



INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION  
&  
WESTERN INDIAN OCEAN MARINE SCIENCE ASSOCIATION

## Marine Science Country Profiles

### *Kenya*

MIKA ODIDO



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## PREFACE

The Marine Science Country Profile (MSCP) is a tool designed to assist individuals, local and international organisations and governments, in making informed decisions regarding allocation of funds to marine sciences programmes, and identification of programmes to be undertaken. It provides an overview of infrastructure in terms of facilities, training and education which may be required to support proposed programmes. In short, the MSCP is supposed to reveal the true picture of the marine sciences in a country, with respect to the available resources (e.g. personnel, facilities, etc.) as well as strengths and deficiencies in the national marine sciences capabilities.

The MSCP provides the following:

- I. a general outline of the main productive activities and sea-related infrastructures within the country's economy, as well as relevant national institutions and policies, particularly those concerned with research and education in marine science and technology;
- II. an objective view of national capabilities in marine science and technology, including institutional aspects, scientific and technical personnel, infrastructures, laboratories and working facilities at sea, common support services, etc.
- III. an assessment of available information and data with a view to determining bottlenecks and other constraining factors.

The Kenya Marine Science Country Profile is produced within the framework of Intergovernmental Oceanographic Commission (IOC) - Western Indian Ocean Marine Science Association (WIOMSA) co-operation and as a contribution to the International Oceanographic Data and Information Exchange (IODE) programme. The MSCP has also been prepared for the following other countries in the WIO region; Madagascar, Mozambique, Tanzania, Comoro, Seychelles and Mauritius. These profiles contain information that has been gathered through library research and interviews with responsible individuals of various organisations. The multidisciplinary approach has been used during the preparations of these documents, since they cover physical and biological characteristics of the coastal resources and their contribution to the economy; social and economic aspects of the coastal communities; human resources, the role of various institutions in the management and development of coastal resources, and national/priorities in terms of management and development of coastal and marine resources.

We would like to acknowledge the assistance provided by Kennedy Ochejo of RECOSCIX-WIO who extracted information required from WIODIR, and the catalogue of holdings of Marine Science Libraries in Western Indian Ocean (WIOLIB).

We would also like to express our thanks to Ms Eunice Onyango who assisted in preparation of the document.

# **1. GENERAL BACKGROUND INFORMATION**

## **1.1 Physical Environment**

Kenya is located on the Eastern African Coast between latitudes 5° 40' north and 4° 4' south and between longitudes 33° 50' and 41° 45' east. The country is bordered by Tanzania to the South; Uganda to the West; Sudan and Ethiopia to the North; and Somalia and Indian Ocean to the East. Kenya has an area of 590,000 km<sup>2</sup> and a coastline 608 km long. The breadth of the territorial waters is 12 nautical miles as described in the Maritime Zones Act of 1991 (ANNEX I). The area is approximately 9000km<sup>2</sup> (Kinyanyui, 1984). For the purposes of measurement of territorial waters, the Ungwana Bay is deemed as a historic bay. The Exclusive Economic Zone is 200 nautical miles wide (Figure 1).

Administratively, Kenya is divided into eight provinces: Central, Coast, Eastern, Nyanza, Rift Valley, Nairobi, North Eastern and Western. All provinces except Nairobi are divided into districts. The districts in Coast province are Kilifi, Kwale, Malindi, Lamu, Tana River and Taita Taveta. Nairobi is the capital city and Mombasa the main sea port. (Figure 2).

Kenya has diverse landforms ranging from the coastal plains through the dry Nyika Plateau to the savana grasslands and the highlands on both sides of the Rift Valley. The highlands which are traversed by the Rift Valley are dominated by Mount Kenya, the Mau Ranges, Mount Elgon, and the Aberdare or Nyandarua Range. The vast expanse of the north-eastern Province varies from flat semi-desert in the east to the more rugged country west of Lake Turkana.

## **Drainage and Water Resources**

The drainage system of Kenya is determined and influenced by the Great Rift Valley running approximately north to south. From the flanks of the rift valley, water flows westwards to Lake Victoria and eastwards to the Indian Ocean with the rift valley itself having an internal drainage system.

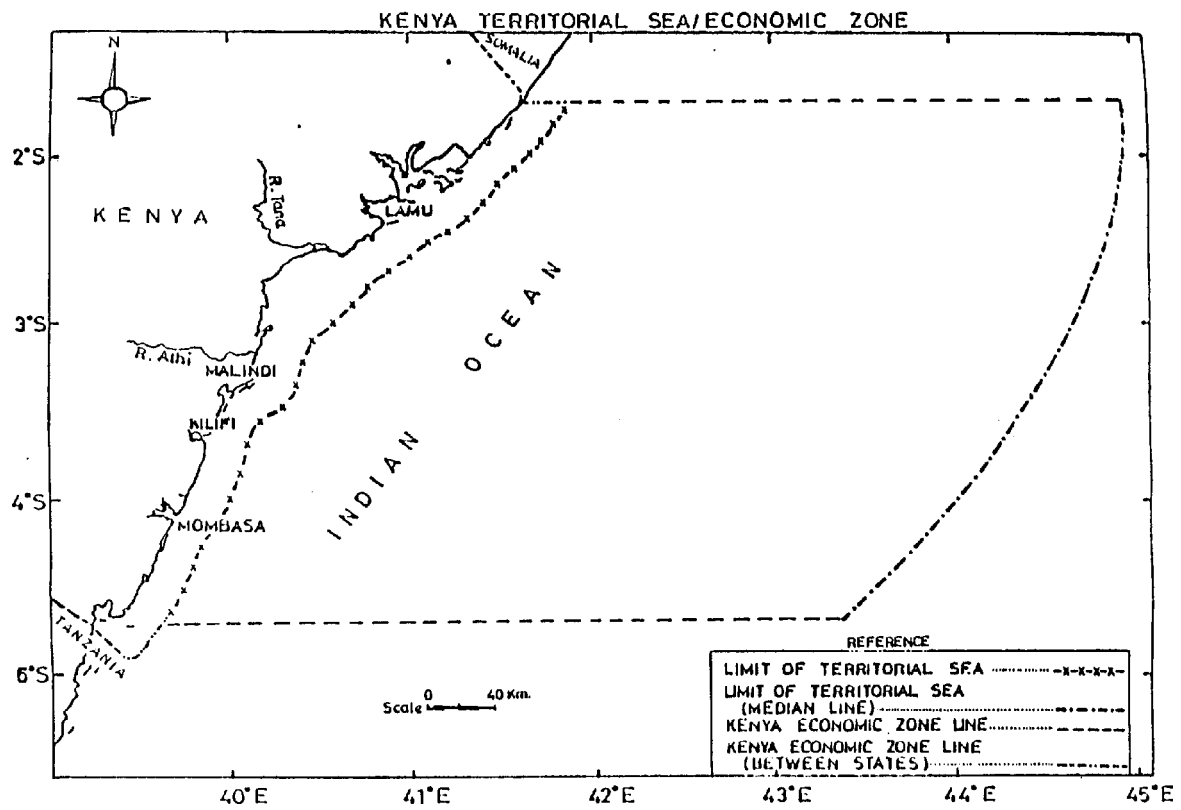


Figure 1. Kenya Territorial Sea and Exclusive Economic Zone

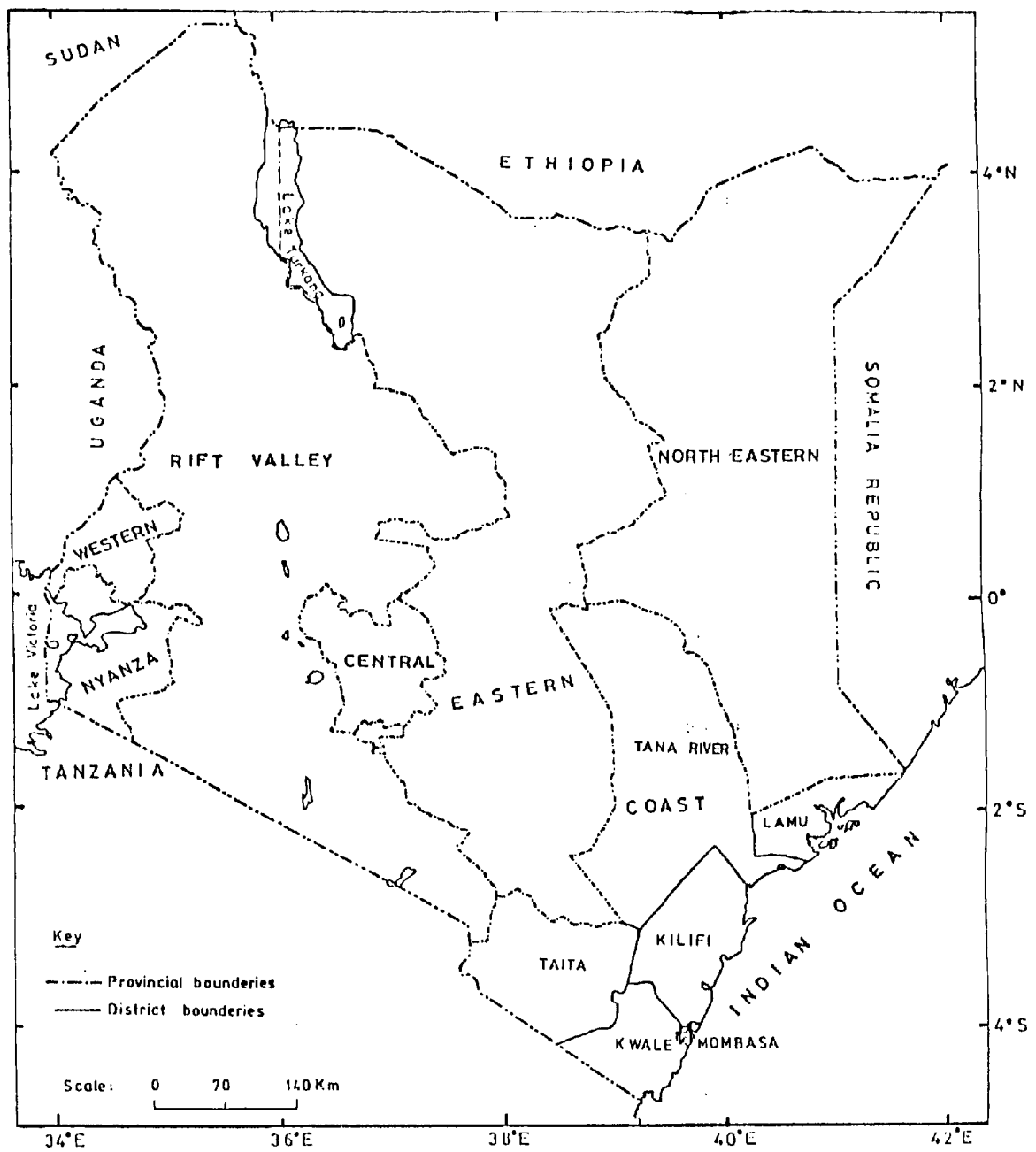


Figure 2 Kenya Provinces and Coastal Districts

The major drainage basins in Kenya include the Lake Victoria Basin, Rift Valley Basin, Athi (and coastal areas south of the Sabaki River) Basin, Tana River Basin and the Ewaso Nyiro and north-eastern Basin. The main rivers drain radially from the central highlands into the Rift Valley and eastwards into the Indian Ocean. Rivers to the west of the Rift Valley drain westwards into Lake Victoria, while those north of Mount Elgon and from the highlands along the Sudan-Ethiopia border drain mainly into Lake Turkana (Figure 3).

Although Kenya has numerous rivers, a comparatively small number are permanent, among them the Tana, Athi, Nzoia, Yala, Sondu, Nyando and Mara. Of these rivers, River Tana is the longest, draining the slopes of Mount Kenya and the Aberdares Range into the Indian Ocean. The Athi River, also called Galana and Sabaki in the lower reaches is the second largest and also drains into the Indian Ocean.

The geological, topographical and climatic factors influence the natural availability and distribution of water with the rainfall distribution having the major influence. The quality and quantity of water varies seasonally from basin to basin, but their average yields have been estimated (Table 1).

