coastline is endowed with numerous potential sites for tourism including historical and seinic sites. Old beach hotels are being rehabilitated, new hotels are being built and plots are continuously being allocated for tourism development along the whole coast. Coastal tourism has the potential has the potential to generate significant employment and foreign exchange earnings.

- **Mining and gas exploitation**
  The coastal regions have great mining potentials in gemstone and hydrocarbon exploitation. Efforts are underway to exploit the gas deposit at Songo Songo and Mnazi bay areas.

- **Deep sea fishing**
  The fish resources within the EEZ are yet to be exploited. Fishing trials using six trawlers converted into long liners during 1997/98 caught 193 metric tonnes of finfish. With proper fishing technology, the exploitation of the EEZ is quite promising.

- **Large scale agriculture**
  The large scale agriculture in the coastal areas is mainly constituted by cashewnut and coconut farms and sisal plantations. Generally, no inputs are used at present but with the liberalization of trade and free markets there is a high potential for developing the agriculture which would include the use of inputs such as fertilizers and subsequently increase the risks of pollution.

2.5 Social Services

Coastal local communities have inadequate infrastructure and services.

2.5.1 Communication and transport

Problems of infrastructure, including roads port facilities, electrical power, and telecommunications, are a fundamental and underlying issue in almost all aspects of development and management in coastal regions. It has a major impact on economic activities, decisions to migrate, health, education and sanitation.

- **Roads**
  In general, the road system is extremely poor in coastal regions. In the Coast Region, 89 percent of the roads are constructed of gravel and earth and are impassable during the rainy season. The "trunk" roads that connect other regions with the Coast Region are about 85 percent hard top. Connecting roads represent about 11 percent (407 kilometers) of the total road length in the region. In Lindi and Mtwara most of the roads are old and have not been rehabilitated; 96.4 percent of the roads are built of earth. Two percent are built of tarmac, but are full of potholes. In Tanga, about 304km of roads are built of tarmac, 1091.5km of gravel and 1382km of earth.

- **Ports and harbors**
  The major ports are located in the cities of Tanga, Dar es Salaam, and Mtwara. The Tanzania Harbors Authority, administers all the ports. The port of Dar es Salaam is by far the most active and handles transit traffic for neighboring land locked countries. The full potential of the port to provide shipping and transit facilities to neighboring landlocked countries in competition with Mozambique and South Africa has not been realized. More than 50 percent of the cargo handled by Dar es Salaam is transit cargo for Zambia, Malawi, Rwanda, Burundi, Uganda, and the Democratic Republic of Congo.

2.5.2 Water supply

Water supply and access to clean water for rural and urban areas is quite variable. In all the coastal regions less than 50% of the rural communities are supplied with clean water while more than 50% of the urban areas are supplied with clean water. Relative to the rest of the country as a whole, water access is good in the coastal regions, the sources being mainly ground water and rivers. On average in Tanzania, only about 22 percent of the people in rural areas have access to safe water. During the dry season, drinking water problems are worse; it takes more time and effort to obtain water, and disease problems are much more severe.

2.5.3 Electrical power

In rural areas of the country, only about 1 percent of the households have electricity; in urban areas, about 30 percent; and in Dar es Salaam, about 52 percent (World Bank,

1996). The source of power is mainly hydroelectric. The national electrical grid channels all power to Dar es Salaam and from Dar es Salaam it is distributed to the regions.

2.5.4 Education

In Tanzania, school enrollment rates are low compared to other sub-Saharan countries. The gross primary school enrollment rate is 69 percent (World Bank, 1996). This compares with 95 percent in Kenya and 71 percent in Uganda. For poor families, primary education of girls in particular is not a top priority. Secondary school enrollment is 5 to7 percent, compared to 29 percent in Kenya and 13 percent in Uganda (World Bank, 1996). A sustained improvement will require a reallocation of government expenditures to support social sector objectives. Tanzania devotes about 15 percent of its recurrent budget to education, which is low relative to neighboring countries. Social services are not keeping pace with growth in the economy, it is falling.

In contrast, Tanzania is performing relatively well in terms of illiteracy rate when compared with other sub-Saharan African countries. The adult illiteracy rate is 23 percent of the population.

2.5.5 Health and sanitation

The majority of the people along the coast are exposed to environmental and nutritional related health problems. Water borne diseases, malaria, cholera, diarrhea and others are prevalent. The availability of toilet facilities is an important aspect in health and environmental sanitation. The majority of coastal communities, rural and urban, use pit latrines or not at all. Table 2.2 shows the percentage distribution of private households with access to and the type of toilet at the disposal of the household in the five coastal regions. Malnutrition is also a common problem, which exacerbates the risk from the diseases.

Table 2.2 Percentage Distribution of Private Households by type of Toilet: 1988 Census

Region	RURAL			URBAN		
	Flush	Pit Latrine	None	Flush	Pit Latrine	None
Tanga	0.8	80.8	18.3	16.2	79.2	4.5
Coast	0.9	76.1	23.0	4.8	88.3	6.7
Dar es Salaam	3.8	80.9	15.2	15.9	83.1	1.0
Lindi	0.6	77.2	22.2	4.7	85.0	10.3
Mtwara	1.0	84.2	14.8	7.4	86.1	6.6

Source: Modified from: Health Statistics Abstract, 1994.

2.6 Poverty

Most rural coastal communities are very poor. Hence addressing the issues associated with the small scale, sustainable use of coastal resources is critical to poverty eradication and slowing rural- urban migration.

Poverty is a state associated with the inability to attain a specified (minimum) standard of living (Bagachwa 1994). Due to the nature of common property regimes prevalent in the coastal areas, the resources are open to a variety of users hence creating competition. The economy of the coastal communities depend mainly on small holder farming, subsistence forestry, artisanal fishing, lime and salt production, seaweed farming, livestock husbandry, and small scale trade handicrafts. While most families in the coastal regions are involved in more than one economic activity many still remain below the poverty line. This has been attributed to poor communication and transportation infrastructure and social services. Moreover, the lack of agricultural inputs and poor fishing gears have also led to poor performance of agriculture and fishing respectively.

CHAPTER THREE

3.0 PRESSURES ON THE RESOURCES

An increasing number and range of human activities threaten Tanzania's coastal and marine resources. Current pressures include urban growth, industrial development, resource extraction, agriculture, fishing and shipping. Looking ahead, Tanzania can expect to face new pressures including tourism, mariculture, and natural gas exploitation.

3.1 Existing Pressures

The current trends in Coastal and marine resource utilization pose potential threats to the sustainability of the resources. If not arrested the activities may lead to the depletion of the resources and loss of biodiversity that support human livelihood.

3.1.1 Population growth and unplanned settlements

Rural to urban migration, natural population increase and the villagelization program of 1974 - 76 have contributed to high pace of population growth and unplanned settlement, particularly in coastal urban areas like Dar es Salaam, Tanga, Lindi and Mtwara.

The significant growth of the urban population in Tanzania is the direct result of three major factors. These are:

- Rural to urban migration. The rural urban migration especially for youths is caused by a number of employment opportunities existing in these areas.
- Natural population increase. The majority of the population (about 52 percent) is in the reproductive cohort (15-45 years) and have a high fertility rate. This contributes to the 2-6 percent population increase. There is a significant decline in infant mortality rates.
- The villagelization program of 1974-76 restructured the settlement pattern in some parts of the country. The restructuring brought about larger settlements that brought together individual villages to create small, but fast growing towns.

The consequences of population growth and urban expansion are increased pressure on the administrative machinery, depletion of resources and environmental pollution.

The increase in urbanization along the coast has placed overwhelming pressure on the administrative machinery. Government has been unable to provide a shelter delivery system at a time when demand for settlement has been growing rapidly. This has led to 40-70 percent of the urban population in Tanzania to live in unplanned housing with inadequate utility services (e.g., water, sewer and electricity) (Kyessi 1997).

The rate and pace of urbanization is exceeding the capacity of the environment to support its inhabitants. Coastal areas are increasingly suffering from depletion of key resources such as

fish, mangroves and agricultural lands. Because of a lack of utility infrastructure, most sewage is disposed of improperly leading to reduced coastal water quality.

NEEDS

As a check to migration and population growth rate, there is a need to improve rural services, infrastructure, employment opportunities and family planning education and campaigns at family level. Also there is a need of having master plans in both rural and urban areas from which housing and settlement plans should abide to.

3.1.2 Industrialization

There are only a few heavy industries in Tanzania but 75 percent of those that exist are on the coast. Most industrial development is either light manufacturing industries or agro-processing plants and mills located in the urban centers of Dar es Salaam and Tanga. However, these plants are point sources of pollution and contribute to pollution in hot spots along the coast.

The total pollution load (liquid waste) to the sea contributed by industries in Dar es salaam is estimated to be 2714.71 tonnes/year for biological oxygen demand (BOD) and 15454.48 tonnes/year for suspended solids (SS), while in Tanga the figures are relatively low i.e. 2.2 tonnes/year (BOD) and 4.2 tonnes/year for suspended solids (Mgana and Mahongo 1997).

Table 3.1 lists the type of industries that are located on the coast and the type of pollution each industry produces while Figure 3.1 shows the location of industries along the coast.

Table 3.1 Types of Coastal Industries in Tanzania and their Pollutants

Type of industry	Examples	Location	Pollutants
Food processing	Darbrew Ltd, Tanzania Breweries Ltd, CocaCola plant, Fahari Bottlers, Ubungo Diaries and Flour mills	Dar es Salaam	Organic matters, detergents, suspended solids, nitrogen and phosphorus compounds, bacteria.
Textiles	Urafiki textiles, Karibu textiles, Ubungo Spinning mills, Coastal Industrial Combined Ltd,	Dare es Salaam Tanga	Organic matters, dyes
Power generation	TANESCO	Dar es Salaam	Oil and lubricants
Metals	UFI, NECO, Steel cast, ALAF, Bicycle Company, Steel Rolling mills.	Dar es Salaam Tanga	Non-degradable matters, suspended solids, zinc, chromium, iron, copper, acids, and alkalis.
Petroleum	TIPER, Storage Tanks at Ports and Tanzania Zambia Pipeline (TAZAMA)	Dar es Salaam Tanga	Degradable matter, suspended solids, sludge, petroleum hydrocarbons, oils and greases, phenols, acids and alkalis, chromium zinc, manganese sulfur,

			mercury, lead, and other metals.
Soap and Detergents	Several factories	Dar es Salaam Tanga	Wastewater, organic matter, phosphates, suspended solids, oils and zinc.
Sisal	Amboni Ltd , Kikwetu Sisal Estates, Kigombe Sisal estate.	Lindi Tanga	Organic matters, waste water, sisal organic wastes
Plastics	Amboni plastic, Tegry plastic, Simba plastic, Cotex	Tanga Dar es Salaam	Non bio degradable solids
Cement	Tanzania Portland Cement, Tanga Portland Cement.	Dar es Salaam Tanga	Dusts, fumes
Chemicals	Tanzania Fertilizer Company	Tanga	Sulfuric acid, Ammonia, Fluoride Phosphorus Calcium and gypsum, suspension
Cigarettes	Tanzania Cigarettes Company	Dar es Salaam	Dusts and fumes

Source: Modified from Mgana 1993

Figure 3.1: The location of industries along the coast of Tanzania

The consequence of industrialization is decreased water quality.

Industrial operations generate effluents that are regularly discharged into coastal waters because the industries do not have waste treatment facilities. This results in decreased water quality around industrial areas. However, the impacts of the point sources of pollution are localized to urban centers of Dar es Salaam and Tanga with other small hot spots in areas where industrial plants are built on the coast or a tributary. Industrial pollution leads to eutrophication, bioaccumulation and salination. The affected biota are corals, seaweeds and seagrasses, intertidal organisms and coastal fish.

NEEDS

The industrial pollutants could be reduced by having waste treatment facilities, wastes discharge standards and guidelines. Moreover, environmental impact assessment should be carried out prior to industrial development.

3.1.3 Extraction of resources and salt production

Extraction activities which include sand mining, quarrying, salt production and coral mining along the coastal areas of Tanzania, have been important contributors to the local economy both in terms of monetary input and supply of raw materials for construction. However, these activities contribute significantly to coastal erosion.

Sand mining

Sand mining exists in most coastal towns but it is not done in coastal villages. Sand mining is generally done on a small scale by local operators, who apply for permits that are issued by local councils. However, permits do not require the miners to rehabilitate the abandoned sand pits even though rehabilitation is stipulated in the mining Act.

The locations where sand mining is known to be both legally and illegally occurring include:

- Tanga town at Kiomoni (5 km from Mwambani) near the shore
- Muheza District at Bagamoyo village and in river courses (e.g. Sigi River.)
- Pangani District from the beach (near Pangani town) and some areas on Pangani river bank upstream
- Mitema in Lindi town near the sea shore. This is the main source of sand
- Kilwa Kivinje - near the shore
- Dar es Salaam area, sand mining is done commercially at Mbagala, Chamazi, Pande, Tuangoma, Magohe, Makongo, Mpiji, Bunju, Kawe and in four main streams (Tegeta, Mbezi, Mlalakua and Kijitonyama). In 1980's it was estimated up to 100,000m^3 of sand were extracted annually (Griffiths, 1987). This is now considered to be a gross underestimate as construction activities are increasing (NEMC-EIC 1995).
- Sand mining is carried out near the shore within Mtwara town (less than 5m from the shore) at Chuno and other areas within the town. It is encouraged by the town council who issues the permits.

