



MOMBASA

DISTRICT ENVIRONMENTAL ASSESSMENT REPORT

National Environment Secretariat,
Ministry of Environment and Natural Resources
P.O. Box 67839
Nairobi

In cooperation with ETMA
and the United States Agency
for International Development

August, 1985

MOMBASA DISTRICT
ENVIRONMENTAL ASSESSMENT REPORT

Published by:
National Environment Secretariat
Ministry of Environment and Natural Resources
P O Box 67839
NAIROBI
Kenya

In Co-operation with The
United States Agency for International Development (USAID)
and the
South-East Consortium for International Development's (SECID)
Environmental Training and Management
In Africa (ETMA) Project
and
Clark University

August, 1985

FOREWORD

The Mombasa District Environmental Assessment Report was the result of collaboration between the National Environment Secretariat (NES) of the Ministry of Environment and Natural Resources of the Government of Kenya and the South-East Consortium for International Development's (SECID) Environmental Training and Management in Africa (ETMA) Project.

The District Environmental Assessments Project of Kenya was initiated in 1978 with the principal objective of incorporating environmental considerations in the process of district planning and decision-making. Funding came from the Government of Kenya and the United States Agency for International Development (USAID). The project derived its motivation from a number of considerations, chief among them being the following:

- i) That it is a policy of Kenya Government to bring environmental factors into the mainstream of Government policy and decision-making in order to optimise use of scarce resources for the overall national good.
- ii) That the Government of Kenya has recognized the district as the primary unit of planning in order to effectively bridge the gap between the grass-roots and the higher policy-making levels. To this end, the Government has established District Development Committees to decentralise decision-making and policy administration.
- iii) That incorporation of environmental consideration at the planning stages of projects and programmes could avert degradation and high costs of corrective measures that might ensue. Hence the need to ensure integration of environmental management objectives in development planning at district level.

This Report, parallel to others in the series, is geared towards making a contribution to the implementation and future formulation of the District Development Plan for Mombasa District.

The aim is that the development of the district takes place without destruction of the resource base upon which it depends so as to ensure a sustained and enhanced quality of life for the people of Mombasa. In these respects the Report is complementary, not only to others in the series but also to other parallel exercises being undertaken by the National Environment Secretariat at provincial and national levels.

The basic framework of the District Environmental Assessment Project is derived directly from the Guidelines for Environmental Management (GEM) developed by UNEP, but tailored to meet the specific requirements of the district exercise. It is hoped, therefore, that the recommendations contained in this Report, and as they will be refined by a seminar to be organised soon, will form a truly useful basis for management of the environment of Mombasa in the dynamic context of development of the district.

I would like to sincerely thank all those persons who made contributions to the success of this exercise including the following:

- the Government ministries based in Nairobi for supplying basic data and information;
- the District Commissioner;
- The District Development Officer and Departmental Heads in Mombasa District;
- the Town Clerk and Departmental Heads of Mombasa Municipality for providing information, data and assisting in planning site visits;
- Managers of factories in Mombasa for interviews;
- The Kenya Ports Authority, the Baobab Farm and Mamba Village for the interviews and tours;
- Ms Lorna Hayes - Chairman of Mombasa and Coast Tourist Association for valuable information on tourism;

- Mr. J. Mwendwa - Chairman of the Kenya Association of Hotel Keepers and Caterers (Coast), for information on tourism;
- and finally the multi-disciplinary National Environment Secretariat and Kenya Marine and Fisheries Research Institute Team whose contribution helped make this Report possible.

The team that carried out the research and preparation of this Report included:

Mrs G.N.Wanyonyi	-	Senior Environmental Education Officer (Head/DEAP)
Mr D.Mathu	-	Analytical chemist
Mr D.Njora	-	Chemist
Mr V.Njuki	-	Sociologist/Geographer
Miss E.Kisang	-	Public Health Officer
Mr E.Ngunga	-	Graphic Designer
Mr Ndonye	-	Research Officer
Mr R.K.Ruwa	-	Marine Biologist (KM&FRI)
Mr Rashid Anam	-	Technician (KM&FRI)
Mr M.Muiyuro	-	Research Assistant
Miss L.Togo	-	Research Assistant

It is my sincere hope that the work and co-operative spirit shown by the above groups will be sustained during the more important phase of the implementation of the recommendations and findings contained in this Report.

D.R.KAMAU
DIRECTOR
NATIONAL ENVIRONMENT SECRETARIAT

TABLE OF CONTENTS

	Page
Foreword	i
Table of Contents	iv
List of Tables	vi
List of Figures	vii
PART I : INTRODUCTION	1
1.0 OVERVIEW OF MOMBASA ENVIRONMENT	1
1.1 Location and Historical Background	1
1.2 Topography, Geology and Soils	5
1.3 Climate and Water Resources	8
1.4 Vegetation	17
1.5 Land Administration and Land Tenure	19
1.6 Marine Environment	22
PART II : ENVIRONMENT AND DEVELOPMENT	28
2.0 NATURAL RESOURCES MANAGEMENT	28
2.1 Forestry	28
2.2 Mining	31
2.3 Wildlife Management	32
2.4 Marine Resources	34
3.0 LAND USE AND DEVELOPMENT	42
3.1 Land Use Classification	42
3.2 Agriculture	47
3.3 Livestock Development	53
4.0 THE HUMAN ENVIRONMENT	56
4.1 Population Growth and Resources	56
4.2 Housing	69
4.3 Water	74
4.4 Environmental Health	75
4.5 Pollution and Waste Disposal	80
4.6 Transport and Communications	88

	Page
4.7 Energy	94
4.8 Tourism and National Heritage	97
4.9 Environmental Education	105
4.10 District Development Administration	112
PART III : CONCLUSION	123
5.0 DISCUSSION AND SUMMARY	123
REFERENCES	127
APPENDICES	129

	Page
3.1 Agricultural Land Per Division	47
3.2 Crop Production in Hectarage of Planted Land	48
4.1 Population by Sex, Tribe or National Group for Mombasa District 1969 and 1979	57
4.2 Population by Sex and Age Group, Mombasa District, 1984	60
4.3 Data for Population Pyramid	60
4.4 Population Distribution in Mombasa District by Place of Birth, 1979	62
4.5 Population Scenarios for Year 2000 - Mombasa District	64
4.6 Population and Resource Trends - Mombasa District	64
4.7 Population Density, Mombasa District, 1979	65
4.8 Total Government Housing Stock in Mombasa, 1984	71
4.9 Vital Statistics for Mombasa	76
4.10 Malnutrition Cases in Mombasa District 1983	77
4.11 Cargo Handled at Kilindini Port (in 000'DWT)	90
4.12 Postal and Telephone Services	93
4.13 Hotels and Lodges in Mombasa District 1985	98
4.14 Hotel Rooms and Beds available and occupied in Mombasa District '000' bed night	99
4.15 Visitors to Fort Jesus in Mombasa	103
4.16 Types of Co-operative Societies in Mombasa	114
4.17 Women's Groups in Mombasa	115
4.18 Self-help Development Projects in Mombasa	117
4.18B Some of the Non-Governmental Organisations in Mombasa	117
4.19 Assisted Self-help Projects 1984	118

LIST OF FIGURES

	Page
Figure 1 Location of Mombasa District	2
Figure 2 Regional Circulation Patterns in January and July	8
Figure 3 Average Annual Rainfall in Mombasa District	9
Figure 4 60% Reliability of Rainfall in the Agrohumid period of First Rains	11
Figure 5 60% Reliability of Rainfall in the Agrohumid period of Second Rains	12
Figure 6 Water Supply Systems in Mombasa District	14
Figure 7 Vegetation of Mombasa District	18
Figure 8 Agro-Ecological Zones in Mombasa District	46
Figure 9 Soils in Mombasa District	52
Figure 10 Age-Sex Distribution for Mombasa District	59
Figure 11 Energy Usage in Kenya and the Coast Province	96

PART I

INTRODUCTION

1.0 : OVERVIEW OF THE MOMPASA ENVIRONMENT

1.1 LOCATION AND HISTORICAL BACKGROUND

1.1.1 Location

Mombasa District fronts the Indian Ocean and is one of the districts of Kenya's Coast Province. With an area of 275 km² it is the smallest district in the country. (Fig.1).

This area includes the island of Mombasa (Mombasa proper) and a crescent-shaped portion of the mainland around the island. It forms a wedge between Kwale District in the south and west, and Kilifi District in the north.

1.1.2 Historical Background

Mombasa town has been in existence for many centuries, even though no recorded information about its early history can be found. The early history of Mombasa, as of other coastal settlements, can only be gleaned from Arabic and Portuguese records, oral poetry and archaeological studies.

Historical events become clearer in and after the fifteenth century. Since then Oman Arabs, the Portuguese, the British and finally the Kenyans have in turns held dominion over Mombasa and the coastal lands. During these eras Mombasa town has experienced retribution, political and commercial intrigue, and prosperity.

In the thirteenth century a general expansion of Moslems in the Indian Ocean region resulted in the founding of many towns on the coast of East Africa, with many immigrants from the Asian continent making homes here. From the fourteenth century until recently the Kings and merchants of the coastal lands were devout Moslems, and the dominant culture was Arabic, including elements of Persian, Indian and Chinese ornaments. Between the fourteenth and the sixteenth century Mombasa and the coastal lands enjoyed great pious living and commercial prosperity based on African resources such as slaves, ambergris and ivory.

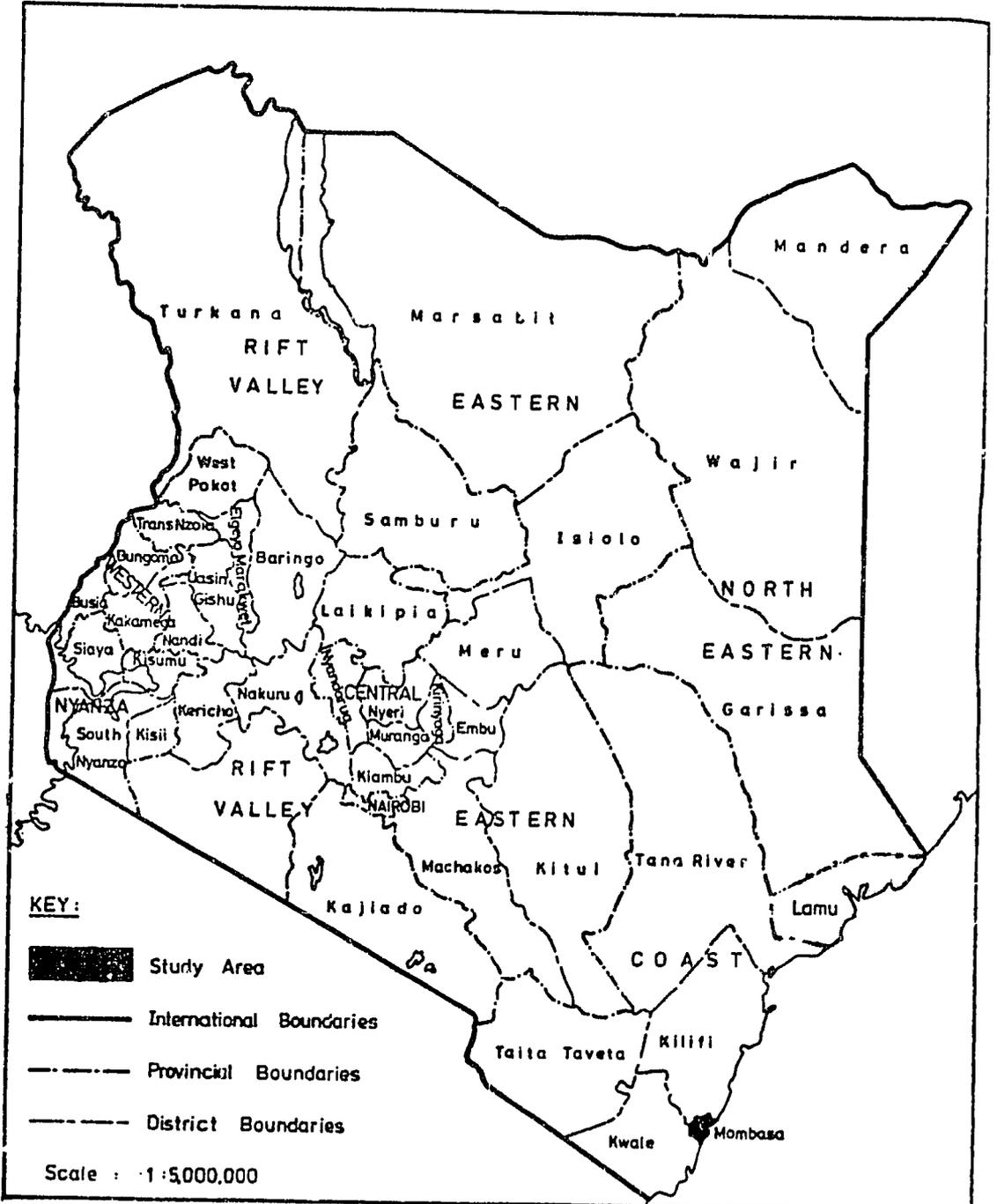


FIGURE 1: LOCATION MAP

In the early sixteenth century the peace of the coast came to a sudden end with the advent of the Portuguese, who under the spur of Prince Henry the Navigator reached East Africa via the Cape of Good Hope in search of gold and spices and a route to India. Mombasa was stormed by Dom Francisco de Almeida and suffered great trauma. Before it could recover the town was again attacked and burnt down by the Portuguese in 1528.

The image of the Portuguese in Mombasa is of vehement subjugation and an unfriendly, indifferent rule, marked with ruthless retributive acts.

Anxious for their own security the Portuguese embarked on the building of Fort Jesus and a tax was imposed on Mombasa and other coastal towns for the project.

The Portuguese era ended with their defeat by the Arabs at the end of the 17th Century. Once again life and power were completely Arabic and centred on Muscat in Oman. Muscat soldiers could be seen in Mombasa. Soon, however, rivalry started between ambitious local groups of Arabs, culminating in a balance of local power between Mombasa and Pate Island in the north.

Meanwhile the British started influencing Seyyid Said, the Sultan of Oman at Muscat. In 1840s Seyyid Said moved his capital from Muscat to Zanzibar. Sultans of Zanzibar after Seyyid Said were easily influenced by the British. In 1890 the Imperial British East Africa Company had an office at Zanzibar.

After the turn of the 20th Century the European powers entered into a scramble for Africa which led to the partition of the Sultan's dominion. The British created their own British East Africa protectorate, followed by the declaration of the Kenya British Colony in 1920. After that event the Sultan of Zanzibar retained sovereign rights over a ten mile strip of the coastland of Kenya which included the present Mombasa District. This domain of the Sultan on Kenyan mainland ceased in 1963.

This historical profile shows that Mombasa has played an important part in the development of not only Kenya but East Africa in general in many roles: an entrepot, a commercial centre, a revolutionary town, a vanquished and martyr town, and as it is today, an international port and tourist resort.

1.2 TOPOGRAPHY, GEOLOGY AND SOILS

1.2.1 Topography

Mombasa District is a coastal lowland with extensive flat areas, becoming undulating westwards on the mainland. The island is surrounded by creeks with steep cliffs on the island and the mainland.

The district can be divided into three main physiographic units:

- (i) a flat coastal plain about 6 km wide, which includes the Island, Kisauni on the north mainland and Mtongwe on the south.
- (ii) a broken, severely dissected and eroded belt of jurassic shale overlain in places by residual sandy plateau, the most important being Changamwe.
- (iii) an undulating plateau of sandstone lying at 150 m above sea level and divided from the jurassic belt by a scarp fault.

1.2.2 Geology

The district is made of young sedimentary rocks. Along the sea the rocks consist of coral limestone of pleistocene age. Further inland the coastal plain consists of rocks formed from lagoonal deposits. The coral limestone and the lagoonal deposits reach a thickness of 100 m.

1.2.3 Soils

The soils in Mombasa District vary greatly both physically and chemically. According to the Kenya Soil Survey (1982) they can be grouped into five categories:

- (i) Soils in Mangrove Swamps: These soils are very poorly drained, very deep, olive to greenish and grey, soft, excessively saline, and moderately

to strongly sodic, loam to clay, often with sulfidic material (thionic fluvisols and cleyic SOLONCHAKS). The soil texture is medium to heavy.

- (ii) Soils Developed in Shales: These soils are heavy and moderately to highly fertile. They are an association of: (a) well drained to imperfectly drained, shallow to moderately deep, yellowish brown to very dark grey, firm to very firm clay, dissected parts (eutric CAMBISOLS, partly lithic phase and (b) imperfectly drained, deep, dark grey very firm clay, with humid topsoil and sodic deeper subsoil: or interfluves (vertic luvisol PHAEZEMs sodic phase, with vertic CAMBISOLS, sodic phase). The soils are found near Mtwapa to the north and Mazeras to the north west.
- (iii) Soils Developed on Higher Level Lagoonal Deposits (KILINDINI SANDS)
Soils in this category are light and of low to very low fertility. They are excessively drained, very deep, reddish yellow to white, loose sand to loamy sand (albic and ferratic ARENOSOLS). These soils are to be found at Port Reitz and Changanwe.
- (iv) Soils Developed on Lower Level Lagoonal Deposits
Here the soils are variable and of low fertility. They are a complex of very deep soils of varying drainage condition, colour, consistence, texture and salinity (albic ARENOSOLS, orlric FERROSOLS, gleyic LUVISOLS, solodic PLANOSOLS, pellic VERTISOLS). The soils are found at Mtongwe and Nyali.

(v) Soils Developed on Raised-Coral-Reef Limestone, with a Mixture of Lagoonal Deposits

These soils are of light, medium to heavy texture and of low fertility. They are well drained, deep, dark red to reddish brown, friable sandy clay loam to sand clay, with topsoil of loamy sand (rhodic FERRASOLS).

The soils are to be found at Likoni along the coastline.

1.2.4 Implications for Environment and Development

The land is unlikely to experience serious soil erosion except in some parts on the western side of the district because it is generally flat. However, there is abundant coral limestone which is excavated for building and manufacture of cement. Limestone is classified as a common mineral in the Mining Act and is therefore not subject to regulations therein except part V of the Act and Mining Safety Regulations. Therefore its exploitation takes place without adequate legal protection of the environment.

1.3 CLIMATE AND WATER RESOURCES

1.3.1 Climate

The climate of Mombasa is related to the regional cycle namely the semi-annual passage of the intertropical convergence zone (ITCZ) and the monsoons. The north eastern monsoon (Kazkazi) occurs from January to March and the south-eastern monsoon (Kuzi) from June to October.

In January the sun is over the tropic of Capricorn and the ITCZ is centred on Zimbabwe in southern Africa. Thus winds blowing over the Kenya coast from November to March are dry north-easterly winds. In July the ITCZ is centred on Sudan in northern Africa. The winds blowing over the Kenya coast from May to October are southerly or, south-easterly (Fig.2). On Mombasa most rainfall occurs in the months between the monsoons when convection is enhanced. The north/south shift of the ITCZ results in a bi-modal rainfall pattern on the coast.

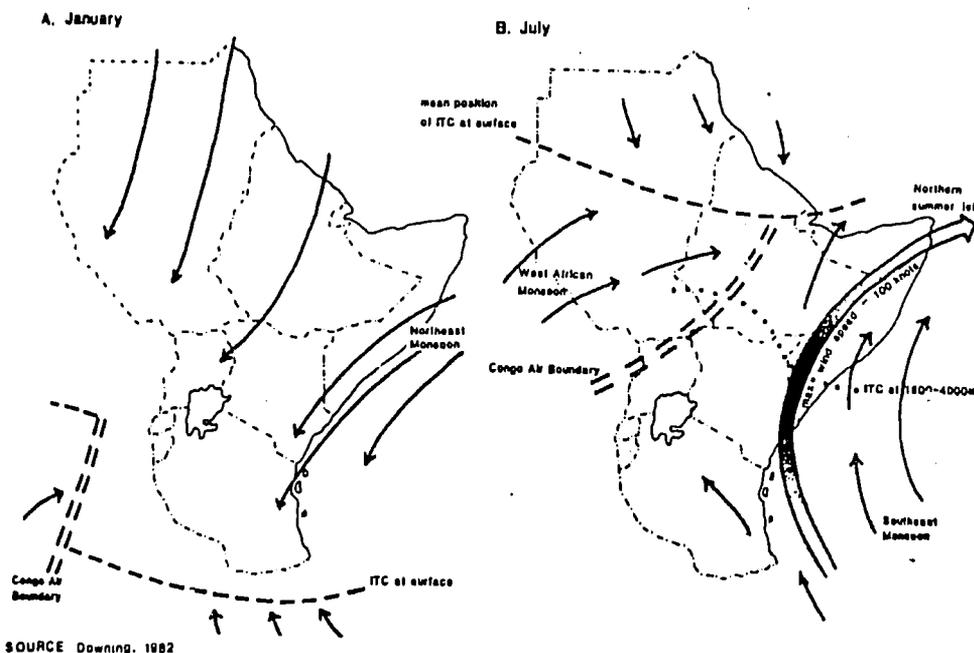


FIGURE 2 REGIONAL CIRCULATION PATTERNS IN JANUARY AND JULY

The first rains ("long rains") occur in Mombasa District between March and June. They start with a 60% reliability towards the end of March. The mean annual rainfall is 1038 mm with the months of April, May and June recording the heaviest rains (Table 1.1). The month of May has the highest precipitation with a mean rainfall of about 235.2 mm. These first rains decrease gradually after May until October but without a distinctive end in most years. The second rains ("Short rains") start indistinctly towards the end of October and last until December or January but with no pronounced end and

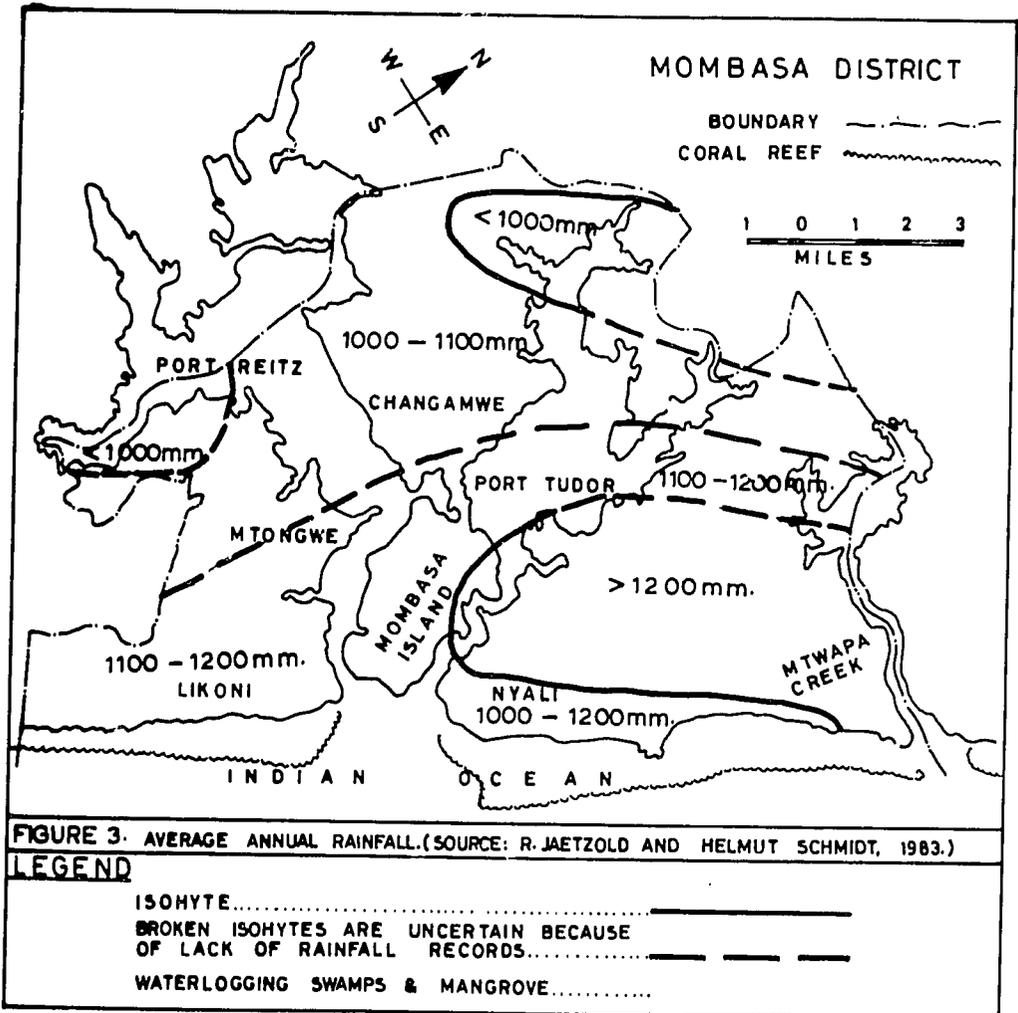


TABLE 1.1 : MONTHLY AND ANNUAL RAINFALL (MM) AT MOI INTERNATIONAL AIRPORT, MOMBASA FOR 1971-1984

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUM
1971	1.0	0.0	38.8	52.0	142.9	124.2	40.3	17.5	23.3	10.4	9.6	84.0	544.0
1972	106.9	9.8	16.3	18.5	469.9	3.2	7.6	94.1	172.9	328.3	84.1	55.6	1436.0
1973	17.8	6.3	1.3	201.4	265.6	181.5	22.1	65.2	24.3	95.7	102.8	33.0	1017.0
1974	0.8	1.6	11.7	30.5	83.9	105.1	109.2	17.5	41.5	9.7	66.9	35.2	523.6
1975	31.4	0.0	10.4	179.6	226.8	97.1	110.0	8.6	43.3	22.9	4.1	58.0	792.2
1976	11.7	9.5	38.7	117.4	184.0	105.4	119.1	10.4	70.7	44.3	10.7	102.5	824.0
1977	27.1	0.6	36.2	97.6	63.1	81.6	57.0	66.4	97.3	297.1	183.2	130.1	1137.3
1978	53.8	15.7	100.5	250.3	241.1	108.6	48.6	25.8	23.1	39.5	167.6	153.7	1227.7
1979	194.5	21.6	52.1	182.9	529.7	127.2	60.6	23.2	75.5	42.3	60.9	43.6	1425.1
1980	1.0	26.9	23.2	238.5	78.8	23.2	53.9	212.8	39.4	21.5	95.9	25.7	840.8
1981	59.6	4.8	201.9	86.8	126.3	77.9	32.2	130.4	32.1	166.3	101.8	124.9	1145.0
1982	1.6	0.0	48.2	184.9	64.8	111.2	140.8	34.9	149.5	296.7	85.6	55.5	1773.7
1983	0.0	15.6	14.7	81.0	594.4	110.0	104.8	37.6	74.2	25.8	34.9	52.2	1145.2
1984	0.0	0.0	34.0	246.6	143.6	198.7	77.3	24.3	18.6	184.9	146.9	64.6	1139.5