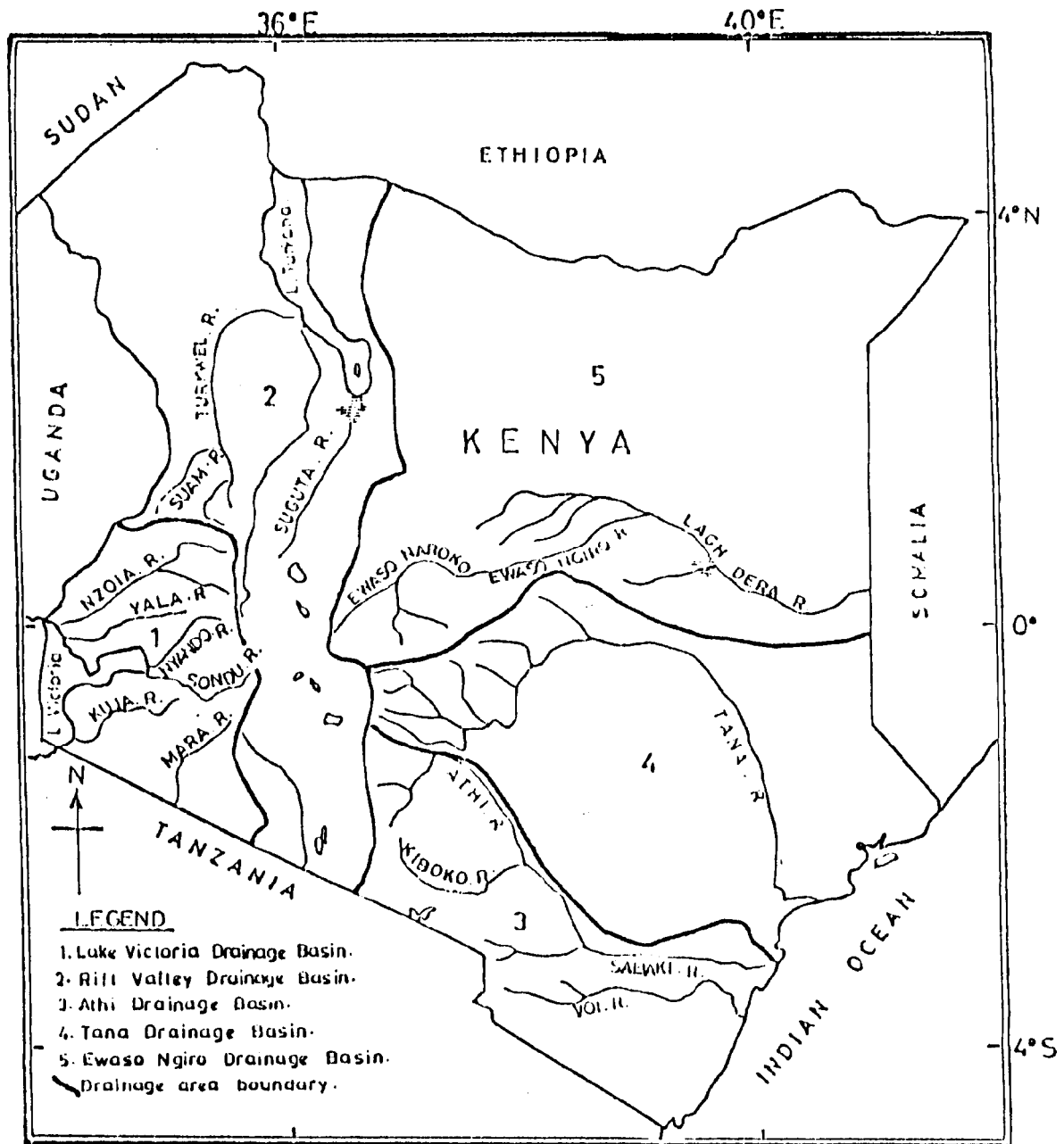
## Climate

The climate of Kenya is controlled by the movement of the inter-tropical convergence zone (ITCZ). The influence of ITCZ is then modified by the latitudinal differences, giving rise to varied climatic regimes. The country's equatorial location and its position on the Indian Ocean seaboard also influence climate.

Annual rainfall follows a strong seasonal pattern. Along the Indian Ocean coastal area, January to March is generally dry, and the main rains come between the end of March and June, with the maximum rains in May. In the eastern, north-eastern, south-eastern and central areas, these are two distinct rainy seasons: March-May and October-December. June to September is dry, while April is generally the wettest month. The western Rift and Lake Victoria areas have no real dry season, and rainfall is generally high from March to September. Outside the highlands proper, most rainfall is received

**Table 1 The distribution of water resources by major drainage basins**  
(Safe yield in m<sup>3</sup> per day)

Basin	Surface Water	Ground Water
Lake Basin	11,993,184	118,622
Rift Valley	211,680	318,192
Athi River	582,336	222,319
Tana River	71,841,600	431,499
Ewaso Ngiro	674,784	602,281



*Source: National Water Master Plan Study 1992*

**Figure 3 The Main Drainage Basins of Kenya**

in April and May. Most parts of the highlands west of the Rift experience one rainy season from March to September (Table 2).



Altitude exerts the greatest influence on temperature. The temperatures vary from below the freezing point on the snow-capped Mount Kenya to over 40°C in some of the low-lying north and north-eastern parts of the country. Along the coast, temperatures range from 22-34°C during the North East Monsoon Season (December-March), reducing to about 19-29°C in the rainy months of June-August.

## Coastal Geomorphology and Oceanography

The coastal belt of Kenya may be divided into four physiographical units which are almost parallel to one another. These are from the coast to inland; the coastal plain; the foot plateau; the coastal range and the Nyika. The width of the coastal plain varies between 4km in the south to 40km in the north and is generally under 50 metres altitude. The coastal plain to the south of Malindi is occupied by recently formed reef limestone overlaid by sands and clays behind the north-south trending fossil reef limestone with lagoonal deposits occupying the low-lying and back reef areas. In the northern sector the Malindi-Mambrui area is dominated by deltaic deposits of sand, silt and clay and wind blown deposits that form the prominent dunes which lie parallel to the coastal zone. Another dominant feature in the northern sector is the remnant topography associated with the geological shifting of the Tana river mouth between Lamu and Mambrui. It is thought that this is related to the barrier island system observed between Mambrui and the Somali border. Offshore there is evidence of

**Table 2 Distribution of Rainfall in Kenya**

<b>Mean Annual</b>	<b>Land</b>	<b>%Total</b>
Rainfall (mm)	Area (Km <sup>2</sup> )	Land Area
>1000	64,070	11.2
800-1000	32,960	5.8
700-800	24,260	4.3
500-700	73,140	12.8
300-500	270,410	47.4
<300	105,730	18.4
<b>Total</b>	<b>570,570</b>	<b>99.99</b>

*Source: IGADD (1990)*

major rivers draining into the Indian Ocean in the Lamu area which are now represented by fossil underwater deltaic feature. The foot plateau coincides with the Jurassic shales and limestones and is partly covered by Pliocene sands. The foot plateau was probably a late Tertiary peneplain. (Schroeder, 1974; Caswell, 1953; Kairu, Personal Communication).

Significant peaks in the coastal range include: Jambo (460m), Shimba (440m) and Mwele (300m) to the south of Mombasa; and Jidana (300m), Senawe (340m) and Mangea (510m) to the north.

Kenya has a narrow continental shelf with depths dropping below 200 metres within less than 4km in most places. However, the shelf widens significantly at the mouths of rivers Tana and Sabaki, exceeding 15km off the northern end of Ungwana Bay.

The shoreline is protected by fringing reefs running along the coast with gaps at the areas adjacent to the mouths of the main rivers.

During the south-west monsoon season, a swift northern current (the East African Coastal Current), flows along the entire Kenyan coast. The current is enhanced by momentum from local winds and reaches velocities of up to 4 knots. However, during the north east monsoons the flow is southward along the coast to about 2°S (off Lamu) where the Somali current meets the East African Coastal Current. The velocity of the current is reduced to about 2 knots during this season.

The Kenyan coast experiences semidiurnal tides with spring range of up to 4 metres and neap range of about 1.8 metres.

## **1.2 DEMOGRAPHY**

The first population census was held in Kenya in 1948 recording a population of 5,408,000. Subsequent census have shown a rapid increase in population; 8,636,000 in 1962; 10,943,000 in 1969; 15,327,000 in 1979; and 21,449,000 in 1989. The growth rate increased from 2.29 per cent per annum to 4.00 per cent in 1979 and is now estimated at 2.6 per cent per annum. This dramatic drop in growth rate has been attributed to a trend towards late marriages, increased family planning awareness, increased urbanisation and increased mortality due to the Acquired Immune Deficiency Syndrome (AIDS).

The population is currently estimated at 28,267,000 (1996), and expected to increase to over 31,000,000 by the year 2000. A large majority of Kenyan population are young with about half (48.9 per cent) below 15 years and 60 per cent below 20 years old. The elderly aged 65 and over remain relatively fewer (2.2 per cent). The percentage urban population increased from 5.1 per cent in 1948 to 9.9 per cent in 1969 and was already 18.0 per cent at the last census in 1989. The literacy level for those aged 10 years and above was over 73.4 per cent in 1989.

The mean death rate for children aged 5 years and below decreased from over 250 per 1000 births in 1948 to 113 per 1000 births in 1989. However, there were wide disparities from district to district with Nyeri District in Central Province recording only 37 deaths per 1000 births compared to 204 per 1000 births for Siaya and South Nyanza Districts in Nyanza Province.

Average life expectancy has also increased from 49.6 years for males and 51.2 years for females in 1969 to 57.5 years and 64.4 years for males and females respectively in 1989. Life expectancy for Coast Province was only 56.5 years compared to the national average of 59.5 years (Tables 3 and 4).

**Table 3: Population Statistics By Province (1989)**

Province	% National pop.	% Land area	Density per km <sup>2</sup>	Life expectancy	Under 5 years mortality	% Urban pop.	No. of Urban Centres
Nairobi	6.2	0.1	1911	66.1	75	100	1
Central	14.5	2.3	235	68.4	50	10	19
Coast	8.5	14.7	22	56.5	131	32	15
Eastern	17.6	27.8	24	67.2	72	9	22
N. Eastern	1.7	22.5	3	54.7	131	24	7
Nyanza	16.4	2.2	280	51.5	179	14	19
Rift Valley	22.9	29	27	61.9	92	14	42
Western	12.2	1.5	317	56.7	155	7	14
NATIONAL			37	59.5	113	18	139

*Source: CBS, Statistical Abstracts 1995*

**Table 4: List of Coastal Urban Centres (with population over 2000 persons in 1989 census)**

	<u>Centre</u>	<u>District</u>	<u>Population</u>
1.	Mombasa	Mombasa	461800
2.	Malindi	Kilifi	34000
3.	Kilifi	Kilifi	14200
4.	Voi	Taita Taveta	13200
5.	Taveta	Taita Taveta	10400
6.	Hola	Tana River	9500
7.	Lamu	Lamu	9000
8.	Mariakani	Kilifi	8400
9.	Lunga Lunga	Kwale	8000
10.	Msambweni	Kwale	5700
11.	Kwale	Kwale	3500
12.	Garsen	Tana River	3200
13.	Mambrui	Kilifi	3000
14.	Wudanyi	Taita Taveta	28000
15.	Watamu	Kilifi	2100

*Source: CBS, Statistical Abstracts 1995*

Whereas the Coast Province occupies 14.7 per cent of the country's total land area, it only had 8.5 per cent of the total population in 1989. The province also had a low population density of 22 persons per km<sup>2</sup>, and a relatively high rate of urbanisation of 18 per cent. However, Mombasa stood out with a population density of 1637 persons per km<sup>2</sup>. There were 15 urban centres with populations over 2000 persons in Coast Province in 1989.

### 1.3 ECONOMY

The Gross Domestic Product per capital has increased from K£ 389 in 1991 to K£707 in 1995 (1K£=20 KShs). However when adjusted at constant 1982 prices the values declined from K£ 176 in 1991 to K£ 170 in 1995. This is due to massive inflationary trends experienced in 1993 (Table 5). Total employment, excluding employment in small scale agriculture and pastoral

activities rose from 2.75 million in 1992 to 3.86 million in 1995. Wage employment (excluding informal sector, self employed and unpaid family workers) rose from 1.462 million to 1.557 million in the same period (Tables 5-6). 44 percent of these were employed in the public sector. Coast Province accounted for 12.5 percent of the people in wage employment.

Agriculture is the mainstay of the Kenyan economy, providing employment for 75% of the labour force and accounting for 30% of the Gross Domestic Product. The main cash crops are: tea, coffee and horticulture.

Tourism has increasingly played an important role in the country's economy and has surpassed the combined tea and coffee earnings to become the main foreign exchange earner for the country. Coastal tourism accounts for 60 - 70% of the national tourism industry. Tourism and related sectors generate nine percent of the total employment.

The liberalisation of the economy over the last few years has provided impetus for the manufacturing sector to grow rapidly. The sector now accounts for 13.6 per cent of the GDP.