The consequences of sand mining are damage to structures and sedimentation.

Sand mining has led to soil erosion in river banks and the shoreline as has been observed in Pangani, Muheza, Mtwara town (e.g. Chuno), Lindi (Mitema) and Dar es Salaam (Kunduchi). Sand mining in rivers has also led to the change of river courses and an increase in soil erosion (e.g., Pangani River). In Dar es Salaam, it has caused damage or threatened structures like road bridges. In some places, the abandoned sand pits have been turned into refuse dumps posing a health hazard to nearby residential areas.

NEEDS

Sand mining should be carried out in allowed areas but away from the shore and river banks. Permits should instruct miners to rehabilitate abandoned pits by land filling.

Quarrying

Quarrying is done at a commercial scale near urban centers and use coral rag and other stones.

Quarrying in Tanga, Mtwara and Lindi regions is limited to areas near towns. Villages are free from quarrying except where there are road/bridge constructions near shore (e.g. Mikindani). Quarrying in Dar es Salaam is extensive. In Tanga, Pangani, Muheza, Dar es Salaam and Lindi areas, quarrying is done 200m landward of the highwater mark. In Mtwara, quarrying is done within 200m from the coastline. Quarries are registered by the Mining Department and are regulated by the Mining Act. Quarrying fees are Tshs 10,000 per year, which is paid to the Mining Department headquarters.

The consequences of quarrying are land subsidence and land slide.

Quarrying near shore in Mtwara region has led to shore erosion, land subsidence (e.g. Mikindani, Kajima quarry) and landslides (e.g. in Lindi hill quarries). Quarrying in Dar es Salaam creates unsightly pits that are not reclaimed by landfill. Currently there is no control of abandoned pits. Data on the extent of quarrying is limited.

NEEDS

Quarrying should be carried out away from the shore to avoid erosion along the shore. Permits should include the need for rehabilitating the abandoned pits.

Coral extraction

Live and dead corals are extracted from reefs, the activity which is quite destructive is spreading in villages all over the coast. It negates the efforts made to save the coral reefs from dynamite fishing.

One of the most destructive activities now allowed and even encouraged by some regional and district authorities is coral mining. Live and dead corals are extracted from reefs using pick axes, crowbars and other implements. The corals are brought ashore where they are piled on kilns and burned to produce lime for local building and trade. This practice is prevalent in Lindi and Mtwara regions where it was reported that at least 20 villages in each region participate in coral mining and lime making. At one of the sites, it was estimated that some 2000 tonnes of coral (mostly massive porites) are mined per year. If this is extrapolated to the 40 villages, at least 80,000 tonnes of coral per year are mined and burned into lime in the two regions. This is a serious damage to the reef in this area.

Coral extraction is being encouraged and is spreading in the villages of Lindi and Mtwara regions as it is considered to be a legitimate alternative income generating activity to dynamite fishing. The extraction of coral is also known to occur in Tanga region (Muheza and Pangani districts) and Dar es Salaam (Sinda Islands) (NEMC-EIC 1995).

The consequences of coral extraction include shore erosion, land subsidence, loss of scenic value due to abandoned pits and loss of biodiversity.

Plate 3.1 shows corals being burnt into lime on kilns at Mikindani, Mtwara in July 1998.

NEEDS

To conserve the biodiversity and protect the shore from erosion coral mining in the ocean and islands should be forbidden. Some permits can be given to extract corals which are in the terrestrial environment flanking the ocean.

Plate 3.1 Corals being burnt into lime on kilns at Mikindani, Mtwara.

Salt Production

Salt works and evaporation methods of sea water involves cutting of coastal and mangrove forests.

Salt making is prevalent in all coastal districts in Tanga, Dar es Salaam, Coast, Lindi and Mtwara Regions (Table 3.2).

There are two types of salt production technologies.

- Salt production using solar energy in salt pans
- Boiling of saline water (e.g. at Chumvini near Tanga town). This has decreased as a result of the prevention of the use of mangroves as firewood.

Both types of salt production technologies are carried out in Tanga region while in Coast region, Dar es Salaam, Mtwara and Lindi the favored technology is salt production using solar energy.

The consequences of salt production are salination and mangrove depletion.

The construction of salt pans involves the cutting of mangroves which is common in Dar es Salaam, Bagamoyo, Tanga, Lindi, Kilwa and Mtwara. Salination of land and ground water occurs in areas with saltworks. Table 3.2 summarizes the information of extractive activities on the coast.

Table 3.2 Extraction Activities and salt production along the Coast of Tanzania

Activity	Distribution	Where the activity is carried out	Technology of Production	Uses	Impacts	Trends
Sand Mining	DSM, Tanga, Bagamoyo, Lindi, Mtwara .	Along rivers, seasonal streams, and the shoreline	Digging with excavators, hoes and shovels.	Construction	Lead to beach erosion, change of river courses, undermining of structures	Increasing
Quarrying	DSM, Tanga, Bagamoyo, Lindi, Mtwara.	Near shoreline	Blasting and crushing,digging with pick axes.	Construction	Soil erosion, loss of scenic beauty	Increasing
Salt Production	Tanga, Bagamoyo, DSM, Lindi, Mtwara.	Near the shoreline in mangroves and coastal forest areas	Solar produced, boiling.	Domestic Industrial	Destruction of mangroves and coastal forests.	Increasing

Source: Field observations – Core Working Group TCMP 1998

NEEDS

Proper site selection and introduction of alternative and energy saving technologies are required to conserve the mangrove forests.

In order to avoid salination of land and underground water plastic sheets or any other material should be laid down to prevent diffusion of salt into the soil.

3.1.4 Coastal agricultural activities

Agriculture forms the core of the economy of the Coastal regions. Small scale agriculture is predominant in terms of peoples' income and occupation and is characterized by low productivity due to low inputs and poor technology. Large scale agriculture is limited to a few crops, and involve high input and modern technology.

Tanzania is an agricultural country that depends on its environment and natural resource base for its development. Agriculture in Tanzania can be divided into two broad categories: small-scale agriculture and large-scale plantation agriculture.

Small-scale agriculture

Coastal agriculture, like in the rest of the country, is dominated by small holders, who form the core of the economy. Small holder farms are characterized by very low inputs and technology. The majority of these farms are located in areas with poor infrastructure limiting accessibility and the availability and timelines of supply of inputs such as fertilizers and credits. These have affected productivity of labor and land. Due to population increase along the coastal area, coastal communities have a challenge of attaining food security. To achieve this, more arable land has to be turned into agricultural production. Rice, maize, legumes and cassava are grown subsistently.

Large-scale agriculture

Large-scale farms occupy only about 10 percent of cultivated land. Large tracts of land have been used to grow sisal in Tanga, Mtwara and Lindi. Apart from sisal, which is grown in big estates operated by private companies, cashew nuts and coconuts are two major cash crops grown by the coastal communities. Yields for cashew nuts have declined in recent years apparently due to poor marketing and the collapse of almost all processing plants.

The consequences of agricultural activities include degradation associated with shifting cultivation, soil erosion, deforestation and pollution by agro-chemicals.

- **Shifting agriculture**
  Due to constraints in input availability and distribution, production is very low; hence more land is brought into cultivation to meet the needs for more food and cash. This expansion gradually extends into marginal areas, bringing with it the associated degradation.

- **Soil erosion**
  Soil erosion is probably the most important environmental hazard resulting from agriculture on the coast. Shifting cultivation and unplanned cultivation in the river

valleys and flood plains entails clearing of vegetation, which results into the exposure of soil to erosive agents such as water and wind. The effects of soil erosion include the siltation of rivers and the adjacent marine ecosystem such as coral reefs. The combined effects of sedimentation and turbidity limit the filter feeding and photosynthesis of corals and other invertebrates resulting in the decline in coastal productivity.

- **Deforestation**
  Deforestation as a result of agriculture occurs mainly in the process of farmland expansion. These activities expose soil to harsh climatic conditions. In addition, water catchment areas are being cleared of vegetation, which leads to loss of biodiversity and impacts ground water recharging process.

- **Agro-chemicals**
  The environmental effects of chemical use in agriculture in Tanzania are yet to be documented. However, it is thought that overuse will have negative effects, including pest resistance, harmful residue in food crops and environmental pollution. Information from agricultural officials (1998) in coast region indicated that rice farmers in the flood plains of Ruvu and Rufiji Rivers use DDT to kill crabs considered to be pests in their fields.

NEEDS

Infrastructure and services should be improved in rural areas which will subsequently improve productivity and prevent shifting agriculture. Integrated chemical and pest management practices should be encouraged. These include a combination of biological control, use of organic manure, engineering etc.

3.1.5 Fishing

Fishing, both industrial and artisanal, is an important economic activity and source of income and protein for coastal communities. However, coastal fishing exerts pressure on the coastal environment due to overfishing and the use of destructive fishing methods.

The most productive fishing grounds are the coral reefs, sea grass beds, mangrove swamps and reef flats. According to resource assessment surveys conducted in the mid 1980's, estimated standing stocks of fish for coastal waters ranged between 94,000 tonnes–174,000 tonnes (Iversen *et al.* 1984).

Artisanal fisheries

The artisanal fishery is concentrated in inshore shallow waters because of the limited range of the fishing vessels. Species composition and biodiversity of artisanal fish landings are shown in Table 3.3.

The annual fish catch has been fluctuating between 45,000 tonnes –54,000 tonnes for the mainland. Figure 3.2 shows the trend in the artisanal fishery of Tanzania in terms of fish landings and fishing effort (fishers) for a period of ten years (1984-1994). Between 1984

and 1990, there was an increase of 37 percent in fish landings by artisanal fishers from 39,810 tonnes to 54,527 tonnes, an average increase of 6.2 percent per annum. This may be the result of the rise in fishing effort as during the same period the number of fishers increased from 13,783 to 16,178 or by 17 percent; an average annual increase of 2.9 percent. Figure 3.3 confirms this as the catch rates also increased from 11.2 to 12.5 tonnes per vessel per year respectively.

However, between 1990 and 1994, artisanal fish landings decreased by 32 percent from 54.527 tonnes to 37,286 tonnes; an average annual fall of 6.3 percent. Similarly, catch rates also decreased from 12.5 tonnes per vessel in 1990 to 11.5 tonnes per vessel in 1994. The decline may signal that the artisanal fishery is exploiting the coastal fishery at its maximum potential and that the decline in catches and catch rates since 1990 may indicate overfishing.

Table 3.3 Species composition and biodiversity of artisanal fish landings along the coast of Tanzania, 1986, 1992

Habitat and Species Group	Percent Composition by Weight	
	1986	1992
Dermersal Fish		
Emperors/Snappers	19.8	24.4
Parrot Fish	6.0	6.1
Rabbit Fish	5.4	8.1
Sharks	2.5	3.0
Rays	2.3	3.7
Prawns	1.6	1.6
Milk fish	1.3	0.1
Rock cod	1.3	1.1
Queen fish	1.1	1.1
Cat fish	1.0	1.2
Thread fin	1.0	0.3
Octopus	0.8	0.4
Cobia	0.4	0.7
Mullets	0.3	0.8
Flat fish	0.1	0.1
Sub-Total	**44.9**	**52.7**
Pelagic fish		
Sardines	10.6	9.7
Mackerels	5.1	8.6
Halfbeaks	4.6	3.8
Jacks	2.9	4.4
Silverbiddies/silversides	2.7	1.7
King fish	1.8	2.2
Tunas	1.2	2.0
Bill fish/Swordfish	0.4	0.9
Sub-Total	**29.3**	**33.3**
Others	**25.8**	**13.9**
Total	**100.0**	**99.9**

Sources: Nhwani 1988, Linden and Lundin, 1992

Figure 3.2 The trend of number of artisanal fishers and catches (tonnes)

Figure 3.3 Catch rate (tonnes/vessel) of artisanal marine fishery during different years

Destructive activities from small-scale fishing include dynamite fishing, beach seining, use of small meshed nets and poison fishing.

These are activities which damage the environment (substrate, fauna and flora) as a result of efforts made to extract as much of the resources as possible in the shortest time.

- **Dynamite fishing**
  Dynamite fishing or blasting is common along the whole coast from Tanga to Mtwara. In 1997, the number of persons prosecuted for dynamite fishing along the entire coast was 601 (information from fisheries officials). This is expected to fall in 1998 as the Fisheries Division, with the cooperation of the Navy, launched a nation wide campaign in March and April 1998 to stem the practice. During the Core Working Group field visit to Tanga, Lindi and Mtwara regions in June 1998, it was reported that dynamite fishing has stopped.