TABLE 1.2 : MONTHLY AND ANNUAL RAINFALL (MM) AT MOMBASA OLD OBSERVATORY FOR 1971-1984

DATE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANNUM
1971	0.0	0.0	93.5	34.7	240.6	188.2	40.1	26.7	34.5	10.8	17.8	30.1	717.0
1972	35.3	21.4	15.0	69.4	687.9	14.8	103.9	119.6	157.6	314.5	75.1	7.1	1621.6
1973	11.0	2.0	7.1	338.3	361.4	235.4	19.0	77.2	18.4	57.5	59.8	14.6	1201.6
1974	24.0	3.3	37.2	76.4	202.8	179.4	121.7	25.1	26.5	25.1	62.4	7.6	791.7
1975	9.6	0.0	12.6	246.4	285.1	153.1	92.0	15.7	53.6	44.2	27.3	29.0	968.6
1976	17.6	4.0	13.0	134.7	159.9	159.0	133.5	25.2	75.6	76.0	46.0	35.5	880.6
1977	7.3	2.5	49.7	123.2	103.0	91.1	43.8	79.1	141.9	405.5	200.2	82.4	1329.7
1978	51.4	4.1	75.1	271.7	228.2	153.1	67.2	58.2	48.2	87.9	172.7	150.1	1367.9
1979	136.4	44.0	93.5	209.7	473.7	102.9	65.5	34.0	73.4	41.8	85.7	50.4	1411.0
1980	5.7	7.9	144.1	99.7	44.8	59.7	235.7	38.5	12.0	59.3	7.0	718.1	718.1
1981	11.6	0.0	241.4	128.6	143.8	62.7	39.6	142.4	38.7	158.3	45.5	102.5	1115.1
1982	1.9	0.0	52.5	230.3	648.7	89.6	131.7	39.7	66.2	719.6	97.7	53.5	1631.4
1983	0.5	30.7	7.7	107.7	689.9	171.7	111.4	36.8	54.9	24.0	31.9	33.2	1300.4
1984	0.0	0.0	11.3	362.6	219.6	183.2	66.2	20.0	29.3	263.1	134.0	71.0	1360.3

TABLE 1.3 : TEMPERATURES IN MOMBASA

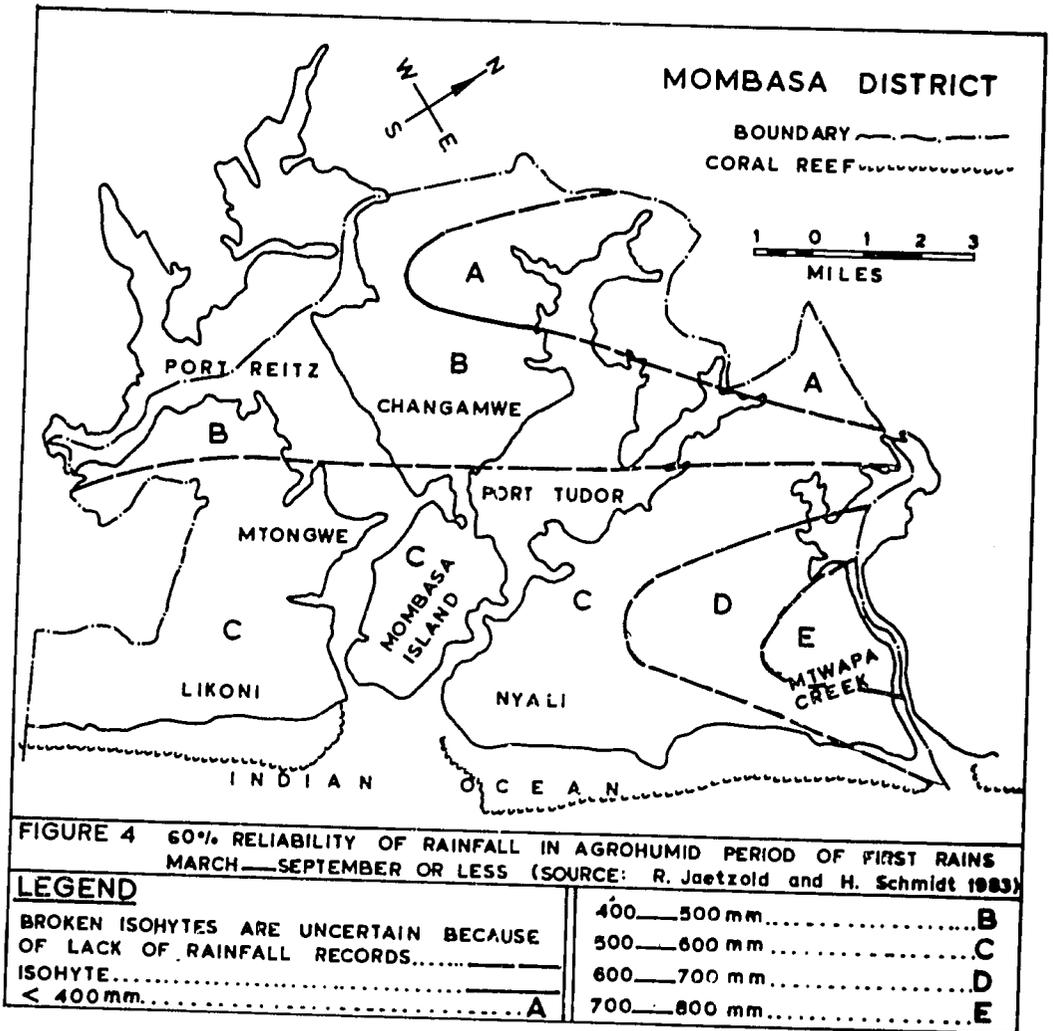
Source: Meteorological Department

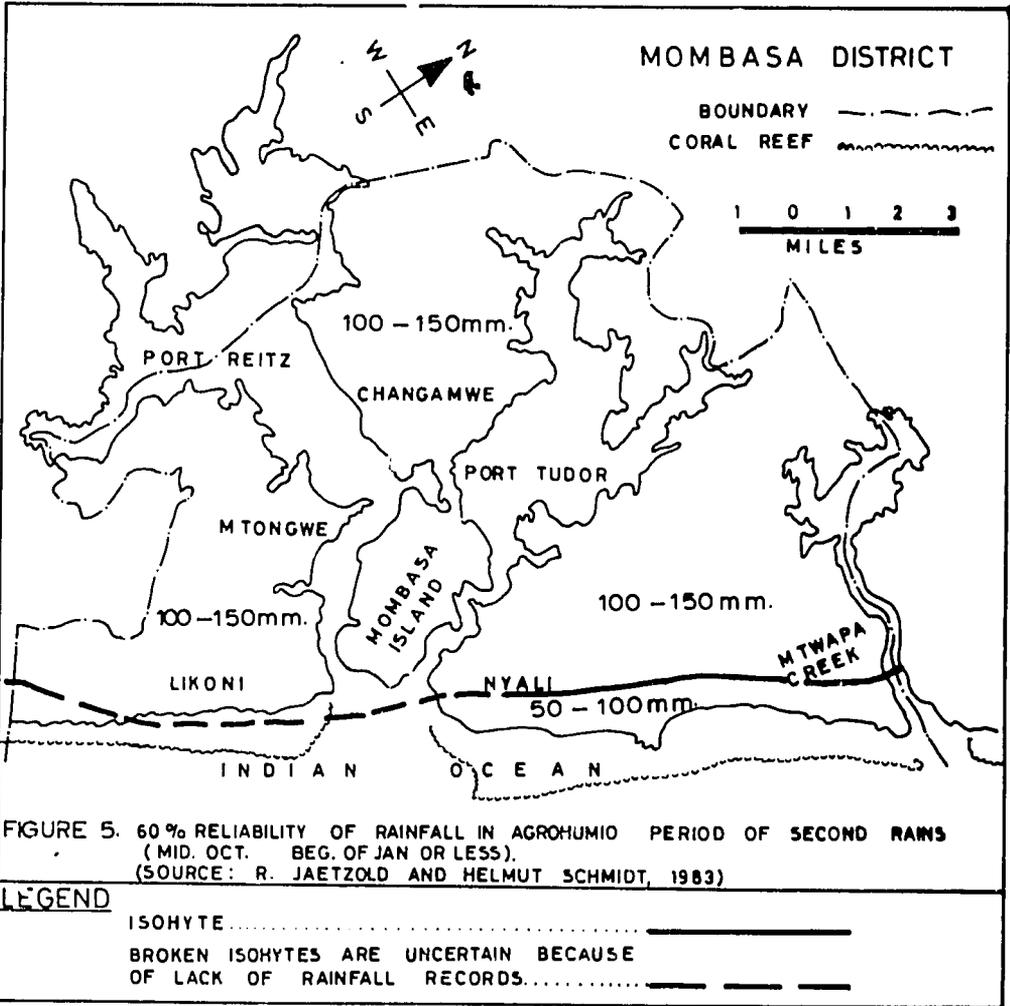
NAME OF STATION	KIND OF RECORD	TEMPERATURE IN °C												YEARS OF RECORD
		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	
MOI INTERNATIONAL AIRPORT (MOMBASA)	Mean Maximum	32.1	32.4	32.7	31.2	29.2	28.5	27.7	28.0	28.9	29.7	30.6	31.6	24
	Mean Temperature	27.6	28.0	28.4	27.5	25.9	24.8	24.0	24.1	24.8	24.8	26.8	27.4	
	Mean Minimum	23.2	23.6	24.2	23.8	22.6	21.2	20.3	20.3	20.8	20.0	23.0	23.3	
	Absolute Minimum	18.4	20.6	20.8	21.1	18.9	17.5	17.6	14.9	17.6	17.7	20.0	19.4	

Source: Jaetzold, 1983

variability is high. The coast is the wettest climatic zone of Kenya with an average annual rainfall of over 1100 mm. The rain decreases gradually from the coast to the hinterland where the average annual rainfall is generally less than 900 mm. (Fig.3,4,5).

Mombasa is hot throughout the year. The minimum and maximum annual temperatures are 30.1°C and 23.4°C respectively with the lowest recorded temperature rarely falling below 25°C. The hottest months are December, January, (Table.1.3). Relative humidity at 15.00 hrs is 67%.





1.3.2 Water Resources

Mombasa District gets water supplies from Marere, Mzima Springs and 4 boreholes at Tiwi (Fig.6). The latest supply from Sabaki river relieved a long deficiency of water the district had experienced for nearly eleven years.

The problem of inadequate water supplies in Mombasa is created by the high demand of the increasing population and industries on one hand; on the other hand continuing problems of machine damage due to siltation is an important factor. The Sabaki pump for instance broke down in November 1984 and was under repair for a long period.

The water supply line from Marere Springs to the southern mainland is at its maximum extension and may not be expanded further for a while, but there is a proposal to dig a borehole to replace one which was overdrilled to saline water.

The water supply from Mzima Springs and Tiwi boreholes is fairly clean and the only treatment applied to it is simple chlorination to kill bacteria. For Tiwi chlorination is done at the boreholes but the supply from Mzima is treated at both Mazeras and Changamwe water reservoirs. Water from both Sabaki river and Marere is polluted, requiring full treatment with alum, soda ash and chlorination which are administered at Baricho and Marere Water Treatment Works (Table.1.4). There are a few shallow wells used for irrigation and religious purposes in Likoni area.

1.3.2 Water Supply Systems

There are a number of water distribution points in the district. Mombasa Island gets its water from Marere and Mzima springs through Marere and Changamwe water reservoirs. The Northern mainland receives its water from Sabaki river and Mzima line through Nguu Tatu water reservoirs. The Western mainland obtains water from both Mzima and Marere springs. Water for the southern mainland comes from both Tiwi boreholes and Marere pipeline.

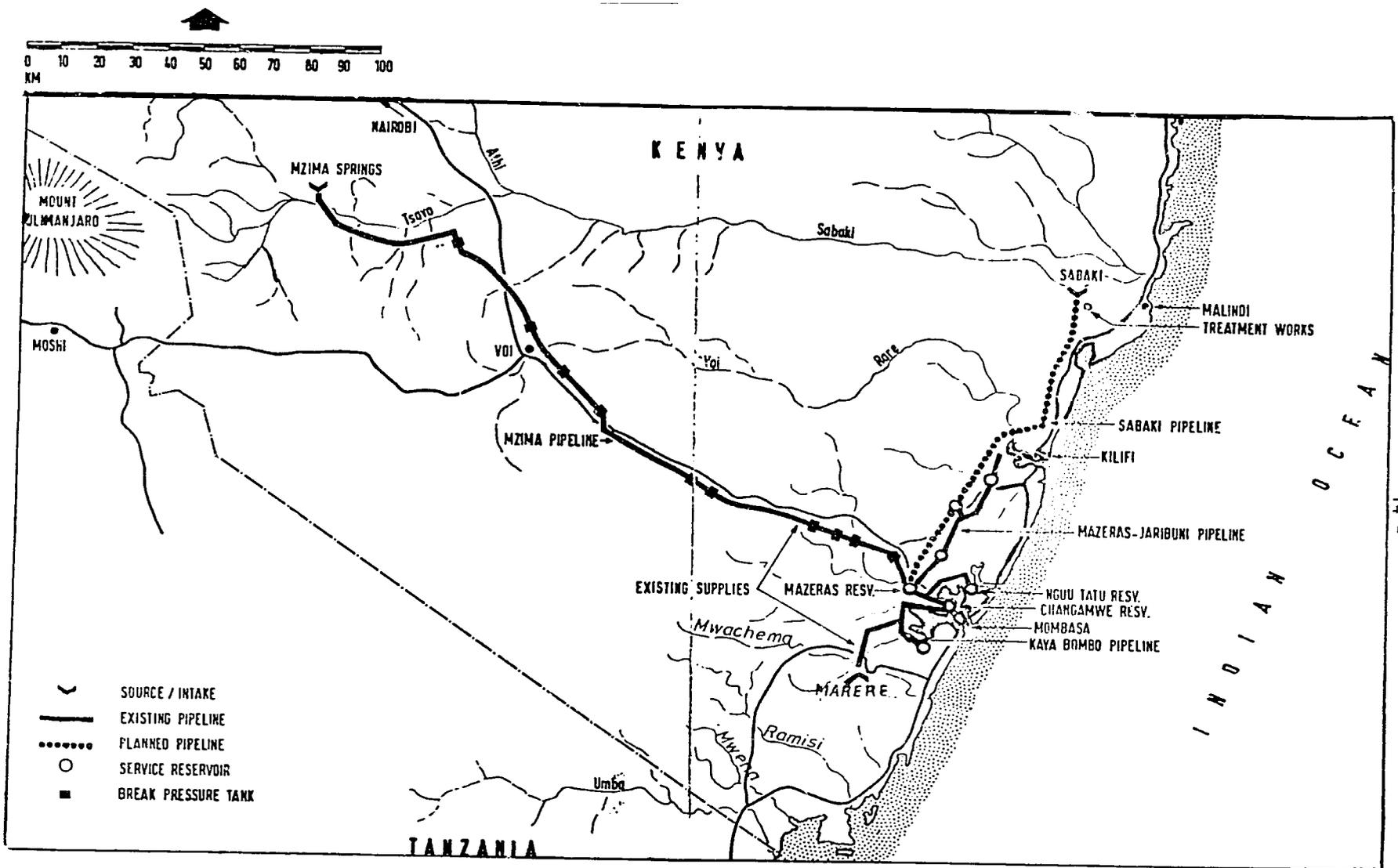


FIGURE 6 WATER SUPPLY SYSTEMS IN MOMBASA DISTRICT. (Source: Norconsult A.S.)

TABLE 1.4 : QUALITY AND QUANTITY OF WATER SUPPLIES OF MOMBASA DISTRICT

WATER SUPPLY	SOURCE	QUALITY	PRODUCTION PER DAY/(M ³)	REMARKS
MOMBASA ISLAND	Mzima Pipeline	Good	36,360	Chlorination. 20500 connections
	Marere Pipeline	Good		
	Sabaki w/supply	Good	30,000	Full Treatment
WEST MAINLAND	Mzima Pipeline	Good	15,900	Chlorination
	Marere Pipeline	Good		4100 connections
NORTH MAINLAND	Mzima Springs	Good	18,000	Full Treatment
	Sabaki w/supply	Good		4200 connections
SOUTH MAINLAND	Marere Pipeline	Good	6,800	Chlorination
	Tiwi Boreholes	Good		1,600 connections

Source: Mombasa District Water Officer
January 1985

The capacities of existing reservoirs are as follows:

Mazeras - 18 million gallons; Changamwe - 6 million gallons; North Mainland - 5 million gallons; South Mainland - ½ million gallons.

The capacity of storage is not yet utilized fully.

A large number of houses are without piped water and depend on water purchased from water kiosks. The areas using kiosk water supply are Majengo, Ganjoni, Kisauni, Kongowea, Changamwe and Likoni.

In 1983 there were 35 water kiosks on Mombasa Island alone which sold 150,000 m³ of water; West Mainland had 108 kiosks selling 150,000 m³; North Mainland had 113 kiosks selling 240,000 m³; South Mainland had 48 kiosks selling 145 m³.

1.3.4 Implications for Environment and Development

Water supplies from Marere, Mzima Springs, Sabaki river and the 4 boreholes are not adequate for the increasing population of Mombasa District. Constant breakdown of pumps resulting from mechanical problems and siltation have intensified the problem of water supply.

1.4 VEGETATION

1.4.1 Vegetation Zones

Most of the natural vegetation on dry land in Mombasa District has been cleared from sites for construction of residential and industrial quarters.

Nonetheless five vegetation zones can be distinguished albeit obliterated or broken on certain parts of the district (Fig. 7).

- i) Afzelia-Albizia/Panicum (Lowland Moist Savanna)
The areas suited for this type of vegetation include Mombasa Island, Changamwe, and Likoni.
- ii) Manilkara-Dalbergia/Hyphantenia: (Lowland Cultivation Savanna)
A small area around Mtongwe.
- iii) Brachystegia-Afzelia: (Lowland Woodland)
The Lowland Woodland type of vegetation would do well in the north coast in Kisauni and on a small part to the south of Mtongwe.
- iv) Combretum Schumanii-Cassipourea: (Lowland Dry Forest On Coral Rag)
This vegetation zone is to be found all along the coastline from Cannon Point through Shelly Beach to Diani Beach in Kwale District.
- v) Mangrove Thickets:
This is the only natural vegetation zone in Mombasa District that has not been cleared out completely and that is mainly because mangroves grow in tidal swamps unsuitable for human settlements. In addition they are gazetted forest, and therefore protected and managed by Forest Department. The mangrove thickets are found at Port Reitz Creek, Port Tudor Creek and Mtwapa Creek, covering an area of approximately 3,059.0 ha. (See also Table 2.1 under 2.1 below).

1.4.2 Implications for Environment and Development

Potentially Mombasa District has a remarkable diversity of natural vegetation, but being an urban area natural vegetation has very little chance of survival except on selected areas such as parks. Mangroves are threatened because mangrove poles are in big demand for building and most of them have to be imported from other districts, especially Lamu, making them more costly. Even though there is no charcoal burning in the district, Mombasa imports a lot of charcoal from the neighbouring districts thereby contributing to the removal of vegetation cover in neighbouring districts. In this regard Mombasa can be termed a problem 'exporter' to other districts. In the district itself the removal of the vegetation cover has resulted in loss of topsoil leaving the coral rock exposed. It is very difficult to reintroduce vegetation in such areas.

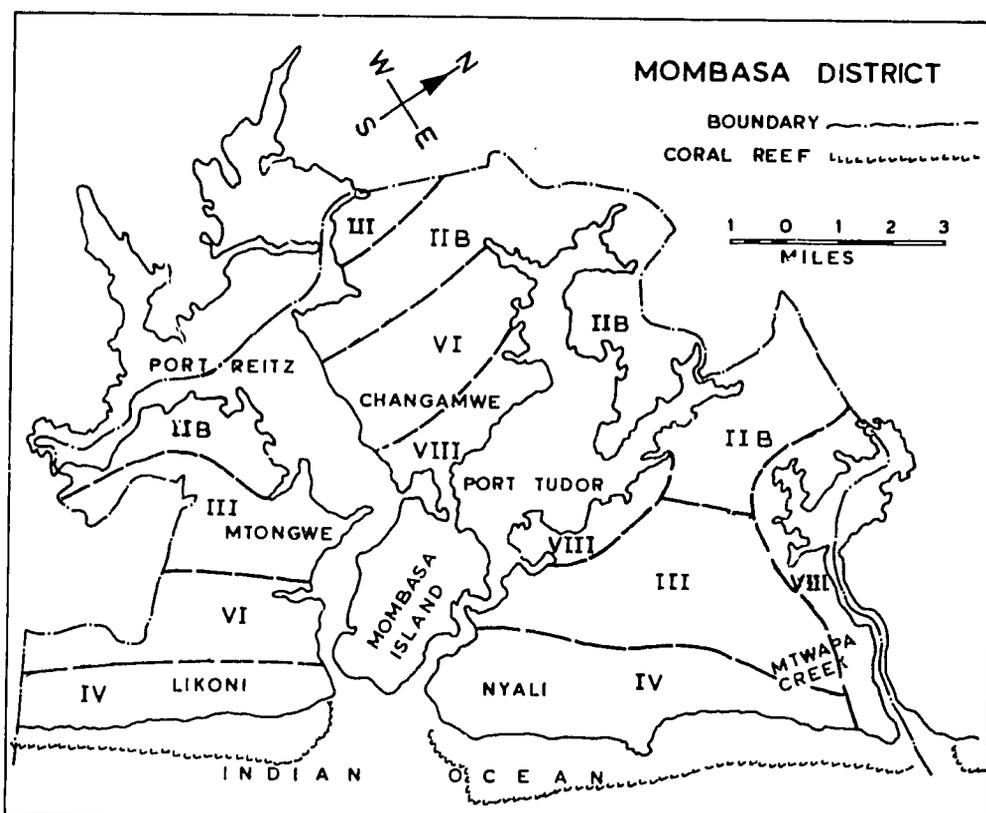


FIGURE 7 VEGETATION (SOURCE: R. JAETZOLD AND HELMUT SCHMIDT 1983)

LEGEND	
MANILKARA DALBERGIA HYPARRHENIA.....IIB	AFZELIA ALBIZIA PANICUM.....VI
BRACHYSTEGLIA AFZELIA.....III	MANGROVE FOREST.....VIII
COMBRETUM SCHUMANII CASSIPOUREA.....IV	

1.5 LAND ADMINISTRATION AND LAND TENURE

1.5.1 Land Administration

Land in Mombasa District is 275 km² made up of Government (State) Land which includes the township and Government reserves together amounting to 207 km²; Trust land of 3 km² and 65 km² of water surface.

TABLE 1.5 : DISTRICT LAND CLASSIFICATION FOR MOMBASA

LAND CLASSES	DESCRIPTION	AREA IN KM ²
GOVERNMENT LAND (State Land)	Township	204
	Reserves	3
	Open Water	65
TRUST LAND	Registered	0
	Unregistered	3
FREEHOLD		NONE
TOTAL:		275

Source: Central Bureau of Statistics 1983

1.5.2 Land Tenure

Land ownership and land rights in Mombasa District are complex, and this is so mainly because of the political and historical background discussed above.

As mentioned under 1.1.2 before Kenya's Independence Mombasa was under the rule of the Sultan of Zanzibar. The land was allotted to his subjects, mostly Arabs and Asians, and it was registered in accordance with the Sultanate law. After independence the Kenya Government undertook to honour the registration. The result was that most of the land, especially on the Mombasa Island, remained the property of the Arabs

and a few Asians. Subsequently most of the owners left the country. As a result much of the land which is not Government owned e.g. in Kisauni, belongs to such absentee landlords.

Such absentee landlords do not develop or sell their land; instead they let the land to other people who use it while paying some form of rent to the owner's agent or relatives when they are available. As a result it is common in Mombasa that the owner of a house is not the owner of the plot on which the house is erected, and that most of the developers are tenants.

As indicated above (Table 1.5) there is only 3 km² of Trust Land available for small holder registration in the district, which means that most of the people in Mombasa District are landless.

A small proportion of the district's households occupy the Trust Lands, using and sharing the land in traditional ways. Another large proportion of the population has settled illegally on land already marked for Government projects (schools, hospitals, etc.).

1.5.3 Implications for Environment and Development

The land tenure in Mombasa District may greatly influence the state of the environment and development of the district. Land is mainly owned by people who are not residents while ownership of some of the land is unknown. The presence of unoccupied land has led to settlement by squatters, generally poor people, living in fear of losing the land any time. Hence their aim is to grow food crops through light traditional methods of farming and very little effort of land conservation is made. The result is a tendency to over-exploit the land, and soil erosion is the ultimate result, leading to degradation of the land and loss of productivity. Thus shifting cultivation and careless use of agricultural land in Mombasa District are perpetuated by the preponderance of absentee **landlordship** and of lands which are not effectively occupied or utilized.

The lack of title deeds of ownership for people who use these lands implies difficulties and hesitation in acquisition of credit finances to develop such lands.

Only a downward trend in the quality of land can be expected from this situation of land tenure.

It is realised, however, that administration of land tenure is not likely to be a short term problem either in terms of the rights of owners and their freedom in management or in terms of illegal settlements by squatters. The tenural basis of land use is important but for short term measures the need for sound physical planning and insistence on standards are most important.

It can be judged from the foreword statement in this Report that environment in Kenya today is an important political issue and will become increasingly so in the years ahead. What is required for Mombasa District is to make the first step to streamline the land tenure and the environmental policies to be mutually supportive and complimentary for development and welfare of the majority of residents. At present the semi-feudal land tenure in Mombasa District is a barrier to development and sound environmental management.