**Table 5 Key Economic And Social Indicators, 1991 - 1995**

		1991	1992	1993	1994	1995**
1 Population .....	(million)	25	25	26	27	28
2. Growth of GDP at constant prices.	(per cent)	2.1	0.5	0.2	3.0	4.9
3. GDP at market prices .....	(K£ mn)	11,062	12,807	16,007	19,684	23,040
4. Net cost of petroleum products	(K£ mn)	213	389	872	620	714
5. Trade balance .....	(K£ mn)	-1,094	-1,213	-1,378	-1,472	-2,891
6. Money supply .....	(K£ mn)	3,716	4,965	6,241	8,136	9,649
7. Total domestic credit .....	(K£ mn)	4,330	4,993	5,011	7,316	10,090
8. Balance of payments (current account)	(K£ mn)	-290	-157	288	291	-1,020
9. Coffee marketed production ..	('000 tonnes)	87	88	78	82	96
10. Tea marketed production ..	('000 tonnes)	204	188	211	209	245
11. Maize marketed centrally ..	('000 tonnes)	304	324	242	316	401
12. Wheat marketed centrally ..	('000 tonnes)	199	126	73	105	126
13. Sugar-cane production .....	('000 tonnes)	4,048	3,657	3,839	3,308	4,394
14. Milk sold centrally .....	(mn litres)	359	220	249	258	350
15. Manufacturing output .....	(K£ mn)	10,818	11,877	15,908	19,428	23,074
16. Construction output .....	(K£ mn)	1,005	1,066	1,293	1,447	1,591
17. Cement Consumption .....	('000 tonnes)	1,119	1,118	894	859	1,065
18. Petroleum Consumption .....	('000 tonnes)	1,755	1,840	1,826	2,009	2,067
19. Electricity Consumption .....	(mn Kwh)	2,854	2,915	3,074	3,205	3,333
20. Tourism earnings .....	(K£ mn)	594	713	1,222	1,405	1,250
21. New registration of vehicles ..	(number)	15,516	14,784	12,420	17,928	22,224
22. Rail freight .....	(mn tonnes-km)	1,865	1,627	1,312	1,172	1,456
23. Air passengers handled .....	('000)	2,617	2,582	2,721	2,773	2,712
24. Wage employment .....	('000)	1,442	1,462	1,475	1,505	1,557
25. Education-primary enrolment	('000)	5,456	5,530	5,429	5,557	5,545
26. Education-secondary enrolment ..	('000)	614	629	531	620	632
27. Education-post secondary enrolment.	('000)	82	83	80	82	85
28. Hospital bed and cots .....	(number)	33,926	34,360	38,137	37,271	47,214
29. Registered doctors & dentists	(number)	4,088	4,218	4,458	5,188	4,510

30.GDP Per capita .....	(K£ )	389	436	519	610	707
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\*\* Provisional

**Table 6.1 Wage Employment By Industry And Sector, 1991 - 1995 ('000's)**

	1991	1992	1993	1994	1995*
<b>PRIVATE SECTOR</b>					
Agricultural and Forestry .....	200.9	203.0	205.9	213.1	226.8
Mining and Quarrying .....	3.6	3.7	3.8	3.9	4.0
Manufacturing .....	149.8	151.0	154.3	158.2	165.5
Electricity and Water .....	0.5	1.1	1.2	1.2	1.3
Building and Construction .....	40.7	42.0	42.4	44.2	47.1
Wholesale and Retail Trade, Restaurant and Hotels	108.8	111.0	114.1	119.7	127.9
Transport and Communications .....	27.3	33.8	36.4	37.2	38.1
Finance, Insurance, Real Estate & Business Services	47.3	51.5	54.8	57.1	59.7
Community, Social and Personal Services ...	147.7	171.3	176.6	182.6	196.6
<b>TOTAL PRIVATE SECTOR .....</b>	<b>726.6</b>	<b>768.4</b>	<b>789.5</b>	<b>817.2</b>	<b>867.0</b>
<b>PUBLIC SECTOR</b>					
Agricultural and Forestry .....	71.1	70.9	68.3	67.9	67.2
Mining and Quarrying .....	0.8	0.7	0.7	0.7	0.7
Manufacturing .....	39.1	39.3	39.3	39.3	39.3
Electricity and Water .....	21.9	21.3	21.2	21.1	21.6
Building and Construction .....	31.7	31.2	30.2	29.3	29.3
Wholesale and Retail Trade, Restaurant and Hotels	7.9	7.5	6.9	6.9	7.0
Transport and Communication .....	48.9	43.1	41.2	41.2	41.0
Finance, Insurance, Real Estate & Business Services	19.0	19.1	17.9	17.9	18.3
Community, Social and Personal Services ...	474.7	460.6	460.3	464.0	465.6
<b>TOTAL PUBLIC SECTOR .....</b>	<b>715.1</b>	<b>693.7</b>	<b>686.0</b>	<b>688.3</b>	<b>690.0</b>

**Table 6.2 Wage Employment By Province, 1992 - 1995 ('000's)**

Province	1992	1993	1994	1995
Nairobi .....	375.2	376.1	393.7	400.1
Coast .....	186.3	187.3	189.6	194.5
North Eastern .....	13.1	13.4	13.8	14.3
Eastern .....	125.5	127.3	129.2	132.4
Central .....	206.3	209.5	212.4	219.9
Rift Valley .....	312.4	316.6	320.3	338.4
Nyanza .....	144.6	146.1	146.7	153.8
Western .....	98.7	99.2	99.8	103.6
<b>TOTAL</b>	<b>1,462.1</b>	<b>1,475.5</b>	<b>1,505.5</b>	<b>1,557.0</b>

\* Provisional

The fisheries sub-sector has continued to perform poorly due to inability to fully exploit the resources. This has been attributed to high cost of credit, inadequate marketing outlets and inefficient technologies. The lack of adequate capacity to effectively utilise the Exclusive Economic Zone in the Indian Ocean and the inefficiency in transforming semi-processed fish products to standard finished output continued to affect the performance of the sector negatively. The quantity of freshwater fish landed rose to 198,000 tonnes in 1994 before decreasing to 194,000 tonnes in 1995. Marine fish, crustaceans and other marine products increased from 5000 tonnes in 1994 to 6200 tonnes in 1995, having previously reached a higher harvest of about 10000 tonnes in 1990 (Table 7).

The value of exports has risen from K£ 4867 million in 1995. Tea and coffee alone accounted for more than 30 percent of total export earnings in 1995 (Tables 8.1 - 8.3). Other major exports included horticulture, petroleum products and beverages and tobacco. The main export destinations were countries in Africa (48.8 percent) and European Union (32 percent).

**Table 7 Quantity And Value Of Fish Landed, 1991 - 1995**

	1990	1991	1992	1993	1994	1995*
Quantities - Tonnes:						
Freshwater fish:-						
Lake Victoria . . . .	185,101	186,366	151,2106	174,829	193,652	190,009
Lake Turkana . . . .	3,180	1,078	1,543	871	1,125	974
Lake Naivasha . . . .	223	299	238	109	75	204
Lake Baringo . . . .	380	130	255	37	7	68
Lake Jipe . . . .		107	112	101	117	112
Fish Farming . . . .	973	1,009	1,017	1,014	1,119	1,064
Other areas . . . .	1,949	2,109	1,676	1,895	1,866	2,028
TOTAL	191,806	191,098	156,057	178,856	197,961	194,459
Marine fish . . . .	9,031	6,434	6,276	3,823	4,138	5,286
Crustaceans . . . .	733	766	573	373	554	657
Other marine products . . .	208	264	345	141	312	288
GRAND TOTAL	201,778	198,562	163,251	183,193	202,965	200,690
Value - K£ '000:						
Freshwater fish . . . .	80,174	83,306	162,277	180,446	185,927	164,416
Marine fish . . . .	6,824	3,765	5,914	4,807	9,088	9,713
Crustaceans . . . .	3,189	3,019	3,108	2,829	3,370	3,662
Other marine products	345	536	850	202	211	221
TOTAL	90,532	90,626	172,149	188,284	198,596	178,012

(\*) Provisional

**Table 8.1 Value Of Principal Exports 1990 - 1994 (K£ million)**

Commodity	1990	1991	1992	1993	1994
Tea	314.51	381.63	474.91	933.66	844.07
Coffee	221.00	218.43	206.34	551.51	652.90
Horticulture * *	128.03	143.83	158.13	269.58	277.00
Petroleum products	140.24	254.96	235.93	335.72	253.43
Beverages and Tobbaco	13.56	16.85	35.29	103.69	143.29
Fish and Preparations	30.82	37.97	42.11	86.39	95.31
Animal feeds	28.02	12.65	19.47	40.71	93.27
Cement	12.62	17.02	24.43	65.03	81.66
Textiles, yarns, fabrics etc.	9.68	20.40	20.94	52.65	79.02
Pyrethrum products	20.93	32.24	36.57	49.61	78.33
Animal and vegetable oils and fats	1.95	2.83	6.68	36.37	70.33
Leather	32.20	35.45	40.09	77.67	60.21
Sodium Carbonate	24.36	30.97	27.26	61.43	48.59
Petroleum by-products	12.50	12.81	12.74	32.27	43.75
Paper and paper products	6.42	9.77	9.32	29.18	43.37
Machinery and Transport equipment	5.98	7.93	9.49	26.99	42.20
Footware	0.79	0.91	3.72	22.35	36.30
Sisal fibre and tow	18.94	17.67	17.44	36.28	33.12
Wood and wood products	3.15	3.60	5.62	20.52	30.16
Printed matter	3.21	17.75	30.32	20.15	16.57
Wattle Bark extract	6.87	7.38	9.93	19.43	14.70
Hides and Skins	1.19	0.63	0.94	6.02	14.19
Flourspar	8.42	6.99	7.06	12.81	11.71
Glassware	1.06	2.16	0.98	8.00	11.61

\* \* Horticulture includes fruits and vegetables, both fresh and processed

**Table 8.2 Percentage Export By Broad Economic Category, 1991 - 1995**

	1991	1992	1993	1994	1995**
<b>TOTAL EXPORT VALUE*</b> <b>(K£ million)</b>	1,533.83	1,708.08	3,625.21	4,170.72	4,656.18
<b>PERCENTAGE SHARES:</b>					
1. Food and Beverages .. . . .	53.31	54.40	54.79	51.49	51.14
2. Industrial Supplies (Non-Food) ..	20.90	21.75	24.21	29.36	26.90
3. Fuel and Lubricants .. . . .	17.35	14.43	9.76	6.54	5.26
4. Machinery and other Capital Equipment .. .	0.70	0.81	0.65	0.90	1.38
5. Transport Equipment .. . . .	0.28	0.47	0.84	1.13	0.53
6. Consumer Goods not elsewhere specified .. .	7.40	8.14	9.75	13.58	14.78
7. Goods not elsewhere specified .. .	0.06	-	-	-	0.00
<b>TOTAL .. . . .</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\* Excluding Re-exports \*\* Provisional

**Table 8.3 Destination Of Total Exports \*, 1991 - 1995 (K£ million)**

	1991	1992	1993	1994	1995**
European Union	632.62	691.31	1,320.21	1,365.50	1,555.70
Other Western European	59.42	53.36	131.22	112.77	40.17
Eastern Europe	2.90	0.97	6.65	7.05	5.31
United States of America	57.83	63.29	137.18	146.83	131.66
Canada	10.33	11.49	29.81	28.92	31.02
Africa	380.29	469.49	1,274.46	1,909.06	2,376.77
Middle East	46.85	50.56	104.97	74.33	115.81
Far East and Australia	174.88	236.25	446.89	484.52	530.53
All other countries	6.72	11.84	29.79	24.17	35.64
Aircraft and Ships Stores	180.26	153.70	197.07	128.98	44.34
All Exports	1,552.12	1,742.26	3,678.25	4,282.13	4,866.95

Excluding gold and currency but including Re-Exports \*\* Provisional

Imports have however risen more rapidly, moving from K£ 2646 million in 1991 to K£7758 million in 1995. The main imports were industrial machinery (16.8 percent); crude petroleum and refined petroleum products (12.9 percent); and motor vehicles and chassis (12 percent). The main source of imports were the European Union (41.5 percent) and countries of the Far East and Australia (27.1 percent). Table 9.1 - 9.3.