  However, it is uncertain whether the practice will be completely eliminated without having a permanent armed patrol of the coast. A recent survey in Tanga region has shown that dynamite fishing was responsible for the damage beyond recovery of 10 percent of coral reefs in the region and 70 percent showed a significant amount of damage but could recover if protected. Only the remaining 20 percent of coral reefs were in good condition (Makoloweka and Shurcliff, 1997). The condition of coral reefs in Dar es Salaam, Lindi and Mtwara regions could be similar to that in Tanga.

- **Beach seining**
  Beach seining, including the banned *kigumi*, is prevalent along the entire coast. Although *Kigumi* is prohibited, it is difficult to differentiate it from other beach seines. In Mtwara and Lindi regions, *Kavogo* seining is encouraged by the regional administrations and the Rural Integrated Project Support (RIPS) as the method is considered to be harmless to the environment. However, observation of the film *"Kavogo ya Kusini"* made by RIPS indicated that this seine net operation could damage corals and catch immature fish if its operation is not closely monitored, which is normally the case.

- **Poison fishing**
  Poison fishing is practiced in localized areas along the coastal regions in Tanzania from Tanga to Mtwara.

Large-scale fishery
The industrial shrimp fishery has a potential yield of about 1,000–1,400 tonnes. Industrial fishery catches, for both fish and shrimp are on average 2,000 tonnes a year of which shrimp catches are between 800–1000 tonnes indicating that the shrimp fishery is probably being exploited optimally.

Total industrial fish landings increased from 1,081 tonnes in 1984 to 2,190 tonnes in 1988, with a corresponding increase in effort from 10 trawlers to 13 trawlers respectively. Since 1988, landings have decreased consistently to only 1,787 tonnes despite the increase in

trawlers to 16. This is also a cause for concern as catch rates have decreased hence indicating possible overfishing in the trawling areas (Bagamoyo and Rufiji). Tanzania has the potential of expanding fish production especially on the pelagic stocks, the sardines, tuna and stocks found in the Exclusive Economic Zone. Since 1997, industrial long liners have caught 193 metric tonnes of tuna and other fish in Tanzania's EEZ. (Fisheries Division Statistics, 1998)

Impacts from large-scale fishing include overfishing, pollution, discard of by-catch and destruction of habitat by bottom trawling.

- **Overfishing**
  The consistent fall in fish landings and catch rates in both the artisanal and industrial coastal fishery in the last five or more years indicates an approach to overfishing. This is emphasized by the fact that the average annual catch in ten years (1984-1994) was 46,000 tonnes while the optimum yield for the coastal fisheries of Tanzania is estimated at only 47,000 tonnes (Ngoile *et al* 1988).

- **Pollution**
  Trawlers and longliners can cause pollution by leakages of fuel oils, lubricants and the discharge of freshwater from ballast tanks.

- **Discard of by-catch**
  A study conducted by Nhwani *et al* in 1993 estimated that about 28 percent of catches in shrimp trawlers are discarded at sea. The discards consist of small immature prawns, trash fish and other finfish which have a low market value. Most discarded fish eventually die as they are usually injured beyond recovery.

- **Destruction of habitat by bottom trawling**
  Bottom trawls are dragged along the floor of the sea in order to catch bottom living (demersal) fish. As they are dragged over the sea bottom, they damage or even kill benthos and other invertebrates on which some of the demersal fish feed. Furthermore, bottom shrimp trawl nets are sometimes fitted with "tickler" chains which further disturb the substrate. The extent of destruction of the sea bottom by trawl nets has not been assessed but it is expected to be significant in the Rufiji estuary and Mafia channel where most of the shrimp trawlers operate for nine months of the year (March to November). Bottom trawling for prawns is supposed to be limited to river estuaries and offshore flats where there are no corals. However, observations and reports obtained during the field trips in June and July 1998 indicated that bottom trawling is now being extended to Kilwa Kivinje, within the reef areas and far from the Rufiji and Matandu River estuaries. It is also carried out illegally in shallow waters and during the night where it conflicts with the artisanal fishery particularly at Kigombe, Pangani, Bagamoyo, Kilwa and Rufiji.

NEEDS

Review the legal framework pertaining to fishing activities and take necessary measures which include proper penalty and enforcement. Provision of proper guidance and incentives to local communities to encourage voluntary adoption. Improve infrastructure and services to attract alternative investments.

Encourage selective gears and ban beach seine nets, and the number of trawlers should be reduced following recommendations from stock assessment studies.

3.1.6 Coastal forests and mangroves cutting

Coastal forests and mangroves play a vital role in Tanzania's rich coastal ecosystem. They also support a number of important socio-economic activities of coastal communities. Although they are designated as protected areas rampart harvesting and clearing for other economic developments continue unabated.

Coastal forests

Coastal forests cover about 1,000km^2 (Burgess and Muir 1994). These forests are remnants of the once extensive ancient forests of East Africa. They occur as isolated patches in some cases as small as 0.01 km^2 and in many cases are limited to hilltops and offshore islands.

Important areas are Mchungu forest in the Coast Region which contains the only fragment of the gum copal forest habitat within a forest reserve; Pugu forest which has the second largest deposit of Kaolin in the world; Kazimzumbwi; Gendagenda in Pangani; Kiwengoma in Rufiji; Rondo and Chitoa in Lindi and Mlola in Mafia.

There are no data to indicate the trend of coastal forests cleared in a given period. However, Table 3.4 shows the increase in the exploitation of coastal forest products in Pangani district between 1994 and1996. Also, some 8,000 ha of coastal forests may be cleared soon to establish new saltworks at Mkwaja in Pangani District. This is the only coastal forest which is adjacent to the shoreline (E. Nashanda, pers. comm).

Table 3.4 Coastal Forest Products from Pangani District 1994-1996

Produce	1994	1995	1996
Logs (m^3)	64,485	105,414	110,325
Poles (No)	3,059	8,577	2,993
Firewood (m^3)	305	286	254
Charcoal (bags)	43	0	40

Source: District Natural Resources Officer, Pangani - June 1998

The pressures on coastal forests are clearing for agriculture, timber, pole and fuel wood collection, mining, quarrying, salt making and over grazing.

These pressures have reduced the once extensive coastal forests from 59,300 sq. km to the present 1050 sq. km or about only 2 percent of the original area (Mwalyosi and Kayera, 1995)

Mangrove forests

Mangroves occupy about 1,640 km^2 (164,000 ha) of the coastal area of Tanzania. They are essential components of the global life support system and an asset that represents opportunities for sustainable development. The largest area of mangrove forests is found in Rufiji Delta occupying about 532.6km^2 (53,260 ha) followed by Kilwa 224.3km^2 (22,430 ha), Tanga and Muheza districts 94km^2 (9,400 ha) (Table 3.5). Box 3.1 shows the species of mangroves and their direct uses (Semesi, 1994).

Mangroves are important and valuable resources. They are highly productive in terms of fisheries, with 80 percent of the shrimps caught in Tanzania coming from mangroves of the Rufiji Delta. Water fowl and shore birds are inhabitants of mangrove swamps as well as crocodiles, hippopotami and invertebrates. Mangroves are also valuable economic and environmental resources in terms of coastal protection, flood mitigation, nutrient filtering etc. Other mangrove uses include fuel wood, timber, medicinal products and poles for building.

Table 3.5 Mangrove Areas in Tanzania Mainland

District/Region	Forest Area (km^2)	Non-forest Areas (Creeks, saltpans, bare saline) (km^2)
Tanga and Muheza D	94.0	35.3
Pangani D	17.6	12.8
Bagamoyo D	56.4	35.5
Dar es Salaam R	21.7	10.5
Kisarawe and Mkuranga D	38.6	21.9
Mafia D	34.7	8.9
Rufiji D	532.6	143.6
Kilwa D	224.3	143.1
Lindi D	45.5	27.5
Mtwara D	89.4	44.1
Total	**1154.8**	**483.2**

(Source: Semesi, 1991) D =District R =Region

Box 3.1 Mangrove Tree Species in Tanzania and their Direct Uses (From Semesi, 1991)

Species	*Uses*
Avicennia marina (mchu)	Inferior firewood, but used for boiling of brine, fish smoking and production of lime, making of dugout canoes and beehives; leaves used as goat and cattle fodder; branches support beehives
Bruguiera gymnorrhiza (msinzi or mshinzi)	Good firewood; used for fish smoking; fishing stakes; poles.
Heritiera littoralis (mkungu)	Good firewood; timber for boat-building; furniture; dhow.
Ceriops tagal (mkandaa)	Good firewood; poles; fishing stakes; fence posts.
Lumnitzera racemosa (mkandaa dume)	Good firewood
Rhizophora mucronata (mkoko or mkaka)	Good firewood; poles; fence posts; fish traps; fishing stakes.
Sonneratia alba (mlilana or mpira)	Inferior firewood; commonly used in boat-building; pneumatophores used as fish net floats.
Xylocarpus granatum (mkomafi)	Good firewood; used for fish smoking; boat-building; making furniture. The seeds are used to treat stomach problems and the fruit pulp to cure rashes.

The establishment of the Mangrove Management Project (MMP) in 1994 in all the five maritime regions of Tanzania has improved the management and protection of mangrove forests. The project activities have resulted in the increase of mangrove areas in some districts as shown in Table 3.6.

Table 3.6 Comparison of Mangrove Areas Before the Establishment of MMP (1989) and After Four Years of Operation of MMP (1998)

Region	District	Area 1989 (ha)	Area 1998 (ha)
Tanga	Muheza, Tanga, Pangani	11,200	12,000
Lindi	Kilwa	22,430	26,737
Lindi	Lindi	4,550	7,301
Mtwara	Mtwara	8,940	13,350

Source:
1. Semesi, 1991
2. Northern Zone Mangrove Officer, Tanga June 1998
3. Southern Zone Mangrove Officer, Lindi, July 1998

The impacts on mangrove forests are destruction of breeding and nursery grounds of fish, coastal erosion, siltation and loss of habitat for other organisms.

Over exploitation of mangroves leads to the destruction of breeding and nursery grounds of finfish and shellfish which results in the decrease of their catches. Other consequences are an increase in coastal erosion, siltation and loss of habitat for flora and fauna associated with mangroves such as migratory birds.

Mangroves are cleared for the construction of salt works for solar evaporation in Tanga, Bagamoyo, Dar es Salaam, Mtwara and Lindi. Mangroves are also cut and used as wood fuel for boiling brine to produce salt (in Tanga), for making lime (in Lindi and Mtwara) and for drying fish (in Pangani) (Semesi, 1991).

Shifting rice cultivation in the Rufiji Delta and elsewhere is becoming a serious threat to mangroves as large areas are clear-felled. Increased human populations have tended to increase the areas cleared for agriculture.

Mariculture, especially prawn farming in Bagamoyo and Rufiji areas are new threats to mangroves.

NEEDS

Continued protection of coastal forests and mangroves is essential for both ecological and economical reasons. The zoning and replantation programs under the mangrove management plan is the right move for conservation and regulated use and therefore, should be strengthened.

3.2 Expected Pressures

Tourism, mariculture, mining and gas exploitation are untapped potentials for the economic growth of the coastal regions and Tanzania at large. However, their development is potentially associated with environmental impacts if not well managed.

3.2.1 Tourism

The coastline is endowed with potential sites for tourist attraction. These range from historical sites such as the Kaole ruins and Kilwa Kisiwani ruins and former slave trade centers and markets; to natural scenery such as the prisitine coral reefs around Mafia, the beautiful beaches at Msimbati, Kilwa Masoko and Wildlife sanctuaries (e.g., Saadani and Selous game reserves). Because of these attributes, tourism is a rapidly growing industry in the coastal zone. Old beach hotels are being rehabilitated, new hotels built and several plots are continuously being allocated along the whole coast from Tanga to Mtwara. Table 3.7 shows the trend of tourists and earnings from tourism from 1994-2000. The economic significance of this form of coastal resource use lies in the generation of employment and foreign exchange earnings.

Table 3.7 Trend and Projection in Tourist Arrivals and Earnings 1994 to 2000

Year	No of Tourist Arrivals	Change in %	Earnings T Shs (million)
1994	261,955	13.65	103,734
1995	295,312	12.89	155,663
1996	326,188	11.01	-
1997	359,096	10.08	-
1998	401,331	11.76	-
"1999	446,653	11.29	-
"2000	495,950	11.04	-

Source: Ministry of Natural Resource and Tourism 1997

The consequences of tourism include pressure on the existing infrastructure, reef trampling, collection of trophies, seashells and corals, beach erosion and pollution.

- **Pressure on existing infrastructure**
  The tourism industry is associated with the development of infrastructure such as good roads and harbors to meet the demand of tourists. However, scenic coastal sites like fine sandy beaches and clear bathing water found in southern Tanzania are far from the main national road grid. This has led to mounting pressure on the more accessible beach areas such as Bagamoyo and Dar es Salaam. Regardless whether the hotels are in existing urban centers or outside, utilities such as electricity and water are not adequate

- **Reef trampling**
  Tourism activities involve snorkeling, diving, boat cruising and beach strolling. These activities lead to trampling on coral reefs and the intertidal areas.