1.6 MARINE ENVIRONMENT

Mombasa District has a small coastline measuring about 32 km long. The aquatic environment as discussed in terms of the bathymetric (Table 1.6), physical and chemical characteristics of the creeks and inshore water (Table 1.7) is as follows. According to Norconsult (1975) the currents in the inshore waters including the creek waters are predominantly tidal currents. The tidal currents flow from the surface to the bottom with flood and ebb strengths of 0.5 - 1.0 m/s. Beyond the reefs, the physical characteristic of the waters are mainly determined by the large scale circulation system of the Indian Ocean. The offshore environment of this district is throughout the year under the influence of the East African Coastal Current (EACC) which flows northwards along the coast. During the South East Monsoon (SEM) which prevails from March to November the speed of the EACC ranges 0.5 - 1.0 m/s. In the North East Monsoon (NEM) the speed of EACC is reduced (0.3 - 0.4 m/s) and a few weeks in the end of NEM, there may be a partial southerly flow of the EACC close to the reef. Offshore currents which are close to the reef bend away from the reef at ebb tides but conversely bend towards the reefs during flood tides. During the latter tides large water masses flow into the shallow water and along the beaches. There is a current which flows perpendicular to the shore when the offshore currents, tidal action and winds interact. Its speed has been estimated to be 0.2 m/s. Incidentally the offshore water that flows inshore into the creeks is that above the thermocline. There are no vertical temperature, salinity and density gradients in the water columns of the creeks. There is complete vertical mixing of the surface and bottom water thus creating favourable conditions for oxidation processes. The two creeks have large tidal volumes (Table 1.6). It is calculated that on the average it takes 3 and 3.5 days to replace the Tudor and the Kilindini waters respectively.

As regards nutrients namely phosphorous and nitrates, their concentrations are as shown in Table 1.7. The Kilindini creek water has more nutrient concentration per unit volume than the Tudor creek water. Since Mombasa is an urban district which has a high rate of industrial and

TABLE 1.6 : BATHYMETRIC CHARACTERISTICS OF KILINDINI AND TUDOR CREEKS

	<u>Kilindini Creek</u>	<u>Tudor Creek</u>
Intertidal zone area	$56 \times 10^6 \text{ m}^2$	$21.5 \times 10^6 \text{ m}^2$
Area below datum	$27 \times 10^6 \text{ m}^2$	$11.5 \times 10^6 \text{ m}^2$
Tidal volume (spring)	$153 \times 10^6 \text{ m}^3$	$65 \times 10^6 \text{ m}^3$
Total volume (neap)	$56 \times 10^6 \text{ m}^3$	$24 \times 10^6 \text{ m}^3$
Total volume (Spring)	$341 \times 10^6 \text{ m}^3$	$126 \times 10^6 \text{ m}^3$
Total volume (neap)	$274 \times 10^6 \text{ m}^3$	$98 \times 10^6 \text{ m}^3$

Source: Norconsult (1975)

TABLE 1.7 : NITRATE AND PHOSPHATE CONCENTRATION (mg/l) IN THE SEWAGE EFFLUENTS AND THE WATER MEDIUMS OF TUDOR AND KILINDINI CREEKS AND INSHORE WATERS

Area	<u>Nitrate concentration</u>		<u>Phosphate Concentration</u>	
	<u>Water medium</u>	<u>Sewage</u>	<u>Water medium</u>	<u>Sewage</u>
Tudor	30.0	37.4	16.0	12.4
Kilindini	125.0	27.0	23.0	11.5
Inshore waters	100.0	—	15.0	—

Source: Norconsult (1975)

TABLE 1.8 : INDUSTRIAL AND SEWAGE EFFLUENTS INTO THE CREEKS

<u>Discharge Area</u>	<u>Source</u>	<u>Flow(m³/d)</u>
Tudor Creek entrance	Kizingo Treatment Plant	3140
Tudor	Lady Grigg Hospital	70
	Coast General Hospital	230
	Housing Estates	856
	Kenya Meat Commission	167
	Kenya Breweries Limited	432
Kilindini Creek	Changamwe Treatment Plant	1750
	Kenya Ports Authority	23
	Kenya Railways	80
	Kenya Petroleum Oil Refinery	1040
	Pearl Laundry Limited	100

Source: Norconsult (1975)

TABLE 1.9 : ANALYSIS OF EFFLUENT FROM VARIOUS SOURCES WHOSE WASTES ARE DISPOSED INTO THE CREEK (Concentration in mg/l)

Source	<u>Suspended Solids</u>	<u>Total Grease</u>	<u>Total Nitrogen</u>	<u>Total Phosphorous</u>	<u>Cadmium</u>	<u>Zinc</u>	<u>Lead</u>
Kenya Meat Commission	3532	48	40	20	—	—	—
Kenya Breweries	2960	—	2.12	3.91	—	—	—
Kizingo Treatment Plant	455	137	70	13.3	0.067	0.438	0.055
Changamwe Treatment Works	134	27	27	11.5	0.044	0.655	0.017

Source: Norconsult (1975)

TABLE 1.10 : TAR BALL CONCENTRATION

Locality	<u>Tar Concentration* g/m (per length)</u>		<u>Tar Concentration** g/m² (per unit area)</u>	
	<u>March 1975</u>	<u>Aug 1975</u>	<u>1979</u>	<u>1980</u>
Shanzu	8	16	13.3	2.0
Bamburi	17	6	6.1	1.4
Myali	0	15	5.4	1.8
Shelly	340	179	—	29.5

Source: *Norconsult (1975)
**Munga (1982)

population growth, disposal of sewage (Table 1.8) into the water environment is worrying. Such effluent may pollute or fertilize the environment (Table 1.9). It was therefore found necessary to consider separately the impacts of such wastes in the aquatic medium including those caused by oil activities (Table.1.10).

1.6.1 Implications for Environment and Development

Due to the fact that the creek waters are the dumping sites of industrial and domestic sewage which have also heavy metals, there is growing anxiety about pollution of the marine environment and over-fertilization (i.e. eutrophication) of the water medium. Apart from the liquid wastes, chemicals leached from the solid wastes disposed in the mangrove area at Kibarani are also considered to be polluting the marine environment. Tar balls which are formed from oil wastes released by oil tankers when the latter are cleaned offshore, have polluted some shores (Table 1.10).

The sewage of 17% of the total population is treated and discharged into the sea through the Municipal Council sewerage system and effluents reaching the sea directly from industries, hospitals and some housing estates have not yet caused any alarming impact on the marine environment. This is suggested to be due to the following reasons:

- (i) The creek waters have low nutrient levels, thus signs of eutrophication have not yet shown up. The water is still sparkling clear which indicates a yet low primary productivity;
- (ii) The waters experience complete vertical mixing daily which permits good oxidation of organic matter;
- (iii) The waters are replaced almost completely in 3-3.5 days thus discouraging a build up of nutrients in the water columns.

It is important to point out that long term research covering the two seasons should be done to estimate the natural nutrient output from mangrove into the creeks so that the magnitudes of the effects of fertilization of the creeks due to sewage effluents can be quantified.

In the light of the fact that lots of mangroves are being destroyed in the harbour the consequences of which is a reduction of the nutrients that can be available from mangroves, the role of treated sewage as a fertilizer may be beneficial.

So far there is no report of complaints attributed to coliform bacteria in the bathing waters of the creeks or due to ingested oysters with coliform bacteria. However there is need to monitor concentration of the coliform bacteria (Escherichia coli) in the water medium and in edible filter feeding organisms e.g. Crassostrea cucullata.

Heavy metals have been detected in Kizingo and Changamwe sewage effluents (Table 1.9). However, the origin of these heavy metals were unknown. Since they are physiologically toxic metals which tend to accumulate in organisms there is need to:

- (a) identify their source and their concentrations in the effluents;
- (b) determine their concentrations in the water medium, sediments and in organisms
- (c) establish their pathways in different trophic levels to the point they enter edible organisms. The data then can be used to find out whether the levels of these toxic metals conform with the internationally acceptable standards.

As regards oil spills in the harbour, it is commendable that the Kenya Ports Authority (KPA) has taken the responsibility to clean such spills. However, for ecological purposes, chemical analysis of dissolved hydrocarbons and oil on sediments have to be undertaken. Benthic studies should be done at the port area to find out any possible effects of oil spills on marine biota. Such data would help in predicting what might happen in other Kenya creeks which may be used as harbours. Still conspicuous are tar ball concentrations (Table 1.10), which result from oil waste released offshore and blown to the shore where they form tar-balls. Such deposits are common at Shelly Beach. Chemical analyses also need to be done on the tar balls to determine any toxic elements. It is important also that tankers should be discouraged from releasing their waste water containing oil in Kenya's territorial waters.

Tar balls stick to people's feet and hair and are difficult to remove. Thus their heavy concentration on beaches may make the beaches unpopular for recreation.

1.6.2 Summary of Recommendations

- (i) There is need to monitor the possible pollutants in sewage e.g. pathogenic organisms like E.coli, toxic matter such as heavy metals, dissolved hydrocarbons, poisons that may be leached from garbage dumps etc. Presently the source of the heavy metals in the sewage is unknown.

The investigations should preferably first begin with finding out whether edible organisms are accumulating any toxic matter and if so at what concentrations? The pathways leading to such build up of toxic matter in edible organisms should be determined. With this knowledge the chain can suitably be broken, to avoid concentration of the toxic matter in edible organisms. Such studies would help in dealing with public complaints that may arise.

- (ii) There is need to monitor the quantity and quality of nutrients released by the mangrove ecosystem as a fertile nursery ground for various juvenile organisms, resident benthic and swimming organisms. Having known their relationship, the impact of adding more nutrients through sewage disposal can be conveniently evaluated. This may help in predicting the effects of adding extra sewage.

- (iii) Tankers should be prohibited from releasing their waste water with oil in the offshore territorial waters. This may reduce the chances of accumulation of tar balls on the sea-shores. The ecological effects of tar balls should be investigated.

PART II

ENVIRONMENT AND DEVELOPMENT

2.0 NATURAL RESOURCE USE AND CONSERVATION

2.1 Forestry

Within the area of Mombasa District of 275 km² as indicated above under 1.1.1, 204 km² (or 70%) of the area is under township, 65 km² is water, 3 km² is Government reserve and 3 km² is Trust Land. From these figures it is quite clear that there is very little room for forest reserve. As mentioned under 1.4.1(v) above gazetted forest in the district is comprised of 3,059 ha of mangrove forests. The area under mangrove is distributed as follows:

TABLE 2.1 : MANGROVE FORESTS IN MOMBASA DISTRICT

<u>Section</u>	<u>Area (ha)</u>
Port Reitz	1,420.0
Port Tudor	1,202.0
Mtwapa	437.0
Total:	3,059.0

Source: Forest Department, 1985

Since these mangroves grow in muddy, salty waters it is very difficult to increase their cover artificially and the forests are left to regenerate naturally. The Forest Department can, however, protect them from being over-exploited and manage them on a sustained yield basis.

Discounting fruit trees such as mangoes, coconuts and cashewnuts. as forming part of agroforestry it can reasonably be said that agroforestry is not practised in the district. In any case not for the conventional uses such as wood fuel, timber, building poles, etc.

2.1.1 Management and Conservation of Natural Forests

As stated in Section 1.4.1 most of the natural forests in Mombasa District are cleared to give way to structures mainly residential and industrial buildings. The only natural forests left and which are under the management of the Forest Department are mangrove forests (Table 2.1). Efforts of the Forest Department to introduce improved varieties of mangrove species have not materialised and the District Forest Office can only protect the natural stands from being over-cut.

Between 1979 and 1983 the cutting of mangrove poles has been as follows:

TABLE 2.2 : ANNUAL HARVEST OF MANGROVE POLES IN MOMBASA

<u>YEAR</u>	<u>SCORES</u>
1979	244.55
1980	2,064.75
1981	3,613.07
1982	9,073.80
1983	2,370.00

Source: Forest Department, Headquarters - 1985

The source did not explain satisfactorily why these figures were not consistent. In the absence of an inventory of the mangrove stock, it is difficult to be accurate on the permissible number of mangrove poles to be cut down.

Mombasa District has 7 tree nurseries each capable of holding 20,000 seedlings while the Forest Department nursery can accommodate 150,000 seedlings. During the last three years communal planting of seedlings has taken place as follows:

TABLE 2.2B : TREE SEEDLINGS PLANTED IN MOMBASA 1982-1984

<u>YEAR</u>	<u>NO OF SEEDLINGS PLANTED</u>	<u>PLACE</u>
1982	3,311	Kisauni Division (Nguu Tatu)
1983	5,000	Changamwe Division (Jomvu Kuu)
1984	10,000	Changamwe Division (Jomvu Kuu)

Source: Forest Department, 1985

School children and scouts take part in this programme. Most of the seedlings planted do not survive, and it is believed that they are uprooted by the 'squatters' who believe that the afforestation programme is the first step towards their eviction from the Trustland.

Assuming that the other divisions in the district planted during the same period the same number of seedlings as the division mentioned, and disregarding the survival rate of the seedlings, it is obvious that the nurseries carrying capacity is under-utilized.

2.1.2 Recommendations

- (i) Bearing in mind that the tree species making up the natural forests take a long time to mature and that there is little land left on which to grow them, it is understandable that the people would be reluctant to plant such species since they expect quick returns for their labour. Consequently there are very few participants and areas to plant indigenous trees. The ideal locations to plant these trees include open areas in public institutions such as schools, hospitals, etc. They should also be planted along the highways. It would be easier to protect the seedlings in such areas where in addition, no individual would be waiting for immediate benefits from them.

2.2 MINING

As stated earlier in this report while discussing vegetation, Mombasa District 'exports' environmental problems to its neighbouring districts: another case illustrating this point is the mining industry. Most of the building materials used in the district e.g. sandstones etc come from outside the district, especially around Tiwi in Kwale District and Mariakani in Kilifi District. However, there is a lot of quarrying of coral limestone going on in Mombasa District itself mostly by the Bamburi Portland Cement Company. Quarrying has also taken place many years ago in several parts of the district as evidenced by many abandoned quarries. Recently there has been a lot of clay scooping in Miritini.

2.2.1 Reclamation of Quarry Sites

Earlier in this report it was indicated under section 1.2.4 that extensive excavation of limestone goes on in Mombasa District. It was also mentioned that the Mining Act excludes limestone, clay, sand, murram and sandstone from the category of minerals whose mining is subject to regulation of the law except in the regards of safety. As a result reclamation of badlands made by quarrying activities cannot be enforced as it is not governed by the law.

Notwithstanding the lack of legal provision, however, the major exploiters of limestone in Mombasa District namely the Bamburi Portland Cement Company, have voluntarily and successfully undertaken the reclamation of disused quarries and wasteland. According to the Baobab Farm Manager, the reclaimed land consists of 35 ha of planted forest, a multitude of wildlife and fish ponds producing about 36 tons of high quality fish every year. The Forest, 8 years old already, produces building poles and charcoal. The firm planted Casuarina and Damas concarpus on experimental basis. Both species were chosen because of their characteristic of salt tolerance, but now the firm has embarked on plantation of indigenous trees such as Mbambakofi and teak while continuing its wasteland rehabilitation exercise.

Another firm worth mentioning with regard to quarry wasteland reclamation is the Mamba Village situated opposite Nyali Golf course. The firm makes use of deep disused mines to rear crocodiles on commercial basis and the 'village' has now added another tourist attraction to the coast.

The SOS Village in Nyali is built from coral rocks on reclaimed land and has a splendid vegetation all over. It has been able to keep goats, dairy cattle and a big fish pond.

2.2.2 Recommendations

- (i) The Mining Act should be revised in order to include quarrying and scooping of common minerals and to take into account aspects of environmental conservation and protection.
- (ii) Levies should be imposed on mining and scooping of clay and sand in the district and the money so collected used to rehabilitate the lands affected by mining activities.

2.3 WILDLIFE MANAGEMENT

2.3.1 Wildlife in Mombasa District

Due to the long history of settlement and related activities wildlife and natural habitats on Mombasa Island have been systematically destroyed over the years. Suitable habitats for terrestrial wildlife are currently negligible. There is, however, a significant population of the Indian housecrows (Corvus splendens vicillot) which are recent invaders of Mombasa. This species was first introduced to the East African coast at Port Sudan and Zanzibar in 1905. In Mombasa the crows feed on garbage around town and are a nuisance to hotels.

In most dispersely settled parts of Mombasa District pockets of natural bush and tree crops provide refuge to sykes monkeys and bush pigs.

2.3.2 Recommendation

The action already being taken to reduce the number of Indian house crows around Mombasa should be intensified.

2.4 MARINE RESOURCES

2.4.1 Introduction

Marine resources can be categorized into two groups i.e. living and non-living resources. The living resources exploited are fish and mollusc shells.

The non-living resources are fossil coral rocks and the sandy beaches. The latter are considered as resources because they offer good scenic sites for hotel industries. Fossil coral is quarried for making of bricks and for manufacturing of cement. In this section emphasis is laid on the living resources.

2.4.2 Marine Fisheries

Unlike the rural coastal districts where marine fishing activities are quite prominent and are practised by various communities, Mombasa District does not have conspicuous fishing activities. However, the Mombasa coastline has ^{no} rich fishery compared to that of Vanga area in Kwale District, Ungwana Bay in Kilifi District or the Lamu Complex in Lamu District. Inshore and sport fishing in Mombasa District yield higher catches whereas the offshore fishing is poor and therefore unpopular.

The inshore fishermen use canoes to fish in the creeks and around the coral reefs and land 70-92 tons of fish per year. The gears used include handlines, beach seine, cast nets, Uzio, Malema and Utata traps. There are industries for fisheries and foreign fishing boats. They fish mainly in the Ungwana Bay, North Kenya banks and sometimes around Vanga, landing their catches in Mombasa. The fishing industries are Samaki Industries, Wananchi Marine Products and Kenya Fishing Industries.

There are about 300 licenced fishermen but not all fishermen fish daily. The landing depots are Nyali, Bamburi, Likoni, Changamwe and Old Port.

Experimental trawl fishing done in the Tudor and Kilindini Creeks has yielded catch rates of 80 kg/h and 650 kg/h respectively but of mostly trash fish. The deeper Kilindini creek which has also more nutrients is richer in fish and prawns than the Tudor creek. It is, however, important to note that no commercial trawling is carried out in these creeks.

Surveys in the offshore waters of the district have shown that offshore fishery is mostly trash fish, which is the reason why offshore fishing in these waters is unpopular. From the records of the inshore (Table 2.3) and sport fisheries (Table 2.4), which are practised more than offshore fishing in the district, it is apparent that Mombasa can record the highest catches in the Coast Province because of catches brought from other districts and landed in Mombasa without indicating the original source locations.

2.4.3 The Baobab Tilapia Farm

The Baobab Farm runs an intensive tilapia production system considered to be the first of its kind in the world. The hatchery has a capacity of 750,000 which satisfies the needs of the farm with a surplus for sale as seed in Kenya and the neighbouring countries. Through research the farm has developed a fast growing breed of tilapia fish tolerant to salt water. About 35 tonnes of fish are produced annually for the local market.

2.4.4 Shell Trade

This is seemingly a lucrative business which depends on demand among foreign tourists who are the main customers of mollusc shells.

In Mombasa District, shell collection goes on along the entire 32 km coastline. The preferred species collected on this coastline are Lambis lambis, Lambis chiragra, Lambis scorpius, Lambis truncata (immature forms), Bursa lampas, Fasciolaria trapezium, Cassis cornuta, Charonia tritonis (immature forms), Cypraecassis rufa, Cypraea talpa (occasional), Tridanca squomosa (immature), and Ovula

TABLE 2.3 : COMPARATIVE INSHORE FISHERIES LANDINGS (METRIC TONS) FOR 1983

Type	Lamu	Tana River	Kilifi	Mombasa	Kwale
Dermersal	1126	13	534	884	541
Pelagic	200	7	338	349	200
Lobsters	33	0	1010	7	6
Prawns	11	0	19	251	17
Crabs	16	0	2	5	34
Others	20	3	199	622	76

Source: Fisheries Department (1983)

TABLE 2.4 : TOTAL SPORT FISHING CATCHES (KG) OF BAHARI CLUB AND MOMBASA SEA ANGLING CLUB

Type	1980/81	1981/82	1982/83	1983/84
Barracuda	359	324	26	210
Cobia	365	75	-	42
Dolphin	662	834	-	663
Kingfish	506	403	24	332
Marlin, Black	438	-	-	151
Marlin, Striped	483	994	1	173
Sailfish	769	698	124	1227
Shark, Hammer head	251	-	-	108
Shark	447	329	-	214
Sword Fish	14	-	-	-
Trevally Giant	73	61	-	61
Tuna, Yellowfin	1374	1204	55	660
Wahoo	809	674	37	473
Total	5550	5596	266	4314

Source: Kenya Association of Sea Angling Clubs (1984)

ovum (occasional). Hidden in bags these beautiful shells are frequently shown only to tourists along the beaches to buy.

There are about 15 shell kiosks in Mombasa, located on high traffic roads and shells are also exported commercially through two export agents. Shells may be collected from the neighbouring districts of Kilifi, Kwale and Lamu for the Mombasa market.

Shell collecting licences do not permit the collector to sell shells to buyers (tourists) directly but to sell to licensed retailers and wholesalers. However, this way the collectors make very low prices and therefore most of them risk to sell shells to the tourists directly against the regulations. Ruwa (1982) found that a dealer who purchased a specimen of Bursa lampas from a collector at K.Shs.3/- sold the same specimen to his customers at between K.Shs.20/- and K.Shs.30/- (Table 2.5).

In another instance in a transaction in which the exporter sold 1000 shells of Chicoreus ramosus at K.Shs.1260/- (Table 2.6) the shell collector could earn only K.Shs.1/25 per shell where the retailer got K.Shs.20/- to K.Shs.30/- from the same.

The foregoing information shows clearly that the shell collector gets the least from these operations. In the price surveys it was found that a total of 149 species, mostly gastropods, were displayed. From these surveys it was deduced that the important commercial species were in the following families of molluscs: Scrombidae, Cypraeidae, Cymatidae, Bursidae, Muricidae, Conidae, Terebridae, Cassidae, Mitridae, Harpidae and Tonnidae.

From the organisation of shell trade and the high rate of collection of shells it seems that the present licensing system encourages exploitation of shell collectors by retailers and wholesalers who act as middlemen in the trade.

TABLE 2.5 : THE SPECIES OF MOLLUSC SHELLS EXPORTED FROM KENYA

<u>SPECIES</u>	<u>COST(KSHS)</u>	<u>UNIT</u>
<u>Chicoreus ramosus</u>	1260	per 1000 pieces
<u>Fasciolaria trapezium</u>	840	" " "
<u>Halotis spp</u>	1120	" " "
<u>Strombus gibberulus</u>	700	per 100 pieces
<u>Lambis lambis</u>	140	" " "
<u>Lambis chiragra</u>	420	" " "
<u>Lambis crocata</u>	420	" " "
<u>Lambis scorpius</u>	420	" " "
<u>Harpa amouretta</u>	1400	" " "
<u>Cypraecassis rufa</u>	2100	" " "
<u>Lambis truncata</u>	35	" unit piece
<u>Cassis cornuta</u>	70	" " "
<u>Tridaena squamosa</u>	14	" " "
<u>Turbo marmoratus</u>	56	per kg
<u>Conus spp. (Assorted)</u>	14	" "

Source: Ruwa (In press)

The significance of prohibiting shell collectors from selling shells directly to the public is unknown. It would be expected that due to the low earnings which shell collectors get from shell retailers and wholesalers they would abandon the occupation. However, they do not do so, and there are several possible reasons why they do not do so:

- (i) Shell collection is only a hobby or side activity and not the mainstay activity;

TABLE 2.6 : FEBRUARY 1985 MULLUSC SHELL PRICES PER PIECE COMPARED WITH THOSE COMPILED BY RUWA (1982)

	<u>1985</u>	<u>1982</u>
<u>Bursa lampas</u>	Shs. 50	20-30
<u>Cassis Cornuta</u>	250	80-120
<u>Conus geographus</u>	40	10-20
<u>C. leopardus</u>	25	5-10
<u>C. marmoreus</u>	30	5-10
<u>C. striatus</u>	25	5-10
<u>Charonia tritonis</u>	600	80-350
<u>Cypraea annulus</u>	1	1-5
<u>C. caputserpentis</u>	10	1-5
<u>C. chinensis</u>	20	20-30
<u>C. diluculum</u>	10	5-10
<u>C. larmacki</u>	15	-
<u>C. lynx</u>	5	1-5
<u>C. mauritiana</u>	20	30-40
<u>C. moneta</u>	1.50	1-5
<u>C. talpa</u>	15	10-20
<u>C. tigris</u>	5	5-10
<u>C. vitellus</u>	5	5-10
<u>Cypraecassis rufa</u>	20	10-20
<u>Fasciolaria trapezium</u>	10	1-5
<u>Harpa amouretta</u>	3	1-5
<u>Lambis lambis</u>	18	10-15
<u>L. truncata</u>	80	40-80
<u>Strombus aurisdianae</u>	3	1-5
<u>S. decorus</u>	3	1-5
<u>S. lentiginosus</u>	5	1-5
<u>Terebra maculata</u>	25	10-20
<u>Turbo bruneus</u>	15	1-5
<u>T. marmoratus</u>	30	20-30

Source: NES/KM&FRI Team and Ruwa 1982

- (ii) A collector collects as much as possible in order to make higher incomes, but this would equally be the case if prices of shells were higher;
- (iii) Collectors get better prices from illegal sale of shells to the tourists.

At present the rate of hunting and collection of shells is very high and should be discouraged owing to the following reasons:

- (a) Molluscs (gastropods and bivalves) are extremely helpless animals against the keenness of shell collectors. The creatures are sessile and move extremely slowly.
- (b) Molluscs have very slow shell growth rates and maturity takes many years.
- (c) The unstable substrata, owing to sand shifts, disturbs settling larvae. Action of currents, winds, and sand shifts frequently occur all along the coastal inshore waters causing scouring effects which tend to dislodge settled larvae or inhibit settlement of larvae. This reduces the biological recruitment of the molluscs.