**Table 9.1 Percentage Imports By Broad Economic Category, 1990 - 1994**

	1991	1992	1993	1994	1995*
<b>TOTAL IMPORT VALUES* (K£ million)</b>	2,645.91	2,954.86	5,056.42	5,753.99	7,758.41
<b>PERCENTAGE SHARES</b>					
1. Food and Beverages .. . . .	4.53	7.62	6.24	10.04	4.53
2. Industrial Supplies (Non-Food) ..	37.60	37.56	38.02	39.37	39.22
3. Fuel and Lubricants .. . . .	18.70	21.24	24.81	16.15	12.98
4. Machinery and other Capital Equipment .. .	23.00	20.29	14.62	15.35	19.25
5. Transport Equipment .. . . .	11.07	8.05	9.13	12.27	17.00
6. Consumer Goods not elsewhere specified .. .	5.01	5.05	7.08	6.69	6.88
7. Goods not elsewhere specified .. .	0.09	0.19	0.10	0.13	0.15
<b>TOTAL .. . . .</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>	<b>100.00</b>

\* Provisional



**Table 9.2 Selected Imports, 1991 - 1995 (K£ million)**

	1991	1992	1993	1994	1995
Crude Petroleum .. . . .	441.71	549.39	946.53	720.38	579.63
Industrial Machinery (including Electrical)	569.97	506.35	653.28	811.93	1,303.21
Iron and Steel .. . . .	177.20	182.87	300.93	310.58	513.10
Motor Vehicles and Chassis .. . . .	184.46	144.51	276.29	475.76	932.98
Petroleum Products refined .. . . .	44.12	62.49	284.88	197.26	419.62
Artificial Resins and Plastic Materials, and Cellulose Esters and Ethers .. .	105.90	108.98	194.60	213.24	462.80
Pharmaceuticals .. . . .	75.38	96.95	273.55	173.63	237.38
Fertilizers .. . . .	62.63	75.13	166.60	170.60	120.56
Agricultural Machinery and Tractors .. .	33.83	37.09	53.97	49.17	88.61
Wheat .. . . .	48.70	34.09	152.61	125.88	116.97
Paper and Paper Products .. . . .	46.38	48.03	75.35	80.27	234.51
Rice .. . . .	29.36	28.46	23.30	69.05	22.44

Provisional

**Table 9.3 Origin Of Total Imports, 1991 - 1995**

	1991	1992	1993	1994	1995*
European Union	1,111.37	995.43	1,746.50	1,936.36	3,219.09
Other Western European	111.06	124.82	177.08	214.25	132.51
Eastern Europe	24.09	18.18	38.68	65.57	69.73
United States of America	132.06	243.43	293.40	381.60	323.06
Canada	24.41	21.30	40.17	26.55	31.98
Africa	79.01	94.06	121.63	790.92	701.46
Middle East	528.34	644.60	1,152.04	885.77	1,007
Far East and Australia	597.69	675.95	948.97	1,393.47	2,104.86
All other countries	37.88	137.09	538.00	59.50	168.71
All imports	2,645.91	2,954.86	5,056.42	5,753.99	7,758.42

\* Provisional

## 1.4 COASTAL RESOURCES UTILIZATION AND DEVELOPMENT

The Kenyan coast has played an important role in trade and communication in Eastern Africa from the time merchants from Arabia sailed to the area over 2000 years ago in search of gold, spices, ivory and other goods. There is evidence of settlements and trading centres built by them as early as the seventh century. The Portuguese also established trading posts along the coast from around 1498. Many settlements have retained prominent facets of Arab culture, which has been progressively integrated with aspects of African, Asian, and European culture. The coastal culture has provided the country with its national language - Kiswahili. Many of the earlier trading centres became important urban centres. These include: Mombasa, Malindi and Lamu among others.

### 1.4.1 Tourism/Marine National Parks and Reserves

The Kenya coast attracts the majority of tourists to the country (Table 10.1) coming to enjoy the beaches, marine parks and reserves and easy access to nearby national parks. Tourists staying in coast hotels account for over 60 per cent of all hotel bed nights in the country.

The number of visitors arriving in Kenya dropped from 863,400 to 690,500 from 1994 to 1995.

**Table 10.1 Hotel Bed-Nights Occupied By Zone, 1991 - 1995 ('000)**

Zone	1991	1992	1993	1994	1995*
Coastal Beach .....	3,881.7	3,482.5	3,762.0	3,071.5	3,059.6
Other .....	269.7	181.8	196.2	185.2	166.7
Coast Hinterland .....	184.9	142.7	146.2	133.2	120.3
Nairobi-High Class .....	544.0	569.1	649.9	550.7	613.7
Other .....	733.1	385.6	499.0	454.7	413.8
Central .....	407.7	307.7	369.0	299.0	275.4
Masailand .....	273.2	272.4	372.7	247.8	245.3
Nyanza Basin .....	100.7	91.6	105.6	82.8	78.6
Western .....	85.3	85.0	79.9	69.9	65.5
Northern .....	38.3	7.4	8.3	15.2	15.9
TOTAL OCCUPIED	6,518.6	5,525.8	6,188.8	5,110.0	5,054.8
TOTAL AVAILABLE	11,036.7	11,464.5	11,988.9	11,988.9	11,562.2

\* Provisional

**Table 10.2 Visitors To National Parks, Game Reserves And Museums In Coastal Region, 1986 - 1994**

	1988	1989	1990	1991	1992	1993	1994
Tsavo (East) .....	87,266	101,100	127,671	135,911	125,508	135,804	132,480
Malindi Marine .....	40,080	40,700	35,577	33,019	44,180	41,100	39,480
Shimba Hills.....	16,725	21,500	59,952	38,215	31,898	24,775	31,670
Kisite/Mpunguti .....	17,900	18,200	27,137	31,117	27,948	27,498	34,817
Mombasa Marine .....	-	-	-	-	-	-	48,017
Watamu Marine .....	-	-	-	-	-	-	32,117
Lamu Museum .....	53,000	13,000	11,412	13,380	10,370	10,850	10,487
Fort Jesus .....	189,600	206,100	226,611	187,008	187,400	167,193	221,400
Gedi .....	47,000	35,600	71,115	41,500	58,506	40,235	45,766
Jumba La Mwana .....	14,800	14,200	9,420	14,072	7,800	4,560	9,657

This decline was blamed on negative international publicity on the local security situation, decline in tourist infrastructure like roads, water and power competition from newly emerging destinations like South Africa. Various measures were taken to arrest this decline, including: formation of Kenya Tourism Board, establishment of a Tourist Police Unit and the initiation of a Beach Management Programme. Like other parts of the country there was a decline in the number of tourists visiting the coastal region in 1995. However, the sector has shown signs of recovery in 1996.

There are six marine national parks/reserves along the Kenyan Coast located at: Kiunga, Malindi, Watamu, Mombasa, Kisite and Mpungutuni. In addition to these, there are several terrestrial

parks/reserves in Coast Province at: Shimba Hills, Arabuko-Sokoke, Tsavo East, Doodori, Boni and Tana River (Figure 4). Other attractions include the museums at Fort Jesus in Mombasa and Lamu Fort in Lamu and several ruins and old settlements dating back to the seventh century scattered along the coastline.

### 1.4.2 Ports and Harbours

The second major economic resource in the Kenyan coast, after tourism is the Kilindini harbour in Mombasa. It derives its viability from its strategic position as a natural harbour and the extensive and reasonably productive hinterland covering: Kenya, Rwanda, Uganda, Burundi and parts of Tanzania, Zaire and Sudan. The port is managed by the Kenya Ports Authority.

The number of ocean going ships entering Kenya Ports reached a high point of 1755 in 1989, and there after began declining to a low point of 1466 ships in 1992. There has been a slight recovery to 1514 ships in 1994. Similarly the number of sailing ships has declined from 164 in 1989 to 87 in 1994 (Table 11.1)

The number of passengers going through the Mombasa Port reached an all time high of over 30,000 in 1991 and declined drastically to 9463 in 1994. Cargo handled at the Mombasa Port has increased steadily from 6,672,000 metric tonnes in 1988 to 8,127,000 metric tonnes in 1994 (Table 11.2).

### 1.4.3 Manufacturing Industries

The location of the port has attracted many industries to Mombasa. Plans to develop Export Processing Zones at Kipevu and Kokotoni, where investors will receive tax incentives so as to encourage them to increase production for the export market, will provide further impetus to the development of the manufacturing sector.

The main industries include cement manufacture, petroleum refinery and motor vehicle assembly. Listed before are some of the industries located in the coastal region (mainly Mombasa and Kilifi): food and beverages; textiles; timber/wood; printing and publishing; chemical industries; cement lime and plaster; manufacturing of building and construction materials; metal industry; electrical machinery, appliances and supplies; ship building and repair; assembly of motor vehicles; and electricity generation.

**Table 11.1 Vessels Entering Kenya Ports, 1987 - 1994**

	1988	1989	1990	1991	1992	1993	1994*
Number							
Ocean Going Ships	1,592	1,755	1,736	1,683	1,466	1,510	1,514
Sailing Ships	147	164	110	149	87	-	87
Net Registered Tonnage ('000)	6,146	6,093	6,189	5,948	7,127	7,151	7,153
Sailing Ships	3.9	10.0	22.0	25.5	4.0	-	24.0

Source: Kenya Ports Authority

**Table 11.2 Traffic Handled at Mombasa, 1987 - 1994**

	1988	1989	1990	1991	1992	1993	1994*
Passenger (Number)							
Embarked	3,215	5,388	8,261	12,511	12,028	8,800	4,441
Landed	4,749	6,976	10,527	18,273	15,779	8,894	5,022
Total	7,964	12,364	18,788	30,784	27,807	17,694	9,463
Cargo ('000 Metric Tons)							
Exports							
Dry Cargo	1,486	1,466	1,907	1,483	1,692	2,088	1,459
Petrol and oils (in bulk)	297	529	390	310	390	685	193
Total	1,783	1,995	2,297	1,793	2,082	2,773	1,652
Imports							
Dry Cargo	1,980	2,097	2,193	2,087	2,828	2,773	3,930
Petrol and Oils (in bulk)	2,887	3,104	2,999	3,228	2,981	2,371	2,483
Total	4,867	5,201	5,192	5,315	5,809	5,144	6,413
Transshipments	22	43	36	41	100	72	62
<b>Total</b>	<b>6,672</b>	<b>7,239</b>	<b>7,525</b>	<b>7,149</b>	<b>7,991</b>	<b>7,989</b>	<b>8,127</b>

Source: Kenya Ports Authority

\* Provisional

#### 1.4.4 Mineral Extraction

There are several minerals being extracted along the Kenyan Coast. These include:

- Salt - (Gongoni near Malindi)
- Gypsum - (Roka and Tula Valley) used for cement manufacture
- Iron Ore - (Jaribuni) used for cement manufacture
- Lead - (Kinongoni)
- Baryte - (Vitengeni) exploited with Galena as by-product
- Limestone - (all along coast) mined in Tiwi for chalk and Bamburi for cement
- Coral stone for building - all along the coast
- Pyrochlore - (Mrima hill) good potential for Niobius and rare earths, iron, manganese and gold. Not exploited.
- Clay - (Mazeras, Mombasa) for brick and tile manufacture
- Apatile - (Mrima Hills) high potential, not exploited.

A major discovery of titanium deposits on the Kenyan coast was announced as this report was being prepared. The find has been described as one of the largest and highest grade undeveloped resources of rutile and zircon in the world. The deposits are located at Mambrui (titanium minerals and zircon), and Sokoke (rutile, zircon and Ilmenite)

#### 1.4.5 Agriculture and Forestry

Most of the land in the coastal area is of low agricultural potential. The following agricultural products are important in the coastal region: horticultural products particularly vegetables and tropical fruits; sisal; cotton; coconuts; cashew nuts and bixa. A cashew nut factory was established at Kilifi in the north coast and a bixa factory in the south coast. However, these factories have not fared very well due to poor production of the two crops. The closure of the

Ramisi sugar factory which operated at Ramisi in the south coast led to the total collapse of sugarcane farming in the coastal region. The inadequate use of farm inputs like fertilisers has contributed to the poor performance of the agricultural sector in the coastal area. There is also substantial livestock production including poultry, beef, milk and mutton in the region. The establishment of "settlement schemes" in the coastal region (Lake Kenyatta, Hindi/Magogoni, Magarini and Witu settlement schemes) has led to increase in agricultural production in the region, especially for cotton and horticultural products.

There are approximately 54,000 hectares of mangrove forests in Kenya. They provide the local community with fuel wood, timber for house construction, fences and furniture. Mangrove forests are protected by Gazette notice 174 of May 20, 1964 and for such areas to be converted to other use there has to be a degazettement.

In recent years mangrove forests have been cleared to make way for agriculture, fish ponds, prawn farms, salt pans, residential houses, industries or dump sites. The ban on export of mangrove poles was lifted in 1996. There are fears that this move could exert more pressure on mangrove forests.

#### **1.4.6 Fisheries and Aquaculture**

Marine fisheries are an important source of protein for coastal populations. The main fishery along the Kenya coast is still artisanal. Most of the fishing is done in the creeks, on the reefs and in shallow inshore waters. While there has been a big increase in quantity and value of freshwater fish landed in Kenya, the marine fisheries sector has continued to perform poorly due to inability to fully exploit the resources. This has been attributed to high cost of credit, inadequate outlets and inefficient technology. The lack of adequate capacity to effectively utilise the Exclusive Economic Zone in the Indian Ocean and the inefficiency in transforming semi-processed fish products to standard finished output continue to affect the performance of the sector negatively.