- **Collection of trophies, seashells and corals**
  The growing tourist industry as well as lack of employment opportunities, especially along the coast, have contributed to the collection of shells, corals and trophies. Most of the coastal inhabitants find this as an alternative way of earning their income. Trophies, seashells and corals are collected for sale to tourists for ornamental purposes. Species of shells commonly collected are Cowries(*Cyprea* spp), Conches, *Volute, Murex, Lambis, Conus* , *Rostellaria, Oliva* and Triton shells. Corals that are collected include Branched corals (*Madrepora*) and Brain corals (*Meadrina*).

- **Beach erosion**
  Construction of tourist infrastructure such as hotels and roads involves quarrying and the clearing of vegetation especially mangroves which has led to beach erosion. Beach erosion could lead to a loss of properties as has been observed on beach hotels along the Kunduchi area, (e.g. Kunduchi Beach Hotel, Rungwe Oceanic Hotel, Silver Sands Hotel and Bahari Beach Hotel). The scenic and economic value of the beach is lost in areas severely subjected to erosion

- **Pollution due to tourism**
  Most of the hotels are constructed on the shoreline. Due to lack of proper sewage disposal facilities in most of Tanzanian urban areas, sewage from hotels is disposed directly into the surrounding sea. Also solid wastes produced are collected and disposed on the beach, destroying the scenic value of the very resource that the tourists are visiting Tanzania to enjoy.

NEEDS
Diversify the tourism industry to include new tourist sites and other forms of tourism such as ecological tourism.

3.2.2 Mining and gas/oil exploration

Tanzania has mineral and gas resources in coastal areas as well as a potential of oil reserves that could make significant contributions to the national economy but have not yet been exploited.

However, Tanzania is just about to embark on development of Songo Songo gas field. This will include large-scale off-shore gas extraction and an extensive pipeline system that will deliver the product to Dar es Salaam. There are confirmed gas reserves at Mnazi Bay. Other potential sites for petroleum exploration in coastal regions include Selous Basin, Rufiji River plain, Ruvu basin, and Mandawa basin.

Beach sands have been found to contain concentrations of heavy metal. The concentrations vary along the coast from south to north, with rich concentrations found on the northern flank of the estuaries of the large rivers. Large reserves of anhydrite and rock salts have been discovered north of Lindi. Limestone used for the production of cement, lime, building stone and aggregates are found at Wazo Hill, north of Dar es Salaam and in Tanga. The second largest deposit of kaolin in the world is found in Pugu hills (2,000 million tonnes) in the outskirts of Dar es Salaam. Figure 3.4 shows the extractive activities on the Coast of Tanzania.

Figure 3.4 Distribution of coral extraction and sand mining activities on the coast of Tanzania

3.2.3 Mariculture

Mariculture is a type of aquaculture defined as the managed cultivation of aquatic species in coastal waters (Pillay, 1990). Aquaculture broadly entails the rearing in water of finfish, shellfish (crustaceans, mollusks) and seaweeds, in a process in which at least one phase of growth is under the control of human beings. Growth in the mariculture industry in Tanzania is expected because:

- Rising costs of capture fishery: Current trends in prices of nets, boats fuel, lamps, engines and spare parts are on the increase and beyond the reach of the majority of the artisanal fisherfolk. Depending on choice of species and technology, mariculture could be a cheap investment.

- The population in Tanzania is increasing at an average rate of 2.8 per year which requires food. Current food production in land-based systems has stagnated or declined due to unfavourable weather conditions, lack of agricultural inputs and market price incentives. Unemployment of new graduates from schools and colleges is increasing. Mariculture can supplement protein needs, and provide additional employment.

- Tanzanian economy depends to a large extent on cash crops that depend on international markets and can become victims of low prices when there is a world glut. Mariculture can play a role in diversification of the economy.

- The country needs foreign exchange earnings and there is a potential in export of mariculture products.

- There is a potential for utilization of products from farmed seaweed and other natural products in emerging new industries instead of importation from other overseas sources.

- Declining catches from the capture fisheries especially in the inshore area favours mariculture where suitable species can be managed. It is an established fact that these cultured species are more efficient in converting feed into flesh than terrestrial livestock.

Although mariculture is seen as an important economic opportunity, there are many constraints to its growth in Tanzania. These can be classified in three broad categories:

Biological

- Lack of knowledge or management techniques to deal with biological problems e.g. precocious spawning, non-spawning in captivity and overcrowding
- Lack of pure strains
- Lack of feeds based on locally available ingredients
- Lack of knowledge about successful mariculture in other countries
- Matching of potential species with sites
- Appropriate systems of technology for selected species

Infrastructure

- Lack of adequate extension services and information dissemination programmes have contributed to the slow pace in mariculture development. In areas where extension workers are available, their mobility is impaired. Extension agents operate on foot, by bicycles or from public transport
- Lack of transport facilities for the products to markets
- Lack of equipment and supplies

Economic

- Mariculture is not a priority to the Government, which lay emphasis on projects with immediate economic returns
- Economic viability of mariculture has not been clearly demonstrated by the government enabling banks and other financial institutions to extend credit facilities to prospective mariculturists
- Lack of information on supply/demand and possibility of marketing

These constraints, coupled with the relative in-experience to deal with large scale mariculture could result in social and environmental impacts as a result of mariculture. Although these impacts do not exist, it is expected that may begin to become evident as mariculture production increases. For more information, refer to the TCMP's mariculture working group.

NEEDS

Maintain and improve the resource base and quality of life of the Coastal Communities while developing these new economic opportunities.

The development of the new economic opportunities such as the development of infrastructure and facilities for example tourism industry should follow environmental protection, regulation and guidelines such as EIA.

3.3 Land use

Land as an entity is a finite resource but the natural resources that it supports can vary with time depending on the management conditions and the uses (UNCED 1991). Poor management and misuse of land resources results in land degradation that lowers the capacity of land resources to support current and/or future human life.

Land is the primary resource base for development, and scope and extent of human activities are closely tied to it. As the coastal population continues to increase, conflicts will arise about the allocation and use of land.

According to the National Environmental Policy (1997), degradation of coastal areas is becoming a serious problem in Tanzania signifying inappropriate use of coastal land and poor management of coastal land resources.

CHAPTER FOUR

4.0 RESOURCE USE PLANS, ALLOCATION AND CONFLICTS

The current trends in Coastal land use and resource utilization are potential threats to the sustainability of the coastal marine environment. Insufficient planning, inadequate policies and governance are among major factors that have contributed to resource degradation and resource use conflicts.

Several attempts are being undertaken to put more emphasis on better plans that take into consideration the need for integrated and participatory approach in the planning and implementation process. This chapter gives an overview on the resource use plans, existing resource allocation procedures, tenure systems and use conflicts. These are discussed with their relevance to integrated coastal management (ICM).

4.1 Resource Use Plans

Resource use plans that are of relevance to ICM include land use plans, mangrove management plans, Tanzania Forestry Action Plan and Mafia Island Marine Park General Management Plan.

Several resource use plans are in place some are being implemented while others are being developed as outlined below.

4.1.1 Land use plan

The objectives of land use plans are to improve land management by land users and promote better definition of and to strengthen land and resource tenure rights.

The National Land Policy of 1996 provides a framework for developing land use plans for urban and rural areas. The land use plans are designed to use a participatory village approach in land use planning and management, so that a number of villagers should manage their own land and natural resources in a sustainable way to optimize their living conditions.

Land use plans have been stratified at National, District and village levels each with a different set of objectives as indicated in Box 4.1.

Box 4.1 Land Use Planning Levels

National/Zonal Land Use Plans

Objectives:

- Identification of current land use types
- Monitoring of trends and changes in land use (e.g. in terms of area expansion, intensification, development plans, environmental degradation, capability to support increasing population, potential for future land use conflict etc).
- Evaluation of current and future needs for different types of land use
- Coordination and supervision of sectoral land use plans
- To ensure best uses of land resources based on economic, technological and environmental criteria.

District Land Use Plans

Objectives:

- To ensure implementation of national policies, guidelines and legislations on land use
- Interface for reconciliation between national interests and local priorities and aspirations
- To explain clearly the existing land uses in the district
- To identify land use issues and problems, resolve them if possible or pass them to higher levels of decision-making if need be
- To evaluate social and economic infrastructure
- To provide technical advice to land users on optimal land use in different agro-economic/agro-ecological settings

Village Land Use Plans

Objectives:

- To realize the potential of village land resources while conserving them for long-term sustainability through appropriate land use and husbandry.
- To provide the base for increased and sustained production from the land.
- To provide individual and groups of farmers with sufficient land to satisfy their present needs and provide opportunities for improving their livelihood in the future.
- To make provision for other land use requirements needed to support and service agricultural activities (both cultivation and livestock) for example, infrastructure and social services.
- To facilitate the movement of people from overcrowded villages to those with sufficient land reserves to absorb the expanding population.

4.1.2 Mangrove management plan

The overall objective of the mangrove management plan is to monitor, regulate the use of the mangroves, advise and assist local people and government agencies on better ways of management.

The plan does not fully address arrangement or facilitate the participation of all user groups in the management process.

The mangrove forests of Tanzania are an important and valuable resource. They play a significant role ecologically and economically. All mangrove forests are designated as national forest reserves. The Mangrove Management Plan (Box 4.2) is being implemented as a project by the Forestry and Beekeeping Division. The plan focuses on participatory approach which involves local communities in the management of mangrove forests.

The objectives of the Mangrove Management Plan are in line with the National Forestry Policy which seeks to develop conservation systems that abate forest degradation and enhance forest ecological and economic services.

The effectiveness of this type of management in achieving its objectives is dependent on support from all sectors of the user communities. The management plan's strategy is to apply the principles of sectoral integration. However, it does not fully address the question of institutional arrangement or facilitate the participation of all user groups in the management process.

Box 4.2 Management Plan for the Mangroves of Mainland Tanzania

The Mangrove Management Plan prepared in 1991 is geared towards institutional strengthening, intersectoral coordination and the involvement of coastal communities. Various studies on different aspects of mangroves and raising public awareness are also incorporated.

The long-term objective of the plan is to enhance the contribution of the mangrove ecosystem to the country's economy through the sustainable use of its resources. A host of short-term objectives have also been recognized:

- Conservation of protective mangrove forests;
- Maintenance of the fauna and flora habitat of the mangrove ecosystem;
- Recognition of the needs of the communities living in and depending on the mangrove ecosystem;
- Managing the mangrove areas for biodiversity, tourism, research and education purposes;
- Development of the management capacity for mangrove ecosystem; and
- Identification and planning of research activities.

Mangroves have been categorized into four management zones:

- Zone I: forests that will receive total protection;
- Zone II: forests that are ready to be brought into production;
- Zone III: degraded areas that will be closed to allow recovery; and
- Zone IV: areas that will be set aside for development of different types.

4.1.3 Tanzania forestry action plan

The Tanzania Forestry Action Plan addresses sustainable forestry development through community involvement.

The Tanzania Forestry Action Plan (Box 4.3) focuses on the protection of forests and its products. The plan covers coastal forests as well. This Action Plan puts more emphasis on the promotion of sustainable forest management.

Box 4.3 Tanzania Forestry Action Plan (TFAP)

The plan incorporates integrated District Forestry Program for the purpose of increasing both District and Local management of forests. TFAP seeks to achieve the following eight goals: Sustainable Land Husbandry, Community Based Aforestation and Forest Management. Others include Bio-energy Development, Forestry Industries, Beekeeping, Wildlife Management and Conservation of Ecosystems and Biological Diversity. Area of focus for the TFAP include forest management and resource sustainability.

4.1.4 Marine park general management plan

The objectives of this plan are:

- *To protect ecosystem processes and areas of high species and genetic diversity;*
- *To stimulate the rational development of less exploited natural resources including tourism;*
- *To promote sustainability of existing resource use incorporating recovery strategies for overexploited resources;*
- *To involve marine park users, especially residents around the park in the planning, development and management of the park; and*
- *To give priority of resource use and economic opportunity to nearby residents.*

The Marine Park General Management Plan (GMP) (Box 4.4) incorporates conservation, sustainable resource use and economic development, with emphasis on the participation of local communities in this process.

Currently there is only one Marine Park in Tanzania (Mafia Island Marine Park - MIMP).

The development and implementation of the MIMP-GMP is based on ICM principles. Marine parks are "special management areas" under the Fisheries Division. Marine park planning therefore can have large implications for ICM program in terms of sharing experiences, enhancement of management skills, innovations and community-based natural resources management.

Box 4.4 Development of the Mafia Island Marine Park

The establishment of a series of marine and coastal protected areas will ensure that local communities derive long-term benefits from an integrated management policy while at the same time conserving the rich marine biological diversity in the region.