2.4.5 Coral Reefs

Collection of coral heads for sale is very rare in Mombasa district. The living coral zones are still healthy, supporting the characteristic colourful fish.

Disturbance may however occur due to artisanal fishing activities, collection of aquarium fish, snorkelling and excursion with glass bottomed boats to the coral reef zones. These coral reef zones are, however, not as luxuriant or diversified as the reefs at Malindi.

2.4.6 Recommendations

- a) Shell trade should be seriously reviewed in view of possible danger to over-exploitation.

- b) Export and sale of shells should be controlled.

- c) Since the artisanal inshore fishery and sport fishing are the most important fishing activities in this district, there is need to intensify research to assess the stocks of organisms which support these two types of fisheries.

3.0 LAND USE AND DEVELOPMENT

3.1 LAND USE CLASSIFICATION

Land use is an important aspect of environmental assessment and monitoring. Indeed land use is sometimes treated as a substitute in environmental surveys. This means that for purposes of present and future district environmental assessments a standard framework of district land use classification is required, which should meet at the district level the needs of District Development Committees, and at national level those of national environmental protection agencies such as NES, for an overview of land use in each district. The framework should provide a basis that is both uniform in scale and categorisation. It should also be related to available techniques of collecting data for updating land use information.

There was no opportunity to undertake a systematic land use survey of Mombasa District for this report. This means that the land use classification given here is rather abstract and may be used only to form a provisional legend until the necessary data from an actual land use survey are available.

In developing an effective land use classification for a given area the following considerations should be kept in view:

- (i) Perspective and context of a land use classification are important. Fundamentally emphasis should be laid on the type of economic or social enterprise, the facilities installed such as factories, warehouses etc. However, depending on method of survey the visible development status and effect on actual land, particularly the facilities, processes and activities, are important as criteria and indicators. The classification and choice of the criteria or indicators should be first and foremost oriented to suit the need of particular question or line of enquiry, in this case the interest of Government in environmental impacts and routine detection of pressure points.

- (ii) The classification should be compatible and receptive to data inputs from airborne surveys which is the method the Government of Kenya has adopted for collecting data with formation of KREMU in the Ministry of Economic Planning. This should also resolve the concern for unco-ordinated duplication in collection and handling of data for land use.
- (iii) Classification should be open ended so that fitting of additional or detailed information at lower (sub-district) level, and aggregation and generalisation of information in upward (regional, provincial and national) levels are rendered possible and smooth.
- (iv) Patterns of occurrence and distribution of land use, especially in rural areas, may not be permanent. A one-time classification is meant to be adequate for the period such patterns last and must be reviewed in the light of progress to manifest new types of land use and to exclude types which may have vanished from the scene. The land use classification should therefore be useable for repeated land use analysis (monitoring).
- (v) There is no ideal or perfect land use classification for all purposes. The process of classification is subjective, even when an objective method is used in accordance with objectives, the level of detail, and categories.

The proposed classification for Mombasa is meant to serve the purpose of this report as given in the Foreword namely environmental protection in planning and implementation of projects in the district. Bearing this in mind the following two level classification of land use in Mombasa District is proposed (see also Appendix I).

01 URBAN AND BUILT-UP LAND

This comprises areas of intensive use where land is covered by structures. This category has precedence over others whenever the criteria for more than one category may be met together.

01.1 Residential

Residential land use in Mombasa ranges from high density residential areas represented by low and high buildings in the urban core, to low density residential areas on the mainland where individual houses are allowed lots of $\frac{1}{2}$ acre or more land. Paradoxically, however, a large portion of residential premises on Mombasa Island are also of low density type.

01.2 Commercial and Services Area

Commercial areas are those used predominantly for sale of products and services. The core of Mombasa Island is in this category of land use. The principal components of the commercial land use are the central business area including shops, offices, hotels, drive ways, parking lots and open air markets.

01.3 Industrial

Mombasa does not have a discrete industrial area. A few old light industries are located on the Island, but recent industrial development has been located on the mainland. Heavier industries include the oil refining plant at Changamwe, Bamburi Cement Factory and KALU Works for manufacture of metal goods.

01.4 Extractive

Extractive land use in Mombasa comprises stone and limestone quarries, gravel and murram excavation pits.

01.5 Transportation and Communications Utilities

Kilindini harbour, with its deep berths, dominates the transportation facilities on the Island. Other facilities include the Mombasa Harbour, the Nyali Bridge, Makupa Causeway, Likoni Ferry, Moi International Airport, Mombasa Railway Station, roads, road service terminals

and parking lots. Communication facilities include the exchange and post office, the radio and television stations.

01.6 Institutional

Institutional land use includes religious, health, educational, military and community facilities, national monuments of which Fort Jesus is the most famous, prison grounds training and research facilities.

01.7 Open Lands

This category includes public gardens, golf courses, show grounds and sports grounds.

Unscheduled open lands are often subject to unplanned settlements (slums) and temporary open-air workshops of various trades.

02. SEMI-URBAN AND RURAL AGRICULTURAL LAND

This category is applicable to the greater part of Mombasa mainland.

03. RANGELAND AND RANCHING

This category is hardly applicable to Mombasa District.

04. FOREST LAND

The main component of forest land use is the mangrove forest in the creeks in Port Reitz, Tudor Creek and Mtwapa Creek.

05. WATER AND WETLANDS (OTHER THAN MANGROVE SWAMPS)

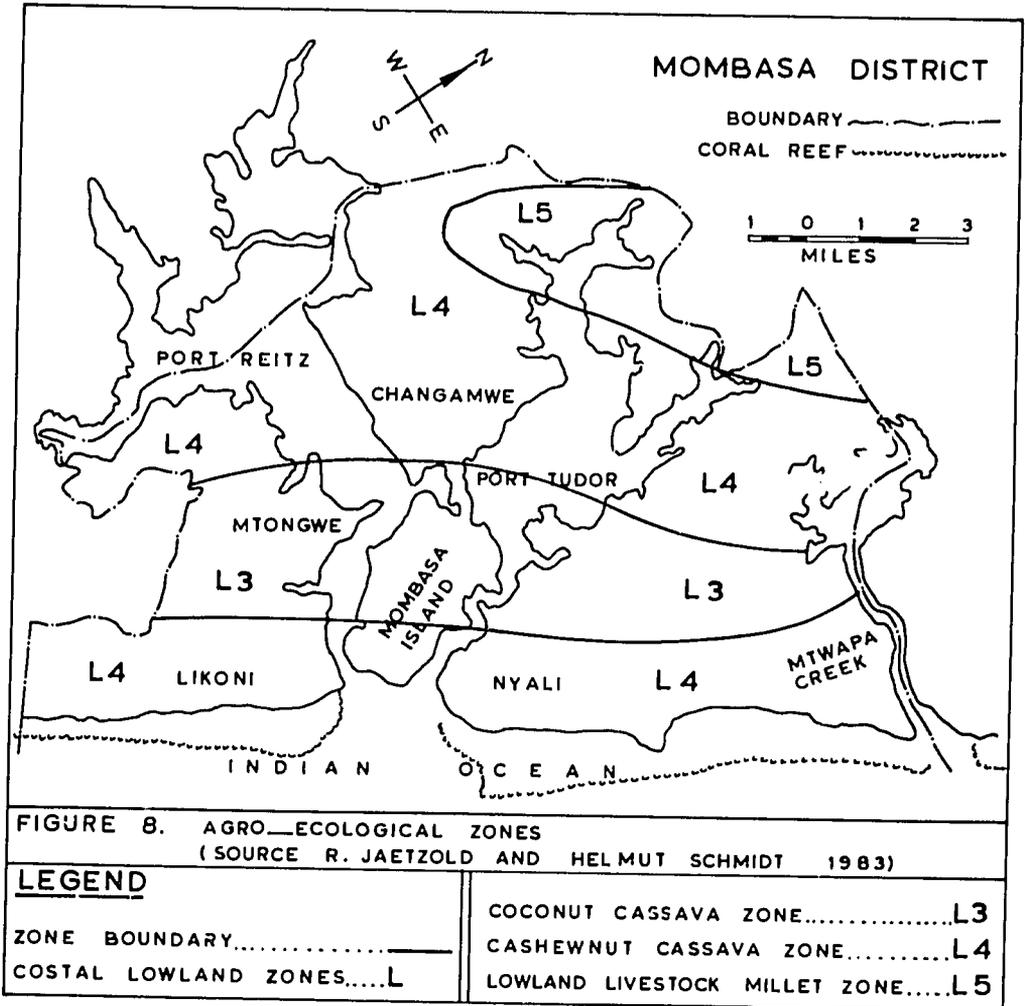
The open sea and creeks are multiple land use areas, supporting fisheries, transport and recreation. Wells and boreholes are important sources of water supply. The open sea is important as a receptacle for sewage disposal and flood water. Natural waters and coral reefs are important for scientific knowledge and aquatic resources.

06. BARREN DRY LAND SANDS

This category comprises the sand beaches, salt flats and cliff rocks. Sand beaches of Mombasa are the mainstay of tourism and leisure activities.

07. OPERATIONAL RESOURCE UTILIZATION ACTIVITIES

This category includes areas and activities which support land use but do not involve fixed structures, and which are not covered in categories above. Examples are fisheries, shell trade, and use of atmosphere.



3.2 AGRICULTURE

3.2.1 Agricultural Productivity

Mombasa, being the smallest district in the country (see 1.1.1 above) and highly urbanized, has less agricultural land when compared to the other districts. However, farming has been intensified in the 180 km² of the land gazetted as agricultural land in the district. Of the four administrative divisions Kisauni, Likoni, Changamwe and Mombasa Island agriculture is undertaken mainly in Kisauni and Likoni divisions. Mombasa Island is taken up by town, while Changamwe division is fast losing its agricultural land to industries and residential estates as a result of the expansion of Mombasa Town.

As already indicated in 1.3.1 Mombasa District receives rainfall in two seasons - the long rains from mid-March to mid-May and the short rains between mid-September and mid-November. It averages 700-1400 mm per year.

TABLE 3.1 : AGRICULTURAL LAND PER DIVISION

<u>DIVISION</u>	<u>LAND AREA IN SQ KM</u>
KISAUNI DIVISION	105
LIKONI DIVISION	45
CHANGAMWE DIVISION	10
TOTAL:	160

Source: District Agriculture Officer 1985

Agriculture is undertaken by both large and small scale farmers whose farming practices differ considerably from one another.

Horticulture has become the most important farming activity in the district, mainly as a result of the great demand for horticultural crops in the town. The large scale and the well-to-do farmers have intensified their activities by introducing irrigation so as to increase their production and to produce crops throughout the year.

The most important horticultural crops grown are kale, brinjal, amaranthus, (Mchicha), okra and tomatoes. Other vegetables such as karela, dudi and tindola are grown mainly for export.

Tree crops are also an important component of farming in Mombasa and occur throughout the district. Most of the farmers own a few tree crops, interplanted with other food crops. There are a number of plantations of cashew nuts, mangoes and coconuts. These plantations are old and no expansion is possible due to lack of space. Fruit trees grown all over the district in small scale include pawpaw, citrus and bananas.

Subsistence farming is carried out in various parts of the district. As mentioned under 1.5.2 above a large number of farmers are squatters who depend on shifting cultivation. Subsistence crops produced in the district include maize, cassava, rice, cowpeas and green grams.

TABLE 3.2 : CROP PRODUCTION IN HECTARAGE OF PLANTED LAND

Crop	Hectares		
	1982	1984	1984
Maize (local)	911	979	1397
Maize (imported)	95	100	84
Rice	152	109	259
Cowpeas	185	113	411
Cassava	389	303	1188
Sweet Potatoes	89	7	10
Simsim	126	17	78
Groundnuts	41	20	-
Bananas	55	71	40
Cashewnuts	1534	1534	1384
Pawpaws	48	98	3
Mangoes	281	283	293
Citrus	8	11	154
Vegetables	300	270	-

Source: Ministry of Agriculture, Mombasa District 1985

3.2.2 Constraints to Agricultural Productivity

Although a lot of efforts have been made to increase agricultural production various factors have affected the farming in the district.

- (i) A large proportion of land in Mombasa is owned by absentee landlords and farmers and developers are usually tenants who pay owners some form of rent. Consequently in farming there is very little investment in the land by the users for the fear of investing heavily on land which the owners may repossess any time.

- (ii) Poverty of the majority of farmers: most of the farmers are not able to purchase modern farm inputs such as fertilizers and pesticides, and do not have title deeds to mortgage for agricultural credit.

- (iii) Lack of appropriate technology: farmers who cannot afford expensive farm machinery and fertilizers do not use cheaper tools and inputs such as oxen-ploughs or animal manures.

3.2.3 Marketing

Marketing of agricultural produce in Mombasa District is not organised. The Majaoni Co-operative Society is the only farming co-operative in the district. However, since its formation in 1975 it has been dormant. Due to the absence of co-operative societies the farmers market their farm produce individually, most of the farmers taking their produce to Mombasa town where they sell it to resident consumers directly or to middlemen at the market. In other instances traders travel from the town to the farms and purchase the produce which they transport and sell in town.

The search for good market, transportation, competition and fluctuation of prices of farm products make marketing one of the hardest tasks of the farmer. The lack of a reliable marketing system finally becomes

a most fatal factor for the incentive of farmers. The problem of marketing therefore has critical importance in the development of agriculture and welfare of individual farmers.

3.2.4 Erosion and Soil Conservation

Mombasa District as a whole experiences very little land degradation in form of soil erosion as compared to other districts in the country. Topographically the district is generally flat or has gentle slopes especially on the Island and Likoni divisions. In the undulating areas of Kisauni and Changamwe divisions soil erosion is accelerated by the high rainfall intensity and poor farming practices which include shifting cultivation. Exhausted and abandoned land is left bare of vegetation cover and exposed to soil erosion. The most seriously affected areas include Nguu Tatu, Mwakirunge, Majaoni, Miritini and Jomvu in both Kisauni and Changamwe divisions.

In Miritini and Jomvu areas road construction has caused severe gully erosion mainly as a result of uncontrolled drainage whereby water is diverted down hill directly onto the farms adjacent to the roads. Because of the large volume of water collecting on the roads farmers are unable to control it thus resulting in the development of gullies on the farms.

Soil Conservation

To combat soil erosion efforts are being made by both the Ministry of Agriculture and the district administration to involve the farmers in soil conservation exercises. The Ministry of Agriculture, through the extension staff, is educating farmers about the dangers of soil erosion and the measures they should take to minimize soil loss. Through field days the farmers are shown the best methods of soil conservation including construction of cut-off drains and terraces, laying of trash lines and grass strips etc.

Through barazas and other fora, the chiefs and other administrators are educating the public about the need to conserve land. This has helped raise the level of public awareness regarding conservation,

especially when failure to take the necessary conservation measures on their farms may result in prosecution.

In 1984, 100 farms in the district were having lay-out plans, 75 farms had fanya-juu terraces, 20 farms had thrash lines, 5250 had cut-off drains constructed and 3 had gullies controlled. Conservation work is going on in all parts of the district (Figure 9) where soil erosion is a hazard and with the cooperation of all concerned good results can be expected.

3.2.5 Recommendations

Most of the problems of agricultural development in Mombasa have been highlighted in the foregoing paragraphs. To increase agricultural production in the district:

- (i) The Ministry of Agriculture and Livestock Development needs to intensify its extension service to the farmers and since the area available for agricultural development is quite small there is need for the land available to be utilized to the maximum. This can only be achieved by change of farming methods from the current traditional practices. Farmers should be encouraged and educated on modern systems of farming such as irrigation of horticultural crops and use of inputs such as fertilizers and pesticides.
- (ii) registration of land should be completed urgently so as to provide the farmers with title deeds which can be mortgaged for loans from lending institutions.
- (iii) Farmers should be educated on sound land and soil resources management and conservation methods so as to avoid land degradation and over exploitation of land resources.

- (iv) an agricultural produce marketing body should be established to help the farmers. Such an organisation would be useful because apart from looking for markets it could stabilize prices and set them at level where the farmer could be assured of profit. In the current situation of open competition and negotiations a farmer might get only minimal or no profits at all.

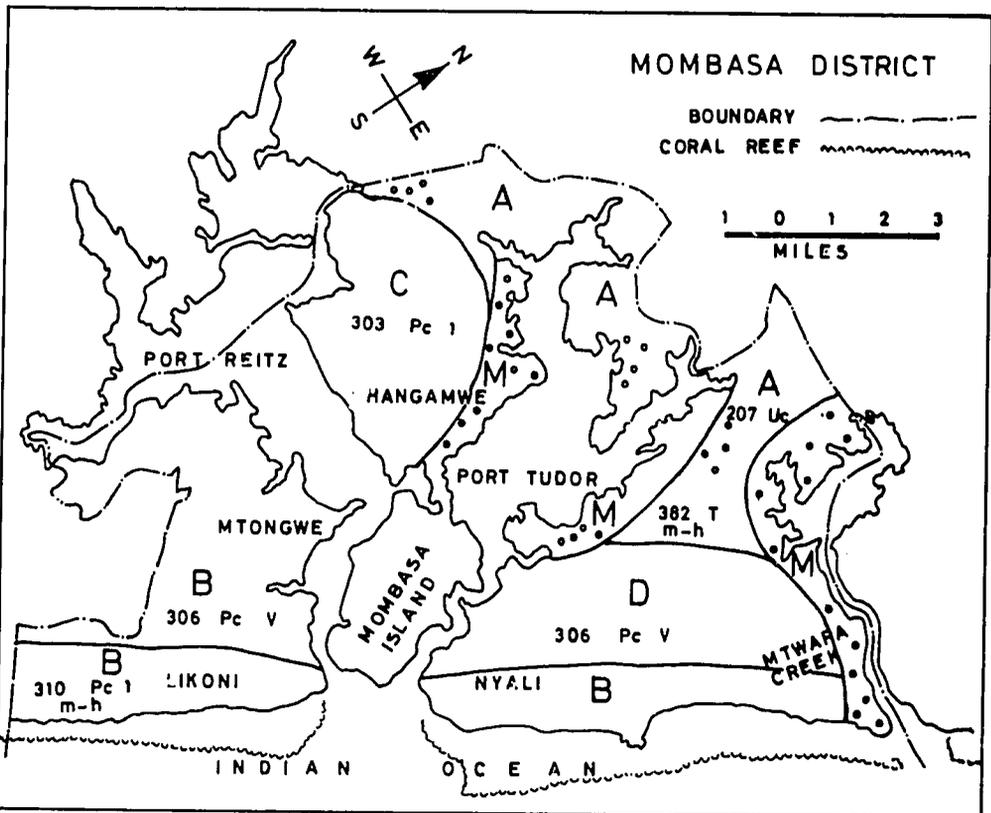


FIGURE 9 SOILS. (SOURCE: R. JAETZOLD AND HELMUT SCHMIDT 1963)

LEGEND	
GENERAL FERTILITY GROUPS (According to soil list)	VARIABLE..... [D]
MODERATE TO HIGH..... [A]	SERIOUS LIMITATIONS
LOW..... [B]	SODIC OR SALINE SOIL..... [S.S.]
LOW TO VERY LOW..... [C]	WATERLOGGING SWAMPS AND MANGROVE..... [M]

3.3 LIVESTOCK DEVELOPMENT

3.3.1 Livestock Production

Because of its size, Mombasa District has very little livestock keeping activity as compared to other districts. According to the 1981 Livestock Census the district had 5310 cattle including both exotic and indigenous breeds. Apart from cattle livestock in the district include goats, sheep, bees, poultry, rabbit and pigs.

Cattle are kept on the mainland only and largely on subsistence scale with most households having a few or no animals at all. Large scale commercial cattle raising ventures are few in number, an example being the Nguu Tatu Ranch.

The overall milk production in Mombasa District is low but this could be improved by introduction of breeds which yield higher milk production.

Most of the cattle available are sold to local butchers and the Kenya Meat Commission gets only a small proportion.

In 1980 the goat population in Mombasa District was estimated at 4,781, most of them kept for meat by women groups. A few households keep a few sheep and pigs.

Poultry keeping has become an important activity in the district and is another area where women groups are very active. Both layers and broilers are kept.

Bee-keeping is carried out on a small scale. The Department of Livestock Development is encouraging development of bee-keeping in the district by urging more people to take up this activity and providing of better bee-hives to the farmers.

3.3.2 Constraints to Livestock Production

The size of the district and urbanization have greatly limited livestock development. There is hardly any open rangeland for ranching.

Diseases including foot-and-mouth, rabies and rinderpest are a big problem for livestock development. Due to inadequate cattle dips farmers are faced with problems of dealing effectively with animal diseases and there is high rate of animal mortality. The whole district is currently served by 9 dips, most of which are privately owned and not available for public use.

Lack of finance has prevented many farmers from keeping cattle especially exotic breeds which require great care to keep. Most of the small scale farmers are poor people who cannot afford the feeds for zero grazing or stall feeding and these types of farming are left to the few able farmers. This is made worse by the fact that most of the small scale farmers do not possess title deeds with which they can acquire loans to upgrade their activities.

Marketing of livestock and animal products is a problem in Livestock development as it is for agriculture (see 3.2.3).

3.3.3 Recommendation

To increase livestock production in Mombasa District several steps should be taken.

- (i) the farmers should be encouraged to take up zero grazing.
- (ii) farmers should be encouraged to plant on their farms grass strips which they can use to stall-feed a number of animals thus reducing the dependence on purchased fodder which is expensive.

- (iii) More cattle dips should be constructed throughout the rural parts of the district.
- (iv) Women groups oriented to livestock development should be given both material and technical aid so as to improve the quality and quantity of their production.
- (v) A system and organization of marketing livestock and animal products should be instituted.

4.0 THE HUMAN ENVIRONMENT

4.1 POPULATION GROWTH AND RESOURCES

4.1.1 Population Growth

In 1948 the population of Mombasa was just over 84,746. This number increased at an annual growth rate of 5.5% to 179,575 in 1962, then at 4.7% to 242,073 in 1969, and at 3.3% to 314,148 in 1979.

The cosmopolitan nature of Mombasa District is well reflected in the diversity in the ethnic composition of the population. The population distribution by tribes and nationality as per the 1979 census indicated that Kenya Africans accounted for 80.5% of the district's population, non-Kenyans 12.7% and Kenyan non-Africans 6.8%. Among the Kenyan Africans the Mijikenda were the most populous accounting for 25.8% of the total district population. (Table 4.1).

Population Density

Within the district there has occurred dynamic changes in population both in total population and density. In 1969 the average density was 1177 persons per km². This increased to 1622 persons per km² in 1979.

At divisional level Mombasa Island (13km²) has the highest density of 19,170 persons per km², followed by Changamwe (49km²) with 1662 persons per km², Likoni (46km²) with 862 persons per km², and Kisauni (100km²) with 798 persons per km². It is noteworthy that Mombasa Island has the highest density and this is spreading to the mainland gradually especially on the west mainland. It is clear from the above quoted figures that the district is generally over-populated. The distribution of population in Mombasa illustrates the characteristic pattern of the occurrence of high population density zones of low income.

TABLE 4.1 : POPULATION BY SEX, TRIBE OR NATIONAL GROUP FOR MOMBASA DISTRICT : 1969 AND 1979

TRIBE OR NATIONAL GROUP	MALE	1979 FEMALE	TOTAL	% OF TTL DIST. POP	1969 % OF TTL DIST. POP
<u>Kenyan African</u>					
Mijikenda	48457	39406	87863	25.8	24.0
Kamba	25074	15281	40355	11.8	12.0
Luo	26172	19807	45979	13.5	9.0
Kikuyu	12307	9269	21576	6.3	6.0
Taita	12420	10864	23284	6.8	6.0
Luhya	15972	12081	28053	8.2	6.0
Swahili/ Shirazi	1171	1170	2341	0.7	1.5
Others	14168	11048	25216	7.4	5.4
TOTAL	155741	118926	274667	80.5	69.9
<u>Kenyan Non-Africans</u>					
Asians	4143	3958	8101	2.4	6.0
Europeans	255	279	534	0.2	0.1
Arabs	5614	5587	11201	3.3	5.5
Others	1532	1470	3002	0.9	0.1
TOTAL	11544	11294	22838	6.8	11.6
<u>Non-Kenyans</u>					
Africans	5373	4192	9565	2.8	5.0
Asians	8196	8072	16268	4.8	6.2
Europeans	2972	2982	5954	1.7	1.8
Arabs	5646	5286	10932	3.2	5.5
Others	465	448	913	0.2	0.1
TOTAL :	22652	20980	43632	12.7	18.5
DISTRICT TOTAL:	189942	151206	341148	100.0	100.0

Source: Central Bureau of Statistics, 1979

Fertility

According to the Registrar of Births and Deaths, reliable figures on fertility are difficult to work out for Mombasa because there is a general reluctance of people to register births. However, an estimate put the total fertility rate (the average number of children born by a woman who lives to the age of 50) in Mombasa to be slightly over 6.1 which is below the national average of 8. Apparently the urban status of Mombasa District has resulted in easy access to social and economic amenities, information and family planning services resulting in an obvious impact on the fertility level which has decreased since 1962. Among the coastal districts, Mombasa has the 2nd lowest estimated annual net growth rate of 3.86% following Taita-Taveta with 3.67%.

Mortality

Reliable figures on mortality rate were also unavailable because most people are generally not keen on reporting of deaths. This assertion is borne out by the fact that within the first six months of 1984 only 2,470 deaths had been registered. However, it is clear that the mortality rate is not high apparently because health facilities are within easy access to the majority of the population.

Age-Sex Distribution

The age-sex distribution indicates a high proportion of children: 39% of the district population in 1984 were under 15 years old. (Figure 10). There is a favourable dependency ratio

$$\frac{(\text{Population 0-14} + \text{Population 60+} \times 100)}{\text{Population 15-59}}$$

of 40.1%, i.e. 40.1% are either under 15 or over 65.

The overall sex ratio of 125.7:100 is characteristic of most African urban centres. In Mombasa there are considerably more males than females with a ratio of about 5:4 (i.e. 25% more males). Apparently the proportion of female population has increased since 1969 when the sex ratio was 150 males to 100 females. Another unique factor of the population structure in Mombasa is

that the male population is concentrated in the age classes between early adulthood and early maturity. (Tables 4.2 and 4.3).