The annual landing for 1995 was only 5300 metric tonnes for marine fish and 660 metric tonnes for crustaceans. This is very low compared to over 195,000 metric tonnes for freshwater fish (Table 7). Approximately 80 percent of these are from reef and shallow coastal waters and 18 percent from offshore trawlers. Nearshore fisheries are at or near maximum sustainable yields, while offshore areas are considered under-exploited.

There are several aquaculture activities along the coast of Kenya, including prawn farming in Malindi-Ngomeni area, artemia culture, tilapia farming at Baobab Farm Ltd. in Mombasa, and an oyster culture project run by the Shirazi women's group in Gazi with support from the Belgian Government through the Coast Development Authority. The pilot study for this project was done by Kenya Marine and Fisheries Research Institute (KMFRI) within the framework of the Kenya Belgium Project in Marine Sciences.

## **2. POLICIES AND INSTITUTIONAL FRAMEWORK**

### **2.1 POLICY AND LEGISLATION**

The management of the coastal environment and resources in Kenya is governed by various legislation covering different sectors and issues. Similarly no single policy document has been prepared specifically on conservation, development or management of the coastal zone. The National Environment Action Plan identifies 77 statutes relating to the management and conservation of the environment (ANNEX II), most of which apply to the marine coastal environment.

In the last few years, several task forces have been formed to review some Kenyan laws, including some related to the management of the coastal zone. Several policy documents relating to the marine areas have recently been finalised or are under review. The new Environment Policy and Forestry Policy documents were finalised in 1996.

The policy on Wildlife Conservation and Management is also being reviewed to take into account the conservation of biological diversity and representative indigenous ecosystems; the promotion of environmentally sustainable tourism and promotion of compatible land use in priority biodiversity areas, and channelling the benefits thereof to the local communities. The Wildlife Conservation and Management Act (Cap 376 of the Laws of Kenya) will be amended in line with the revised policy. According to the Policy Framework Paper 1996-1998, comprehensive environmental legislation will be presented to parliament for approval.

The Maritime Zones Act of 1989 consolidates the law relating to the territorial waters; provides for the establishment and delimitation of the Exclusive Economic Zone (EEZ) of Kenya; and provides for the exploration, exploitation, conservation and management of resources in the maritime zones. The Continental Shelf Act of 1975 vests the rights in the government in respect of the continental shelf, and the resources thereon, therein and thereunder. Whereas the holder of a title to land is free to use resources on the land, the “..water of every body of water.... is vested in the government” under the Water Act. Similarly all unextracted minerals, other than common minerals (eg. clay, murram, limestone) are vested in the government by the Mining Act (Cap 306 of the Laws of Kenya). Sand extraction is governed by local government by-laws.

Land ownership and land use is a particularly touchy subject in the coastal region because of the relatively large number of squatters (people staying illegally on land which they do not own). In the Policy Framework Paper, the government recognises this and indicates that a Land Use Commission will be created to address land tenure and land use policy issues. Other issues to be addressed in proposed land legislation is the ownerships/allocation of land created by recession of the sea.

The Fisheries Act (Cap 378 of the Laws of Kenya) provides for the development, management, exploitation, utilisation and conservation of fisheries and for connected purposes. Under the Act, the Fisheries Department, in collaboration with other appropriate agencies and other government departments shall promote the development of traditional and industrial fisheries, fish culture and related industries; and may impose measures necessary for the proper management of any fishery.

The Act also declares Kenya fishery waters a pollution prevention zone for the purposes of protecting the aquatic environment and ecology.

Regulations on pollution and its control are spread in several Acts, with different enforcing agencies. These include the Factories Act, the Public Health Act, Merchant Shipping Act and the Local Government Act. The Environmental legislation currently being prepared will consolidate statutes on pollution of the environment, especially the coastal environment.

Kenya is party to several international conventions including the Law of the Sea Convention, Framework Convention on Climate Change; Biodiversity Convention; Convention for the Protection; Management and Development of the Coastal Environment of the Eastern African Region (Nairobi Convention); and the Ramsar Convention. Kenya is the depository for the Nairobi Convention.

Other regulations governing access, use and management of environment and resources in the coastal area are listed in Annex III.

The laws relating to the coastal areas have not been adequately enforced by the relevant authorised institutions, owing to a number of reasons such as poor or weak administrative structures; absence of provisions to specify standards of performance; inadequate deference and inadequate incentives; generally low levels of active and participative awareness among the majority of the population; preference for short term gains at the expense of more sustainable alternatives in policy making and planning; gaps and overlaps in institutional responsibilities making enforcement difficult; and poverty which promotes unsuitable use of resources. Some of the enforcing agencies do not have the necessary resources to adequately enforce regulations and follow-up on complaints and violations.

## **2.2 NATIONAL AUTHORITIES IN MARINE AFFAIRS**

There is no single authority/institution responsible for all aspects of marine affairs. Several departments of government ministries and parastatal organisations deal with specific aspects of marine affairs. Inter-ministerial or departmental committees, and committees bringing together government and non-governmental organisations have been created to address issues that transcend the mandates of single organisation like oil spill response. Below are some of the departments and committees dealing with marine affairs:

### **Office of the President**

Three departments falling under the office of the President deal with marine affairs. The Department of Provincial Administration and Internal Security with personnel from provincial, through district to divisional and location levels are involved in various aspects of marine affairs in the coastal areas. This include approval of development plans and management of the environment. The Police in the same department are responsible for security.

The Kenya Navy, under the department of defence is responsible for patrolling the Kenyan Waters.

The Government Chemists Department does the chemical analysis of samples for various government ministries and departments. The Mombasa laboratory of the department has undertaken marine pollution monitoring activities.

### **Ministry of Land Reclamation, Regional and Water Development**

Two regional development authorities falling under the Ministry cover all or part of the coastal areas:

The Tana and Athi Rivers Development Authority (TARDA) which was established in 1974 is responsible for institution and co-ordination of development projects in the area drained by and bounded by the Tana and Athi Rivers and their tributaries. These are the two main rivers flowing into the Indian Ocean on the Kenyan coast. The authority has initiated numerous projects in aquaculture, power generation irrigation, and water management which have a direct impact on the discharge level of these rivers. The authority has also undertaken studies on changes the discharge/flow rates of the rivers and the impact this has on the coastal area.

The Coast Development Authority was established in 1992 to plan and co-ordinate the implementation of development projects in the whole of Coast Province and the Exclusive Economic Zone. The authority has been liaising with other government organisations in this regard and was the lead Institution for the development of a pilot Integrated Coastal Area Management Project in the Nyali-Bamburi-Shanzu area.

### **Ministry of Local Government**

The main local government authorities in the coast region are: Mombasa, Malindi and Voi Municipal Councils; and Kwale, Kilifi, Lamu, Taita Taveta and Tana River County Councils.

Local government authorities (Municipal, Township and County Councils) provide services, including construction of roads, markets, garbage collection and effluent treatment and disposal within their jurisdiction.

### **Ministry of Transport and Communication**

The Kenya Ports Authority and the Meteorological Department in the Ministry deal with marine affairs.

Kenya Ports Authority is responsible for construction, maintenance and operation of ports in Kenya. Currently, it manages the ports of Mombasa, Vanga, Shimoni, Funzi, Mtwapa, Kilifi, Malindi, Lamu and Kiunga. KPA also operates ferry services across Kilindini channel at Likoni and Mtongwe and is the single largest share holder in Kenya National Shipping Lines. KPA has a technical services division which is involved in surveys of harbours and ports.

The Meteorological Department is responsible for the collection of weather data and weather prediction. The Department provides prediction to shipping and also receives ship weather reports. The Department hosts the regional Institute for Meteorological Training and Research at Dagoreti in Nairobi.



### **Ministry of Tourism and Wildlife**

Two agencies within the Ministry are concerned with coastal issues;

The Fisheries Department is responsible for development, management, exploitation and conservation of fisheries. This is done through providing extension and training services, conducting of research and surveys; promotion of co-operation among fishermen, promotion of arrangement for orderly marketing of fish; providing infrastructure facilities and stocking waters with fish and supplying fish for stocking. The Department is also responsible for licensing fishing vessels, fish processors, fish dealers.

The Kenya Wildlife Services is responsible for the protection, conservation and management of wildlife in Kenya. KWS manages marine and terrestrial parks and reserves. KWS collaborates with KMFRI in research and monitoring activities within the marine parks and reserves. KWS also runs the Naivasha Wildlife Management and Fisheries Training Institute which provides training to low and middle level personnel.

### **Ministry of Environment and Natural Resources**

Two agencies within the Ministry are concerned with coastal issues;

The National Environment Secretariat within the Ministry is the co-ordinating body for matters related to the environment. There are plans to create a council to replace NES. Unlike NES, the council will have powers to enforce legislation for the protection of the environment.

The Forestry Department is responsible for development and management of Kenya forest including the mangrove forests.

### **Ministry of Research Technical Training and Technology**

The National Council for Science and Technology, National Research Institutes, and the Polytechnics and Technical Training Institutes fall under this Ministry.

The National Council for Science and Technology is the machinery for making available to the government advice upon all matters relating to scientific and technological activities and research necessary for development. NCST also co-ordinates research undertaken in the country. The Council has four advisory research committees concerned with: agricultural sciences; medical sciences; industrial sciences; and natural sciences. Marine sciences is the responsibility of the natural sciences advisory committee of the Council.

Kenya Marine and Fisheries Research Institute undertakes all aspects of aquatic research including biological, physical and chemical oceanography, pollution, fisheries, aquaculture, fishing technology and fish processing. The Institute is also the advisory body for the government on all matters related to aquatic sciences.

Kenya Forestry Research Institute undertakes forestry research including work on mangrove forests.

### **Ministry of Education**

Kenya has five public Universities: University of Nairobi, Kenyatta University, Moi University, Egerton University and Jomo Kenyatta University of Agriculture and Technology. Each of these Universities has courses covering some aspects of marine sciences in their programmes

### **Ministry of Public Works and Housing**

This Ministry is responsible for construction and maintenance of public infrastructure including roads and houses. The Ministry has constructed and maintain seawalls in Lamu and Pate Islands to protect the beaches.

### **Ministry of Foreign Affairs and International Cooperation**

Kenya is the depository for the Convention for the Protection, Management and Development of the Coastal Environment of the Eastern African Region (Nairobi Convention). This task has been assigned to the Ministry of Foreign Affairs and International Co-operation.

### **National Oceanographic Committee**

This Committee operates within the framework of the Kenya National Commission for UNESCO and brings together various organisations with an interest in marine affairs. The objectives of the committee are: to promote and develop marine science research and training in Kenya by facilitating the acquisition of information, cooperation in marine research programmes and activities, and the dissemination of marine science related information; to promote and develop joint actions directed towards sustainable utilisation of marine resources and conservation of the environment; to promote and develop the use of ocean services and related supporting activities. The committee acts as the focal point for IOC related activities and an advisory body on issues related to marine sciences in collaboration with the relevant institutions.

### **Natural Oil Spill Response Committee**

The Committee was formed to prepare contingency plans for dealing with oil spills on the Kenyan coast and also to oversee oil spill surveillance duties. Membership includes private companies and parastatals involved in oil refining and distribution; and government agencies dealing with wildlife, maritime activities and environmental conservation. These include Kenya Ports Authority, Kenya Wildlife Services, Kenya Marine and Fisheries Research Institute and the Fisheries Department.

The committee has an anti-pollution boat equipped with fire fighting equipment from the Kenya Ports Authority. Two aircraft from the Kenya Wildlife Services are used for oil spill surveillance duties and during emergencies. However they need better communication equipment and night watch facilities.

The Committee has submitted proposals to the government to provide it with legal status.

## **2.3 INTERNATIONAL RELATIONS IN MARINE AFFAIRS**

Kenya participates in the marine related activities of various international organisations. These include:

Intergovernmental Oceanographic Commission (IOC) of UNESCO where Kenya Marine and Fisheries Research Institute is the focal point. Kenya holds the Vice Chairmanship of the organisation. Programmes of IOC in which Kenya participates actively include GLOSS, IODE, TEMA, IGOSS.

Food and Agricultural Organisation (FAO) of United Nations. Kenya actively participates in the fisheries programmes of FAO where it is represented by the Fisheries Department and KMFRI. Kenya is also a member of the Aquatic Science and Fisheries Abstract (ASFA) Board and KMFRI is an ASFA Input Centre.

International Maritime Organisation: Kenya is a member of the organisation and is represented by the Kenya Ports Authority.