The management plan was approved by the then Ministry of Tourism, Natural Resources and Environment in 1993, while the legislation was enacted by the parliament in 1994. Mafia Island Marine Park was declared the first marine park in 1995.

One of the management strategies in the Mafia Island Marine Park is zoning. In consultation with the concerned parties, the Mafia Park area was divided into several zones, each being defined by the activity allowed within it (i.e., general use, tourism, artisanal fishing, scientific research, protection, etc.) It is important to note that the zoning of marine areas can be somewhat difficult, since the ocean presents a uniform surface with few visible features for boundary demarcation. Nonetheless, zoning provides an immediate strategic framework for managing activities within protected areas (Ngoile 1989; Horrill and Ngoile 1992).

NEEDS

There is a need of having a coordinating mechanism for the plans for the protection and development of the coastal ecosystems.

4.2 Resource Allocation

Resource ownership and allocation are controlled by the state. Although market forces determine how resources are allocated; quantity, location, demand for the resource and the coast required to develop the resource are important influencing factors.

All natural resources within the coastal and marine areas belong to the state. Resource allocation is controlled by the Central Government through laid down procedures that

involve application, authorization and registration. In this era of liberalized economy and free market, the market forces determine how resources are allocated.

Several issues arise from the present system of coastal and marine resource allocation:

- *That resource allocation is sectoral based, each sector has the mandate to allocate the resources under their custody. Allocation is not coordinated; there is no requirement for consultation. As a consequence an allocation by one sector may have a negative impact on the other sector.*

- *Allocation of the resource is based on the resource type. There is no mechanism in place to ensure that resource allocation, even within the same sector, does not cause negative impacts to other resources. For example, a permit to make lime may cause degradation of the coral reefs which are vital habitats for marine life.*

- *Allocation procedures were laid down without consultation of the local resource users. As such, the implementation of these procedures normally overlooks the interest and life style of the local communities.*

- *The systems of allocation do not make reference to previous allocation made to the very person/entity on other resources. A person may be allocated as many resource types as he wants provided the allocation procedures are met. The system lacks coordination and does not make reference to the applicant's past record of performance in other related sectors to form a basis for resource allocation.*

- *There is overlapping mandate on resources found in the same area resulting in conflict of who allocates what. This has been experienced in issues like allocation of mineral works in the forest reserves and suitable arable land for rice farming and mariculture in the mangrove areas.*

Given that most coastal communities are poor and depend on the coastal and marine resources for their livelihood, it becomes imperative that allocation of the resources should make sure that their interest and their livelihood is ensured.

The criteria used in allocating a certain resource for a particular use depends on a number of factors, such as the availability in terms of quantity (amount, size, number) and location. These factors are influenced by the demand for that resource as well as initial cost required to harvest that resource or process it into usable products.

There is increased tendency to allocate resources based on the management plans. This is particularly so in land resources, forestry and forestry products, agriculture and to some extent water, fisheries and minerals.

The water resources in particular freshwater are considered basic. In some water basins where there is competing use, the Government has created water boards as competent

authorities for allocating water for various uses. So far, it is only Pangani and Rufiji basins that have established water boards. Allocation of the water in these basins is either for irrigation, urban consumption and hydropower generation. In these cases the allocation is based on the level of utilization and the volume of water required. Aquatic resources are considered common property with no tenure system.

Box 4.5 is an example of resource allocation procedure for land.

Box 4.5 Procedure for Land Allocation

The procedure involves the following stages:

Stage 1:	Submitting application at the respective village meeting of a village council.
Stage 2:	After approval by the Village Council the meeting minutes are forwarded to the Ward (Kata) for further consideration and approval.
Stage 3:	The meeting proceedings from both the village and the Ward (Kata) are then submitted to the District Land office whereby a District Land Allocation Committee, a meeting chaired by the District Commissioner is convened. If the land area applied is less than 100 ha the District Committee is authorized to approve and submit a report to the Regional Land Officer who authorizes a survey of the lands. If the land area applied is more than 100 ha the application, together with the meeting proceedings are forwarded to the Region where, again, a meeting in convened, chaired by the Regional Commissioner.
Stage 4:	After approval, the committee endorses surveying.
Stage 5:	After approval land endorsement survey is carried out.
Stage 6:	After surveying, the data goes from the District Land Officer to the Regional Land Officer and eventually to the Director of Maps and Surveys for approval of deed plan.
Stage 7:	After the Deed plan is approved, an application for Title deed is made, a process which takes months.

All the above processes do not involve other relevant sectors such as fisheries, forestry or water. Also from village level to the District Level, the applicant is sometimes required to pay sitting allowances to the committee members. This may influence decision making. The process is long and bureaucratic.

NEEDS

There is a need of reviewing the present/existing resource allocation procedure so that the process is multi-sectoral, consultative in order to avoid overlaps of mandate resource use conflicts and bureaucracy

4.2 Resource Access and Control

Some measure of control and regulation are exercised for resources in planned areas or for commercial use. Resources on unplanned areas and domestic use, access is free and control is adhoc.

Access to Land

Under the Town and Country Planning Act all developments must receive a planning consent. Under the Town and Country Planning Ordinance, local authorities are given planning authority. Once a land has been designated as a planning area then building regulations are required under the Township Ordinance. Any development on a plot must get a building permit.

But if land is settled that has not been designated as a planning area, and has not been surveyed, customary law prevails. Some 75 percent of Dar es Salaam are settled on land under customary law, creating problems concerning what to do, either regularize or move people away from hazard areas such as flood plains, slopes and drainage areas. The 1979 Master Plan for Dar es Salaam has not been amended and surveys have been done on an *ad hoc* basis, so industry and housing are mixed. The pace of development far outpaces surveys.

Effectiveness of laws, and the enhanced role of local government in land use management, *inter alia*, is hampered by lack of revenue. Dar es Salaam City Council has recently established a tax on business revenue that has improved its ability to function with less central government subsidy.

Access to Natural Resources

Access to natural resources in public land is free so long as it is for domestic/household use. Otherwise permission from relevant authority is sought. The permission is normally accompanied with payments in form of fees, levies, or concessions. There is an increased tendency to decentralize powers of the various authorities to local level. However, the system of access to natural resources is characterized by bureaucracy, uncoordinated mandates and non consolidated charges on the same permit. A number of fees and levies are charged to the same application (for a natural resource) by different authorities. The process is cumbersome, inept and is prone to abuse hence rendering the whole exercise inefficient and ineffective.

Access to Marine Resources

Access to marine-based resources is also regulated and controlled. In fisheries for example, the resource is considered common heritage. Whether access is for domestic or commercial use, there is a general attitude by individuals to consider the ocean as a limitless provider of fish and other ocean resources. Also there is an attitude that if one leaves the fish someone else will catch it. This has caused the depletion of fish stocks in the near shore waters. But there is thinking that if fish stocks are depleted in the near shore fishing grounds, one will move to other parts of the sea.

Fishing is one of the main stays to most coastal communities and most of them are dependent on marine resources for their livelihood. A variety of fisheries take place in the coastal waters. A number of management measures are used to control the access to industrial fisheries. They include:

- Controlled access to fishing grounds. This is whereby visiting artisanal fishermen need to obtain permission from the village authorities to fish in that fishing ground.

- Open and closed season to some fisheries especially prawns and octopus. There is a closed season on these fisheries. Prawn fishing by trawlers is closed for three months each year.

- Zoning of fishing grounds. In prawn fishery, fishing grounds have been zoned. Three zones exist on the entire coast. But also there is restriction on fishing time in each zone. Trawlers are restricted to fish during the day time.

- Limited number of fishing vessels. In prawn fishery the number and size of fishing trawlers is limited.

- Restriction on gears used. Access is also controlled through gear restriction. Some gears have been outlawed e.g. seine nets, but also certain types of gears operate in specific fisheries.

NEEDS

There must be clear roles and mandate between local and central governments. Moreover, revenue collection must be consolidated and allocate adequate proportions to the management of the resources.

4.4 Land Tenure System

The tenure system in the coastal areas has resulted in land use development activities that take a narrow sectoral approach in management and development of the land and its resources. Emphasis has been placed on harvesting (e.g. forests, fisheries, marine products) and trade (e.g. port development, shipping and commerce). Little attention has been paid to develop suitable and appropriate land use management policies and legislation as important components of management for sustainable development of the land and its resources. Some of the existing economic activities in the coastal zone have tended to ignore the ecosystem linkages of coastal habitats.

4.4.1 Land tenure

Land in Tanzania is public and vested in the President as trustee on behalf of all citizens. Land is the basic natural resource. Its allocation for use other than public is in the form of a lease for a specified period, accompanied by a certificate of occupancy. Where customary tenure system is applied certificate of occupancy is not applicable.

Land tenure in rural Tanzania is still overwhelmingly influenced by customary ownership systems where land is communally owned and user rights are administered by clan and transfers to outsiders are rare. Most of Tanzanian small holder farmers hold land under the deemed right of occupancy which does not require a certificate and is fairly secure. The ownership of most coastal land is based on customary tenure system. The allocation of parts of such lands through statutory tenure systems leads to conflict with local communities. The coastal area has different land uses depending on the coastal features. The land use development activities include farms with permanent crops like coconuts and cashew nuts, smaller farms with perennial crops like cassava etc. These farms are not transferred or sold as the system exists that men and women inherit cash crops from their parental family but as women leave their parental household when they marry, they loose their claims to their brothers.

4.5 Existing Resource Use Conflicts

The liberalization of the economy to a free market economy has increased resource use pressure and hence intensified the conflicts between the investors/commercial users and small scale/local resource users.

4.5.1 Shallow water fishery

Before the introduction of industrial trawlers (1980s), conflicts in fishery resource use were minimal. The introduction of trawlers increased fishing pressure hence intensified the conflicts between industrial and small-scale fisheries. The existing conflicts as currently observed include:

- Destruction of artisanal fishing gears by industrial trawlers
- Increase in fishing pressure that leads to the decline of resources
- Mariculture activities (seaweed farming) and small scale fishermen operate in the same grounds
- Coral reef miners destroy important habitats for fisheries

4.5.2 Mangrove exploitation

Mangrove utilization by most coastal village communities has shown that it is done in a sustainable manner for local needs. The potential conflicts observed include:

- The exploitation by commercial users which in most cases is done illegally leads to overexploitation limiting resource for local users
- Mangrove conservation strategies conflict with coastal development activities like Tourism, Mariculture, Salt mining, Coastal Agriculture

4.5.3 Intersectoral coordination

- Lack of coordination between the land sector which provides land ownership for various uses, and other line sectors like mining, forestry and agriculture

- There is inadequate linkage between local authorities and District authorities for instance local authorities issue permits for coast sand mining while District authorities prohibit it

4.5.4 Tourism

Tourism development is rapidly growing along the coast. Hotels are being built along the beach. Observed conflicts include:

- Deprived public access to beaches by violating a setback line regulations of 60m from the highest water mark
- Clearing of seagrass and mangroves in search of recreation beaches
- Imported cultures against traditional norms

4.6 Conflict Resolution

Conflicts resolution procedures for resources use in coastal and marine areas are not clearly defined.

Current conflict resolution may include top - down procedures whereby the problem is resolved at the National Headquarters far away from the source of the conflict or a more informal localized procedure including meetings and reaching consensus. This is a new mechanism for addressing conflicts that may wide spread application in the future. The following description illustrates how conflicts are being resolved according to the nature of the problem.

As pointed out earlier, the conflict exists between artisanal fisherfolks whose nets are being destroyed by prawn trawlers and prawn fishing companies. In such an incident, the complainant is required to submit his claim to the District Fisheries Authorities whose responsibility is to assist in forwarding the issue to the Fisheries Headquarters. It remains the responsibility of the complainant to follow-up the matter at the Fisheries Headquarters for resolving the conflicts. What can be concluded from this procedure is that, it is a cumbersome procedure taking into consideration the distance where the incident has occurred and the office responsible for addressing the conflict.

Existing projects, in particular the Mangrove Management Project and the Tanga Coastal Zone Conservation and Development Program, have taken informal responsibility in convening meetings and workshops involving conflicting sectors to discuss and achieve consensus on resolving sectoral conflicts.

4.7 Gender perspective

Gender refers to the roles men and women play in a community; i.e. the differences in tasks, responsibilities, constraints and opportunities between both groups. These roles are deeply fixed in people's minds and hearts but can be changed and actually do change overtime.

Traditionally women in coastal communities are mainly involved in household activities, production of food and subsistence fisheries; while men are mainly involved in cultivation of food and cash crops, fishing and small scale business and trade.

Considering gender or applying a gender sensitive ICM program, the intervention approach at the village and all other levels should take into consideration the difficult roles, interests and expectations of men and women. Taking an example of gender in fisheries development, in capture fisheries most women are now involved in post harvest processing. The national Fisheries policy statement aims at incorporating gender perspective in the development of the fisheries sector. At the national level gender equity is encouraged and women have been given equal positions and training opportunities. At regional and District levels a growing number of women participate in the fisheries sector. However, in the majority of the coastal villages traditions still prevail for example, women in Tanga, Kilwa, Lindi and Mtwara are only involved in small scale fishing such as fishing dagaa ("Kutanda dagaa na uduvi) and collection of cowries, crabs and octopus. In these local communities women are still not allowed to participate in fisheries development because they are excluded in community planning and decision making.