Implications to the Environment and Development

Among the coastal districts Mombasa District has the lowest Total Fertility Rate (T.F.R.) of about 6.1. For an urban district where supposedly people are more educated and have easy access to family planning services, this is obviously a high rate. Coupled to this high fertility rate is the ever growing flow of people from other districts to Mombasa District in search for employment opportunities. The fact that 49.5% of the population of Mombasa in 1984 were the youth suggests that though the annual growth rate has declined since 1948 the population structure is one that is inherently geared to sustain its growth in absolute figures.

FIGURE 10: AGE-SEX DISTRIBUTION FOR MOMBASA DISTRICT
(Source: Central Bureau Of Statistics.)

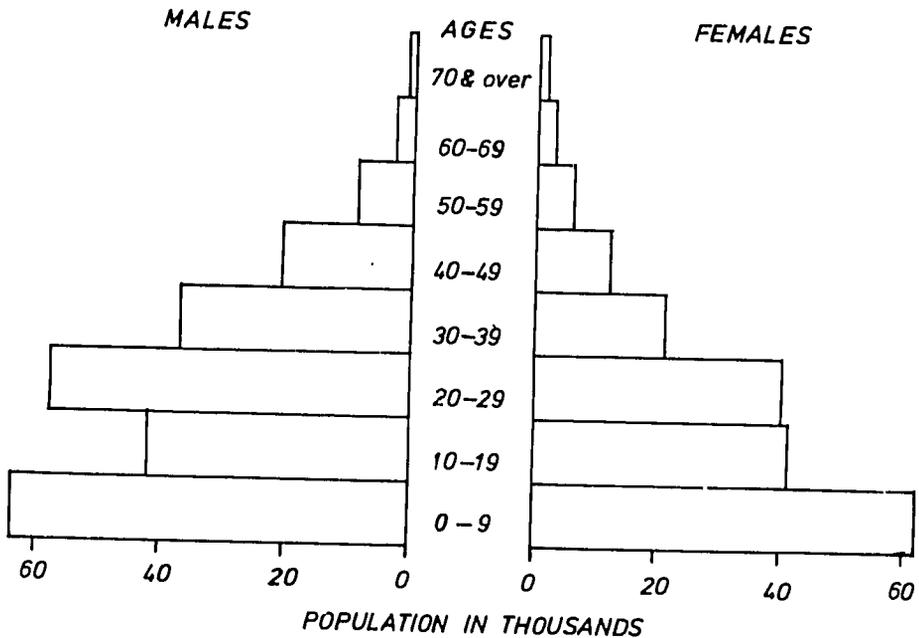


TABLE 4.2 : POPULATION BY SEX AND AGE GROUP : MOMBASA DISTRICT 1984

<u>AGE GROUP</u>	<u>MALE</u>	<u>FEMALE</u>	<u>TOTAL</u>
0 - 4	37391	35879	73270
5 - 9	27080	27001	54081
10-14	19470	19561	39031
15-19	22674	21561	44235
20-24	30583	22751	53334
25-29	27867	18167	46034
30-34	20191	12532	32714
35-39	16423	8950	25373
40-44	12291	6511	18802
45-49	9170	5135	14305
50-54	6004	3617	9621
55-59	3587	2727	6314
60-64	2198	1889	4087
65-69	1077	1164	2241
70-74	614	646	1260
TOTAL	237,059	188,575	425,634

NOTE: 1984 population projected from 1979 census assuming constant levels of fertility, mortality and net migration.

Source: Central Bureau of Statistics, 1984

TABLE 4.3 : DATA FOR POPULATION PYRAMID:MOMBASA DISTRICT 1984

<u>AGE GROUP</u>	<u>MALE</u>	<u>FEMALE</u>	<u>% OF TOTAL</u>
0 - 9	64471	62880	29.9
10-19	42144	41122	19.6
20-29	58450	40918	23.3
30-39	36614	21473	13.6
40-49	21461	11646	7.8
50-59	9591	6344	3.7
60-69	3275	3053	1.5
70-	1053	1139	0.5

4.1.2 Migration

As already indicated in section 1.1.2 Mombasa has grown to a modern metropolis and is Kenya's second largest town. It is an important centre for transportation, communication, tourism and industries.

These developments have triggered the flow of people from the rural areas (upcountry as well as the surrounding districts) into Mombasa in search for employment opportunities as already mentioned. Mombasa has good transportation connections which enhance the process of long distance migration. Migrants from Eastern Province, particularly Machakos District, have had comparative ease of access to Mombasa and the coast in general (Table 4.4).

The occurrence of large tracts of 'free' undeveloped land has acted as a population pull factor with the outer town fringes forming the principal receptacles of new population. Considerable in-migration was sparked off by the break-up of the East African Community when many Kenyans leaving Tanzania arrived in Mombasa. Many Tanzanian and Ugandan nationals left Mombasa at the same time.

Other movements have occurred from time to time. For example the opening of both the lake Kenyatta (Lamu) and Shimba Hills (Kwale) Settlement Schemes attracted a sizeable number of people from Mombasa. The ending of the shifita problem in Lamu District prompted many people originally from Lamu to return to their home district. Many workers and their families have been attracted from Mombasa by prospects of getting employed in the new hotels which have been set up outside the district on both the south and north Coasts.

The composition of Mombasa population in 1969 and 1979 (Table 4.4) illustrates clearly the dynamism of population movements both from and into the district. In 1969, Kenya Africans accounted for 69.9% of the total district population. This had risen to about 80.5% in 1979.

TABLE 4.4. : POPULATION DISTRIBUTION IN MOMBASA DISTRICT BY PLACE OF BIRTH 1979

BIRTH PLACE	MALE	FEMALE	TOTAL
NAIROBI	3361	3322	6693
CENTRAL PROVINCE	8659	5781	14440
COAST PROVINCE	107227	94414	201641
EASTERN PROVINCE	23632	13005	36637
NORTH EASTERN PROVINCE	880	680	1560
NYANZA PROVINCE	20827	14519	35346
RIFT VALLEY PROVINCE	2538	1743	4281
WESTERN PROVINCE	12929	8975	21904
TANZANIA	3098	2480	5578
UGANDA	1011	1217	2228
ELSEWHERE	5660	4955	10615
KENYA (so stated)	120	105	225
TOTAL:	189942	151206	341148

Source: Central Bureau of Statistics, 1979 census

Implications for Environment and Development

Inspite of the heavy out-migration that has taken place, population increase in Mombasa is being sustained by the even heavier in-migration. Being a very small and urban district, the pressure of population increase on the available resources in Mombasa is very conspicuous.

4.1.3 Resource Projections

The trends in population growth have been used as the basis for resource projections for Mombasa District. The analysis of trends in population growth is well illustrated through a three scenario simulation covering up to year 2000. (Table 4.5).

The first scenario (status quo) assumes constant rates of fertility and mortality. The second one (low growth) assumes a fertility decline of 25% by year 2000, at constant mortality. The third scenario (high growth) assumes a fertility increase of 20% and a mortality decrease of 15% by year 2000. A 20% increase in fertility corresponds to an increase in average number of children born per woman from the present 6 to 7 in the year 2000. Migration rates have not been included in the scenarios. They are assumed to remain at roughly the current levels.

Resource Trends

The demographic dynamics in Mombasa District are typical of major urban centres in Kenya. The high rate of population movement from the rural areas coupled with a high internal natural growth have ensured a steady increase in population size. The population scenarios (Table 4.5) are used to illustrate resource trends in the following assumptions. The population of Mombasa District is growing rapidly, and even with the low growth scenario population will double in 21 years and about 38% of the population will be children under the age of 15.

The prevailing population growth in Mombasa District warrants concern especially when compared with the available resources. The district at present does not produce enough food to adequately feed its residents and there is a high dependency on foods from upcountry districts. The food deficit is partly a result of human settlements especially housing, taking up prime agricultural lands, and partly a result of the gross under-utilization of land suitable for agriculture. The deficit is further explained by the unequal distribution of financial resources, thus resulting to widespread malnutrition among the urban poor.

The provision for water within the district in terms of both cost and portability is inadequate. Steady population increase is bound to aggravate the situation as domestic and other water demands will increase. Based on the status quo scenario, demand will triple by year 2000.

TABLE 4.5: POPULATION SCENARIOS FOR YEAR 2000 : MOMBASA DISTRICT

AGE	1980 PROJECTED			I STATUS QUO			II LOW GROWTH			III HIGH GROWTH		
	Men	Women	Total	Men	Women	Total	Men	Women	Total	Men	Women	Total
0 - 4	32.6	31.2	63.8	63.5	64.2	127.7	49.5	50.1	99.7	75.9	76.5	152.5
5 - 9	23.1	23.0	46.1	51.5	52.3	103.8	43.2	43.9	87.1	58.8	59.5	118.3
10-14	16.5	16.7	33.2	42.6	43.1	85.6	38.0	38.5	76.4	46.5	47.0	93.5
15-19	18.3	17.5	35.8	37.8	37.1	75.0	35.5	34.8	70.3	39.9	39.2	79.1
20-24	26.0	19.6	45.6	36.6	33.5	70.1	35.5	32.4	67.9	37.7	34.5	72.3
25-29	23.5	15.8	39.3	32.0	28.7	60.8	31.6	28.3	60.0	32.7	29.3	61.9
30-34	17.6	10.9	28.5	28.6	23.7	52.2	28.5	23.5	52.0	29.0	24.0	52.9
35-39	14.4	7.8	22.2	25.1	19.7	44.8	25.1	19.6	44.7	25.4	19.9	45.3
40-44	10.8	5.7	16.5	21.8	16.1	37.9	21.8	16.1	37.9	22.1	16.3	38.4
45-49	8.0	4.5	12.5	18.3	12.7	30.9	18.3	12.7	30.9	18.6	12.8	31.4
50-54	5.2	3.2	8.5	14.6	9.5	24.1	14.6	9.5	24.1	14.8	9.7	24.5
55-59	3.2	2.4	5.6	11.0	6.9	17.9	11.0	6.3	17.9	11.3	7.0	18.3
60-64	1.9	1.7	3.6	7.8	4.8	12.6	7.8	4.8	12.6	8.1	4.9	13.0
65-69	0.9	1.0	1.9	5.1	3.2	8.4	5.1	3.2	8.4	5.4	3.4	8.8
70-74	0.5	0.6	1.1	3.1	2.0	5.1	3.1	2.0	5.1	3.3	2.1	5.4
75+	0.4	0.5	0.9	2.4	1.8	4.2	2.4	1.8	4.2	2.7	2.1	4.9
TOTAL	203.0	162.1	365.1	401.7	359.3	761.0	370.8	328.2	699.0	432.3	388.1	820.4

Average Annual Growth Rate %	3.86	3.73	3.29	4.12
Doubling Time in Years		18	21	17
No of Children under 15 for every person 15 and over		0.71	0.6	0.79

Source: Central Bureau of Statistics and NES: Population model

TABLE 4.6 : POPULATION AND RESOURCE TRENDS : MOMBASA DISTRICT

RESOURCE/SERVICE	RELATIONSHIP	UNIT	CURRENT STATUS (1980)	SCENARIOS		
				STATUS QUO	LOW GROWTH	HIGH GROWTH
Housing	New houses needed based on additional households	Houses/year	5,797	95,823	80,817	110,200
Agriculture	Agricultural land per capita	Ha/pop	0.05	0.1	0.09	0.11
Woodfuel	per capita consumption for firewood and timber at 0.50m ³ /person/year	Hospitals Health Centres Dispensaries	9 19 10	19 40 21	17 36 19	20 43 22
Education	Schools needed at current ratio of 07 students per school	No. of schools Primary Secondary	56 27	117 56	107 2	126 61
Employment	Labour Force=85% of adults 15 to 64	1000s	185.3	362.3	355.5	371.5
Domestic Water	Urban Centre 140L/person/day	m ³ /day	51114	106540	97860	114856

Source: NES Population Model 1985

The demand for fuel especially woodfuel is very high in Mombasa. As indicated earlier the district depends on the neighbouring districts of Kilifi and Kwale for its charcoal and firewood. This demand will certainly rise in response to an increase in population.

The housing stock existing in the district is grossly inadequate. Given that more people looking for employment are expected every year, the short fall is bound to continue unless urgent efforts towards the provision of decent housing are mobilised.

As indicated earlier the district is attractive as a potential source of employment opportunities. However, due to the steady increase in the population of job seekers, there has inevitably occurred a deficit in these opportunities thus relegating many people to a state of idleness and vagrancy. This state of **affairs** is bound to continue unless there is a curb on population inflow into the district accompanied by an increase in employment generating enterprises.

TABLE 4.7 : POPULATION DENSITY : MOMBASA DISTRICT 1979

DIVISION	AREA (km ²)	DENSITY PER KM ²
Island	13	10170
Changamwe	49	1563
Likoni	46	862
Kisauni	100	798

Source: Central Bureau of Statistics, 1979 Census

The urban infrastructure and services such as health facilities, post offices, schools, roads, telephones, electricity etc will also need to be expanded as the population increases. For this expansion to be effective, it will be necessary to ensure that facilities are located in an equitable manner i.e. avoiding the present state of poralization of such facilities in some areas.

Recommendations

To minimise population growth in Mombasa there is need to curb the migration from the rural areas. This may be achieved through the setting up of employment generating industries in the rural areas

There is need to strengthen the existing family planning campaign through:

- (i) increasing the level of staff;
- (ii) motivating the staff to practice what they preach. The disturbing aspect here is that some people on the family planning staff are not convinced of the need for family planning. Thus they obviously are not effective as motivators.
- (iii) accord proper training to the staff;
- (iv) the involvement of extension officers of various Ministries to integrate family planning into their activities;
- (v) initiation of community based distribution points. This implies bringing services nearer to the people and far from health centres and hospitals, thereby eliminating the unappealing association of family planning with hospitals and sickness;
- (vi) greater involvement of men.

4.1.4 Poverty and Unemployment

Poverty is defined in simple terms as the occurrence of a population living below a specified minimum level of the income necessary to enable them obtain essentials of a healthy livelihood, clothing and shelter.

The problem of poverty in Mombasa is the result of many factors some of which are local in nature while others are national and international.

Because of its small land size the district has very little agricultural development and as a result the district inhabitants depend largely on wage employment.

According to the 1979 census the district had about 170,346 people within the age of 20-60 years. Out of these only 92,707 were engaged in wage employment leaving 77,839 people within working age unemployed. The situation has not become any better but continues to worsen.

The little agriculture found in the district is undeveloped consisting mainly of old traditional subsistence farming.

Mombasa town being the second largest in the country is very attractive to job seekers who come from all over the country in search of wage employment.

A large proportion of job seekers have low educational standards and lack professional skills which coupled with the shortage of job opportunities leaves a large number unemployed. A large number of those who are employed work as casuals in the port area, earning incomes which are too low for the essentials of a healthy living. Some of the visible signs of poverty in Mombasa are the slum settlements, malnutrition and generally low standards of living by the majority of residents. As already indicated the important local and national factors of poverty in Mombasa are unemployment, landlessness, low wages and a large and growing population relative to scarce resources.

Recommendations

Some of the desirable remedies have been mentioned in foregoing sections (see 4.1.3 above), but the following additional measures should be included.

- (i) Since Mombasa attracts people from all over Kenya solving unemployment in the district will require a national effort to minimise the people moving into the town. Organisations such as the Kenya Industrial Estates, Industrial and Commercial Development Corporation (ICDC) and other financial bodies should be encouraged to finance small enterprises in the rural areas providing employment to the job seekers so as to hold back the number of school leavers who have to move to the towns in search of employment.
- (ii) the youth should be taught technical skills such as carpentry, masonry and foundry in schools and village polytechnics so that on leaving school some of them can become self-employed in the rural areas and thus reduce the numbers looking for employment in the towns.

4.2 HOUSING

Residential housing in Mombasa District is characterised by variety in technique of construction, materials used, styles, cost and maintenance. Houses fall into five broad categories: public flats, private flats, detached houses, traditional Swahili houses and Old Town houses.

Public flats are those houses built by either the Government or the Municipal Council out of public funds for the purpose of providing low cost junior staff housing. They constitute the bulk of Mombasa's official low cost housing programme. The flats are built in two to four storeys, usually with two to three rooms per flat. The rents range from K.Shs.375.00 to K.Shs.450.00 per month. The Tudor and Changamwe housing estates are examples of such flats.

Private flats are built by either private entrepreneurs for private families or by companies for staff housing. They are generally in the categories of upper-middle income groups. Most of them are situated on Mombasa Island but there are some company flats on the west and north mainland.

Detached houses are the large high-cost houses on plots ranging in size from $\frac{1}{2}$ acre to 2 acres. They are built of materials such as stone, bricks or concrete blocks either by private developers for private families or by the Government for senior officers. They are concentrated in Kizingo, Mbaraki and Tudor areas of Mombasa Island, the Port Reitz area of the west mainland and Likoni on the south mainland.

Traditional Swahili houses comprise the cheapest and the most extensive housing in Mombasa. The house has a central corridor leading to four to six living rooms, a kitchen, a latrine and store at the back yard. Rents range from K.Shs.100.00 to K.Shs.300.00 per month depending on the condition of the house, its location, the number of rooms occupied and the utilities found within the premises. Most

Swahili houses occur on private land and are categorised by the Municipal Council into either planned temporary or unplanned temporary. The Old Town area of Mombasa Island is unique in its mixture of old multi-storey dwellings and Swahili houses. There are only a few other cases of mixed development: modern flats mixed with single storey dwellings, on Mombasa Island and west mainland.

4.2.1 Shortage of Housing and Over-crowding

There is an acute shortage of residential housing in Mombasa. This is due to various factors, the major one being the population increase that has occurred since 1948 (see 4.1.1 above).

Shortage of land is another aspect that has contributed to the inadequacy of housing. In contrast to most other towns in Kenya where most of the land is public (State owned) most land in Mombasa is private property held in 'Fee Simple'. This has limited the availability of land for the development of residential estates by Government. Construction of space-wasting, low-rise residential buildings tends to exacerbate the problem of space. The shortage of housing in Mombasa mainly affects the low income earners.

New housing estates meant for the middle and lower-income groups end up being affordable by only the upper income earners.

The problem of shortage of development funds is another corollary to the development of residential housing.

The design of houses is another important factor. Some of the Municipal Council houses were designed very poorly, with a nice looking exterior but grossly inadequate interior. Buxton Estate built in early 1970s with most units having single bedroom illustrates such very cramped interior space which easily leads to overcrowding. The Changamwe Municipal houses are another example of inappropriate design.

TABLE 4.8 : TOTAL GOVERNMENT, HOUSING STOCK IN MOMBASA 1984

CATEGORY	LG	MG	HG	TOTAL
Government Owned	164	384	154	702
Rented	1939	1039	461	3439

Source: Provincial Works Office

Serious overcrowding can be observed in certain sections of Mombasa District. In Majengo, for instance, families of ten can be found living in a single room unit, with inadequate ventilation, lighting and sanitary services. In such high density situations sanitary services are shared among many units, posing serious danger of contamination.

4.2.2 Maintenance of Houses

The climate of Mombasa plays havoc to building materials. The hot, humid, saline weather conditions (see 1.3 above) lead to the fast corrosion of iron sheet roofing materials and plumbing, and rapid decomposition of palm fronds (makuti) roofing which are common in the district.

Heavy rains which occur in Mombasa lead to the peeling off of wall paints and destruction of mud walls. The rains also cause the caving-in of pit latrines in areas where the soil is loose, an example being west mainland. This state of affairs implies that for proper housing standards to be sustained there is need for constant maintenance of the existing houses. Unfortunately proper maintenance is generally lacking. According to the Provincial Works Officer, shortage of funds has led to the gross under-maintenance of Government housing. This has led to problems of leaking roofs, burst plumbing, broken sanitary facilities and peeling off of wall paints. These problems of neglect can be observed in Government, Municipal Council and private houses.

4.2.3 Unplanned Housing (Slum Development)

The fast growth and the scarcity of low income houses has resulted in the development of unplanned settlements in various locations: Kaloleni, Bondeni, Changamwe, Chaani, Majeugo and Mikindani. These settlements are a big sore to development and more so to the environment.

The process of slum development in Mombasa has been influenced by the steady growth in human population already discussed under 4.1 and the land tenure discussed under 1.5.

Slum areas are environmentally hazardous in many ways. The provision of basic infrastructure which is lacking is made costly due to the haphazard arrangement of the housing units. Surface drainage on roads is non-existent. Schools, social halls and health centres are inadequate. There are no sewerage systems and the water distribution has been based on individual requests for which reason the water kiosks are not conveniently located. The housing units are clustered closely, posing a fire hazard. The density of population both in the area and in the crowded housing units is a potential cause of epidemics.

4.2.4 Recreational Facilities

The need for recreational facilities in a fast growing urban centre cannot be over-emphasized. This applies strongly to Mombasa where the torrid climate necessitates occasional resting. A feature of Mombasa are the small gardens which are developed and used as leisure meeting places for groups of residents casually talking, playing drafts or smoking.

The existing Municipal Council facilities include Mama Ngina Drive, Prince's Park, Uhuru Garden, Makadara Garden, Fort Jesus Park, Kenyatta Public Beach, Shanzu Public Beach and the Moi Stadium. However, most of these facilities are situated far from high density areas and are accessible only to people with vehicles and not to the majority poor. There has been a noticeable deterioration in cleanliness of existing parks recently.

Recreation spaces are most important in the low cost housing areas where over-crowding is more severe. In over-crowded conditions living accommodation tends to become reduced to sleeping spaces. The usual living room activities are not possible inside the house and must take place outside. The provision of such spaces in needy areas such as the unplanned settlement scheme (Chaani and Majango) is made cumbersome by the haphazard location of housing units. There is also a tendency for the open spaces in temporary villages to be fully occupied by temporary workshops, auto repairers, charcoal stores, lumber yards, carpenters and refuse.

Heavy commercialisation and appropriation of beaches has denied the people easy access to beach recreational facilities. Kenyatta Public Beach at Bamburi is the only piece of public land which has been developed with facilities for public enjoyment.

4.2 5 Recommendations

- (i) It is important that the Municipal Council ensure that land which is set aside for leisure and recreation is kept free of other forms of utilization. There is need to leave small open spaces in all housing layouts, for development of more of the very popular Mombasa 'gardens'.
- (ii) There is need to ensure that a minimum of 10% of the first class beach frontage is reserved for public use to ensure adequate opportunity for local tourism and public recreation. In order to enhance enjoyment of the beach by the public it is an important point to consider that where a strip of land above high water mark has not been set apart, such land should be acquired for public use so that at high tide the public is not forced to trespass private land.

- (iii) Absentee landlords should be encouraged to donate land to their poor squatters.
- (iv) The Government's intention through the Ministry of Lands and Settlements to work out a plan to enable people who have built houses on rented plots to acquire them permanently (Kenya Times, March 11, 1985), in areas such as Majengo, Kisauni, Kongwea and Likoni should be recommended and accelerated.
- (v) The Mombasa Municipality should be commended for being one of the first local authorities in Kenya to recognize the need for a change in policy and attitudes towards the uncontrolled urban settlements and acceptance of the traditional Swahili house as a significant type of housing for residents. The Swahili type of house, which shelters over 50% of Mombasa's population, should be encouraged because it uses the local building materials, is cheaper than houses made of imported materials, and can pass Municipal engineering standards after minor improvements in design.

4.3 WATER

The water resources and water supply in Mombasa District have been discussed under Section 1.3.2. As outlined in Section 4.1.3, there is a steady increase in population in the district which should be matched with a corresponding rise in services including portable water. As noted earlier, even if a status quo in population growth is maintained, the water demand will double by the year 2000.

In order to cope with the anticipated rise in demand for water, a number of projects are currently being funded or planned. These include various phases of Shika-adabu-Kibundone, Babububu, and Funda. When completed, they will cater mainly for communal water retailers.

Recommendation

Current efforts in the provision of clean portable water to Mombasa residents should be intensified.

4.4 ENVIRONMENTAL HEALTH

Health care must be looked at from its totality. Issues of health problems are rooted and related to the environment. Diseases are borne in land, water and air and are transmitted by various vectors that originated from the biological, social and physical environment. Consequently man needs to be made more aware of environmental health problems facing him, including mortality, nutrition, environment and use of drugs.

4.4.1 Mortality and Morbidity

In Mombasa District the leading causes of natural mortality are malaria, measles, tetanus, anaemia, malnutrition, diarrhoea and skin diseases.

Malnutritional deficiencies are quite pronounced especially on the mainlands and contribute to a large proportion of deaths. Increased diarrhoeal diseases are caused by inadequate sanitational practices and poor sewage disposal. Vital statistics in the 1983 annual report of Mombasa Municipal Council show the socioeconomic and environmental factors of health which the district experiences (Table 4.9).

The common causes of morbidity in the district are communicable diseases including malaria, acute respiratory diseases, intestinal worms, acute eye and ear infections, anaemia and venereal diseases particularly gonorrhoea. These diseases, although not fatal, may cause disabilities which place heavy strain on individuals and on economic resources of the district. Malaria is characterised by a very high degree of endemicity and transmission in the district.

TABLE 4.9 : VITAL STATISTICS FOR MOMBASA

Estimated mid-year population	522,821
Population density	2,205
Total deaths	2,448
Crude death rate	4.6
Live births	15,558
Still births	392
Birth rate	29.7
Infant deaths	782
Infant Mortality Rate	51.2
Maternal deaths	15
Maternal mortality rate	0.09
Still Birth Rate	26.0

Source: Medical Officer of Health, Mombasa, 1985

4.4.2 Nutrition

Undernutrition is a socioeconomic and political problem which affects the level of health, bringing diseases in a community. Factors which contribute to malnutrition include agricultural patterns, educational level, social and customary beliefs, and family life. The principal diseases related to malnutrition are Kwashiokor, marasmus and underweight.

The incidence of malnutrition in Mombasa District is markedly high on the mainland. The distribution pattern of malnutritional deficiencies tends to follow the pattern of crops grown in the different areas.

Kwashiokor results from deficiencies in protein and energy. This disease is more common than either marasmus or underweight (Table 4.10).