World Meteorological Organisation: Kenya is represented by the Kenya Meteorological Department and is also the regional centre for Africa and hosts the Regional Institute for Meteorological Training and Research.

Kenya is also a member of several regional bodies involved in marine science activities including:

IOC's Regional Committee for Co-operative Investigations in the North and Central Western Indian Ocean (IOCINCWIO) where KMFRI represents Kenya. Kenya is vice chairman of the organisation.

Indian Ocean Marine Affairs Commission (IOMAC): Kenya is a member and is represented by the Ministry of Foreign Affairs and International Co-operation.

### **2.3.1 International Organisation Located in Kenya with interest in Marine Activities**

The United Nations Environment Programme (UNEP) has its headquarters in Nairobi, Kenya. The UNEP Water Branch deals with coastal and marine science activities and is also the implementing agency for the Nairobi Convention for Protection, Management and Development of the Coastal Environment of the Eastern Africa Region.

The World Conservation Union (IUCN) also has a regional office in Nairobi. IUCN has projects dealing with marine biodiversity and Integrated Coastal Area Management.

The UNESCO Regional Office for Science and Technology in Africa (ROSTA) is also located in Nairobi. The activities of ROSTA include co-ordination of marine science programmes of UNESCO and IOC including the Regional Project for Research and Training on Coastal Marine Systems in Africa (COMARAF).

The Food and Agricultural Organisation of the United Nations also has a regional office in Nairobi which has been involved in fisheries research and development activities in the region.

### **3. CAPABILITY AND NEEDS**

#### **3.1 ORGANISATIONS INVOLVED IN MARINE SCIENCE AND TECHNOLOGY**

We can categorise organisations involved in marine science and technology into three broad groups: Higher Education Institutions, Research Institutions and Non-governmental Organisations.

##### **3.1.1 Higher Education Institutions**

###### **University of Nairobi**

The University was established in 1970 after dissolution of the University of East Africa.

The Faculty of Science in the College of Biological and Physical Sciences offers several courses in which marine science subjects are taught. The Departments of Botany and Zoology offer, jointly, a course in aquatic ecology at the undergraduate level.

The Department of Botany offers an MSc in Plant Ecology which includes; aquatic botany, eutrophication and pollution, ecology of marine algae, ecology of Phytoplankton, seagrass ecology, mangrove ecosystems and ecology of strand vegetation.

The Department of Zoology offers an MSc in Hydrobiology which includes; marine fauna and associated flora, types of marine environment, adaptation of marine animals, marine invertebrates, marine vertebrates, the sea as an ecosystem, marine resources, marine pollution, systematic lithology, physiology of fish, ecology of fish, techniques of fisheries, fish farming and biostatistics.

Other departments in the faculty of sciences offering courses in which marine science subjects are taught include: Meteorology, Geology, Chemistry and Geography.

The faculty of Science has facilities for teaching and research in marine sciences, including a field station at Diani beach on the South Coast of Kenya. The faculty also has several collaboration programmes with the Kenya Marine and Fisheries Research Institute.

Personnel from the University of Nairobi in marine science related fields are as follows:

Biology/Biological Oceanography,	
Marine ecology, biodiversity, fisheries	9
Chemical Oceanography, nutrients, natural	
products, marine pollution	1
Marine Geology	1
Aquaculture	3

###### **Moi University**

Moi University was established in 1984 to introduce new areas of learning which would help meet the high level manpower requirements of a modern and increasingly technological society.

The School of Environmental Studies offers postgraduate Diploma, Mphil and PhD programmes covering different aspects of marine sciences. These include: economics of the coastal zone and marine research management; economics of fisheries and wildlife management; forestry, fisheries and fisheries law; legal control of ocean pollution; Law of the Sea; planning and management of coastal marine environment; environmental oceanography; environmental monitoring and cartography; coastal and marine environment; status of aquatic and marine ecosystems; Environmental Impact Assessment; and Geographic Information Systems.

The Department of Fisheries in the Faculty of Forest Resources and Wildlife Management offers a fisheries course which is designed to provide the students with an overall perspective of the concepts of fisheries and aquaculture management, with reference to Africa and Kenya in particular.

Other departments that offer marine science related courses include Tourism in the Faculty of Forestry and Wildlife Management and Zoology in the Faculty of Science.

Personnel from Moi University in marine science related fields include:

Biology/Biological Oceanography, marine ecology, fisheries, biodiversity	9
Chemical Oceanography, natural products, marine pollution	1
Marine Geology	1
Aquaculture	2

Moi University is developing a field station for marine sciences at Malindi on the north Kenya coast.

### **Kenyatta University**

The University was started in 1965 as a college offering Secondary School Education and Secondary Teachers Certificate Course. The Secondary Education Division was phased out in 1973.

In 1970, Kenyatta College became a constituent college of the University of Nairobi offering Bachelors of Education Degree and Diploma in Education. The Secondary Teacher's Certificate course was phased out in 1975. In 1985, Kenyatta University became a fully fledged University.

In the Faculty of Science the Botany Department has courses in marine ecology and marine vegetation while the Zoology Department has a course aquatic ecology. The Faculty of environmental studies also has courses with marine science subjects.

Personnel from Kenyatta University in Marine Science related fields include:

Biology/Biological Oceanography, Marine Ecology, Fisheries, Biodiversity	6
Chemical Oceanography, Natural products, Marine pollution	1

## **Egerton University**

The Zoology Department has courses in marine biology while the Department of Resource Management has a course on marine ecosystems.

Personnel from Egerton University in marine science related fields include:

Biology/Biological Oceanography,  
Marine Ecology, Fisheries, Biodiversity

3

### **3.1.2 Research Institutions**

#### **Kenya Marine and Fisheries Research Institute**

The Kenya Marine and Fisheries Research Institute (KMFRI) was created in 1979 to take over the functions of the defunct East African Marine Fisheries Research Organisation (EAMFRO) and the East African Freshwater Fisheries Research Organisation (EAFFRO) in Kenya, by an amendment to the Science and Technology Act (Cap.250 of the Laws of Kenya). KMFRI was given the mandate to undertake research in:

- marine and freshwater fisheries
- aquatic biology including environmental and ecological studies
- marine research including chemistry and physical oceanography

The Institute is divided into two divisions, Coastal and Marine Areas and Inland divisions. Each division is headed by a Deputy Director. KMFRI headquarters is located at Mkomani in Mombasa. There are seven other research stations at Kisumu (Lake Victoria), Sang'oro (River Miriu), Kampi Ya Samaki (Lake Baringo), Kalokol (Lake Turkana), Naivasha (Lake Naivasha), Kegati in Kisii and Nairobi. The Nairobi station also doubles as the office of the Chairman. The Institute also has field stations at Lamu and Gazi on the Kenyan north and south coast respectively and Nataba on Lake Turkana.

KMFRI has laboratories for chemical and physical sciences with limited space. The Institute also has a pollution laboratory; nutrient laboratory and a wet lab with aquaria. KMFRI has received an Atomic Absorption Spectrophotometer (AAS); and Gas Liquid Chromatograph (GLC) within the framework of UNEP EAF/5 and EAF/6 projects.

The Institute does not have a lecture room or conference room and uses the library for meetings which inconveniences other library users. The Institute has a Information and Data Management Centre with 7 PC's, a digitizer and plotter. The Centre provides services in word processing, data processing and analysis, data and information archival and retrieval. A National Oceanography Data Centre (NODC) has recently been established at KMFRI.

KMFRI research activities are grouped into six programmes:

Fisheries; Aquaculture; Environmental and Ecological Research; Natural Products; Socio-economic; and Information and Data Management.

KMFRI has done a number of collaborative project with various institutions including the University of Nairobi, Kenyatta University, Moi University, National Museums of Kenya, Kenya Wildlife Services and the Coast Development Authority.

The scientists working in the Coastal and Marine Areas Division include:

Biology/Biological Oceanography, Marine Ecology	
Fisheries, Biodiversity	24
Physical Oceanography, Marine Meteorology, Hydrology	4
Chemical Oceanography, Natural Products,	
Marine Pollution	9
Marine Geology	4
Socio-economics, Fisheries Statistics	5
Aquaculture	6

With the following qualifications:

PhD	-	2
MSc	-	32 (15 registered for PhD)
BSc	-	19 (5 registered for MSc)

The Division also has 45 technicians, 4 of them with Higher National Diploma, and 7 with Ordinary National Diploma from the National Polytechnics and 5 with Certificate in Laboratory Techniques.

In addition the Institute has 40 research scientists working in the Inland (freshwater) Division.

### **Kenya Wildlife Services**

The Marine National Parks and Reserves division of KWS is responsible for its marine science programmes.

There are five scientists working in marine sciences related fields including Biology/Biological Oceanography, Marine Ecology, Fisheries and Biodiversity.

KWS has done collaborative research with KMFRI on Mida Creek biodiversity, pollution assessment in Mombasa and Kisite Mpunguti Marine Parks and an environmental impact study of Makupa Creek Oil Spill. KWS has patrol boats which are used in the marine park and reserves.

### **National Museums Of Kenya (NMK)**

The National Museums of Kenya has several programmes with marine science component. These include the Biodiversity Programme, Ornithology and the Coastal Archaeology Programme.

The Biodiversity Centre of the National Museums of Kenya was set to pursue the national and regional initiatives on biodiversity conservation. At the national level the centre is developing a research and action programme aimed at developing, gathering, storing, analysing and disseminating information required for the sustainable conservation of biological resources. Within the Centre, a department has been set up to be responsible for issues pertaining to marine

biodiversity. The general aim of this department is to gather, store and disseminate information on Kenyan marine life with a view to preserving and protecting the biodiversity.

The programme incorporates the element of public education and awareness to let the public know the benefits the sea provides through its products or ecological services and therefore share in the responsibility for conserving marine biodiversity.

NMK is currently undertaking a survey of birds in the coastal area in collaboration with KMFRI.

There are four personnel working in marine science related fields including marine biodiversity, marine ecology, fisheries and wetlands programmes.

### **Kenya Forestry Research Institute**

The Institute undertakes all aspects of Forestry Research in Kenya including mangroves.

There are four people working in marine science related fields including forestry ecology (mangroves) and socio-economics and policy.

### **Department Of Resources Surveys And Remote Sensing**

The Department has done country-wide surveys of resources using both aerial photographs and satellite imagery. In the marine sector they have surveyed mangroves and sedimentation from major rivers. They have actively co-operated with the Regional Centres of Services in Surveying and Remote Sensing based in Nairobi. There is one person working on mangrove ecology.

### **3.1.3 Non-Governmental Organisations**

#### **East African Wildlife Society (EAWLS)**

EAWLS was formed in 1961 by amalgamating the Wildlife Societies of Kenya and Tanzania and the Uganda Wildlife Conservationists. Its main objective is to safeguard the Wildlife and its habitats in all forms as a regional and international resource. Its a non-profit organisation and has played a leading role in promoting conservation and sustainable use of wildlife and the environment throughout East Africa. To this end the Society has invested over US\$ 2 million in over 1,000 environmental, wildlife and conservation education projects, several of which concern the marine environment.

The Society publishes a bimonthly newsletter 'Swara' and the 'African Journal of Ecology'.

#### **East Africa Natural History Society**

The Society was founded in 1909 as an amateur naturalist society. The society founded a museum, library and a journal. The library and museum were transferred to the government around 1930.

The society currently has over 1000 members (both locally and overseas). Its publications include: Journal of East African Natural History; Bulletin; Ballya (on succulent plants); Scopas (on orinithology); Kenya Birds



The society's subcommittees include the Kenya Wetlands Working Group and the Ornithological Steering Committee.

### **Society for Protection of Environment in Kenya (SPEK)**

SPEK is an environment and development oriented non-governmental organisation with two main objectives that define its mandate:

- (i) to increase the level of awareness of the community on environmental issues,
- (ii) to promote activities aimed at sustainable use of local resources.

The programmes have been drawn up to fulfil these objectives in the coast region. The first addresses environmental education and targets youth, resource users, women and industry. More than 500 people have benefitted from the programme which is implemented through demonstrations, workshops and seminars.

The second programme provides support to village based sustainable activities. Initial work began by identifying the protected areas from where the local community can derive greater benefits without adopting destructive methods. Such areas include mangrove forests and fishing areas.

SPEK has been particularly active in mangrove conservation where it spear headed the formation of a youth group called 'Friends of Mangroves' which organises an Annual Marine Conservation Youth Conference.

The group has also undertaken a mangrove reforestation project at the Kibarani dump site in conjunction with KMFRI, KWS, Forestry Department, CDA and the Mombasa District Environment Office.

### **Coral Reef Conservation Project (CRCP)**

CRCP is a project of the Wildlife Conservation Society with the following objectives:

- (i) to determine if localised species extinction of fin fish and other coral reef species assemblages (i.e coral and molluscs) are occurring on heavily fished reefs due to over-fishing and/or high sea urchin population densities;
- (ii) to determine the effect of an increase in sea urchin populations on the benthic productivity and species composition of the coral reef and its possible impact on commercial fisheries yields;
- (iii) to determine rates and processes of coral reef recovery from a sea urchin dominated to a fish dominated reef in relation to coral reef management practices.

The project works closely with the Kenya Marine and Fisheries Research Institute (KMFRI) and the Kenya Wildlife Services (KWS) and also organises training programmes in coral reef ecology and monitoring techniques for scientists from the Western Indian Ocean region.

### **Mombasa and Coast Tourist Association**

MCTA is a lobby group bringing together leading players in the tourist industry along the coast, including hoteliers and tour operators. The association has been actively involved in

conservation issues and is participating in the Mombasa Beach Management Programme. The association has also organised a “Save the Bahari Campaign” in collaboration with UNEP to increase public awareness of the marine environmental conservation issues.

### 3.2 GENERAL ASSESSMENT OF CAPACITY AVAILABLE

Most of the marine science and technology organisations in Kenya still lack sufficient trained skilled personnel. There is a need for a sustained capacity development programme to ensure that a critical mass of personnel is created. The institutions have also been affected by a high level of staff mobility. Trained and skilled people are able to attract better remuneration in the private sector. In some instances the lack of supporting infrastructure (equipment and funds) to enable them discharge their duties after training has also contributed to departures.

This initial survey shows that substantial capacity has already been developed in the biological sciences, which now account for 60 percent of all marine scientists and 73 per cent of all marine scientists with PhD degrees. The physical sciences (physical oceanography, marine meteorology) are the least developed, with less than five percent of the marine scientists (Table 12.1-12.2) Statistics of publications in marine science from Kenya available at RECOSCIX-WIO also reflect this dominance of the biological sciences. Out of about 200 articles, half are from biological sciences with the chemical sciences and marine pollution a distant second with about 20 percent of the publications (Table 12.3).

KMFRI with over 50 scientists in the Marine and Coastal Areas Division has by far the largest concentration of scientists in the country with different backgrounds.

**Table 12.1 Number Of Marine Scientists In Different Institutions**

	KMFRI	KWS	NMK	KEFFRI	DRSRS	UON	KU	MU	E U
Biology/Biological oceanography, Marine ecology, Fisheries, Biodiversity	24	5	3	3	1	9	6	9	3
Physical oceanography, Marine meteorology, Hydrology, Modelling	4					1		-	
Chemical oceanography, Natural products, Fish quality and Marine pollution	9					-	1	1	
Marine Geology	4					1		1	
Socio-economics, Fisheries statistics	5			1		-			
Aquaculture	6					3		2	
TOTAL	52	5	3	4	1	14	7	13	3

**Table 12.2 Qualifications Of Marine Scientists In Different Fields**

	BSc	MSc	PhD	TOTAL
Biology/Biological Oceanography Marine Ecology, Fisheries, Biodiversity	11	32	19	58
Physical Oceanography, Marine Meteorology, Hydrology	1	3	1	5
Chemical Oceanography, Natural products, Fish quality and Marine pollution	1	8	2	11
Marine geology		4	3	7
Socio-economics, Fisheries statistics	4	1	1	6
Aquaculture	3	8		11
TOTAL	20	56	26	98

**Table 12.3 Scientific Publications From Kenyan Scientists In Wiolib**

	No of Publications in WIOLIB
Biology/Biological Oceanography Marine Ecology, Fisheries, Biodiversity	104
Physical Oceanography, Marine Meteorology, Hydrology	15
Chemical Oceanography, Natural products, Fish quality and Marine pollution	19
Marine geology	7
Socio-economics, Fisheries statistics	13
Aquaculture	11
TOTAL	28

There has been a tendency to concentrate training of personnel at the medium and higher levels, in the process forgetting to cater for technician training and public awareness at the grassroot levels. Less than half of the 45 technicians at KMFRI have received training at diploma or certificate level, and none of them at degree level.

Facilities for marine science research in Kenya are limited, with none of the institutions having an ocean going research vessel. Kenya Wildlife Services has several patrol boats used in the marine parks while KMFRI has two rubber dinghies with outboard engines. KMFRI and Government Chemists Department have reasonable facilities for chemical analyses including Atomic Absorption Spectrophotometers and Gas Liquid Chromatographs.

Equipment and facilities for physical oceanography research are minimal, with KMFRI having only one current meter, two pressure gauges and two tide gauges installed at Mombasa and Lamu.

Most of the Non-Governmental Organisations draw their membership mainly from professionals already working with other institutions. Frequently they maintain a small secretariat and support work undertaken by scientists from other organisations like Universities and research institutions. Occasionally they employ people on short term contracts for specific studies.

Due to the limited resources, institutions have learnt to share capacity and resources available in order to address problems of mutual interest. For example the Government Chemists Department, KMFRI and KWS have put together their resources in a pollution monitoring programme in several places along the coast. Several institutions have signed 'Memorandums of Understanding' (MOU) to facilitate such collaboration (e.g. KMFRI/KWS, KWS/CDA, KMFRI/CDA, KWS/Forestry Department, KMFRI/Fisheries Department). Such mechanisms for Institutional co-operation should be strengthened to encourage the sharing of capacity and resources available.

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## **ANNEX I: AREA OF THE TERRITORIAL WATERS (extract from Maritime Zones Act)**

The area of the territorial waters of the Republic of Kenya extends on the coastline adjacent to the High Seas to a point twelve international nautical miles seawards from the straight baselines, low water lines or low tide elevations, hereinafter described as follows:-

Commencing on the straight line joining Diua Damasciaca Island and Kiungamwina Island at the point at which this line is intersected perpendicularly by the Median straight line drawn from Boundary Pillar 29 (being the terminal pillar of the Kenya-Somalia boundary);

thence continuing south westerly by a straight base line to Kiungamwina Island;

thence south westerly by a straight base line for about 25 km to Little Head;

thence south westerly by a straight base line for about 11 km to Boteler Island;

thence westerly by a straight base line for about 45 km to Ras Takwa;

thence south westerly by a straight base line for about 18 km to Kinyika Island;

thence south westerly by a straight base line for about 9 km to Tenewi Ya Juu Island;

thence south westerly by a straight base line across Ungwana Bay for about 56 km to the northernmost point of Ras Ngomeni;

thence continuing generally along the low water line to Ras Wasini;

thence southerly across the Wasini Channel to Ras Kisinga Mkoni;

thence by the low water line to Mpunguti Ya Chini Island;

thence westerly by a straight base line for about 18 km to the terminal of the Kenya/Tanzania land boundary at Ras Jimb.

## **ANNEX II : STATUTES RELATING TO THE ENVIRONMENT.**

1. The Constitution
2. The Penal Code Cap.63
3. The Chief's Authority Act, Cap.128
4. The Public Health Act, Cap.242
5. The Radiation Protection Act Cap.243
6. The Local Government Act Cap.265
7. The Trust Land Act, Cap.288
8. The Land Planning Act, Cap.303
9. The Mining Act, Cap.306
10. The Petroleum (Exploration And Production) Act, Cap.308
11. The Agriculture Act, Cap.318
12. The Water Act, Cap.372
13. The Wildlife (Conservation And Management) Act, Cap.376
14. The Tourism Industry Act, Cap.385
15. The Forests Act, Cap.385
16. The Merchant Shipping Act, Cap.389
17. The Traffic Act, Cap.403
18. The Tourist Development Corporation Act, Cap.382
19. The Lake Basin Development Authority Act, Cap.442
20. The Kerio Valley Development Authority Cap.441
21. The Tana And Athi Rivers Development Authority Act, Cap.443
22. The Factories Act, Cap.514
23. The Coast Development Authority Act, No.20 Of 1990
24. The Fisheries Act, No.5 Of 1989
25. The Maritime Zones Act, Cap.371
26. The National Water Conservation Pipeline Corporation Act L/No.270 1988
27. Carriage Of Goods By Sea Act, Cap.392
28. The Timber Act, Cap.386
29. The Government Lands Act, Cap.280
30. The Registration Of Titles Act, Cap.281
31. The Land Titles Act, Cap.282
32. The Land Consolidation Act, Cap.283
33. The Land Adjudication Act, Cap.284
34. Registration Of Documents Act, Cap.285
35. Land (Group Representatives) Act, Cap.287
36. Mazrui Land Trusts Act, Cap.288
37. Equitable Mortgages Act, Cap.291
38. Way Leaves Act, Cap.292
39. Distress For Rent Act, Cap.293
40. Land Acquisition Act, Cap.295
41. Rent Restriction Act, Cap.296
42. Survey Act, Cap.299
43. Registered Land Act, Cap.300
44. Landlord And Tenant Act, Cap.301
45. Land Control Act, Cap.302
46. Mortgages (Special)Act, Cap.304
47. Lakes And Rivers Act, Cap.409
48. Grassfires Act, Cap.327
49. Crop Production And Livestock Development Act, Cap.321

50. Local Authorities (Recovery Of Possession Of Property)
51. Antiquities And Monuments Act, Cap.215
52. Occupiers Liability Act, Cap.34
53. Plant Protection Act, Cap.324
54. Fertilizers And Animal Foodstuffs Act, Cap.345
56. Town Planning Act, Cap. 134 (1948)
57. Fire Inquiry Act, Cap.103
58. Wakf Commissioners Act, Cap.109
59. Explosives Act, Cap.115
60. Petroleum Act, Cap.116
61. Housing Act, Cap.117
62. Methylated Spirit Act, Cap.120
63. Malaria Prevention Act, Cap.246
64. Use Of Poisonous Substances Act, Cap.247
65. Food, Drugs And Chemical Substances Act, Cap.254
66. Local Authorities Services Charge Act, Cap.274
67. Continental Shelf Act, Cap.312
68. Suppression Of Noxious Weeds Act, Cap.325
69. Coconut Preservation Act, Cap.332
70. Pests Control Products Act, Cap.346
71. Mineral Oil Act, Cap.307
72. Irrigation Act, Cap.347
73. Territorial Waters Act, Cap.371
74. Ewaso Ng'iro South River Basin Development Authority Act Cap.447
75. Ewaso Ng'iro North River Basin Development Authority Act, Cap.448
76. The Science And Technology Act, Cap.250
77. The National Museums Act, Cap.216.



## ANNEX III: STATUTES RELATING TO COASTAL ZONE AND ENFORCEMENT AGENCIES

ISSUE/CONCERN	LEGISLATION	ENFORCEMENT/ IMPLEMENTATION
Security	Maritime Zones Act Continental Shelf Act	Kenya Navy
Land Tenure	Government Lands Act Land Titles Act Registration of Titles Act Land (Group Representatives Act) Trust Land Act Mazrui Land Trust Act Registered Land Act Land Planning Act	Commissioner of Lands  Local Govt. Authorities  Physical Planning Dept.
Water Use and Conservation	Water Act National Water Conservation Pipeline Corporation Act	Ministry of Land Reclamation, Regional & Water Development/ NWCPC
Environment and Conservation, including pollution	Chief's Act Local Government Act Kenya Ports Authority Act Public Health Act Factories Act Fisheries Act Wildlife Management and Conservation Act National Museums Act Petroleum Act	Provincial Administration Municipal, Town, County Kenya Ports Authority Ministry of Health Ministry of Labour Fisheries Department KWS, Ministry of Tourism and Wildlife NMK
Tourism	Tourist Industry Act Tourist Development Corporation Act	Ministry of Tourism and Wildlife/KTDC
Industrial Development	Coast Development Authority Act Factories Act Export Processing Zones Act Land Planning Act Town Planning Act	CDA Ministry of Labour EPZA Physical Planning dept Municipal, Town, County
Shipping	Kenya Ports Authority Act Merchant Shipping Act. Carriage of Goods at Sea Act.	KPA/ Ministry of Transport and Communications

Agriculture	Agriculture Act Crop Production and Livestock Development Act Plants Protection Act Seeds and Plants Varieties Act Coconut Preservation Act Irrigation Act Pests Control Act	Ministry of Agriculture and Livestock Development
Forestry	Forestry Act	Ministry of Environment and Natural Resources
Research	Science and Technology Act	Ministry of Research Technical Training and Technology/ Research Institutes.
Fisheries	Fisheries Act	Fisheries Department.

## ANNEX IV : ORGANIZATIONS PARTICIPATING IN COASTAL RESOURCES MANAGEMENT.

INSTITUTION	MAIN COASTAL MANAGEMENT FUNCTION
<b>Government Agencies</b>	
Coast Development Authority	Coastal planning and coordination of development
KMFRI	Research on marine environment and resources
Kenya Wildlife Services	Conservation of biodiversity (biotopes) flora and fauna in protected areas and critical habitats and species in general
Fisheries Department	Fisheries licensing, monitoring and policing
Local Authorities (Municipalities, Township and County councils)	Approval of structures and delivery of services, such as waste management
Tourist Police Unit	Security of tourists
Kenya Navy	Military surveillance in territorial waters
Forest Department	Licensing, reforestation and policing use of forest products
Kenya Ports Authority	Ports management and administration of maritime traffic
National Environment Secretariat	National advisory secretariat with coordination of environmental policies
Physical planning department	Provides physical plans but does not execute the plans
Water Department	National planning for both surface and ground water
Water Conservation and Pipeline Corporation	Water reticulation and servicing
Tourism Department	Tourism planning and licensing
Government Chemists Department	Quality control, as service to government and private sector
Cooperative Department	Facilitating self help and income generating community groups
<b>Hotel and Tourist Industry</b>	
Kenya Association of Hotelkeepers and Caterers	Hotel marketing, quality control, and bargaining at national and regional levels
Mombasa and Coast Tourist Association	Coast hotel and tour operators marketing group and forum

Watamu Boat Operators Association Malindi Boat Operators Association Mombasa Boat Owners Association	Common bargaining, facilitation of members and lobbying forum
<b>NGO</b>	
Wildlife Clubs of Kenya	Youth conservation and education group
East African Natural History Society	
East African Wildlife Society	Research, Conservation and Education
Baobab Trust	Environmental Conservation
<b>Others</b>	
Green Belt Movement	Planting of trees
National Oil Spill Response Committee	Oil spill response
Beach Management Task Force	Organization of beach trade, environment and security
Coastal Forest Management Team	Advisory and coordination for issues on coastal forests
Friends of Fort Jesus	Public awareness,
Friends of Mangroves	Public awareness and revegetation of mangrove system
Turtle conservation committee	Turtle conservation and education
Kenya Wetlands Working Group	
Fishermen's Association Safari Sellers Association Mangrove Cutters Association	Common bargaining, assistance to members, and lobbying forum

## ANNEX V: LIST OF RECENTLY FINISHED/ONGOING/PLANNED INITIATIVES/PROJECTS IN THE AREA OF COASTAL RESOURCES/ENVIRONMENT PROTECTION AND MANAGEMENT.

Development/Review of National Environment Policies and Legislation	
(i) National Environmental Action Plan	COMPLETED
(ii) Environmental Policy	COMPLETED
(iii) Environment Legislation	ONGOING
(iv) Forestry Policy	COMPLETED
(v) Amendment to Forestry Legislation	ONGOING
(vi) Wildlife Conservation and Management policy	ONGOING
(vii) Amendment to Wildlife Conservation and Management legislation	ONGOING
(viii) Establishment of Land Use Commission	PLANNED
Development of National ICAM strategy	PLANNED
Beach Management Program	ONGOING
East African Regional Seas Programme	ONGOING
(i) Protection and Management of Marine Coastal Areas (EAF 5) FAO National Institutions/IOC/UNEP/IUCN/University of Rhode Island/USAID Nyali-Bamburi-Shanzu ICAM activity	COMPLETED
(ii) Assessment and Control of pollution in the Coastal and Marine Environment (EAF 6) FAO UNEP/IOC/WHO/IAEA/SAREC National Institutions	COMPLETED/ ONGOING
(iii) Coastal Resources Database and Atlas project (EAF 14) UNEP/Belgian Government/National Institutions	
SAREC Marine Sciences Regional Program	ONGOING
(i) Physical Oceanography training	
(ii) Nutrient analysis	
(iii) Social and Cultural aspects of ICZM	
Kenya Belgium Programmes in Marine Sciences	PLANNED
(i) Mangrove Restoration Project (KMFRI/UON/VUB)	
(ii) Oyster Culture project (CDA/KMFRI/Shirazi Women's Group)	
(iii) Ecological Marine Management program (KMFRI/VUB)	
(iv) Fundamental and Applied Marine Science Certificate Course (KMFRI/VUB)	
WIOMSA supported projects (Marine Research Grants)	ONGOING

IOC supported programmes (i) Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean region RECOSCIX-WIO (ii) Sea Level Monitoring (iii) National Oceanographic Data Centre (iv) Regional Project for Research and Training on Coastal Marine Systems in Africa (COMARAF) (v) Participation in TOGA and WOCE experiments	O ONGOING
National Museums of Kenya (i) Coastal Forests Conservation Programme (ii) Kipepeo project (iii) Preservation and rehabilitation of old towns of Mombasa and Lamu (iv) Coastal Archaeology	ONGOING
Biodiversity Database Management/ NES and others	ONGOING
Coral Reef Conservation Project (Wildlife Conservation International)	ONGOING
Kenya Sea Turtle Conservation project	ONGOING
European Union Supported Projects i) Dynamics and assessment of Kenyan Mangrove Ecosystems Interlinkages of Coastal Ecosystems- STD 3 i) Anthropogenically induced changes and functioning of Eastern Africa Nearshore Ecosystems	COMPLETED COMPLETED ONGOING
Ministry of Public Works (i) Lamu Sea Wall (ii) Pate-Ndau Sea wall project	COMPLETED ONGOING
Ministry of Land Reclamation, Regional and Water Development (i) Up grading of Baricho Water Supplies (ii) Expansion of Mzima Water supplies	ONGOING PLANNED
KMFRI/KWS Cooperative programmes (funded under KWS-Netherlands Wetlands conservation and Training Programme. (i) Mida Biodiversity Study (ii) Pollution assessment programme (Mombasa Marine Park, Kizite Mpunguti Marine Park) (iii) Environmental Impact Study (Makupa Creek Oil Spill)	ONGOING ONGOING ONGOING
Kenya Dutch Indian Ocean Expedition /Training and Analysis of Samples and data	ONGOING

## LIST OF ACRONYMS

ASFA	Aquatic Sciences and Fisheries Abstracts
CBS	Central Bureau of Statistics
CDA	Coast Development Authority
CMSC	Coastal Management Steering Committee
COMARAF	Coastal Marine Systems in Africa
DRSRS	Department of Resource Surveying and Remote Sensing
EEZ	Exclusive Economic Zone
EPZA	Export Processing Zone Authority
EU	Egerton University
FAO	Food and Agriculture Organisation
GLOSS	Global Sea level Observing System
GOK	Government of Kenya
IAEA	International Atomic Energy Agency
ICAM	Integrated Coastal Area Management
ICZM	Integrated Coastal Zone Management
IFAD	International Fund for Agricultural Development
IOC	Intergovernmental Oceanographic Commission
IODE	International Ocean Data and Information Exchange
IOMAC	Indian Ocean Marine Affairs Commission
ITCZ	Inter-Tropical Convergence Zone
KAHC	Kenya Association of Hotelkeepers and Caterers
KATO	Kenya Association of Tour Operators
KEFRI	Kenya Forestry Research Institute
KMFRI	Kenya Marine and Fisheries Research Institute
KPA	Kenya Ports Authority
KU	Kenyatta University
KWS	Kenya Wildlife Services
NCST	National Council for Science and Technology
NEAP	National Environment Action Plan
NES	National Environment Secretariat
NMK	National Museum of Kenya
NWCPC	National Water Conservation and Pipeline Corporation
RECOSCIX-WIO	Regional Cooperation in Scientific Information Exchange in the Western Indian Ocean
ROSTA	Regional Office for Science and Technology in Africa
SAREC	Swedish Agency for Research Cooperation with developing Countries (now known as SIDA/SAREC)
SIDA	Swedish International Development Agency
TEMA	Training Education and Mutual Assistance
UNEP	United Nations Environment Programme
UNESCO	United Nations Scientific and Cultural Organisation
UON	University of Nairobi
USAID	United States Agency for International Development
WIODIR	Directory of Marine Scientists in the Western Indian Ocean Region
WIOLIB	Catalogue of holdings of marine science libraries in the Western Indian Ocean Region

## ADDRESSES OF ORGANISATIONS

Kenya Marine and Fisheries Research Institute  
P.O. Box 81651  
Mombasa, KENYA  
TEL: 254-11-475152/475157  
FAX: 254-11-472215

National Museums of Kenya  
P.O. Box 40658  
Nairobi, KENYA  
TEL: 254-2-742161/742131/742563  
FAX: 254-2-741424

Assistant Director MNP/MNR  
Kenya Wildlife Services  
P.O. Box 87626  
Mombasa, KENYA  
TEL: 254-11-313371/313306/313314/313332  
FAX: 254-11-311650

Government Chemists Department  
P.O. Box 81119  
Mombasa, KENYA  
TEL: 254-11-471931

Coast Development Authority  
P.O. Box 1322  
Mombasa  
TEL: 254-11-224490/311119/311277  
FAX: 254-11-224411

Commandant  
Kenya Navy  
P.O. Box 95350  
Mombasa, KENYA

Director  
Survey of Kenya  
P.O. Box 30123  
Nairobi, KENYA

Dean  
Faculty of Science  
University of Nairobi  
P.O. Box 30197  
Nairobi, KENYA  
TEL: 254-2-442482  
FAX: 254-2-446138/449539

Faculty of Science  
Egerton University  
P.O. Box 536  
Njoro, KENYA

Dean  
Faculty of Science  
Kenyatta University  
P.O. Box 43844  
Nairobi, KENYA  
TEL: 254-2-810901  
FAX: 254-2-810651

Permanent Secretary  
Ministry of Research, Technical Training and  
Technology  
P.O. Box 30568  
Nairobi, KENYA

Managing Director  
Kenya Ports Authority  
P.O. Box 95009  
Mombasa, KENYA  
FAX: 254-11-311867

Director  
Kenya Meteorological Services  
P.O. Box 30259  
Nairobi, KENYA  
TEL: 254-2-567880  
FAX: 254-2-56788819

Secretary  
National Council for Science and Technology  
P.O. Box 30623  
Nairobi, KENYA

Director  
National Environment Secretariat  
P.O. Box 67839  
Nairobi, KENYA

Secretary General  
Kenya National UNESCO Commission  
P.O. Box 72107  
Nairobi, KENYA  
TEL: 254-2-229053/4

Dean



Department of Fisheries  
Moi University  
P.O. Box 1125  
Eldoret, KENYA

Dean  
School of Environmental Studies  
Moi University  
P.O. Box 3900  
Eldoret, KENYA

East African Wildlife Society  
P.O. Box 20110  
Nairobi, KENYA  
TEL: 254-2-748170  
FAX: 254-2-746868  
Director of Fisheries  
P.O. Box 58187  
Nairobi, KENYA

Coral Reef Conservation Project  
Wildlife Conservation Society  
P.O. Box 99470  
Mombasa, KENYA  
TEL: 254-11-474848/471759  
FAX: 254-11-472215

IUCN - World Conservation Union  
P.O. Box 68200  
Nairobi, KENYA  
TEL: 254-2-890605-12  
FAX: 254-2-890615

Society for the Protection of the  
Environment in Kenya (SPEK)  
P.O. Box 60125  
Nairobi, KENYA  
TEL: 254-2-246317  
FAX: 254-2-230230

Kenya Forestry Research Institute (KEFRI)  
P.O. Box 20412  
Nairobi, KENYA  
TEL: 254-154-32891/32892  
FAX: 254-154-32844

East African Natural History Society  
P.O. Box 44486  
Nairobi, KENYA  
TEL: 254-2-749957  
FAX: 254-2-741049

National Oil Spill Response Committee  
P.O. Box 30200  
Nairobi, KENYA  
TEL: 254-2-767842/9  
FAX: 254-2-767 575

Tana and Athi River Development  
Authority  
P.O. Box 47309  
Nairobi, KENYA  
TEL: 254-2-337805  
FAX: 254-2-332456/7

Department of Resource Surveys and  
Remote Sensing  
P.O. Box 47146  
Nairobi, KENYA  
TEL: 254-2-502223

United Nations Environment Programme  
P.O. Box 30552  
Nairobi, KENYA  
TEL: 254-2-621324  
FAX: 254-2-226886/226890

Regional Office for Science and  
Technology in Africa  
UNESCO  
P.O. Box 30592  
Nairobi, KENYA  
TEL: 254-2-621234

Regional Centre for Services in Surveying  
Mapping and Remote Sensing  
P.O. Box 18118  
Nairobi, KENYA  
TEL: 254-2-803320/9

Food and Agriculture Organisation of the  
United Nations  
P.O. Box 30470  
Nairobi, KENYA  
TEL: 254-2-725128  
FAX: 254-2-727584

Mombasa and Coast Tourist Association  
P.O. Box 99596  
Mombasa, KENYA