One important aspect in gender considerations is the issue of resources accessibility and ownership. The ocean is a free access resource, but traditions dictate that only men have the right to access and as a result no women are involved in the development of the resources especially fisheries. The social and economic consequence is that women are solely dependent on men. Recent moves to uplift the status of women through seaweed farming are constrained by such segregations.

Most of women are already involved in seaweed farming and the activity is dominated by women in areas like Dar es Salaam, and Bagamoyo. There has been increasingly encroachment of areas for seaweed farming. This problem derives its origin from fishermen who want to use the site for beach seining. Fisheries department has donated a substantial amount of money to TAWLAE (Tanzania Association of leaders in Agriculture and Environment) for women groups in Dar es Salaam and Cost regions in order to be trained in seaweed farming. The program encourages small scale activities at the same time it helps women to uplift their income and improve their living standards.

Unless new policy development, provides an enabling environment, these opportunities will be lost. Concerning land management, women usually have access to use of land only because of their central role in Food production, meanwhile men inherit and hence own and control land. Limited access to land affects coastal women's access to resources for sustainable livelihood. The existing customary laws and values especially when it comes to allocation and inheritance of land and property in villages still restrict house ownership by women although there is no such restrictions in law.

Similar issues are found in all other sectors including, forestry, wildlife etc. The development of an ICM programme in Tanzania should give them utmost attention.

CHAPTER FIVE

5.0 RESEARCH, TRAINING, TECHNOLOGY AND AWARENESS

5.1 Research and Training

There are a number of governmental and non-governmental institutions that are involved in research and training on coastal and marine related issues. However, most are focused on one particular aspect of coastal resource management. No single institution specializes in ICM research and training.

Institutions that do work related to ICM are summarized in Table 5.1

Table 5.1 Selected Research and Training Institutions relevant to Coastal Management

INSTITUTION	ROLE	FIELD OF SPECIFICATION	LEVEL OF TRAINING
a) Mbegani Fisheries Development Center Bagamoyo	Training and Research	Fisheries Science	Diploma and Certificate
b) Kunduchi Fisheries training and research Institute – DSM	Training and Research	• Fisheries Biology • Food technology • Marine Engineering • Nautical Science • Fisheries Management Administration	Diploma and Certificate
c) University of DSM Through the Institute of Marine Science, Zanzibar; Faculty Of Science; and the Institute of Resource Assessment	Training and Research	• Marine Biology • Marine Sciences • Marine Geology • Marine Botany • Oceanography • Natural Resources	BSc, M.Sc. and PhD
d) Tanzania Fisheries Research Institute (TAFIRI)	Fisheries Research	• Fisheries Research	
e) Sokoine University of Agriculture	Training and Research	• Forestry Ecology • Food Science • Forestry Resource Assessment • Soil and Water Conservation • Land and Water Engineering • Agricultural Machinery Engineering • Rural Structures and Services • Principles of Agriculture	BSc. MSc. And PhD
f) Tanzania Forestry Research Institute - Morogoro	Research	• Coastal Forestry and mangrove	
g) Mlingano Agriculture Training Institute - Tanga	Training	• General knowledge in Agriculture	Certificate

h) Rwegarulila Water Resource Institute DSM	Training	• Water quality	Diploma and Certificate
INSTITUTION	**ROLE**	**FIELD OF SPECIFICATION**	**LEVEL OF TRAINING**
i) University College of Lands and Architectural Studies - DSM	Training and Research	• Urban and Rural Planning • Land Valuation • Survey and Mapping • Public Health Engineering	Advanced Diploma/ Degree
j) Dar Es Salaam Maritime Institute	Training	• Ship handling, • Marine engineering, • Nautical science • Deck hand	Certificate of competence
k) Bandari College	Training	• Port and Harbour Management	Certificate
l) National Museums of Tanzania	Research	• Marine Biology • Natural Science	
m) Serengeti Wildlife Research Institute	Research	• Wildlife	
n) Meteorological Department	Research	• Weather forecast	
o) Center for Agriculture Mechanisation and rural technology	Research	• Agriculture Technology	
p) Naliendele Research Institute	Research	• Cashew nut Husbandry	
q) National Coconut Development Program	Research	• Coconut Husbandry	

Research Conducted in Coastal and Marine Areas

A number of researches have been conducted in coastal and marine areas in Tanzania as shown in Table 5.2.

Table 5.2 Research conducted in coastal and marine areas in Tanzania

Institution	Research conducted	Status
Kunduchi Fisheries Training and Research Institute	• Biology and fishery of *scomberomorus lineatus* in the Zanzibar channel	Completed
	• Biology and fishery of small tuna *Thunnus albacare* in the Zanzibar channel	Completed
	• Monitoring of tuna fishery in the Indian Ocean	On-going
	• Comparative drying of *Leptoscarus sp.* Using solar tent drier and open sun drying	Completed
	• Energy consumption in fish kidneys	Completed
Mbegani Fisheries Development Center	• Development of insulated containers using local materials	Completed
	• Utilisation of small pelagics	Completed
	• Post harvest (fish) losses	Completed
	• Stock assessment in Bagamoyo	Completed
	• Utilisation of coconut timber for boat building	Completed

	• Development of outrigger canoes using planks • Development of collapsible (fish) traps	Completed Completed
Tanzania Fisheries Research Institute	• By-catch composition in the prawn fishery • Distribution and fishery of small pelagics of Dar es Salaam coast • Prawn resources of Rufiji and Kisiju • Fishery of King-fish • Coral reef (fishery) research • Heavy metal concentrations in oysters *crassostrea cucullata* • Environmental degradation caused by beach seine fishery • Prawn culture in Tanzania • Crustacea resources assessment in Rufiji and by-catch studies of prawn trawlers	Completed Completed Completed Completed Completed Completed Completed On-going Completed
Institute of Marine Sciences Zanzibar, UDSM	• The ecological study of the Chwaka Bay • Lagoonal sediments and their distribution between Msasani and Kunduchi, North of Dar es Salaam • Inter-linkages between Eastern-African Coastal Ecosystems • Algal physiology, cultivation and Nitrogen/Carbon metabolism • Physical oceanography of Chwaka Bay • Nutrient dynamics in Chwaka Bay • Fish stock assessment studies • Aquaculture experiments of siganids and oysters	Completed Completed Completed Completed Completed Completed Completed Completed
Institution	**Research conducted**	**Status**
Tanga Coastal Zone Conservation & Development Program	• Rapid assessment and monitoring of coral reefs in Tanga • Trials of mariculture of seaweeds and oysters	Completed On-going On-going
Frontier - Tanzania Project	• Mangrove ecosystem studies • Coral reef studies • Coastal forests studies	Completed On-going On-going
Forest and Beekeeping Division	• Management plan for the mangrove ecosystem of mainland Tanzania	Completed

Sources: Francis, J, 1997
Makoloweka and Shurcliff 1997
Semesi, 1991

Most research programs cater to sectoral needs and training is designed to meet only specific sectoral manpower needs. The impact that this research and training has on the wise management of the coastal areas is limited by

- Inadaquate technical and financial support;
- The training carricula in all the institutions do not cover Integrated Coastal Management;
- Most research is single discipline and not geared towards addressing issues related to the planning and implemention of Integrated Coastal Management programmes;
- Absence of priority setting mechanisms for research at both institutional and national levels; and
- Poor dissemination and communication of research findings to various user groups.

5.2 Technology

Most coastal communities do not have access to modern resource harvesting and processing technology and as a result there is underutilization and unsustainable utilization of resources.

Technology is an important aspect in the conservation and development of coastal resources. The access and level of technology determine resource utilization as improved technology will tend to give rise to lessened utilization of resources such as forestry, land and fishery, and at the sametime opening opportunities for better scientific methods of controlling environmental degradation.

5.2.1 Extraction/harvesting technology

- Energy
  Due to inadequate information and extension services to modern technology most of the coastal community do not have access to modern technology and still rely on bio-energy as major source of energy. Adoption of other alternative source such as wind, solar geothermal energy and biogas is very low, hence dependence on charcoal, wood and related vegetation products which poses a threat to environment.

- Agriculture
  The majority of smallholder farmers rely primarily on household labour and traditional farming techniques especially the hand hoe. Adoption of improved technology by farmers is very low and hence intensification and yield per acre is still low.

- Fishing
  The level of Technology employed in fishery is still traditional using small vessels with limited operational range to exploit fisheries resources further offshore. Most of the fisherfolk interviewed during field visit attributed low

catch to poor fishing gears. Types of fishing gears commonly used by coastal fisher folks includes gillnets, hooks, ringnets, longline, traps and seine nets. However most of these gears are very expensive for an ordinary fisherfolk to afford replacing the worn out ones. They resort to using destructive fishing methods. Services such as credit schemes are lacking or have failed where attempted.

- Mining and Quarrying:
  Quarrying involves the blasting of rocks using dynamite. The results are cracks in-nearby buildings and loosening of substrata. The dynamites are illegally made available to unscrupruos fishermen who use it in fishing.

  Illegal mining of corals (dead and live) involves use of pick axes, crowbars and other implements. The harvested corals are burnt in kilns using wood fuel.

- Salt production:
  Two types of salt production technologies are used both of which have negative consequences. Boiling of saline water and construction of salt pans involves the clearing of mangroves for energy and land respectively.

5.2.2 Processing

- Fishery products:
  Due to inadequate infrastructure such as electricity and good road, which facilitates accessibility to modern processing plant, most fishery products are still traditionally processed using preservative methods such as salting, sun drying and smoking which is fuel intensive. All these methods produce products which have short shelf life.
- Agricultural products:
  The canning and processing technology of agricultural products is very low. Most of the products such as orchads, pineapples are left to rot before being preserved.

5.2.3 Constraints

- Research finding are not made available to producers to adopt;
- Extension services to disseminate technology is faced with financial constraints;
- Lack of capital.

5.3 Data and Information

There is a wide range of actors in data and information generation and use. However, there is no system in place to link these actors together to ensure good information flow and networking.

The availability of reliable environmental data is prerequisite to good coastal management. In Tanzania there is a wide range of sources of data and information related to the management of marine and coastal resources. These sources range from

line ministries, specialized agencies concerned with marine science to the more general organizations dealing with subjects related to environment, sustainable development and socio-economic aspects of coastal communities.

There is a complexity of roles within the various organizations but they can generally be categorized as users or producers of data and information (Table 5.3). But there exists a continuum of information actors that range from pure suppliers such as raw data takers, through intermediate actors such as data and information analysts to pure decision makers who develop policy based on information supplied to them. There is no system in place to link these actions together to ensure good information flow.

5.3.1 Dissemination of information

There are a range of information centers established in some institutions in Tanzania, including: the Institute of Marince Sciences Zanzibar, has a data base on coastal and marine environment as well as a library with a number of marine related collections; the National Environment Management Council has Environment Information Center (EIC); and the Institute of Resource Assessment is hosting Tanzania Natural Resources Information Center (TANRIC).