TABLE 4.10 : MALNUTRITION CASES IN MOMBASA DISTRICT
(KWASHIOKOR, MARASMUS, UNDERWEIGHT) 1983

CLINICS	NEW CASES			RE-ATTENDANCES		
	Kwashiokor	Marasmus	Under-Weight	Kwashiokor	Marasmus	Under-Weight
1. Majengo	19	26	96	80	83	177
2. Makupa	15	5	30	56	8	154
3. Mwembe Tayari	28	27	46	40	20	92
4. Kisauni	35	16	162	163	23	58
5. Mtongwe	8	2	5	64	11	38
6. Shika-Adabu	21	4	15	49	9	40
7. Magongo	474	193	193	2460	482	482
8. Jomvu kuu	412	145	168	348	170	168
9. Utange	34	2	29	87	8	43
10. Mwakirunge	1	4	5	18	9	15
11. Maunguja	10	3	10	15	-	20
12. Kwa Jomvu	457	45	-	393	34	-
13. Kongowea	24	2	13	102	21	128
TOTAL	1538	474	772	3875	878	1415

Source: Municipal Council of Mombasa Annual Report of the Medical Officer of Health, 1983.

The data summarised in table 4.10 clearly illustrates the magnitude of the problem even without further search into other deficiency diseases such as severe vitamin deficiencies, goitre or anaemia which may be present in the district.

The most important single issue in relation to inadequate nutrition is poverty, which in turn results from the socioeconomic development patterns. Other important factors leading to malnutrition include losses of food after harvest, due to vermin, fungus, moisture, etc; cultural attitudes in form of taboos and their influence on the consumption of certain foodstuffs; and ignorance in regard of balanced diet, food preparation and food production.

Remedies to malnutritional problems must involve teaching in schools, families and communities - as well as facilitation so that target groups can be equipped with appropriate means of solving their respective problems. Family health educators and nutrition field workers have a major role to play in these regards.

4.4.3 Environmental Factors in Public Health

Health determining factors interact with each other and no single factor can be isolated as the most important problem the solution of which would be the major step towards better health for large segments of the population. Nor can the list of factors be complete or exhaustive. For discussion however, environmental factors in public health could be grouped into the following: communicable diseases, environmental hygiene, nutrition, poverty, productivity; political, social and economic factors. Among these factors communicable diseases, nutrition, poverty and productivity have been discussed in foregoing sections. Only a few highlights could be added in this section.

Among the communicable diseases common in Mombasa malaria has the highest incidence and the greatest natural killer. Cases of malaria fluctuate seasonally, becoming higher after the rains when mosquitoes have bred abundantly. Malaria has been a subject of a special control programme which is now weakened by lack of personnel. Measures taken for control of malaria include treatment of affected persons, larviciding stagnant waters, clearing of bushes, draining and removal of standing water and education.

Veneral diseases have increased in Mombasa over the years. There is a special Veneral Disease Control Centre at Ganjoni.

Water, food and nutrition are discussed in length earlier in this report. Washing of food with clean water, proper cooking, and cleanliness of kitchen utensils are important. Population of some parts of Mombasa Mainland is particularly weak in respect of hygiene in habits of food and faeces disposal.

In Mombasa Island both underground and surface water is contaminated by sewage and industrial pollutants. Therefore most of the drinking water used in the Island comes from the mainland. Half of the population is supplied with water by water kiosk retailers. This water can easily be contaminated if proper health measures are not taken.

Mombasa Island shows signs of industrial pollution, overcrowding, poor management of sewage and solid wastes, and lack of space.

4.4.4 Drug Abuse

Unfortunately very little study has been done on drug abuse.

The illicit drugs that are present in Kenya, and in Mombasa District particularly include bhang (Cannabis sativa) grown locally and sold illegally in vicinity of homes, streets, maize fields and market places. Miraa (Khat), cultivated and sold legally and exported to muslim countries is a drug that requires much medical research work.

Sources of illicit medical drugs in circulation range from drug stores, retail shops, hospitals, dispensaries and 'bush doctors'. For non-medical drugs the sources range from bars and retailers to closely guarded private sources known only by the consumers and their suppliers.

Other drugs that could be sold are opium, heroine, cocaine and morphia. These drugs are generally smuggled into the country from either Europe or United States of America and then supplied to Kenya's major urban centres like Mombasa, Nairobi, etc.

The most important recommendation is drug-abuse research work, educational programmes and rehabilitation centres to be provided within the district. The other is strict enforcement of drug laws by the divisional and locational administrators.

4.5 POLLUTION AND WASTE DISPOSAL

4.5.1 Industrial Growth and Environment

Mombasa District has a rapid industrial growth which is desirable for economic development. However, unless responsible attitudes toward social and environmental problems are held by managers of industry and administration officials in charge of planning the rapid growth of industry could lead to the disruption of environmental quality through pollution with tragic results. In this section the characteristics of industrial growth in Mombasa are given in outline as they relate to the state of environment. Some of the cases have been mentioned in earlier sections of this report.

Quarrying of limestone is an important basic industrial activity. The limestone is used as raw material for manufacture of cement as well as for building. The crucial environmental impact of limestone quarrying is (as mentioned earlier) creation of badlands and open pits. The Bamburi Portland Cement Company has pioneered in reclamation of quarry wastelands with an exemplary reforestation project. Another important extractive industry is use of sand for manufacture of glass and building.

Refinery of petroleum is a significant industry in Mombasa. After unloading their cargo of crude oil tankers are washed out at sea and globules of oil have accumulated on the shores in the form of tar balls which are noxious to beach users.

Other important industries in Mombasa include manufacture of coconut oil, crushing and refinery of cooking salt, manufacture of iron and steel products, tourist hotels, processing and packaging of agricultural produce especially fruits and meat canning.

A huge volume of liquid and solid wastes are produced from the various processes and must be disposed on the land or into the water within the district. This fact is the origin of enquiry on the capacity and resilience of the environment, and the impacts of various industrial developments on the environment i.e. the water, air, vegetation, soil, topography, animals and human beings.

4.5.2 Occupational Safety (Factory Inspectorate)

Occupational safety is governed through the factories Act, Chapter 514 of Laws of Kenya. The Act makes provisions for the health, safety and welfare of persons employed in the factories and for matters connected with such works. This Act applies to all factories equally whether big or small, private or Government owned.

Factory Inspectors are the people entrusted with the execution of this Act. The factory inspectorate is mainly concerned with registration of each factory's health aspects such as sanitation, first-aid facilities, ventilation and lighting, adequate working space, safety in usage, operation and maintenance of equipment, and protective clothing and appliances.

In the entire Coast Province there are only three Factory Inspectors who are stationed in Mombasa town and the work is beyond their capacity.

4.5.3 Collection and Disposal of Solid Waste and Pollution of Wells

The Public Health Department in conjunction with the Municipal Council are responsible for collection and disposal of solid waste. At present the cleansing services are poor due to lack of finance, personnel and transport facilities. As a result heaps of uncollected rotting garbage are a common sight in Mombasa.

There are two major sources of solid wastes: industrial and domestic activities. In recent years the expansion of industry and increase in population have not been matched with any increases in services.

In some Estates visited e.g. Kisauni, which has a high population density, pits are dug to dump the litter but sometimes litter is burnt. But in other areas the garbage is thrown carelessly on the roads and paths in the estates. This is a health hazard that can result in epidemics. In the town centre, especially the Mwembe Tayari market, heaps of smelly and rotten agricultural wastes are a major problem. Though efforts are being made to clean this central market, the

results are far from being successful.

All the solid waste collected by the Mombasa Municipal Council is dumped in an uncontrolled landfill at Kibarani, next to the Makupa Creek south of Makupa Causeway. These wastes include broken glass materials, metal containers, paper materials, expired medicines from hospitals, animal carcasses, toxic chemicals and other unknown hazardous wastes. The wastes are occasionally burnt in open air. The aim of the landfill is to reclaim the wasteland and shallow swamps but this is not the proper method of reclamation.

No action is taken to prevent these wastes reaching and polluting the creek water or run-off of leachates during the rainy season. There is another dumping ground opposite the municipal landfill and the story is the same. Thus it is obvious that some toxic materials end up in the marine environment. The same toxic chemicals can affect man mainly through eating of sea foods that have accumulated these toxic chemicals in their bodies and there is urgent need to check on this aspect.

A proper landfill requires the non-toxic wastes to be pressed and covered with at least 9 inches of soil for each layer. This process is repeated as required.

The Municipal Council has tried to find alternative solid waste disposal sites on the mainland but lack of land and high transportation costs have hindered progress. There is now need for the Council to adopt proper solid waste disposal methods and sites.

4.5.4 Sewage Disposal

The district has three modes of sewage disposal namely pit latrines, septic tanks and sewerage, though a few people in the less developed area still use the bushes.

Disposal of faecal matter in pit latrines is the most common method and almost 60% of the population use it. Pit latrines are constructed mostly inside houses which has been practised for a long time by the local people. When a pit latrine is full it has to be emptied as there is hardly any other space available for a new one. This is usually done manually by licensed agents who bury it safely elsewhere but who could also throw it illegally into the sea or storm water drains. These people do not wear any protective clothing and are susceptible to contamination by sewage related diseases which they can also spread.

Construction of pit latrines on the island is prohibited by the Municipal Council but on the mainland latrines are still constructed. With the rapid population increase pit latrines can no longer be acceptable as they become overused and misused especially if they are open to be public.

Pit latrines located in the sea shore area are likely to cause pollution and this must be avoided as the beaches are important in tourism and recreation.

Pit latrines and soakage pits located close to wells could cause pollution through underground seepage of sewage but not much information is available on the state of these wells some of which are very old.

Septic tank systems serve about 23% of the population, including all tourist hotels along the sea shore.

Septic tanks in Mombasa are not inspected or emptied regularly however and many of them are overloaded resulting in over-flows. Some septic tanks are constructed where soil conditions are poor, rendering them useless. When tanks are full of faulty, sewage is emptied by the licenced agents mentioned above or public health section of the Municipal Council.

The wastes emptied from septic tanks and soakage pits is supposed to be transported and buried safely elsewhere but there is a tendency of emptying sewage into stormwater drains or into the sea, thus transferring a problem to a new area. Beaches are likely to be polluted by seepage of sewage if the systems are located close. Thus there is need for the beach hotels to be connected to a sewerage to avoid this problem which can affect the tourist industry.

Some homes have individual septic tanks. Public toilets also are served by septic tanks. The present number of public toilets is not enough compared to the ever increased population that use them. Their conditions are not satisfactory and there is room for improvement both as to the number and maintenance services.

The most efficient and convenient method of sewage disposal for an urban area is a sewage treatment plant that is properly designed and functions properly.

Mombasa district has three sewerage plants that serve about 17% of the population. The Kizingo treatment plant which is an underground plant serves parts of Mombasa Island. This is a primary treatment plant where the removal of solid water and sedimentation take place before the sewerage is discharged into the sea. The plant was designed a long time ago for a small population and has been overloaded due to rapid population increase. The west mainland sewerage plant at Kipevu is only an oxidation ditch which has been out of order for a long time. The north mainland sewerage is small and serves only a small population.

Discharge of untreated sewage far into the sea is accepted on the premise that the sea has an infinite dilution capacity provided there are no toxic effluents in the sewage.

Recommendations

- (i) all licensed manual emptiers of latrines and septic tanks **should** provide protective garments to their employees before a licence can be issued and action taken against those found operating without such garments.
- (ii) Efforts should be made to stop illegal disposal of sewage into the stormwater drains or the sea front as this would cause pollution and abnoxious smells.

4.5.5 Monitoring and Treatment of Industrial Wastes

As may be gathered from earlier sections of this report Mombasa has numerous wet and dry industries that produce wastes. The composition and quality of waste depend on type of industry, size of factory and process used.

Of the industries visited, the management was aware of the necessity to pre-treat the effluents before they left the premises but in most cases facilities for such pretreatment were non-existent, poor or faulty and neglected.

At present monitoring and enforcement of effluent treatment are done after there is an obvious problem especially when there is a public outcry. Though most of the effluents are not toxic enough to kill at once, the cumulative effects are dangerous because there may be no cure.

Another aspect is air pollution which comes from Kenya Petroleum Refineries and the Bamburi Portland Cement factory - just to mention a few. The chemical nature and the cumulative effects of the gasses in the environment are unknown. Although there is claim that there is only 'smoke' from the refinery and only 'dust' from the cement factory, there is need for a complete investigation and regular measurement to find out what actually goes to the air and the surrounding areas.

Other industries such as Kenya Meat Commission and the breweries are located close to the sea and discharge a lot of water. In the case of Kenya Meat Commission no pretreatment of waste is done before the effluent is discharged in the adjoining creek. The concentrated and raw effluent is an obvious health hazard.

There are many other medium and small scale industries in Mombasa and there is need to check regularly on their activities in view of pollution threats. In general there is little or no information about the magnitude of pollution caused by industries even though reports from industries tend to indicate there is no pollution in order to safeguard their interests.

4.5.6 Recommendations

- (i) There is need for qualified personnel to deal with solid waste management, at present collection and disposal of the waste is left to cleaners who have no knowledge of proper management and disposal.
- (ii) Recycling of solid wastes such as paper and bottles, where suitable and applicable, should be highly recommended as this reduces the volume of waste to be collected and disposed.
- (iii) There is need for investigation and action to protect wells including monitoring of the water quality.
- (iv) There is an urgent need for construction of full treatment sewage plant(s) in Mombasa District as the present sewage disposal systems are not satisfactory for the ever increasing population. With a large sewage treatment plant(s) a high percentage of the population would be sewerred.
- (v) The standards required for industrial effluents should be strictly enforced if it is to be discharged into the municipal sewer.

- (vi) There is an urgent need to monitor all the industrial effluents and enforce the requirement to pre-treat the effluents to acceptable levels of purity before final discharge.

4.6 TRANSPORT AND COMMUNICATIONS

4.6.1 Transport

Mombasa is served with good road, railway, air and water transport facilities. There are also numerous hand carts especially in the town.

Mombasa has a well established internal network of roads. The Municipal Council of Mombasa maintains the roads through contracts from the Ministry of Transport and Communications (MT&C).

The length of roads registered directly under MT & C comprises 14.1 km of tarmac Government access roads, 7.1 km of gravel roads and 13.5 km of earth roads.

There are no trunk roads in Mombasa District. Roads in the old town of Mombasa are narrow and are usually one-way only to ease traffic congestion. In some estates roads are mere paths and are flooded during the rains. The way the houses are built leaves little room for improvement of such roads.

Mombasa town experiences traffic jams during the rush (peak) hours in the morning, lunch time and evening. Apart from the rush hours public transport by Kenya Bus Services (KBS) Mombasa, country buses and "matatus" is adequate. With the construction of the New Nyali bridge traffic flow to the north mainland has improved. The Likoni ferry which connects Mombasa Island to the south mainland is operated by KBS Mombasa. The charges at the ferry are very high compared to those of the Government toll station at the Nyali bridge. This has an effect on the traffic flow to the south mainland, and as a result major developments are taking place in the north mainland where transport is easier compared to the south mainland.

Any permanent solution, such as a bridge or tunnel across the Likoni channel, though it would have a lot of technical problems as this is the entrance to the port, would be welcomed with relief by those who use the ferry regularly.

Kilindini port, the international port of Kenya and the largest in eastern Africa, is located in Mombasa District. This port serves and links Kenya, Uganda, Burundi and Eastern Zaire with the outside world.

The port has 16 deep water berths of which 3 are container berths and 13 are general cargo berths. There is also a dry dock for repair of ships. There are bulk cement berths located near Likoni ferry, oil tank berths at Kipevu and a soda ash berth.

The nature of the entrance channel limits the size of ships that can enter the port. At present ships of upto 300m long and 13 metres draft can enter the port. About 1,300 ships call each year and the total export and import cargo is about 7M tons. (Table 4.11). Petroleum, machinery and fertilizers account for the largest volume of imports. Cement, soda ash and agricultural products including coffee and tea account for the larger part of exports.

The Kenya Ports Authority (KPA) is responsible for the running of the port. It is responsible for constructing and maintenance of berths. The development of the port started about 100 years ago and continues even now. Dredging to deepen and widen the entrance and the port itself has been going on and off, the latest dredging was 1982-83. The present number and depth of berths is satisfactory, but depending on future traffic volume further modernisation, expansion and equipping of old berths, and if need be construction of additional berths, will be undertaken. Minor dredging is undertaken regularly to remove accumulating material. Dredging can have a detrimental effect on the marine life. It also increases the force of sea waves reaching the coastline resulting in erosion. Thus more funds would be required

TABLE 4.11 : CARGO HANDLED AT KILINDINI PORT (IN, 000 D.W.T.)

TYPE OF CARGO	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
DRY CARGO:												
IMPORT	886	1068	1344	1237	1175	1288	842	938	1337	1480	1037	2004
EXPORT	1353	1749	1471	1418	1821	1726	1450	1559	1507	1486	1604	1438
PETROLEUM OIL AND LUBRICANTS:												
IMPORT	2314	2466	2638	2564	2998	3183	3304	2924	2571	2732	2761	3387
EXPORT	687	737	850	617	676	552	363	375	417	276	409	520
OTHER LIQUIDS:												
IMPORT	1	-	-	-	-	-	-	47	57	57	60	80
EXPORT	57	72	62	56	55	52	51	36	41	38	65	79
TOTAL: IMPORT & EXPORT CARGO	5298	5792	6365	5892	6725	6801	6010	5879	5924	6069	5936	7508

Source: Kenya Ports Authority 1981 - General Information Brochure

to strengthen and protect the coastline against sea erosion.

KPA also runs the old Mombasa port which is not active and all operations are manual.

Railway facilities existing in the district include several railway branches and stations on the main railline to the hinterland. Passengers and cargo from the district are within access of railway transport.

Air transport facilities are well developed in Mombasa. The Moi International Airport caters for national and international flights for passengers and cargo. Port Reitz, the old airport, continues to be operational.

The operations of the Kilindini Port, the railway station and airports are of national importance and the district benefits considerably by virtue of their locations.

4.6.2 Communications

The communication facilities available in Mombasa District include postal services, telecommunications, radio, television, national and local newspapers.

The Kenya Posts and Telecommunications (KP&T) headquarters for Coast Province is located in Mombasa, and is responsible for postal and telecommunications services.

Post offices are within easy reach of the public in many parts of Mombasa. Besides the main Post Office in Coast Province which is located in Mombasa there are several post offices in the district (Table.4.12).

The newly introduced speed posts (same day delivery service) is available. At the moment the demand for rental postal boxes is almost satisfied.

Telecommunication services, including telephones, telegrams and telex are all available within short distances. There are both automatic and magnetic (manual) telephone exchanges (Table 4.12). Automatic telephone exchanges serve urban areas but magnetic telephone exchanges exist holding a total of 1,649 telephone lines at present.

Public telephone booths (coin boxes) installed in various parts of the town are connected to automatic telephone exchanges. At present Mombasa has about 200 coin boxes. It is possible to dial international calls directly from Mombasa.

There is no misuse and destruction of public telephone booths. Underground telephone cables are not destroyed by water since waterproof plastic cables have been installed.

There are no plans for building of new exchanges in Mombasa at present but there are plans for modernising and expanding the present exchanges depending on demand and availability of funds.

4.6.3 Recommendations

- (i) There is need to identify roads that can be used regularly by heavy vehicles, with a view to strengthening them to accommodate heavy weights. All heavy vehicles should be restricted to such roads only.
- (ii) With the heavy commercial transportation in or through Mombasa District, there is need for trunk roads to be constructed.
- (iii) There is need for provision and expansion of estate roads. In all housing estate development plans, roads which are essential are included and should not be ignored.

TABLE 4.12 : POSTAL AND TELEPHONE SERVICES

A. POSTAL OFFICES					B. TELEPHONE SERVICES			
NAME OF POST OFFICE	CAPACITY (BOXES)	RENTED BOXES	VACANT BOXES	PENDING APPLICATIONS	NAME OF EXCHANGE	CAPACITY (LINES)	NO OF SUBSCRIBERS	NO OF VACANT LINES
MOMBASA	10,000	9,970	30	-	BAMBURI	1,000	445	555
AMBALAL HOUSE	100	100	-	-	CHANGAMWE	2,000	782	1,218
CHANGAMWE	900	674	226	-	LIKONI	400	251	257
KILINDINI RD	900	900	-	10	MAKUPA	6,000	1,088	4,912
DOCKS RD	340	241	99	-	MOMBASA CENTRAL	12,000	9,446	2,554
MAKUPA RD	900	334	66	-	NYALI	2,000	872	1,128
LIKONI RD	300	300	-	-				
NYALI	300	300	-	25				
MOI AIRPORT	100	68	32	-				
MAJENGO RD	1,000	610	390	-				

Source: Postal Manager - Coast Province, 1985

Source: Telecommunications Manager - Coast Province 1985

4.7 ENERGY

4.7.1 Introduction

The main sources of energy in the district are electricity, petroleum fuels, charcoal and, to a lesser extent, firewood and solar energy.

All fuels are imported either from within the country or from outside. Figure 11 provides comparative data on energy use for the Coast Province which probably hold true for Mombasa District.

Much of the electricity consumed in the district is generated at the Kipevu thermal station using steam and fuel oil at a budget of K.Shs.20m per month. Electricity from Kipevu station is supplemented by hydro-electricity from Kamburu Dam up country which is transmitted through a 220Kv overhead line via Rabai.

The demand for electricity in Coast area at present is 70 megawatts and much of this is consumed in Mombasa District. The demand is increasing due to rapid urbanisation particularly the expansion of industrial, commercial and domestic sectors.

Imported crude oil is the source of petroleum fuels used in Mombasa. Petroleum fuels include gas (LPG), petrol, diesel and paraffin. Petrol and diesel are used in the transportation services. Gas and paraffin are used mostly for domestic purposes of heating, lighting and cooking. Gas is also commercially used as fuel in hotels. Petroleum fuels are generally expensive but are essential sources of energy both to the country and individuals. Coal is imported for fuel in big industries like the Bamburi Portland Cement factory.

Charcoal is in high demand in the district. It is readily available and cheaper (Shs.45.00 per bag) than other sources of energy. It is used mainly for cooking purposes in homes and small commercial

enterprises. These factors make charcoal an essential commodity in the district. No charcoal is produced in Mombasa District; it is all imported from the neighbouring districts of Kwale and Kilifi and these districts have suffered vegetation depletion due to charcoal burning. Charcoal consumption is rising with the rapid urbanisation of the district.

Firewood is mainly used for cooking and heating purposes. It is obtained either locally in the district or from the surrounding districts.

The overall effect of firewood and charcoal consumption on the Mombasa environment is depletion of vegetation. Thus the sources of woodfuel are diminishing while the demand is rapidly rising. Unless there are concerted efforts for afforestation and tree planting by all, future supply of woodfuel (charcoal and firewood) is not guaranteed.

There is very little use of certain renewable sources of energy e.g. solar, wind and wave energy. The traditional use of solar energy is in drying of fish, copra and other foodstuffs. Solar heaters have been installed in the new residential estate at Changanwe. Solar heaters are cheaper not only to individuals but also to the country as less electricity would be required if solar heaters were available and the amount of fuel oil required to run the thermal station would be reduced considerably. Solar heaters would also reduce the amount of gas fuels, charcoal and firewood required for heating water.

4.7.2 Recommendations

- (i) The public should be encouraged to use woodfuel (charcoal and firewood) in modern fuel-saving stoves (jikos) which are economical. This would save many trees from being cut down in the surrounding areas.

- (ii) The Municipal Council of Mombasa should set aside, acquire or request for some land to establish fast growing tree plantations to produce charcoal and firewood for the local market. The Council would get revenue, create employment and help the Government to fight wanton destruction of vegetation for energy supply.
- (iii) Development and use of renewable sources of energy e.g. solar, wind, and biogas should be given higher priority and demonstrated by extension services and pilot projects to familiarise and encourage the public to adopt the technology. This would reduce the dependence on vegetation, thermal electricity, gas and other petroleum fuels and help the country save foreign exchange.

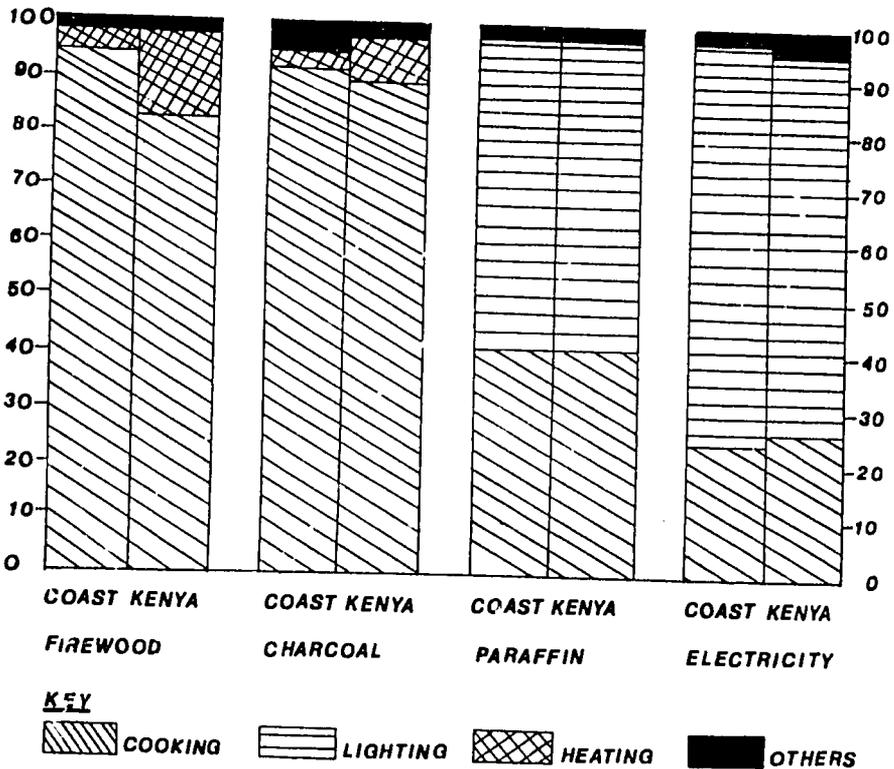


FIGURE 11 THE USAGE OF ENERGY IN KENYA AND THE COAST PROVINCE

SOURCE: CENTRAL BUREAU OF STATISTICS, 1980

4.8 TOURISM AND NATIONAL HERITAGE SITES:

4.8.1 Goals and Nature of Tourism

The fundamental national goal for tourist industry is to maximise net economic benefits from the scenic environmental resources of the country. In addition tourism is intended to generate foreign exchange and increase employment. Local tourism is being promoted so that the local population may also benefit from the natural environment, which in turn should ensure increasing public support for environmental protection.

Mombasa District is in a strategic position in relation to Tsavo National Park, Amboseli, Shimba Hills, historical sites of the coast, and the beautiful beaches which attract tourists from all over the world.

Hotels are a major source of wage employment in Mombasa District. In general the younger people with some education are more eager for expansion of the tourist industry than older men and women who either see tourism as a force in cultural change or anticipate no personal benefits from its development.

4.8.2 Accommodation

Different classes of accommodation facilities are offered in Mombasa. There are about fifty tourist class high cost hotels with 2,500 rooms and 5,000 beds and about eighty medium cost hotels used mostly by the local tourists.

North Coast has about sixteen tourist class hotels, with 1,500 rooms and 3000 beds (Tables 4.13 and 4.14). Mombasa Island offers 30 hotels with 900 rooms and 1,800 beds, and 72 cottages. Other accommodation includes private homes owned by foreigners who are paid (accommodation fees) in their countries before the tourists come to stay.

Tourists stay for an average of 15 days and spend approximately Kf225 per person. The package tour is the mainstay of the industry. Although in the peak seasons the hotels are fully booked, in low season they are almost empty.

TABLE 4.13 : HOTELS AND LODGES IN MOMBASA DISTRICT : 1985

<u>BEACH HOTELS : NORTH COAST</u>			<u>BEACH HOTELS : NORTH COAST</u>		
	<u>BEDS</u>	<u>ROOMS</u>		<u>BEDS</u>	<u>ROOMS</u>
Dolphin Hotel	216	103	Giriama Cottages	100	
Whitesands Hotel	240	120	Continental Beach Cottages	46	
Seawaves Beach Hotel	40	18	Sun 'N' Sand	166	
Nyali Beach Hotel	184		Cowrie Shell Apartments	48	
Oceanview Hotel	145	70	Wason Beach Cottages	32	
Severin Sea Lodge	131	66	Mohan Shah Cottages	27	
Casuarina Hotel	124	62	Octopussy Cottages	52	
Mombasa Beach Hotel	300	100	Silver Star	230	
Bamburi Beach Hotel	118	59			
Kenya Beach Hotel	182	91	<u>SOUTH COAST</u>		
Coral Beach Hotel	84	42	Shelly Beach Hotel	136	
Reef Hotel	312	106	Rosa Cottages	72	
Bahari Beach Hotel	194	97			
Silver Beach Hotel	214	107	<u>BEACH HOTELS - NORTH COAST</u>		
Serena Beach Hotel	248	120	Hotel Malaika	170	83
Neptune Beach Hotel	156		Nyali Beach Hotel (Bamburi Beach Hotel)	184	186
Plaza Hotel	176				
<u>ISLAND HOTELS</u>	<u>BEDS</u>	<u>ROOMS</u>	<u>ISLAND HOTELS</u>	<u>BEDS</u>	<u>ROOMS</u>
Taj Hotel	40	17	Sportaview Hotel	50	28
Manor	105	59	Adies Hotel	16	8
New Carlton Hotel	50	26	Hotel Strand	40	
Oceanic Hotel	184	101	New Briscon Hotel	21	11
New Palm Tree Hotel	60	28	Elias Hotel	14	7
Splendid Hotel	60	39	Ocean Car Hire Guest House	28	
Rainbow	40	20	White Rembo Hotel	28	
Port Tudor Hotel	55	30	New Peoples Hotel	82	
Lotus Hotel	46	23	Hotel Bridgeview	23	
Castle Hotel	119	66	Hotel Relux	40	
Mombasa Club	47	29	Chui Lodge	17	
Metropolitan Hotel	23	10	Olem Silent Lodge	19	
Mermaid Hotel	34	15	New Mermaid Lodge	40	
A.B.C.Lodge	36	18	Balges Lodge	22	
Hotel Fortuna	24		Magistrate Restaurant	30	
Bahari Lodge	27	13	Al-Edbaal Hotel	40	
Jimneys Hotel	30	18	Hotel Herms	38	19
Y.W.C.A.Hostel	30	33	Cosy Guest House	48	38
Visitors Inn	34	17	Coast Pride Hotel	15	7
			Oletrigger Hotel	90	30

Source: Ministry of Tourism and Wildlife - Mombasa

TABLE 4.14 : HOTEL ROOMS AND BEDS AVAILABLE AND OCCUPIED IN MOMBASA DISTRICT '000' BED-NIGHT

Year	Nbr HtIs	Rms Avl	Rms Occ	Beds Avl	Beds Occ	Frgn Res	Res Tan	Res Ken	Permnt Occ	Beds Occ	Rooms Occ	%
<u>1974</u>												
N. MOMBASA	16	445.6	259.9	894.8	466.3	388.4	3.4	72.2	2.4	52.1	58.3	
MSA ISLAND	28	269.7	163.9	497.6	222.6	68.3	19.5	85.3	49.6	44.7	60.8	
<u>1975</u>												
N. MOMBASA	14	426.4	301.4	857.3	546.3	478.9	3.0	60.3	4.2	63.7	70.0	
MSA ISLAND	27	259	160.1	473.4	222.2	68.1	20.8	84.0	49.4	46.9	61.0	
<u>1976</u>												
N. MOMBASA	16	470.8	366.3	945.2	658.4	608.4	2.3	45.9	1.8	69.7	77.8	
MSA ISLAND	30	214.5	166.0	506.7	220.7	73.4	19.9	85.2	42.3	43.6	60.5	
<u>1977</u>												
N. MOMBASA	16	499.1	412.9	992.4	740.3	684.5	1.1	53.2	1.5	74.6	82.7	
MSA ISLAND	30	283.7	177.3	509.9	234.0	79.5	12.3	99.1	43.6	46.0	62.5	
<u>1978</u>												
N. MOMBASA	15	520.4	427.2	1045.9	785.9	732.5	0.7	50.7	2.2	75.1	82.1	
MSA ISLAND	33	289.8	184.5	531.4	254.5	84.0	15.2	41.3	44.1	47.5	63.7	
<u>1980</u>												
N. MOMBASA	17	653.1	494.1	1264.5	920.5	846.7	1.9	70.1	1.8	72.8	75.1	
MSA ISLAND	32	351.3	233.5	648.7	345.4	165.0	16.0	120.6	43.9	53.3	66.4	

Source: Ministry of Tourism and Wildlife - Mombasa 1985

KEY TO ABBREVIATIONS

Nbr - Number, HtIs - Hotels, Rms - Rooms, Avl - Available, Occ - Occupied, Frga - Foreign, Res - Residents, Tan - of Tanzania, Ken - of Kenya, Permnt - Permanent.

4.8.3 Services (Transport, Water, Security)

Tours are organized by tour operators who deal with car hire, air ticket bookings, ocean sports, as well as clearing and forwarding of goods for the tourists. In such tours the share of organization marketing and air transportation cost combined is larger than the share incurred. It appears that larger tour operators and large overseas travel wholesalers have the monopoly on the business making it difficult for medium sized and small operators to progress or benefit fully.

Most of the hotels use very little or no wood or charcoal for heating and cooking, and waste disposal seems adequate. Water used in the hotels is usually inadequate and unreliable but with the completion of Sabaki Water Scheme the problem will be solved.

The feeder roads to the most important tourist resorts for example to Shelly Beach Hotel in Likoni, Malaika Hotel, Casuarina, and Sea Waves, just to mention a few, are not maintained. Other means of access lack efficiency and comfort. Although communication by air has been improved, it is also not always efficient.

4.8.4 Promotion of Local Tourism

The development of local tourism is an important way of making the local people benefit from the efforts made by Government to protect their environment.

The Government, through the Ministry of Tourism and Wildlife, has embarked on the Kenyanization of personnel in hotels and tourist firms, including training in travel and catering at the Kenya Utalii College.

Recommendations

- (i) The Ministry of Tourism and Wildlife should embark on training "Wananchi" on how to reach and to use national parks and reserves especially through organized tours.
- (ii) Tourism promotion funds available in the Ministry of Tourism and Wildlife should be used to subsidize "Wananchi" to travel in tourist resorts.

4.8.5 Cultural Pollution

In Mombasa District people of various racial, ethnic and religious backgrounds have coexisted for ages in the past, giving the district a wealth of cultural heritage, which is unparalleled in the country. As a modern metropolis, today Mombasa has attracted people from virtually all the tribes in Kenya who have come along with traces of their original culture. Thus, Mombasa is indeed a cultural melting pot, where cultures from diverse backgrounds interact, and blend into a culture that is essentially African. For instance morals and norms which act as checks and balances of social behaviour have emerged.

Tourism affects the local situation in several ways. First tourism is the main cause of cultural overlaps. As it is a fast growing and very valuable industry in Mombasa, tourism is responsible for providing employment in the hotels and many ancillary occupations. However, tourism also causes cultural pollution of the Muslim and Afro-Arab cultures in Mombasa District. The most noticeable aspect is the vertical relation whereby the tourists are dominantly European and the hosts non-European, and there is a tendency of the tourists' culture dominating the hosts' culture. This is a form of pollution which is manifested in various ways.

'Beachboy' mania has increased leading to increased frequency of criminal acts against tourists. Children especially have been affected most by the contact with foreign tourists as they readily

adopt some of the tourists' behaviour which may be in variance with local behaviour. This is conspicuously illustrated by the mode of dressing that is creeping in, including semi-nudism. This has been accompanied by an escalation in the habits of smoking, abuse of dangerous drugs prostitution and homosexuality. Another social cost has been the exploitation of youth who instead of going to school, spend their time entertaining hotel guests by dancing.

Tourism is not to be condemned wholesale however, since it has obvious advantages. Apart from the creation of better international awareness, tourism has made Kenyans aware of the importance of preserving forests, wild animals, flora and also the appreciation of indigenous culture and dances. Cultural pollution in Mombasa District has not reached an alarming stage yet; the majority of residents hold strong values in the traditional ways of life, a fact which may help to sustain the indigenous cultures.

4.8.6 Distribution of National Heritage Sites and Preservation

Most of the national heritage sites in the district are found along the coast, many of them on private land. They consist of ruins of buildings, palaces, houses, walls with gates, tombs and remnants of household articles and utensils. These sites (or National monuments) are preserved in order to maintain various aspects of Kenya's history, architecture and tourism.

Fort Jesus, built by the Portuguese in 1598, stands ancient and sombre as a reminder of bitter battles fought between the Arabs and the Portuguese during the late 16th and 17th centuries as outlined in 1.1.2 already. It stands on a coral bluff at the southern end of the town, and has a collection of historical artifacts. It offers educational facilities for secondary schools which go for talks and film shows. These film shows reached an audience of

1771 in 1983 and a total of 11,107 school children. The number of visitors to the Fort Jesus museum doubled between 1971 and 1980 (Table 4.15). The old town, with its narrow streets, has old houses with wonderfully carved doors and lintels and is famous for its wharf. Apart from Fort Jesus other sites like Mbaraki Pillar, Fort St Joseph, Ruins of Allidina Visram etc have not been developed for tourism as there are no financial provisions made for their maintenance.

Preservation of these monuments faces several problems. Owing to the isolation of the sites they are vulnerable to vandalism. Overgrown vegetation around some sites checks accessibility. The monuments are exposed to severe weathering problems from wind and rain, and cracking of walls due to heat and roots. In the old town a few houses have submerged into the ocean and some important old buildings have been replaced with modern buildings.

TABLE 4.15 : VISITORS TO FORT JESUS IN MOMBASA

	1971	1974	1975	1976
Number of Visitors	65,439	77,759	93,126	100,160
	1977	1978	1979	1980
Number of Visitors	107,107	121,595	111,639	140,925

Source: Central Bureau of Statistics, Nairobi

4.8.8 Recommendations

- (i) There is a tremendous potential for integrated tourist development in Mombasa District. The attractions include: Tsavo National Park, Amboseli National Park, the up-coming Mamba village, and the Marine Park offer visitors a range of wilderness experience; the developed beaches and the sites in Mombasa offer a comfortable

holiday and leisure. The historical sites and the old town are additional attractions. Yet even plans developed in the mid 1970s have not been implemented (Eames, 1976). It is recommended that the concept of integrated tourist development be revived and co-operative effort of funding by hotels, investors and the Government be pursued.

- (ii) Charter arrangements should be developed; perhaps charter licences could be granted subject to participation in a regional development programme.
- (iii) Access roads to the hotels should be upgraded.
- (iv) Air transport should be made operational every day, and comfortable trains between Mombasa and Nairobi during day time should be introduced in order to let tourists view the countryside.
- (v) Cultural changes and conflicts will continue, but may be minimized by educational programmes, greater policing of public areas and perhaps by creation of more private tourist areas. A series of talks on the history, culture and environment of the coast should be developed and given in the tourist hotels.
- (vi) The Ministry of Tourism and Wildlife should intensify efforts in promotional and marketing programmes currently being undertaken, especially programmes to promote local participation in tourism.

4.9 ENVIRONMENTAL EDUCATION

4.9.1 The Role of Education in Environmental Management

Most people in Kenya still regard the natural components of the environment as inexhaustible or unalterable. These components include forests, soils, air, water, animals, minerals, etc. People use these components to supply their daily as well as commercial needs but destruction ends up taking the upper hand. In return the effects of human activities on the environment become the greatest threat to the very existence of man and other living organisms.

There is need to change the attitudes of people towards the environment if rational management has to be achieved. Education can be used to create positive attitudes towards environmental management.

In order to be effective, environmental education should be carried out as a unified educational system including both the formal and the non-formal sector. It should aim at showing people their place within and responsibility towards the environment. At present, environmental education in Kenya is not an obligatory, well-integrated and continuous programme, but units of it occur in various sections of the curriculum both in the formal and informal sectors.

4.9.2 School Curricula

Schools as formal centres for transmission of knowledge and skill, constitute a vital agent for sensitizing the public on environmental management. Recent changes in the curriculum for various levels will enhance environmental awareness and management as discussed below.

Primary School

The Ministry of Education Science and Technology, through the Kenya Institute of Education has embarked on a revision of the Primary Education Project (PEP). The project puts substantial emphasis on environmental education throughout the curriculum by using the ecosystem approach at a simpler level and introducing practical subjects e.g. agriculture. The project is being piloted in 50 schools in the

country and should be implemented by 1986. PEP has produced, in addition, materials for use in Primary Teachers Colleges. It is expected that the Primary Teachers Colleges will implement the PEP curriculum in May 1985. The PEP curriculum in Primary Teachers' Training Colleges replaced a curriculum which did not focus on environmental education sufficiently to create the right attitude among teachers. This situation underscores the importance of organizing regular inservice courses or seminars for School Inspectors and teachers to keep them aware about new trends in environmental education.

Most schools in Mombasa district plant trees, or raise seedlings in nurseries and containers for issue to people who have land to plant on. Some schools have clubs e.g. Wildlife Clubs, whose members engage in tree planting, controlling soil erosion within their vicinity, etc. These activities should be encouraged in all schools.

Successful environmental education requires a proper inservicing programme. In Mombasa these could be undertaken at Shanzu Teachers College or by tutors at the six Teachers Advisory Centres (TAC). The programmes could include tours of areas of serious environmental concern, examples of environmental rehabilitation, natural resources which require proper management for use on a sustained yield basis etc.

Post Primary Education

Currently these institutions have suitable curriculum units included in subjects like geography, statistics, agriculture, science and wood-work technology, etc. The main objective is to promote awareness of environmental problems, and develop a concern for environmental quality.

The Ministry has now embarked on the revision of the curriculum under the Secondary Education and Technical Education Project (SEP AND TEP) and it is envisaged that a lot of environmental education will be incorporated. The projects also develop materials for Secondary Teachers Colleges.

The Kenya Polytechnic in Nairobi is currently making efforts to start an environmental education course. It is hoped that the Mombasa Polytechnic will do the same.

School clubs and societies play an important role in promoting various elements of environmental education. Clubs organized in post-primary institutions in Mombasa district include Geographical Societies, Science Clubs, Debating Societies, Young Farmers, etc. These should be strengthened and new ones established in schools which do not have them.

4.9.3 Adult Education

Most environmental problems are either traceable to actions by adults or affect them. Environmental adult education should therefore be seen as an essential requirement to enable them understand the complex nature of their environment and solve their day to day problems.

Within their curriculum, functional literacy covers subjects like community development projects, health-related topics, home science, agriculture and animal husbandry. The adult educators are encouraged to **make** learning more meaningful by inviting extension workers to participate in relevant sessions, but the level of adherence to this requirement varies from teacher to teacher. There is need for the local administration to be sufficiently involved in assisting to make the programme a success.

4.9.4 Education for Administrators and Other Decision-makers

Administrators and other decision-makers both in the public and private sector should be given correct information about methods of rational utilization of the natural amenities in order to achieve proper environmental management. This can be done through:

- (a) Lectures, journals, exhibitions, and mass media.
- (b) Special instructions in the existing system of general education through special courses e.g. at the Kenya Institute of Education, Matuga Development Centre etc.

- (c) Workshops organized at the District level on local environmental problems.

Although practice has shown that systematic education is more effective than propaganda, efforts should be made using both methods to stimulate concern for environmental problems and values in those responsible for policy and decision making.

4.9.5 Education for the Public

Extension officers normally use available media of communication such as Chiefs' Barazas, to educate the people.

Voluntary organisations working in the area should also endeavour to teach people about proper environmental management. These include the child welfare society, Family Planning Association, Freedom from Hunger Committee, etc.

4.9.6 Recommendations

General Recommendations

- (i) The National Environment Secretariat (NES) in Co-operation with the Ministry of Education Science and Technology, should play an active role in ensuring the infusion of environmental education at all levels. Concerted efforts should aim at reinforcing attitudinal change towards environmental management.
- (ii) Questions emphasizing environmental aspects should be prominently included in all national examinations.
- (iii) Noting that locally written books, pamphlets and other literature on current environmental issues are necessary, potential authors should be encouraged through payment of honoraria.
- (iv) NES should spearhead incorporation of environmental topics into calendars.

- (v) NES in conjunction with the Kenya Institute of Education (KIE) and the School Equipment Production Unit (SEPU) at Kenya Sciences Teachers College (KSTC), should produce an environmental kit.
- (vi) NES should invite education officers and inspectors of schools to seminars on environment and development to inculcate in them a concern for proper environmental management.
- (vii) Policy makers should appreciate the importance of participation in environmental courses and seminars. On the same token, education officers from NES should attend all seminars organised on environmental aspects at districts and local levels. Short seminars, of preferably one day duration are ideal.
- (viii) In-service courses for the PEP curriculum should be organised for practising teachers, college tutors and school inspectors.

Specific Recommendations on Mombasa District

- (i) The Teachers' Advisory Centres (TAC) in Mombasa should incorporate environmental components in their activities in order to effectively assist primary schools teachers. NES should provide necessary inputs e.g. posters, booklets, and pamphlets. TAC should liaise with the Municipal Education Officer on this matter and in future organise seminars involving relevant organisations, local authorities and teachers.

NES should look into the possibility of organising a seminar at local or district level.
- (ii) School clubs e.g. Wildlife Clubs, young farmers etc, play an important role in creating environmental awareness and they should be encouraged. Schools which can establish Environmental clubs should obtain guidelines from KSTC.

The District Education office should organise club competitors for the award of certificates preferably on the world Environment Day. NES should look into the possibility of budgeting for the certificates.

- (iii) The adult education section should be provided with services and facilities to assist environmental education and training. Such services should include visual aids and excursions for elders to environmentally degraded areas. Total mobilization of individuals or groups who can contribute to environmental education is absolutely essential.
- (iv) Dissemination of proper environmental education to administrators is vital and formal inservice training should be encouraged in all Government Training Institutes.
- (v) Taking note of the vital role the public plays in environmental degradation, there is need to create awareness among them through mass media - Radio, T.V. Films, pamphlets, "barazas", and the Mombasa show.
- (vi) Kiswahili pamphlets on environment should be prepared by NES and sent to Mombasa. Kiswahili should also be used in disseminating research findings especially for materials destined for local libraries. These would help to keep adults literate.
- (vii) NES should approach religious organisations e.g. Young Muslims Association, NGOs such as the Family Planning Association of Kenya, and Mass organisations like Kenya National Union of Teachers etc to disseminate ideals of proper environmental management.

- (viii) Use should be made of environmental slogans over radio such slogans can also be printed on wrappers of popular or essential commodities e.g. Match boxes, salt, milk etc.
- (ix) Public officers in charge of information should help increase environmental awareness through one or two minutes environmental slogans over radio before start of school broadcasts, news, etc.
- (x) Extension workers should follow up activities e.g. seedlings planted, to ensure they survive.
- (xi) NES should surrender a set of slides on the Mombasa environment to the Local Teachers Advisory Centres to facilitate dissemination of environmental education.
- (xii) Environmental awareness should be provided for managers and industrialists.
- (xiii) Inservice course should be conducted for teachers to enhance their ability to teach environmental education using local materials.
- (xiv) NES should provide an input during the short courses accorded to provincial administration officials.
- (xv) Local primary school teachers should make use of the Resource Centre at Shanzu Teachers College.
- (xvi) Learners at various levels should visit degraded areas as well as areas where environmental rehabilitation is taking place around Mombasa district.

4.10 DISTRICT DEVELOPMENT ADMINISTRATION

The development process is an interaction between two sets of activities: private initiatives to promote individual and group welfare and Government programmes and resources applied in various sectors. District development administration is how these activities are organised, promoted, implemented and necessary research authorised at the district level. The success of such activities depend largely on the management of the recurrent problems of misallocation of funds, poor co-ordination, lack of manpower, and lack of incentives and motivation.

Development administration is the responsibility of the Government. Although initiatives also come from the local community, it is through the District Development Committee that the proposed projects and programmes are planned and eventually implemented. The Government carries out its mandate using annual allocation of development funds from the Treasury and Rural Development funds.

Local and international organizations and donors play a key role in development through assistance to major government and self-help projects either financially, technically or both. However, it is common in Kenya for the local community to identify and initiate their own development projects in the spirit of harambee (self-help) instead of waiting for the Government to do everything.

Consequently about 30% of the national development is through self-help. Mombasa is an urban district with large industrial and commercial individual and group undertakings. The larger part of the community struggle to improve their standards of living. Their efforts are reflected in joint ventures in co-operatives, women groups and self-help projects.

There are 124 co-operative societies in the district. 90% of these (109) are Savings and Credit Societies. The other societies are for housing, consumers, handicrafts, farm-purchase and fisheries (Table 4.16).

The farm purchase society have never collected enough money to purchase a farm and as such it is dormant. The handicraft society is faced with the problem of middlemen in marketing of carvings while the fisheries society is dormant.

By the end of 1984, there were 70 registered women groups with a total membership of 3,544 women (Table 4.17). These groups were involved in a range of income generating activities, viz - supplying piped water, rental houses, handicraft, food, kiosks, day care centres, fishing, poultry, bee-keeping, pottery and small businesses. As mentioned earlier handicrafts form a major activity for most groups and hence the problem of marketing.

With the introduction of the District Focus for Rural Development it has become easier to follow up development projects more closely with the help of divisional development committees and community development committees. This has made it possible also to start more projects at grassroot level. The major self-help development projects in Mombasa District have put emphasis on construction of primary schools to facilitate the 8-4-4 education system, village polytechnic and women group buildings. At the end of 1984, a total of 13 harambee projects were completed (Table.4.19). The communities contributed labour, materials and finances (Table 4.18). So far, over 10 self-help projects have benefitted from the Rural Development Fund.

The Municipal Council of Mombasa, whose boundaries of jurisdiction coincide with the district boundaries, is at the centre of planning and implementation of programmes and projects in the district. It works alongside other government departments and Ministries in the provision of infrastructure and services to the community. It carries out programmes and projects aimed at improving social welfare, public health, education, housing and practically every sphere of community development.