Table 5.3 Selected Information Users and Consumers

Sector/Name of Organisation	Type of Information	Form of information production or use	Method of Dissemination	Target/ Beneficiaries
Tanga, Lindi and Mtwara Regional Planning departments	Regional social economic profile; Natural resources information from all districts: fisheries catches, number of vessels, fishermen, revenue from forestry etc	Statistics, Documentation: books, annual reports and reviews, briefs, bulletins, profile. No computerised database.	Data/information unit; Dissemination mostly on request; Village meetings, and focus group meetings.	In-house for regional planning and development strategies; RC's office; PMO; National sectoral offices; Planning Commission and the President's office; Researchers - students, project planners, councils and government officials
UDSM (Dept. of Zoology and Marine Biology, and Botany	Marine biology, coastal resources and their management	Training and research materials, Ph.D. and Masters dissertations and thesis.	Lectures, seminars proceedings, Tanzania Journal of Science	Researchers, students
Institute of Marine Sciences (IMS)	Subjects connected to the study of marine environment and ecosystems particularly of tropical waters	Documentation plans for Bibliographic databases GIS of habitat and species.	Library; database; Research publications; seminars, workshop proceedings	Researchers, students.
AGENDA	Mariculture	Documentation	Library Services,	In-house project

	particularly seaweed farming		AGENDA Newsletter	planning, entrepreneurs, researchers
Dar Es Salaam University Library • Biodiversity Documentation Project • Environmental Documentation Data base Project	• Biodiversity and related subjects. • Environment, sustainable development	Documents and computerised catalogues of documents	Referral library, database.	All users of different background - researchers, policy decision makers and practitioners.
TANRIC	Natural resources, environment, fish and marine life.	Database, GIS meta-database, maps and documents	Library, Databank.	General public, consultants, researchers, IRA staff.
NEMC Environment Information Centre	All subject on or related to environment; Biodiversity country report; State of environment report EIA reports and guidelines etc.	Documents, database, GIS	Library services, Newsletter - NEMC News.	Students, academics, researchers, consultants and general public.
JET	Dynamite fishing Environment, sustainable development	Under proposal an Information Resource Centre with Library catalogue, databases, audio-visual materials.	JET Newsletter, publications in news media, fliers, brochures, video films.	General public, media professionals, policy/decision makers.
TCZCP Project	Generate own information on corals, fish catch, dynamite fishing trends	Publications (brochures, leaflets, handouts, reports booklets), slides, video films, training manuals	Meetings, slides, video shows	Nine pilot villages, schools, extension officers, judiciary (police magistrate), government officials and general public
Frontier Tanzania	Mafia, Songosongo and Mtwara reef surveys	Mapping of reefs, Survey reports	Reports	Researchers, Students, Resource managers
National Agricultural Library (SUA)	Environment and related subjects	Documentation centre of the EIS in Tanzania	Reference library, computerised information system	All users of different background
Directorate of Meteorology: (climatological stations)	Weather (parameters observed are temperature, wind run, incoming solar radiation, rainfall, etc).	Weather reports	Newspapers, Radio, Television.	General public

5.3.2 Constraints

There are considerable constraints in the effective dissemination and utilisation of the coastal and marine environmental data and information that exist. These include inadequate awareness of the availability of information, inadequate institutional and financial resources, lack of appropriate technology for effective access as well as production of information in a form that is not easily usable. Most data collectors are not well trained. Currently, the most commonly used means are meetings (workshops, seminars, conferences) where representatives from different organizations, departments or units meet to exchange ideas, to provide input into, or endorse plans and policies which require cross-sectoral contributions. Common also are multidisciplinary technical committees working together on a specific issue. A new development is the Environmental Information System for Tanzania being proposed by NEMC (1998).

Constraints to information exchange include:

- **Accessibility**

Currently, there is no clear or consistent government policy on environmental data and information. Information generation and use is generally sectoral and there is no clear mandate on its access, moreover, a framework for environmental information is lacking. Law or any other directives to share, transfer or report information to outside bodies do not oblige the different sectoral ministries and their agencies. The legislation that established NEMC and COSTECH mandates these organizations to acquire, systemize and disseminate information but they are not given due recognition by the concerned organizations.

- **Compatibility**

There is absence of standards for data quality, accuracy and inter-operability. The information produced does not usually meet the user demands. Data/information related to fisheries for example, is generated at district level and sent to the Ministry as raw data where it is processed/compiled into national bulletins and stored in computerised databases. Although matters of data quality, consistency and maintenance are ultimately the concerns of the sector responsible for collecting the data, they are equally important pre-requisite to developing an effective information exchange network. As information management is computerised, the possibilities of integrating information are enhanced.

- **Co-ordination and networking**

At present there is no institution that serves as a hub for establishment of data exchange procedures or as contact point for other institutions as well as external organizations. Box 5.1 gives the information coordination and networking system for the Tanga Coastal Zone Conservation and Development Program.

Box 5.1 Information Coordination and Networking

An example of information coordination and networking is within the TCZCDP. The project has been integrated within the existing administrative structure of the region. It operates with the assistance and advise of district technical teams drawing members from education, planning, lands, natural resources, community development, health, law, and agriculture. Also there are multidisciplinary Village Environmental Committees. The project activities dealt with at district/village level, fit into district/village council's plans. With this arrangement the flow and exchange of information among the stakeholders has tremendously improved. Special programs like socio-economic studies also facilitate exchange and networking between sectors.

The Mangrove Management Project on the other hand works through Village Natural Resources Committees.

- **Technology**
  Various institutions are now actively pursuing the use of computer technology in their programmes. There is growing experience with different hardware and software combinations in use. This shift will bring a variety of experiences in the country as each sectoral programme acquires packages that are suited to serve specific interests of the individual sectors. The non-compatibility of softwares may pose an obstacle if information is to be exchanged between the various sectoral programmes. Most departments involved in information collection, storage, processing and dissemination are facing shortages of proper tools to streamline, and optimise the use of information produced. Inadequate financial resources preclude the acquisition of the equipment necessary for enhancing the information handling and management capabilities of these institutions. Annual budgetary allocations often overlook this requirement. In the majority of cases, such equipment is secured through donor-supported sectoral programmes and projects. However, this does not necessarily mean that the demands for information as determined by the user are adequately met.

- **Human and Financial Resources**
  Lack of sufficiently trained personnel in information production and exchange, this problem is common in most of the organisations. Information management technology is expanding at a much faster rate than local human and financial resources can absorb.

5.3.3 Use of Information in Decision Making

In Tanzania, information collected and analysed is often not used in the decision-making process. Lack of awareness on the part of policy makers and administrators of the value and limitations of the technologies involved in information production and exchange is also a major constraint.

5.4 Awareness

There are several local, and national initiatives with components on awareness raising about the need for the Coastal Management. These include the Tanga Coastal Zone Conservation and Development Project, Rural Integrated Project Support of Lindi and Mtwara regions and Mafia Island Marine Park. Other initiatives involve various NGO such as the World Wide Fund for Nature (WWF) program office for Tanzania, The Jounalist Enviromental Association for Tanzania (JET), Agenda, MACT as well as The Wild-life Conservation Society of Tanzania (WCST). The awareness raising campaigns conducted through the radio and other news media have helped to raise the level of awareness on coastal and marine enviromental concerns especially on dynamite fishing.

5.5 Indigenous knowledge

Indigenous knowledge refers to a large body of technical knowledge that has been generated to enable people to manage their natural resources in order to subsist. Indigenous knowledge has been generated within a given culture or society and hence it is unique to that specific culture or society. Coastal communities of Tanzania have a long traditional way of utilizing coastal resources for subsistence and shelter. The traditional activities, which form a bulk of the local economy of each village, include fishing, mangrove harvesting and agriculture.

Local knowledge is relevant to resource use, management and conservation.
Indigenous communities have for ages developed and maintained traditional knowledge and practices for the management and conservation of resources on which they depend.

With cultural and environmental change, customary knowledge is being lost at rapid rate. Their approach to management of resources may be based on religious beliefs, taboo and myths.

For example, members of Ruvu village in Lindi region have developed their own management plans for areas of mangrove that include restrictions on harvest and closure of certain areas to establish community based protected areas. Certain mangrove stands in Mwandusi village in the Tanga region are regarded as sacred and remain untouched.

Through the introduction of foreign culture by way of religious practices, certain traditional religions or rituals that were relevant or involved in resource management in a traditional way are lost. Unfortunately, most of the information on indigenous knowledge has not been documented.

CHAPTER SIX

6.0 POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

Tanzania's current legal framework in relations to the institutions engaged in coastal and marine resource management is characterized by ambiguities, and gaps in the law. In order to realize Tanzania's goal related to coastal and marine resource management it is necessary to revisit and review them.

6.1 Constitutional Framework

The constitution of the United Republic of Tanzania provides power to the central government to formulate policies and laws on coastal and marine resources, while delegating specific powers of implementation to the local government.

Under the Constitution of the United Republic of Tanzania of 1977, policies and laws respecting natural resource management, including coastal and marine resources, are established and implemented by the central government. It has exercised its constitutional authority to make laws concerning coastal lands, resources and the environment, but, as discussed below, local governments have been delegated specific powers of implementation and enforcement that differ depending on the particular resources and laws involved.

Zanzibar, although a part of Tanzania, has a unique legal status. According to Article 2(1) of the Constitution, the territory of the United Republic consists of the whole area of Mainland Tanzania and the whole of the area of Tanzania Zanzibar, and includes the territorial waters. However, one Mainland Tanzania law (the Fisheries Act of 1970) does not cover the territorial waters of Zanzibar. Zanzibar has its own fisheries legislation, although two Union laws concerned with deep sea fishing and delimitation of maritime zones extinguish these separate rights.

NEEDS
The need for environmental protection and the right for every Tanzanian to a clean environment should be stated in the constitution of the United Republic of Tanzania

6.2 Policy Framework

6.2.1 National policy documents

A number of government policies adopted in the 1990s directly and substantially affect coastal and marine resources, although only a few make specific reference to them. These policies, while not themselves enforceable, constitute drafting instructions from the Government for the laws established by Parliament.

Investment policy
The National Investment Promotion Policy (1996) presents important challenges and opportunities to integrated coastal management. It focuses on new investment in industry, tourism, transport, infrastructure and energy that could have potentially significant positive or negative impacts on coastal resources.

The environmental components in the investment policy are limited but they are important to build upon in coastal areas of interest to investors.

Environmental and natural resources policies
Although few of the new national policies concerned with natural resources refer to coastal resources most affect them. They include the National Land Policy (1995) and other sectoral policies concerned with water (1991), fisheries (1997), minerals (1997), forestry (1998) and wildlife (1998). Tanzania's Environmental Policy (1997) is intended to guide implementation of each sectoral policy.

These policies reflect common themes of Agenda 21 by supporting "integrated resource management" and "balance between sustainable development and environmental protection." The land and environmental policies endorse Environmental Impact Assessments (EIAs). The land policy calls for mangrove areas and marshlands to be protected for public benefits and hotel and home construction is to be regulated to protect coastline erosion and public access.

Environmental and Natural Resources policies do not provide guiding strategies for governance of coastal and marine resources when sectoral interests conflict, as they so often do.

International conventions
Tanzania has ratified a number of international conventions concerned with natural resource and environmental management that reflect national policy and require domestic legislation to implement. Many have substantial importance for coastal resources (Box 6.1). As with national policies, implementation requires follow-up legal action by the National Assembly.

Box 6.1 International Conventions Related to Coastal and Marine Resources Ratified by Tanzania

These include: the UN Framework Convention on Climate Change adopted in May 1992, ratified; Convention on International Trade in Endangered species on Wild Fauna and Flora adopted in 1973, ratified; the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, adopted in 1989, acceded; the UN Law of the Sea Convention, adopted in 1958, ratified; and The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern Africa Region, adopted in 1985, acceded; and the International Convention for the Prevention of Pollution from ships (MARPOL) of 1973; MARPOL Protocol signed in 1978; The 1985 Protocol Concerning Co-operation in Combating Marine Pollution in

cases of Emergency in the Eastern African Region, acceded; The 1985 Nairobi Convention and Protocols for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, acceded. The 1971 Ramsar Convention on Wetlands of International Importance Especially as Waterfowl Habitat, as amended, has not been ratified by Tanzania.

NEEDS

While most of the present policies do not have regulations in place it is an opportune time to incorporate ICM principles in the formulation of policies related to the management of coastal resources

6.3 Legal Framework

Once adopted by the Executive branch, policies and international treaties require legislation as well as regulations and action plans. Hence policies and ratified conventions are only the tip of the pyramid; the operational legal framework embraces the legal structures needed to establish, maintain, and oversee specific government objectives.

6.3.1 Framework of existing legislation

The existing legislation for natural resources in Tanzania provides strong controlling powers to the central government and management of the resources is highly centralised.

There is no provision for incentives for voluntary management and adoption of environmentally friendly practices. Legislation provides powers to an array of institutions to manage the same resource resulting to conflicts of interests.

Cal government management of natural resources

Tanzania has an extensive array of land and natural resources management laws that establish strong central and weak local government. Existing legislation emphasizes command and control management tools and extensive central government engagement in approving economic activities. The need for market-based, tax or other economic incentives has been noted by the National Investment Promotion Policy, but policies and laws have not focused on incentives to improve natural resource management or to encourage environmentally friendly investments.

Land and natural resource management

Basic land legislation dates back 70 years when all land was declared public, with significant new legislation following independence. Land management is highly centralised. The President must approve the disposition of land acting through the Commissioner for Lands, and the Commissioner must approve land use plans even if planning authority has been delegated to local government.

Major sectoral laws were passed after independence in 1961 (Box 6.2). They establish strong central government ministries that have delegated little of their authority over natural resources to local governments. Local governments may pass by-laws to protect natural resources under the two local government acts, with authority to make violations criminal and enforce them. The Ministry of Local Government must approve by-laws of city, municipal or town governments, or District Councils (where there are villages). The District Councils must approve their village council by-laws.

Box 6.2 Major Legislation Concerned with Coastal and Marine Resources in Tanzania

Principal legislation pertaining to coastal and marine resources uses include: for land, Land Ordinance of 1923, Town and Country Planning Ordinance Cap 378 of 1966, Land Acquisition Act of 1967. For natural resources: the Forest Ordinance of 1957; Mining Act of 1979 and a new Mining Act passed by Parliament in 1998 but not yet enforced; Fisheries Act of 1970, the Marine Park and Reserve Act of 1994; the Territorial Sea and Exclusive Economic Act of 1989, Deep Sea Fishing Authority Act of 1997 Merchant shipping Act of 1967, Water Utilization Control and regulation Act of 1974. Others are the Petroleum Exploration and Protection Act of 1980, Wildlife Conservation Act of 1974. The principal legislation governing water resources management in Tanzania is the *Water Utilization (Control and Regulation) Act* of 1974 and its Amendment of 1981 and Written Laws (Miscellaneous Amendment) Act of 1989

Water management

Water use allocation and water pollution control, critical to coastal management, are highly disaggregated among separate departments, each responsible for its own operations independent of others. As a result decision making tends to be fragmented. Different agencies often have conflicting plans to develop the same publicly owned water or land.

Water law is a mix of common law principles reflected in judicial decisions, affecting riparian rights, and statutory law affecting other water rights and obligations. To control water pollution the colonial state enacted the Public Health *(Sewerage and Drainage) Ordinance*, which deals with preservation of public health through sewerage, drainage and sanitation, and it is still good law in Tanzania. The *Fisheries Act*, the *Territorial Sea and Exclusive Economic Zone Act*, the *Deep Sea Fishing Authority Act* and the *Marine Parks and Reserves Act* contain some water pollution provisions. The Ministry of Water, responsible for setting water quality standards, and has set two "temporary" standards for effluent and receiving waters.

An example of the diverse but potentially important legal and institutional regimes affecting water and coastal resources is the Rufiji Basin Development Authority, established to manage development of land through which the Rufiji River flows to the Indian Ocean. Its functions are cross-sectoral with direct impact on the coastal area, including forestry, flood control, and energy, industrial and agricultural development. The Act does not, however,

establish the Authority's duty to cooperate with the range of institutions concerned with coastal resources.

Coastal resources under law
No legislation currently defines a coastal area in Tanzania. The Ministry for Lands established a coastal band (development set back line) in 1992. Reserved for public use, and allowing only moveable or temporary structures, the zone was set at 200m from high tide, then 100m, and it is now 60m.

Judicial review
Following British common law, judicial review of government agency actions under the law is essentially confined to procedural questions, such as whether an agency acted arbitrarily or unreasonably. Rights of citizens to seek judicial redress against agency actions are also limited, as in the U.S. until the early 1970s. Standing to sue requires a showing of direct economic harm, and for a citizen to be able to sue the government a notice of 90 days is required under the government Proceedings Act of 1967 as amended.

NEEDS
The legal framework must provide institutions with the statutory, regulatory and enforcement tools they require. The government must provide institutions with the necessary leadership, political support, funding and staff for sound management and operational results.

6.3.2 Status of policy and legislative reform

Implementation of new policies
Of the many policies affecting coastal resources that need implementation under new law, only the Mining Law of 1998 has responded. The Tanzania Investment Act of 1997 responds to the National Investment Promotion Policy.

The traditional sectoral approach to coastal resources therefore remains largely unchanged, despite the policy goals. There remains a sharp contrast between existing land law and the new Land Policy, which envisages integrated mechanisms for protecting public values of sensitive areas, specifically beaches, and a Coastal Zone Integrated Development and Management Program.

No bill has yet been introduced to implement policies for Environmental Impact Assessment (EIA), but two new laws recognize EIAs. The Mining Act of 1998 requires an EIA before mining operations and the Marine Parks and Reserves Act of 1994 requires that no construction within a park can begin without an EIA under a management plan. They emphasize needs for a legislative framework to mandate EIAs for projects likely to have significant environmental impacts and to establish clear EIA management responsibilities.

Conflicting or ambiguous laws
Several current laws appear to be in conflict or fail to address coastal resource conflicts and therefore can contribute to delayed, costly or poor resource management decisions.

In mining for example appears to be allowed within forest reserves, although it is restricted within wildlife reserves. And despite the ultimate authority of the central government, in practice a large number of issues arise concerning whether local or central government agencies can allocate use of natural resources in the coastal area, including forest reserves, fisheries, water and minerals.

6.4 Institutional Framework

Many sectoral-based ministries share coastal and marine resource planning, management and enforcement duties.

These include the Ministries of Natural Resources and Tourism (with forest, fishery, tourist, and park regulatory responsibilities); Lands and Human Settlement; Trade and Industry; Water; Agriculture and Co-operatives; Foreign Affairs and International Relations; Energy and Minerals; Communication and Transport; and Home Affairs. Responsibilities are further divided among the many divisions within each ministry. In addition the Vice President's Office (NEMC and the Department of Environment), Ministry of Regional Administration and Local Government; and the Ministry of Justice and Constitutional Affairs have important coastal and marine responsibilities.

Except in a few instances Local governments are not given mandate in the natural resource management.

Local governments add an additional dimension to the framework. Their precise role in natural resource management depends on the particular sectoral legislation (see Table 6.1). The only act specifically requiring central government coordination with local government is the Marine Parks and Reserves Act of 1997.

Table 6.1 Central and Local Government Natural Resource Management

Subject Matter	Central Government	Local Government	Comments
Land Allocation	Commissioner of Lands grants land rights; President revokes/ acquire land rights	Land Committees approve land rights	Once investment approved land rights are also granted. Villages dispose of land to foreigners
Water Allocation	Water Officers grant water rights	Establish, maintain, control water supplies and impose water rates.	
Water Pollution Control	Ministry sets water quality standards	Prevent water pollution.	

Fisheries	Director of Fisheries issues fishing licenses Licenses big trawlers	Director must approve village by-laws on fisheries.	Lack of powers on part of District to control and monitor big trawlers
Forest Use	Director of Forestry and Beekeeping issues logging licenses	District Authorities manage Local Authority Forestry Reserves (LARFs)	No provision for "village-managed" forest reserves. Lack of "tree tenure."
Wildlife	Director of Wildlife issues hunting, taking capturing licenses	No mandate	
Mining rights	President/Commissioner of Mines grants mining rights	No mandate	Sand mining along beaches under central government licenses
Tourist Hotels Development	Tanzania Investment Centre (TIC) Tanzania National Tourist Board Tourist Agents Licensing Authority	No mandate	TIC gives Certificates of Approval (CoA) for investment after sectoral Ministries comment. No specific requirement for environmental consideration by TIC. Approvals issued for beach hotel construction.

6.5 Policy Development and Coordination

6.5.1 Policy analysis and coordination institutions

Policy analysis

Tanzania's new natural resource and environmental policies established in the 1990s do not rest on analyses of the economic costs or benefits of their implementation. Yet this is a major issue. There is tension, on one hand, between concerns that current policies and laws are not enforced and, on the other, Ministers' complaints of insufficient staff, funds or equipment to carryout existing mandates. The new policies will increase administrative costs if they add to existing practices by requiring new improvements in institutional skills and procedures, more inter-agency interaction, and more effective regulation. On the other hand, new policies could be implemented through legislation designed to reform current practices in ways that improve administrative efficiencies.

Coordination of policies, planning and management

Strong needs for more efficient coordination of governmental actions, expressed, for example, in the Forestry policy, have appropriately been addressed at a high level of government.. The National Environmental Policy designates "the Ministry responsible for environment" as the source of "overall policy guidance and advice" on environmental vision, policy and goals. The Vice President's Office currently coordinates environmental affairs through the Directorate of Environment (DoE) and the National Environment Management Council (NEMC).

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The National Environmental Management Act of 1993 charges NEMC to serve primarily as an advisor with additional coordination functions. Its precise role and authority remains ambiguous

6.5.2 The role of environmental impact assessment

Tanzania's Environmental Policy envisages EIAs as a major, mandatory, planning tool to reconcile "urgent development needs and long term sustainability before a final decision is made." EIAs are mentioned in other policies and required in two new acts, but their role and management are unclear. Tanzania has been developing sound EIA guidance documents based on extensive analysis of EIA experiences in a number of developed and developing countries.

NEEDS

The control and monitoring of the exploitation of natural resources by district authorities should be enforced.

There is a need to have a coordination mechanism among and within ministries in the planning, management and enforcement.

6.6 Implementation and Enforcement

6.6.1 Regulatory framework

Compliance is highly dependent on enforcement and not voluntary compliance. Voluntary compliance is found in projects attempting to implement ICM, which include TCZCDP, RIPS, and MMP. This is lack of quantitative data on enforcement which constraints measurement of progress in enforcement efforts.

As noted above, Tanzania's current natural resource management system relies largely on central government direction of extensive regulatory, command and control approaches. Allocation of land, forestry, water, fishery and mineral resources requires government approvals and annual permits. Its sectoral bias requires an extensive bureaucracy and entails high transaction costs for the regulatory agencies as well as for private parties seeking approval.

A characteristic of the regulatory regime in Tanzania is that most penalties for natural resource violations are criminal. Fines are usually low and they are not, in any event, levied on the basis of the damage done to the natural resources.

6.6.2 Regulatory enforcement

Compliance requires either highly effective enforcement or high rates of voluntary compliance, or both. Unfortunately, violations and poor enforcement of prohibitions of

fish dynamiting, coral mining, mangrove destruction and unlicensed sand mining are widely cited.

Enforcement currently resides with the police, local police auxiliaries and natural resource officers of central and local government agencies. The local government natural resources committees employ natural resource officers who are primarily revenue collectors, collection fees for fish landings and use of timber. They do not engage in preventative enforcement or natural resource management. When arrests are made, the pursuit of convictions in court demands attention of officers from the relevant Ministry. Proceedings in High Court require attention from exceedingly hard-pressed State Attorneys in the Attorney General's Chambers, who may also be Ministry legal officers.

Experience under the Tanga Coastal Zone Conservation and Development Program (See Box 6.3), illustrates ways in which village involvement in coastal management helps communities see its direct benefits and support enforcement. Since 1997, the Tanzanian Navy engaged in joint enforcement against fish dynamiting in cooperation with village patrol units. Previous efforts to enforce against dynamiting through local police efforts had proved unsatisfactory. Since the vigorous Navy efforts there has been a 40 percent reduction in fish dynamiting.

A vexing underlying problem, however, is the lack of quantitative data on enforcement. Reliable statistics are not available to measure enforcement progress, compare enforcement efforts or assess institutional capabilities.

NEEDS

Information is needed on enforcement of all the key coastal resource regulations concerning: allocations or licenses granted and withheld; prosecution and conviction trends; fines collected; equipment existing and required; staff required and available for monitoring and enforcement; staff training obtained and necessary; and the enforcement budget requested by relevant ministries.

No system of central record keeping covers the disposition of natural resource cases. The result is still spotty and anecdotal evidence of poor enforcement.

This experience is common throughout the developing world for reasons often cited in Tanzania that cover the entire spectrum of enforcement needs. They begin with basic lack of political will to establish effective laws, regulations and institutional enforcement capabilities. They include failure to provide resources for monitoring, testing, analyzing and publicizing conditions and trends.

Opportunities for abuse are facilitated by the proliferation of required approvals and transactions required from usually poorly paid inspectors or officers. There are usually few if any salary or position rewards for vigorous and successful enforcement by government employees. Nor are there incentives for environmentally–friendly performance by business. Overlapping government agency responsibilities, difficulties in getting convictions in court, court delays and low penalties add fuel to the forces discouraging vigorous enforcement.

NEEDS
Most, of these issues also exist in developed countries, where Effective enforcement depends on many other forces. Successful enforcement nearly everywhere requires:

- *substantial community support;*
- *strong support by courts;*
- *a media watchful over government as well as resource users;*
- *effective monitoring of resource conditions and trends;*
- *economic incentives to maximize voluntary compliance;*
- *legislative oversight of agency compliance, and*
- *efficient institutional enforcement systems*

Box 6.3 Tanga Coastal Zone Conservation and Development Program (TCZCDP)

The Program has managed to solve the problem of resource tenure through Management Agreements that stipulate roles, responsibilities and sharing of benefits. To resolve resource management conflicts between Central government and Local Authorities, the Program has a Memorandum of Understanding with the Mangrove Development Program of the Forestry Division to address problems of beach erosion and declining fish catches caused by mangrove cutting through re-planting.

The Program has also managed to create a joint enforcement efforts of by-laws, by cooperating with the Navy in combating the problem of dynamiting fish.

A key goal is to create a sense of ownership of the Program. Some villages have entered into management agreements for coastal protection by establishing conservation areas. These now await Gazetting by the Director of Fisheries. Under the agreements villagers have established a mechanism for village patrol units, which are supported by the Programme through training of the militia and provision of patrol boats, fuel, and radio communication equipment. To build management capacity and awareness, the Program has helped judicial officers and police prosecutors gain skills and ecological knowledge. It also conducts seminars and workshops for villagers on the importance of conserving marine resources.

6.6.3 Revenue laws affecting compliance

We cannot with any degree of certainty establish the extent to which revenue collected by Local Government Authorities from resource allocation and utilization is used in the conservation of the resources. We have not been able to obtain any data on this aspect to determine whether the revenue so collected is being used for other development activities or for conservation purposes. The Local Government (District Authorities) Act, 1982, empowers District Councils to regulate and monitor the collection and utilization of revenue of village councils.

There is nothing comparable in the coastal resources arena to Tanzania's Wildlife Protection Fund (TWPF). The TWPF, however, offers a potentially useful model for a possibly similar fund focused on coastal/marine issues.