TABLE 4.16 : TYPES OF CO-OPERATIVE SOCIETIES IN MOMBASA

TYPE	NUMBER	STATUS
Handicraft	1	active
Housing	10	active
Fisheries	1	dormant
Farm Purchase	1	dormant
Consumer	2	active
Savings and Credit	109	active
TOTAL:	124	

DIVISIONAL DISTRIBUTION OF CO-OPERATIVE SOCIETIES

DIVISION	NUMBER
Kisauni	24
Likoni	3
Changamwe	22
Island	75
TOTAL:	124

Source: District Co-operative Office, Mombasa, 1985

115-

TABLE 4.17 : WOMENS GROUPS IN MOMBASA

NAME OF GROUP	MEMBERSHIP	LOCATION	TYPE OF PROJECT	SOURCE OF FUNDS
1. Bomu W/G	20	Changamwe	Water Kiosk	
2. Kizingo W/G	15	Island	Poultry keeping	
3. Bokole W/G	40	Changamwe	Water Kiosk	
4. Maweni W/G (Kisauni)	20	Kisauni	Selling charcoal Sewing Water Kiosk	
5. Shime W/G	19		Rental House	Self-help Government aid
6. St Lwanga W/G	20	Changamwe	Sewing Poultry keeping	
7. Maweni W/G	30	Likoni	3 Rental houses 1 Shop 1 Kiosk Soon to start a tailors shop	Self help Aid from Government
8. Mtorgwe 'A' W/G	31	Likoni	Animal Keeping Handicrafts	
9. Mpeketoni W/G	18	Kisauni	Handicrafts Food Kiosk Needlework	
10. Changamwe 'A' W/G	15	Changamwe	Welfare services Loaning	
11. Chaani W/G	60	Changamwe	Selling Lessos Selling Charcoal	
12. Upendo W/G	20		Nursery school	
13. Likoni flats W/G	28	Likoni	Charcoal selling	
14. Cultural W/G	50		Entertaining (traditional dancers) Handicrafts	
15. Jomvu Kuu W/G (Taratigu)	168	Changamwe	Farming Poultry keeping	Self-help Government aid
16. Mvembelegeza	30	Kisauni	Poultry keeping Vegetable growing	
17. Mwandoni W/G	27	Kisauni	Handiwork Handicrafts	
18. Likoni Family project	19	Likoni	Poultry keeping	
19. Ganjoni W/G	63	Island	Self-help assisting	Member contributions
20. Ziwa la Ng'ombe W/G	54		Rental house	Self-help
21. Mwakidemu Maigo W/G	100		Nursery school Social Hall	
22. Peke W/G	18	Kisauni	Rental House	
23. Utange W/G	20	Kisauni	water kiosk	self-help Government assistance
24. Furaha W/G	30		Handicraft Handwork	
25. Nuru W/G	30		Handicraft Welfare Services	
26. Sukuma W/G	15		Poultry keeping Business Banda	self-help Government assistance
27. Likoni W/G	45	Likoni	Charcoal selling	
28. Magongo W/G	30	Changamwe	Handicraft Water kiosk	
29. Mombasa District shop	50	Island	Handicraft shop	self-help + Government assistance
30. Changamwe 'B' W/G	28	Changamwe	Kiosk (shop	

TABLE 4.17:..Continued

- 116 -

NAME OF GROUP	MEMBERSHIP	LOCATION	TYPE OF PROJECT	SOURCE OF FUNDS
31. Makupa W/G	25	Island	Handiwork	
32. Changamwe */G	18	Changamwe	Kiosk Selling Clothes Grocery	
33. Tusife Moyo W/G	50		Nursery school	
34. Ukweli Chaani W/G	35	Changamwe	Entertainment (Traditional Dancers) Sewing Handiwork	
35. Ndiru Kamba W/G	14		Entertainment (Traditional Dancers)	
36. Haba na Haba W/G	26		Small business	
37. Spaki W/G	15	Island	Handicraft	
38. Kipevu W/G	52	Changamwe	Tea kiosk Charcoal Kiosk	
39. Salama Likoni W/G	25	Likoni	Handwork	
40. Mabati W/G	15		Welfare	
41. Nyota W/G	50		Small business	
42. Maunguja W/G	25	Kisauni		self-help Government assistance
43. Tudor Estate W/G	25	Island	Handiwork Handcraft	
44. Makande W/G	18	Island		self-help Government assistance
45. Mikanjuni W/G		Changamwe	Agriculture Handicraft Water kiosk	
46. Kenya Navy W/G	49	Likoni	nursery school Tree planting Sewing Cookery	self-help Government Assistance
47. Mtongwe Catholic W/G	31	Likoni	Poultry keeping Selling eggs	
48. Jitegemee W/G			Welfare services Assisting destitutes & widows	
49. Mwakirunge W/G			'Banda'	self-help Government assistance
50. Likoni Social Hall	40	Likoni	Handwork	
51. Frere Town W/G	22	Kisauni	Handwork Sewing	
52. Ngamani W/G	23	Changamwe	Handwork Poultry keeping	
53. Umoja W/G	58		Handicraft Adult Literacy	
54. Mvita W/G	21		Handicraft	
55. Amani W/G			Small scale business Entertainment (Cultural dances)	
56. Kutani W/G			Poultry keeping	
57. Jomvu Mission W/G	30	Changamwe	Poultry keeping	
58. Mwangaza W/G	27		Selling Firewood Water Kiosk	
59. Msaada W/G	23	Handiwork	Handiwork Selling Charcoal	
60. Mikindani W/G	26	Changamwe	Poultry keeping Selling vegetables	
61. Salama W/G			Handicraft	
62. Likoni 'B' Kwaimani W/G	98	Likoni	Selling Charcoal	

Source: District Social Development Office, Mombasa, 1985

TABLE 4.18 : SELF HELP DEVELOPMENT PROJECTS IN MOMBASA

Projects continued from 1983	18
Projects started during 1984	21
Projects abandoned during 1984	-
Projects Completed in 1984	13
Projects Carried forward to 1985	25
<u>Projects Contributions</u>	
Labour Contributions	K.Shs.105,167.50
Materials Contributions	K.Shs. 23,450.00
Cash Contributions	K.Shs.4181.625.00
Central Government	K.Shs. 87,391.85
Other Donors	NIL
TOTAL:	<u>K.Shs.4,397,634.65</u>

Source: District Social Development Office, Mombasa, 1985

TABLE 4.18B SOME OF THE NON-GOVERNMENTAL ORGANISATIONS IN MOMBASA

N.C.C.K	National Christian Council of Kenya
Y.M.C.A.	Young Men's Christian Association
Rotary Club	
Lions Club	
Little Sisters of the Poor	
Alms House	
Mji wa Salama	
Maendeleo ya Wanawake	

TABLE 4.19 : ASSISTED SELF-HELP PROJECTS - 1984

NAME	LOCATION	TYPE OF PROJECT	SOURCE OF FUNDS
Mwakirunge Primary School	Kisauni	Primary School Building	- contributions from the local community - Government aid (K.SHS.5,645.00)
Ganjoni Primary School	Island	- do -	- do - (K.Shs.8,987.00)
Mvita Primary School	Island	- do -	- do - (K.Shs.5,369.00)
Gome Primary School	Changamwe	- do -	- do - (k.Shs.8,719.25)
Makunguja Primary School	Kisauni	- do -	- do - (K.Shs.2,517.50)
Ronald Ngala Primary School	Island	- do -	- do - (K.Shs.9,994.60)
Likoni Secondary School	Likoni	Secondary School Bldg	- do - (K.Shs.6,050.00)
Mtongwe Primary School	Likoni	Primary School Bldg	- do - (K.Shs.2,975.00)
Makande Primary school	Island	- do -	- do - (K.Shs.2,278.00)
Maweni Nursery School	Likoni	Nursery School	- do - (K.Shs.2,278.00)
Shika Adabu Primary School	Likoni	Primary School	- do - (K.Shs.2,278.00)
Vidziwa Primary School	- do -	- do -	- do - (K.Shs.2,278.00)
Mbaraki Primary School	Island	- do -	- do - (K.Shs.3,417.00)

Source: District Social Development Office, Mombasa 1985

There are several non-governmental organisations assisting in the district (Table 4.12B). Most of these cater for social and spiritual welfare of their members with little to do with development. Manedeleo Ya Wanawake co-ordinates the activities of the women groups, providing them with leadership education. The National Christian Council of Kenya, through the "TOTOTO HOME INDUSTRIES PROJECT", helps the women groups in marketing of their handicrafts and at the same time offers training in dressmaking and design, textile dyeing, for women. Several international organizations are supporting large productive projects. These include: the European Economic Community (EEC) supporting two projects, DANIDA supporting one project, Swedish International Development Agency (SIDA) and the International Fund for Agricultural Development (IFAD). Some measure of local contribution is usually a prerequisite to such foreign assistance. The RFD insists on 1% local contribution; EEC requires 25%.

The district's development priorities are in agriculture, industrial development, infrastructure and social services with the aim of promoting production, health standards, education, housing and industrial productivity. Emphasis is laid on on-going projects, under-utilized and over-utilized projects. The main constraint to the achievement of these objectives is lack of skilled and qualified manpower to implement projects.

4.10.1 Marketing

Marketing of agricultural and livestock products has already been discussed. It remains to be said, however, that availability of reliable and good marketing system can be an incentive to production. Problems faced by both the co-operatives and the women groups in Mombasa have greatly undermined people's initiatives and motivation. The marketing co-operatives fail to pay members in time and as a result members prefer to sell their products outside the co-operatives. This is particularly so with handicrafts where the elimination of middlemen has been difficult to achieve, despite support of the

Handicraft Co-operative by a Nordic grant for building of offices, a packaging room, store and showroom. The same problem affects the Fisheries Co-operative which has been rendered dormant. Most members of the latter society prefer to sell their catches to well established business organizations for ready cash. The Municipal Council does not have enough personnel to enforce the bye-laws protecting co-operative societies from such practices.

Competition by the various groups for the small market makes the marketing problem even worse. Apart from the Akamba Handicraft Movement most women groups have taken up handicraft as one of their major lines of business, selling both through the TOTOTO INDUSTRIES as well as by door-to-door operations. In the same manner women groups which have taken up poultry and agriculture have to compete with larger well established business holdings. An outside market could ease the problem but there is lack of finances among the groups to take up ventures in outside markets.

4.10.2 Community Development Programmes

Women and Self-help groups discussed above are important aspects of community development efforts which have been very successful in Mombasa. They form good forums for dissemination of education and introduction of policy changes as they are groups with common interests.

The success of such groups and of community development depends largely on the people's initiative, motivation and attitudes towards self-help. In Mombasa District, the self-help spirit is now gathering momentum although it has not been very discouraging in the past. It has been found that people from outside Mombasa take more interest in women group activities than the local people although this situation is changing rapidly.

Another negative factor is the ignorance among the general membership and management committees of various groups. This is a major set back in the progress of the co-operatives, women groups and the harambee groups.

Adult literacy classes have been introduced in most women groups especially in Changamwe Division, with positive effects. Village polytechnics are among the major projects initiated on self-help basis, and are providing young people with skills enabling them to be self-reliant and independent financially. There are three village polytechnics: Kisauni, C.I.T.C., and Tototo. Two more village polytechnics are planned for Likoni and Changamwe. Tototo offers tailoring only. The other two teach two year courses in carpentry, painting, metal work, masonry, plumbing, electrical wiring, motor vehicle mechanics, cloth making, upholstery, home economics and tailoring.

The recognition that even the handicapped people can participate in development has led to establishment of training institutions for such people. These are located at Bombolulu, Likoni, and Mombasa Secondary School for the Physically Disabled. Other institutions are the Port Reitz School for the Blind and the Aga Khan Special School for the Mentally Handicapped.

The Social Services Department has embarked on a programme of using the Relief Fund for Distress to help the disadvantaged people initiate socio-economic projects instead of waiting for financial assistance. Such projects include fishing, hawking, vegetable kiosks, retail kiosks, charcoal selling and water kiosks.

Community development depends as mentioned above, on awareness of the

community as to what their problems are, the methodology and resources for solving them and the willingness to participate.

4.10.3 Recommendations

- (i) Intensify present campaign of elimination of middlemen by imposing heavy fine on members of Handicraft Society who breach the procedure, and by enforcement of the Municipal bye-law.
- (ii) Educate the general membership of various groups by all possible means including workshops and seminars for group leaders on subjects such as book-keeping and management. The Municipal Council, to whom the groups pay a lot of money as cess, should be able to provide facilities for such purposes.
- (iii) Women groups and non-governmental organizations should organize tours to other groups outside the Mombasa District for their members.
- (iv) Groups should try to put their resources together to enable them venture in marketing outside the district and even export their goods.
- (v) All Government Ministries concerned with such development should deploy more of their extension workers to solicit more co-operation from the members of the community and at the same time motivate them to initiate their own projects.
- (vi) More co-ordination between the Ministries and the Municipal Council of Mombasa should be advocated to foster greater development in Mombasa.

PART III

CONCLUSION

5.0 DISCUSSION AND SUMMARY

5.1 DISCUSSION

The basic purposes of an environmental assessment are:

- (a) To understand interactions and obtain specific information on the interface of environment and development.
- (b) To detect trends of the impacts and make predictions of future events.
- (c) To formulate the important questions that need to be addressed by assessors, impact analysts and advisors in environmental management.

The first important step and issue of environmental assessment is to find out the specific information and data needed. For a coastal, urbanized, industrial Island district like Mombasa there is an enormous amount and variety of possible environmental information much of which may not be pertinent to an assessment. So the first task of an effort should be to specify the information pertinent to the questions that must arise in future. The questions must be defined first and only after that can the data needed be specified.

It must be recognized that the society (industries, farmers, scientists, planners, administrators and individuals) can yield only partial information. This information must be collected taking into account the basic purposes of the environmental assessment outlined above.

The collection and use of original data such as sample aerial photographs depends highly on funds, and time available, as well as on the repeatability of such methods in future assessments.

The second very important step of environmental assessment is to produce development scenario. This is made from the information collected from all segments and aspects.

An environment - development scenario takes the form of a plan for the area, but it is concerned specifically with the environment. The scenario calls for different inputs, including Government Development Plan. It shows the chronological sequence of activities (economic, agricultural, industrial etc.) and reveals the processes and activities of construction, population growth (demography), material flows, socio-economic structures, land-use and other possible sources of impacts.

The third step is to analyse potential environmental development conflicts. This takes the form of question-answer or question-search process. The demands and impacts of various planned development activities are matched on the scenario with questions like "Given this development what environmental, socio-economic problems, conflicts or issues might arise over a certain period in future?"- being as specific as possible.

The final step of an assessment involves formulating advice on the different sectoral activities. Specialists representing the industries concerned and regulatory Departments of central and local authorities may be required to contribute in formulation of the advice to management, including alternative actions for decision-makers.

5.2 SUMMARY

From this report the following general conclusions can be made:

- (i) The Kenya Government has made a significant achievement in strategy for environmental management by shifting emphasis in national planning to focus on districts. The district forms an optimal geographical unit for assessment of impacts of development on the environment and for application of necessary controls, monitoring and remedial measures.
- (ii) Mombasa District, though small in area (275 km²) is a complex environment on account of diversity of biota, including not only marine, aquatic and terrestrial habitats, but also heavy intensity of urban and industrial development. Mistakes could easily enter the course of development through mere juxtaposition of physical and biological phenomena with not only heavy demands and diverse processes of human activities but also a concentration of discharges of components of domestic and industrial wastes of unknown biochemical effects.

The predominance of water in the Mombasa environment is the most critical factor in view of the large amounts of domestic and industrial wastes discharged into the water. Accumulation of decomposing products in the water is likely to cause heavy demand and even depletion of oxygen in the water environment, leading to eutrophication of semi-stagnant waters in the creeks. High concentrations of undergradable materials such as mineral oil residues (tar balls) may occur due to disposal of industrial wastes.

In these respects the Mombasa environment is very sensitive to local pollution by domestic and industrial waste water, that is besides other sources of pollution and degradation such as silt and sediment from land erosion, removal of trees and agricultural pesticide residues.

The specific issues of environmental management and recommendations for environmental protection in Mombasa District are summarised at the end of each discussion in the foregoing chapters.

REFERENCES

- Caswell, P.V. and B.H. Baker, 1953. Geology of the Mombasa-Kwale area. Geological Report No. 24
- _____ "Hotel Optimism." Executive Magazine, February 1984; pp3
- _____ "Tourism in the Balance." Executive Magazine, January 1985, pp 17-18.
- Central Bureau Statistics. Statistical Abstract 1981, 1983
- FAO/UNEP, 1982, Marine Pollution in the East Africa Region. UNEP Regional Seas Reports and Studies, No. 8.
- Fisheries Department, 1983. Fisheries Statistical Records. Club Catches Statistics. pp 8
- Ghai, D.P. "Population growth, labour absorption and income distribution" D.P. 183 Institute of Development Studies, University of Nairobi.
- IMO/UNEP, 1982 "Oil Pollution Control in the East African Region." UNEP Regional Seas Reports and Studies. No. 10
- Jaetzold, R. and H. Schmidt, 1983. Farm Management Handbook of Kenya, Vol. c. Ministry of Agriculture, Nairobi
- Kenya Association of Sea Angling Clubs, 1984. Kenya Fishing Records. Club Catches Statistics pp 8.
- Kenya Petroleum Refineries Ltd. 1984. Mombasa
- Kenya Ports Authority, 1981. General Information Brochure.
- Martin, C.M.P. and Esmond Bradley Martin, 1970. Quest for the Past. An Historical Guide to Lamu.
- Martin, C.M.P.; Balcomb, V. and A. Thurston, 1979. Kenya Past and Present. Kenya Museum Society.
- Migitt-Adolla, S.E. and K.G.C. Mkangi, 1982. A Study of tourism in Kenya with Emphasis on the Attitudes of the Residents of the Kenya Coast. University of Nairobi, Institute of Development Studies.
- Ministry of Agriculture and Livestock Development 1982 Annual Report
- Ministry of Economic Planning and Development, 1978. The Rural/Urban Household Energy Consumption Survey.
- _____ Mombasa District Development Plan 1979-1983
- _____ Mombasa District Development Plan 1984-1988
- Ministry of Transport and Communications, 1984. Schedule of Bitumen Roads 1983/84.
- _____ Classification Breakdown of All Unsealed Roads - Coast Province.
- Moomaw, J.C., 1960. A Study of the Plant Ecology of the Coast Province of Kenya.

- Munga, D. 1982. Some Observations on Petroleum Pollution along the Kenya Coast. Proceedings of Workshop Held at Kenya Marine Fisheries Research Institute.
- National Environment Secretariat, 1981. Report of the GOK/UNEP/UNDP Project on Environment and Development.
- ? _____ 1984. Kilifi District Environmental Assessment Report. NES/ETMA Project
- Norconsult A.S. 1975. Mombasa Water Pollution and Waste Disposal Study, IV. Sewerage and Sewage Disposal Master Plan.
- _____ 1977. Mombasa Water Pollution and Waste Disposal Study, VI. Marine Investigations.
- Odhiambo, D. 1979. Interdisciplinarity as an Approach to Environmental Education. Paper presented at the National Symposium on Environmental Education, Nairobi. National Environmental Secretariat
- Peal, Neta, 1984. Minister's Challenge to the Coast Hotels, Executive Magazine, February, 1984
- Republic of Kenya, _____ The Mining Act.
- Ruwa, R.K. 1982. The Kenya Commercial Species of Molluscan Shells: Their Market Prices, Ecology, Zoogeography and Conservational Implications. Kenya Marine & Fisheries Research Institute. Occasional Paper No. 1, KMF/RES/26/9.
- _____ 1984. Invertebrate faunal zonation on Rocky Shores Around Mombasa, Kenya. Kenya Journal of Science and Technology (B) 5(1):49-65
- _____ (In press). Further commercial Species of Molluscan Shells of Kenya: Their Ecology and Conservation. Post (Kenya).
- Salim, A.I. 1973. Swahili Speaking Peoples of Kenya's Coast, 1895-1965
- Sombroek, W.G. H.M.H Braun and B.J.A van der Pouw. 1982. Exploratory Soil Map and Agro-Climatic Zone Map of Kenya 1980. Nairobi: Kenya Soil Survey.
- UNDP/UNEP 1982. Industrial Sources of Marine and Coastal Pollution in the East African Region. UNEP Regional Seas Reports and Studies, No. 7 UNEP, 1982.
- Vandermoortele, J. "Income distribution and poverty in Kenya." D.P. 275, Institute of Development Studies, University of Nairobi.
- Worrall, J. 1984. Tourist Trade Talks of 100,000 British Holidaymakers Flying to Kenya. Executive. January 1984.

APPENDICES

APPENDIX I : MUNICIPAL COUNCIL HOUSES, MOMBASA 1985

LOCATION	Number of Houses	Number of Flats	Number of Maisonettes	Total
Jomo Kenyatta Estate		288		288
Mvita (Majengo)		12		12
Tom Mboya Estate		52		52
Buxton (Public)		128		128
Likoni Estate	170	180		350
Likoni Tenant Purchase (USAID/NHC)	122			122
Kisauni Rental	100			100
Kisauni Tenant Purchase (USAID/NHC)	84			84
Tudor Estate	1037	76	5(new)	1118
Nyerere (Public)Rental/staff		44		44
Changamwe (new) Rental	4	300		304
Buxton/Mzizima (Staff Quarters)	74	116		190
Tudor Valley	100			100
Changamwe (old) Rental	257	341		598
Kizingo	12	6		18
Tom Mboya Road (near Kaloleri)	3			3
Ngala Estate (new flats)		216		216
Tudor Village Hall (staff)		1		1
Old Secretarial College	1			1
Institutional House Mtongwe	2			2
Mwakirunge	1			1
Maunguja	1			1
Miritini	1			1
Shika Adobu	1			1
Zivani Primary	7			7
Mbaraki Primary	4	4		8
Serani Primary		4		4
Fire Brigade (Changamwe)		1		1
Jomvu Kuu Clinic	2			2
Mtongwe Clinic	2			2
Alms House	5	1		6
Magogo Clinic	1			1
Mombasa Primary	1			1
Changamwe Tenant purchase (new & old)	1139			1139

Source: Municipal Council of Mombasa : Social Services & Housing Department

APPENDIX 11 : HEALTH FACILITIES IN MOMBASA DISTRICT

The following list includes all health facilities in Mombasa District except Shimo La Tewa Prison Hospital and H.H.The Aga Khan Hospital

FACILITIES	LOCATION	STATUS/ RESPONSIBLE ORGANIZATION	SERVICE GIVEN	CAPACITY (BEDS)	DOCTORS	PARA - MEDICAL STAFF	OTHERS	
HOSPITALS	Coast Provincial Gen.Hospital	Mzizima M.I.	Government	All	671 beds 96 cots	59	446	279
	Port Reitz Hos.	Port Reitz M.W.	"		206	3	73	
	Lady Grigg Maternity	M.I.Mzizima	"	MCH/FP IP/Mat	109			
	Shimo La Tewa Prison Hosp	Shimo-la-Tewa	Private		-	-	-	-
	The Mombasa Hosp	M.I.	Private	IP&OP	80	-	40	139
	H.H.The Aga Khan Hosp	M.I.	Private	IP&OP	70			
	Pandya Memorial	M.I.	Private	IP&OP	118	3	59	
	Dr Vibhakar's Nursing Home	M.I.	Private	IP&OP	18	1	5	12
	Changanwe Mater- nity Home	Changanwe	Private	Mat MCH/FP	8	1(P.T.)	3	1
	HEALTH CENTRES/ DISPEN - SARIES	Mwita Clinic	M.I.	Municipal	G.O.P.		2	17
Old Town Disp		M.I.	"	"		1	10	3
Mwembe Tayari Clinic		M.I.	"	MCH/FP			6	1
Makupa Clinic		M.I.	"	MCH/FP			3	1
Majengo Clinic		M.I.	"	MCH/FP			3	1
Communicable Diseases control Centre						1	5	2
Hagongo Health Sub/C		M.I.	"	G.O.P.		1	19	7
Kwa Jomvu Clinic		M.W.	Municipal	MCH/FP		4	4	2
Jomvu Kuu Clinic		M.W.	"	"			3	1
Kisauni Clinic		M.N.	"	"		1	12	2
DISPENSARIES	Kongowea Clin. :	M.N.	"	"			8	2
	Utange Clinic	N.N.	"	"			4	1
	Mwakirunge Cl'nic	M.N.	"	"			1	1
	Maunguja Clinic	M.N.	"	"			1	1
	Mtongwe	M.S.	"	"		1	3	1
	Shika Adabu Clinic	M.S.	"	"			3	1
	Alms House Disp	M.I.	"	For aged			1	1
	S.T.D.(V.D.) Clinic	"	"	O.P.			2	
	T.B.	"	"	"			2	
	Bilharzia	"	"	"			1	1
SPECIAL CLINICS	Food Handlers	"	"	Med Exam				
	Leprosy	"	"	O.P.			2	2
	Staff Clinic	"	"	G.O.P.		1	1	1
	Inoculation	"	"	Inoculation				

FACILITIES		LOCATION	STATUS RESPONSIBLE ORGANISATION	SERVICE GIVEN	CAPACITY (BEDS)	DOCTORS	PARA MEDICALS	OTHERS
HEALTH CENTRE	Tudor Harambee	Tudor M.I.	Government	G.O.P		1	1	2
	National Youth Service	"	"	"		3		
	Shanzu Teachers College	M.N.	"	"		1		
	Shimo La Tewa School	N.N.	"	"		1		
	Railways	M.I.	K.R.	"		3	1	1
	Navy	M.S.	Government	I.P.	1 1	19	1	1
	K.P.A.	M.I.	K.P.A.	GOP/IP MCH/FP	20 2	27	58	1
	Kenya Cargo	"	K.C.H.S.	GOP/MCH/ FP	- 2	17		3
	Bamburi P.C.C.	M.N.	Industrial	GOP	5 P.T	4		
	Mkomani Clinic	M.N.	Private	GOP/MCH/FP	6 2	19	1	1
HEALTH CENTRES DISPENSARIES	E.A.O.R.	M.W.	Industrial	GOP	1 P.T	2		
	K.M.C.	M.W.	"	"	1 P.T		1	1
	Kenya Breweries	M.I.	"	"	3 P.T		2	
	Social Services League	"	Private	"	3			
	Stella Maris Disp	M.S.	Catholic	"			1	1
	Mary Immaculate H/C	M.I.	"	"	6		2	1
	Likoni H/Centre	Likoni MS	Government	GOP/MCH/ FP		11	1	5
	F.P.A.K.Clinic	M.I.	PFAK/Priv)	F.P.	1P.T	1		
	Associated Vehicle Assembly	M.W.	(Industrial) Private	GOP	4P.T		2	1
	Brollo Dispensary	"	Industrial (Private)	"	1 P.T		1	
State House Disp	M.I.	Government				2		
NOTE: SOON TO START								
	Chasani Health S/C	M.W.	Municipal	GOP				
	Mikindani Health S/C	"	"	MCH/FP				
	Bamburi	M.N.	"	"				

N.B. Over 120 General Practitioners in all Four Divisions

Source: Medical Officer of Health, Mombasa 1985

1. ABBREVIATIONS IN FULL ARE AS FOLLOWS:

M.I.	Mombasa Island
M.N.	Mombasa North
M.W.	Mombasa West
M.S.	Mombasa South
IP	In Patient
OP	Out Patient
G.O.P.	General Out Patients
MCH/FP	Maternal & Child Health/Family Planning
P.T.	Part Time
FPAK	Family Planning Association of Kenya
S.T.D.	Sexually Transmitted Diseases
K.P.A.	Kenya Ports Authority
E.A.O.R.	East African Oil Refineries
K.C.H.S.	Kenya Cargo Handling Services
Mat	Maternity
Med Exam	Medical Examination
K.R.	Kenya Railways

2. The Communicable Disease Control Centre is in charge of the following special clinics & Units:

- (a) Sexually Transmitted Diseases Clinic
- (b) Tuberculosis Clinic
- (c) Bilharzia Clinic
- (d) Leprosy Clinic
- (e) Food Handlers Clinic
- (f) Mosquito Control Unit
- (g) Vermin Control Unit

3. The following important sections & functions come under the public Health Department of the Municipal Council of Mombasa:

- (a) Health Inspectorate with 16 Public Health Officers and 30 Public Health Technicians.
- (b) Cleansing section with around 800 employees including: