

REPUBLIC OF KENYA

MALINDI
DISTRICT DEVELOPMENT PLAN
1997-2001

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CHAPTER ONE
DISTRICT SETTING FOR INDUSTRIALIZATION

GEOGRAPHICAL DESCRIPTION

The Location, topography of a District has a bearing on its development. This section present a brief description of the geographical characteristics of Malindi District and also assess their effects on development in general and industrialization in particular.

Position and Size

Malindi District was created in December 1996 carved from the old Kilifi District. It became the seventh district in Coast Province. It borders Kilifi district to the South Tana River district to the north and North West and the Indian Ocean to the East. It lies between the latitude 2°20 and 4° South and longitude 39° East and 40°14 East. The District covers a geographical area of 7605 Sq.Km which constitutes 9.1% of the total Coast Province area. The district has a coastline of 155Km. The area distribution by Division is as indicated in table 1.1.

Table 1.1
Area of the District by Division

Division	Area (sq.Km)
Malindi	4727
Marafa	2149
Magarini	729
Total	7605

Source: District Commissioner, s office Malindi, 1997.

Malindi Division accounts for 62% of the total area while Magarini Division which is the smallest accounts for only 9% of the total area.

Topography and Climate

Malindi district can be divided into four topographical features namely the Coastal plains, foot plateau, Coastal range and the Nyika plateau.

The Foot Plateau consists of Sandstones and impervious clay supporting grassland and stunted vegetation.

The Coastal Range consists of low range sandstone hills of 150 -420m high. The rest of the hinterland forms the Nyika Plateau which is 130 - 300m above sea level.

The entire zone is marginally semi arid and suitable for extensive Livestock Development.

The District has two rainy seasons in a year. The Long rains come in March to May and short rains in October to November.

The average rainfall ranges from 400mm in the hinterland to over 1200 mm at the Coastal belt.

The Coastal belt receives an average annual rainfall of about 900mm to 110 mm due to the effects of monsoon winds and the topography.

It is generally hot and humid all the year round. The mean daily temperature is 22.0° Minimum and 29.5° Maximum. Average relative humidity along the coastal belt is 65% but decreases as it moves to the hinterland.

Administrative and political units

Malindi District is divided into three Divisions namely Malindi, Magarini and Marafa. The Headquarters is Malindi Town. There are 16 locations and 55 sub-locations.

Table 1.2 shows the number of locations and sub-locations by Division.

Table 1.2

Administrative Units By Division

Division	No. of Location	No. of Sub-Location
Malindi	8	31
Magarini	5	16
Marafa	3	9
Total	16	56

Source: District Commissioner's Office, Malindi, 1997

There two Political Constituencies in Malindi District namely Malindi and Magarini. Malindi Constituency follows the administrative boundaries of Malindi Division while Magarini Constituency encompasses Marafa and Magarini Divisions.

In the district currently there are two local Authorities namely malindi Municipal Council and Malindi County Council with a total of twenty three wards as shown in table 1.3

Table 1.3

Local Authorities

Name of Council	No. of Wards
Malindi Municipal Council	12
Malindi County Council	11
Total	23

Source: D.C's Office Malindi

Malindi Municipal Council has 12 wards while Malindi County Council has 11 wards. Three in Malindi Constituency and eight in Magarini Constituency.

POPULATION PROFILES

The various population variables have a significant role in the development of our district as Population and development are interactive.

The structural elements of the district population including its size, age/sex structure, distribution density and urban population are discussed hereunder within the content of Industrialization for sustained Development.

Population Size

The District has an estimated population of 260746 persons and is expected to rise to 304,766 persons by the end of the plan period (2001). The District had an Intercensal growth rate of 3.9% between the 1979 and 1989 census periods.

The District Population Projections by Age Group for the plan period is as indicated in table 1.4.

Table 1.4

Population Projection by Age Groups

AGE	1989	1987	1999	2001
0 - 4	35,691	48,759	52,715	56,991
5 - 9	32,065	43,805	47,359	51,201
10 - 14	25,575	34,940	37,774	40,839
15 - 19	19,277	26,335	28,472	30,781
20 - 24	14,124	19,295	20,861	22,553
25 - 29	13,169	17,991	19,451	21,029
30 - 34	10,688	14,602	15,786	17,067
35 - 39	8,589	11,734	12,685	13,714
40 - 44	7,062	9,648	10,430	11,276
45 - 49	6,108	8,344	9,021	9,753
50 - 54	4,772	6,519	7,048	7,619
55 - 59	4,008	5,476	5,920	6,400
60 - 64	3,245	4,433	4,792	5,181
65 - 69	2,290	3,129	3,383	3,657
70 - 74	1,718	2,347	2,537	2,743
75 - 79	1,145	1,564	1,691	1,829
80+	1,335	1,825	1,973	2,133
TOTAL	190,861	260,746	281,898	304,766

Source: District Statistical Office Malindi, 1997

The Population of the district is bottom heavy with 49 percent of the population under fifteen years of age, while persons aged 60 and over constitute only 5 percent of the total population. This is attributed to the high growth rate and a decline in the Child/Mortality rates.

Population Structure.

Age/Sex Structure

Generally the District has a higher population of females than males as indicated in Table 1.5 below.

Table 1.5

Age/Sex Projection

Age Group	1989		1997		1999		2001	
	M	F	M	F	M	F	M	F
0 - 4	17,774	17,917	24,282	24,477	26252	26463	28382	28609
5 - 9	16,097	15,968	21,990	21,815	23774	23585	25703	25498
10 - 14	13,043	12,532	17,819	17,121	19265	19509	20828	20011
15 - 19	9,426	9,851	12,878	13,457	13923	14549	15052	15729
20 - 24	5,918	8,206	8,085	11,210	8741	12120	9450	13103
25 - 29	5,557	7,612	7,592	10,399	8208	11243	8874	12155
30 - 34	4,307	6,381	5,885	8,717	6362	9424	6878	10189
35 - 39	3,814	4,775	5,210	6,524	5632	7073	6089	7625
40 - 44	3,051	4,011	4,168	5,480	4506	5924	4871	6405
45 - 49	2,779	3,329	3,797	4,547	4105	4916	4438	5315
50 - 54	2,200	2,572	3,005	3,514	3249	3799	3512	4107
55 - 59	1,992	2,016	2,716	2,760	2942	2978	3181	3219
60 - 64	1,597	1,648	2,181	2,252	3258	2434	2549	2632
65 - 69	1,216	1,074	1,661	1,468	1796	1587	1942	1715
70 - 74	935	783	1,277	1,070	1380	1157	1492	1251
75 - 79	653	492	891	673	964	727	1043	786
80+	726	609	993	832	1073	900	1160	973
TOTAL	91,085	99,776	124,430	136,316	134530	147368	145444	159322

Source: District Statistical Office Malindi, 1997

The district has a sex rate of 98 (i.e. 98 males for every 100 females). The female population is higher in all age groups except for the 5-14 and over 65 age groups where the males are slightly more. It is noted that the female population within the 20 - 44 age-groups is significantly higher than the out-migration of the males in pursuit of employment outside the district.

Age Group 6-13 (Primary):

The population of children within the primary school age group stood at 45,425 in 1989 and is estimated at 62,058 in 1997. This population is expected to increase to 75,234 by the end of the Plan Period (2001) as indicated in table 1.6. The age group has a sex ratio of 102 and represents 24 percent of the total population.

Table 1.6
Population Projection for Selected Age Groups

Age Group	1989		1997		1999		2001	
	M	F	M	F	M	F	M	F
6 - 13 (Primary)	22985	22440	31401	30657	33948	33144	36775	38459
14 - 17 (Secondary)	8128	7904	11105	10798	12005	11674	12979	12621
15 - 49 (Female Fertility)		44165		60334		65229		70521
15 - 49 (Labour Force)	87797		119944		129674		140192	

Source: District Statistical Office Malindi, 1997

Age Group 14-17 (Secondary)

In 1989 the population in this age group was 16,032 and is estimated at 21,903 in 1997 and expected to increase to 25,600 by the year 2001 as shown in table 1.6. The age group represents 8 percent of the total population and has a female & male ratio of 103.

The increase in population of the Primary and Secondary age groups will require increased investment in Education facilities. There is also need to increase Vocational training Institutions to cater for School drop outs.

Female Population (15-49):

The reproductive Female population within the 15 - 49 age group accounts for 23 percent of the population. The population was 44,165 Females in 1989 and is estimated at 60,334 in 1997. It is expected that the population will increase to 70,521 by the end of the Plan period.

Labour Force (age 15-59)

The district has an estimated labour force of 119,944 persons constituting 46 percent of the total population. The labour force has a sex ratio of 80. The District has a dependency ratio of 128 which is higher than the National ratio of 105.

Distribution and Density

Malindi Division has the highest population within the district while Marafa Division has the lowest population as indicated in table 1.7 below.

The population distribution by Division is as indicated in table 1.7.

Table 1.7

Population Projections by Division

Division	1989	1997	1999	2001
Malindi	112920	154362	166844	180421
Magarini	45289	61796	66810	72230
Marafa	32652	44588	48204	52115
TOTAL	190861	260746	281898	304766

Source: District Statistical Office Malindi, 1997

Malindi Division has the highest population within the district while Marafa Division has the lowest population.

Malindi Division which has over 59 percent of the total District population has relatively better agricultural land in addition to being the District Headquarters. The Division also has a well established tourism Industry which is the major employer in the District.

The District population density is expected to increase from 34 persons per Sq.Km in 1997 to 40 by the end of the plan period as shown in table 1.8.

Table 1.8

Population Density by Division

Division	Area (Sq Km)	1989	1997	1999	2001
Malindi	5259	21.5	29.4	31.7	34.3
Magarini	729	62.1	84.8	91.6	99.1
Marafa	1617	20.2	27.6	29.8	32.2
TOTAL	7605	25.1	34.3	37.1	40.1

Magarini Division has the highest population density while Marafa has the lowest density.

Urban Population

It is estimated that over 21 percent of the population is within the Urban areas of the district. The major Urban centres of the District include Malindi Watamu, Mambui, Gongoni whose population projections are as indicated in the table below.

Table 1.9

Urban Centre Population Projections

Centre	1989	1997	1999	2001
Malindi	34047	46086	49727	53653
Mambui	2951	4026	4344	4687
Watamu	2089	2861	3086	3330
TOTAL	39057	52973	57157	61670

Source: District Statistical Office Malindi, 1997

These were the only Urban Centres within the District with a population of 2000 persons and above during the 1989 Census Enumeration. However, we now have more centres with populations of 2000 persons and above namely Gede in Malindi Division, Marereni and Marafa Towns in Magarini and Marafa Divisions respectively.

All the Urban Centres are well served with the service utilities like telephone, postal and electricity.

RESOURCE POTENTIAL AND EXPLOITATION FOR INDUSTRIALIZATION

RESOURCE POTENTIAL

Land and Soils

Soils in the district can be deviated according to Topographic features. There is the Coastal Plains where Soils are developed on raised coral reefs. The Soils are loamy with moderately thick sand covers. They are saline and sodic.

The Coastal Uplands have soils developed on unconsolidated sandy deposits,. This comprises the so-called Magarini sands. The Soils are also clayey on limestone.

In the inland of the Nyika region the Soils are saline and sodic. The Soils developed on fine sandstones and siltstone.

On Land the district can be categorized in various land uses. There is the Forest Covering 48,142.5 Ha with Arabuko Sokoke 41,000Ha Mangrove 6378.5 Ha. The Municipal Council of Malindi covers an area of 364 Km²

Water Resources

The district has inadequate water Resources. Sabaki River is the most important in the district.

The main pipeline to Malindi Town and Watamu gets water from River Sabaki. Most people are served by the pipeline for domestic and livestock purposes.

River Sabaki provides potential fresh water fishing and prawn farming in adjacent areas along the river. These areas have also been identified as ideal for irrigation. These are Chakama Irrigation Scheme, Mongotini and Sabaki Scheme.

Apart from the River Sabaki there is also the Indian Ocean. Water from the Indian Ocean is dried by evaporation to produce salt. This is a major economic activity in Gongoni. The waters of the Indian Ocean also provide fish for sale. The Indian Ocean is also used by boats as a means of transport connecting many centres along the Indian Ocean especially when the roads are impassable.

The ground water level in the regions of the district close to the ocean, is relatively high resulting to small lakes when it rains heavily, as seen in Jilore where there is now an existing small lake.

The drier areas of Marafa and Magarini have numerous Pans, Dams, shallow wells and boreholes which serve the people although they are not adequate because most are of poor yields and/or quality. They are also not enough forcing people to walk for very long distances.

Forestry.

The district has a total Forest area of 48142.5 Ha of which 41,00 Ha is Arabuko Sokoke Forest, 6,378 Ha is Mangrove Forest and 308 Ha is Plantation Forest.

Forests are important as they provide fuel, timber for the construction industry in the district.

In the district the forest also provides home to many Wildlife and birds.

The Forests are also used for traditional ceremonies. The "Kaya" where a lot of emphasis is now being put to preserve them are regarded highly by the local inhabitants for traditional and Religious Ceremonies.

One of the benefits derived from the Arabuko Sokoke forest include harvesting of butterflies for export thus bringing in a lot of foreign exchange through the Kipepeo butterfly Project.

The Forest in the Trust land provide grazing area for Livestock in the district thus we find big Ranches in the area.

Commercial Minerals and Materials

The district is not richly endowed with commercial Minerals. Some of the major activities carried out include salt and sand harvesting. Coral block and Galana stones extraction is also a major activity in the district.

Salt and Sand harvesting is mainly done in Gongoni and Fundisa while Galana Stones are extracted in Baricho and Chakama but not to a large extend.

Coral Block extraction is done in Mayungu, Watamu and Kijiwetanga but also in a small scale.

Recently Titanian deposits have been discovered in abundance in the drier areas of the district. The Titanian Mining is yet to start.

Tourist Attraction

The most important Tourist Attraction in the district include historical Sites, Wildlife, Beaches, Indian Ocean, Forest, Marine Reserve and Marine Park, National Park.

There are many species of Wildlife which include elephants, buffaloes, Warthogs, Antelope and many species of birds and butterflies in the district.

The district host the Famous Arabuko Sokoke Forest, Malindi Marine Park, Watamu Marine Park and Reserve and Tsavo National Park.

Historical Sites include Vasco Da Gama Pillar and Gede ruins. There are two Privately owned Snake Parks. With the improvement of the Tsavo Road more tourists will move to the interior especially sites along the Sabaki River and Tsavo East National Park.

Another Tourist attraction is the Kipepeo Butterfly Farm in Gede and bird Watching venture in Arabuko Forest where many organized groups visit Tourist also get attracted to the rich traditional songs and dances performed by various groups in Hotels.

Apart from the sun and good beaches which visitors enjoy in the district the hinterland has good grassland scenery of Land Formation. The "Devils Kitchen" is an example of attractive places in the district's hinterland.

Fisheries and Marine Resources

Malindi district has four main fish landing stations namely Malindi, Ngomeni, Mayungu and Watamu. Other potential fish landing stations which are in the process of being opened include Mamburui, Uyombo, Kinyaole, Kichwa cha kati and Mto Kilifi

The Indian Ocean has the potential to satisfy the local and export market. Currently fishing is restricted to the shallow waters of the coastline due to inadequate fishing technology.

There is a great potential for fresh water fishing within the district especially along River Sabaki and other inland water bodies. The potential for aquaculture development also exists within the district.

RESOURCE EXPLOITATION

Having looked at the resource potential in the district this section explores how these resources have been exploited. Most of the resource potential have not been fully exploited due to various reasons.

Apart from the Tourism activities in the major towns of Malindi and Watamu the rest of the district land is mainly utilized for Agricultural activities. Most of the farming in the district is small scale

Agricultural Activities

Agriculture is the biggest economic sector in the district. About 90% the district land is devoted to agriculture. Most of the people in the district are small scale farmers.

Table 1.10 shows the small firm sector per division.

Table 1.10

Small Farm Sector by Division

Division	Farm Area (Sq Km)	No. of H'Hold	H'Hold per Sq Km	No. of Small Holdings	Main Food Crops	Main Cash Crops	% of H'Hold with High Value Cash Crops
Malindi	887	18665	21	20513	Maize, Cassava, Cowpeas, Greengrams	Mangoes, Coconut, Cashew nuts, Citrus, Cotton	60
Magarini	678	5451	8	5451	Maize	Coconut, Pineapples	35
Marafa	1590	7841	5	7841	Maize, Cassava, Cowpeas.	Mangoes, Coconut, Cashew nut, Cotton, Simsim	55
TOTAL	3155	31957	10	33805			50

Source: District Agricultural Office Malindi, 1997

From the table, it is evident that Maize is the main food crop in the district. Other food crops include cassava cowpeas and green grams. Malindi division has the highest density with 21 farm Households followed by Magarini division.

Other draught resistance crops such as sorghum and millet are not found in the district. Maize is the staple food in the district and is popular because the variety grown in malindi matures fast and can resist diseases. The main cash crop grown in all the divisions is coconut. Cashewnuts are grown in malindi and marafa. The other crops are fruits with magarini and marafa leading in pineapple production. Malindi and marafa grow a lot of mangoes. cotton and simsim are only found in Marafa division.

With the exception of an oil extraction industry in malindi town there are no agriculture based industries in the district. Most of the cash crop grown are sold raw from the farm. Potential existing for agro-based industry include fruit processing industries, starch industry from cassava, soap making industry from coconuts and a cashewnut industry.

To supply the farmers with inputs there is a need for a fertilizer industry. There is also a need to

strengthen the jua kali sector to supply implements like Hoes, Wheelbarrows, and ox-plough.

The large farm sector in the district is as shown below.

Table 1.11

Large Farm Sector

Division	No. of farms	Total Area	Main crop	No. of employees	
				Permanent	Seasonal
Malindi	10	1800	mangoes	12	56
Magarini	16	909.2	mangoes simsim coconuts		16

Source: District Agricultural Office Malindi, 1997.

The large farms in malindi division grow only mangoes while those in magarini division grow mangoes together with simsim and coconuts.

Table 1.12 shows the production trend of various crops (1991-1995)

Table 1.12

Crop Production Trends 1993 - 1995

Crop	Description	1993	1994	1995
Maize	Area (ha.)	10850	10265	10551
	Yield (1000 Tons)	4.9	8.2	4.2
	Av.Yield/ha.	0.45	0.8	0.4
Sorghum	Area (ha.)	826	136	27
	Yield (1000 Tons)	0.2	0.1	0.02
	Av.Yield/ha.	0.7	0.8	0.7
Cowpeas	Area (ha.)	1095	1902	940
	Yield (1000 Tons)	0.4	0.8	0.3
	Av.Yield/ha.	0.4	0.4	0.3
Greengrams	Area (ha.)	179	188	299
	Yield (1000 Tons)	0.1	0.1	0.1
	Av.Yield/ha.	0.4	0.4	0.4
Cassava	Area (ha.)	959	1638	1300
	Yield (1000 Tons)	9.6	16.4	13
	Av.Yield/ha.	10	10	10
Cotton	Area (ha.)	874.6	927	431
	Yield (1000 Tons)	0.4	0.2	0.02
	Av.Yield/ha.	0.5	0.2	0.04
Coconut	Area (ha.)	4037	4054	4055
	Yield (1000 Tons)	6.1	6.1	5.7
	Av.Yield/ha.	1.5	1.5	1.4
Cashewnut	Area (ha.)	6200	5447	4621
	Yield (1000 Tons)	4.3	0.8	0.8
	Av.Yield/ha.	0.7	0.2	0.2
Mangoes	Area (ha.)	1251	1290	1292
	Yield (1000 Tons)	12.5	12.9	9.0
	Av.Yield/ha.	10	10	7
Citrus	Area (ha.)	1185	1220	1227
	Yield (1000 Tons)	11.8	12.2	9.8
	Av.Yield/ha.	10	10	8
Pineapples	Area (ha.)	140	847	1231
	Yield (1000 Tons)	1.9	10.2	16.6
	Av.Yield/ha.	13.5	12	13.5

Source: District Agricultural Office Malindi, 1997

Coconut is mostly grown in malindi and marafa division. The production of coconut increased between 1993 and 1994 from 4037 tons to 4054 tons. There is need to increase coconut production as this could attract more oil industries since at present there is only one such industry.

Another industry to be supplied with oil from coconut include soap making which currently is not in the district. The district produces a lot of mangoes pineapple and citrus. The production of Horticulture has been increasing but has been affected by scarcity of market. There is a need to set up a fruit processing plant to add more value to the fruits and also attract export market.

Vegetables grown in the district cannot meet the local demand. Efforts will be made to produce more vegetables especially in the irrigation schemes along the sabaki river.

The cashewnut production has been on the decline due to low price and also because the cashewnut plant are old and farmers are not planting new ones. There is no cashewnut factory in the district thus the crop continue to be marketed haphazardly.

Maize is the main staple food in the district. Most of the farmers put a lot of land under maize but the demand is yet to be met. The deficit of maize production is due to scarcity of rain fall, low acarage due to the lack of ploughing equipment and planting of low yielding maize variety due to adverse weather and soil conditions.

The only place in the district where maize production per hectare is high is in Madunguni area near the mouth of river sabaki where a lot of silt has been deposited.

Cassava is a very popular crop in the District but its only used for domestic purpose. It is a drought resistant crop which supplement Maize during the dry season.

Many farmers do not grow cassava as a cash crop because there is no starch Industry in the district.

Cotton production has also been declining as farmers don't put a lot of effort on it. This is due to absence of Market outlets within the district and low prices farmers get.

Livestock Production Activities

Livestock production is a very prominent activity in the district especially in the drier areas of Malindi Division, Marafa and Magarini.

These areas though with little rainfall have good vegetation and large areas of land for ranches. Livestock, apart from providing a source of income to the local people are used for various ceremonies such as funerals, dowry and ploughing land.

Figure 1.13 shows Livestock production by Division.

Table 1.13

Livestock Production by Division

Division	Area Km ²	H.H No.	Main Livestock	Live-stock Prod.	Land Carrying Capacity
Malindi	887	18665	Dairy Cattle Zebu cattle goats sheep poultry honey	Milk, Beef Chevon/m utton Eggs/ meat honey	Coastal belt 1 5u--8Ha Hinter-land 1 5u-15-20Ha
Magarini	729	8050	Zebu goats sheep Bee-keeping Poultry	Beef chevon/m utton Eggs/ Meat Honey	Coastal Belt 1 5u-5-8Ha Hinterland 1 5u-15-20Ha
Marafa	1590	7841	Zebu Cattle Goats Sheep Poultry Bee- keeping	Beef chevon/ mutton Eggs/ meat honey	1 5u-15-20Ha

Key: SU - Livestock unit

Source: District Livestock Production Office Malindi, 1997

From the table the main Livestock activities do not vary except along the coastal belt in Malindi Division where Dairy Cattle are found.

Main Livestock in all the divisions of the district are zebu cattle, goats sheep and beekeeping and poultry.

Table 1.14 shows Livestock Production between 1991 - 1995

Table 1.14

Livestock Production 1991 - 1995

Type of Livestock	1991	1992	1993	1994	1995
Cattle	DC 6500 L/C 80,000	DC 7000 L/C 75,000	DC 7500 L/C 62,000	DC 7500 L/C 62,000	DC 7,800 L/C 60,000
Goats	65,000	60,000	63,000	60,000	58,000
Sheep	50,000	48,000	45,000	46,000	40,000
Poultry	C/B 17000 L/B 300,000	C/B 18000 L/B 320,000	C/B 20000 L/B 350,000	C/B 20000 L/B 360,000	C/B 25,000 L/B 400,000
Hives (Bees)	KTB 100 L/H 500	KTB 105 L/H 520	KTB 110 L/H 580	KTB 115 L/H 600	KTB 130 L/H 650

Key: D/C - Dairy Cattle
L/C - Local Cattle
KTBH - Kenya Top Bar Hives
C/B - Commercial Birds
L/B - Local Birds

Source: District Livestock Production Office Malindi, 1997

The main type of animal is the zebu cattle in the district which is kept in all the divisions. The number of the zebu cattle however has been decreasing between 1991 and 1995. This is due to many people practising dairy cattle farming which has high yield than the zebu. The decrease can also be attributed to the long dry spell of weather leading to scarcity of fodder, conflict between wildlife and livestock where wild animals especially lions have been killing cattle.

The number of goats and sheep has also been facing a declining trend. In 1991 the total number of shoats was 115000, in 1993 108000 and 1995 was 98000. a decrease of 14.8% between 1991 and 1995.

On poultry, both local and commercial birds have increased from 300,000 to 400,000 an increase of 33.3%. The increase of local birds can be attributed to the preference by the local people as they are cheaper to maintain and have a lower disease incidence. Commercial birds rearing has also been increasing between the same period. in 1991 there were 17000 birds in the district and in 1995 they increased by about 47%. This is due to their high demand in the local hotels and availability of drugs in local stockist.

The increase in poultry in the district has a positive effect as they could lead to investment in chicken feed industry which is currently not there. The poultry demand will also lead to an increase in hatcheries in the district.

On Bees the adaptation of kenya top Bar hives in the district has been very slow. In 1995 there

were 130 an increase of 30%.

This has been due to the available of the KTBH which are reduced mostly outside the district.

Log hives continue to play an important role in the honey production sector in the district. In 1991 there were 500 log hive while 1995 there were 650 an increase of 30%.

The investment in honey production remains minimal in the district and if fully exploited the honey refinery could be started in the district. Most of the supply of the honey comes from outside the district.

The quantity of livestock production are shown in table 1.15

Table 1.15

Sales of livestock and livestock products 1991-1995

Year	Cattle	Shouts	Poultry	Hides & Skin	Milk (litre)	Ghee (Kg)	Honey (Kg)	Eggs (No.)
1991	16,000	15,000	40,000	50,000	0.3	50,000	10,000	0.5m
1992	12,000	18,000	42,000	60,000	0.4	60,000	12,000	0.6m
1993	14,000	18,500	50,000	80,000	0.5	75,000	15,000	0.8m
1994	15,00	23,000	56,000	100,000	0.75	80,000	18,000	1.0m
1995	20,000	25,000	60,000	130,000	1.0m	85,000	20,000	1.2m

Source: District Livestock Production Office Malindi, 1997

As seen in table 1.17 sales of milk has been increasing. This is due to the introduction of dairy cattle in the district. Sales of cattle had a downward trend between 1991 and 1992 due to severe drought but went up between 1992 and 1995. The same trend could be seen on shoats.

Eggs production has been going up in the district between 1991 and 1995.

To take advantage of the large land available there are six ranches which have been established as shown below covering an area of 94.1Ha

Table 1.16

Ranches By Division and Area.

Division	No of Ranches	Total Area
Malindi	4	54.1 Ha
Marafa	2	40 Ha

The ranches are ADC/Galana, ADC Kulalu, chakama and Weru ranches-Malindi division. In marafa there is Bungale group ranch and ranching to co-operative society. Animals in these

ranches include cattle sheep and goats.

The estimated number of goats in the ranches are 36,000 while cattle are about 41,500.

Other Natural Resource Exploitation

Fisheries:

Malindi District has four main Fish Landing Stations although there is potential to develop five more stations. The district also produces prawns at Ngomeni Farm.

Table 1.17 shows the production of fish in Malindi district by station.

Table 1.17

Fish Production in Malindi District (Kg)

Station Beach	1993	1994	1995	1996
Malindi	325905	430266	411417	319,009
Ngomeni	201,429	224,450	341,563	322,170
Mayungu	149,873	153,541	105,455	99,377
Watamu	53,575	133476	92944	61,507
Total	736,782	941733	951379	802,063

Source: District Fisheries Office Malindi, 1997

From 1993 to 1995 there has been a general fish production increase in the district but 1995 and 1996 Fish production decreased due to partly unpaid increase of licence fees charged to fishermen by the Government. Another reason of the decrease is deteriorating nature of fishing gear.

Figure 1.18 shows production of prawns in Ngomeni.

Table 1.18

Prawn Production in Ngomeni.

Year	Production	Value (K.shs)
1993	277	--
1994	375	--
1995	869	101,872
1996	2034	305,100

Source: District Fisheries Office, Malindi 1997.

Prawn farming has been picking up in the district between 1995 and 1996. This could be attributed to the increasing demand of prawns in local hotels and increased promotion by the Fisheries Department of prawn farming.

Fresh Water Fishing especially in River Sabaki has not been fully Developed. The little fishing carried out is only for domestic use. The production of fish in the district will increase steadily with the opening up of Mto Kilifi, Kinyaole, Kichwa Cha Kati, Mambrui and Uyombo Fish Landing Stations/Beaches. This will warrant a setting up of a fish processing Industries and also an Industry producing animal feeds derived from fish.

Production of Fish has been hampered by scarcity of Market. The available Fish Marketing Co-operative Societies have not been strong resulting to a lot of wastage. Production of Fish has also been affected by frequent power failure especially between 1995 and 1996. Many Fishermen prefer having a small Catch which they could sell fast rather than having more fish which need cold storage facilities.

Forestry and Agro-Forestry:

Although the district has large forest like the Arabuko Sokoke and the Mangrove forest, production of timber has been very limited. Most of the timber for making of furniture and for construction Industry come from outside the district. The district has only one Saw Miller. Mangroves are used in the construction Industry especially in hotels.

The Forest are important as they provide wood fuel especially where cooking Gas and electricity are not available. The forest has not been fully exploited because of Government restriction to protect the Mangrove and conserve the Arabuko Sokoke which has rare species of birds and also provide home to many animals.

Mining:

The district does not have any precious minerals for exploitation. Recently large deposits of titanium were discovered in Marafa and Magarini division but exploitation has not started.

Industrial Activities

The most important economic industry in the District is Tourism. There are 104 Tourist resorts in the district with a bed capacity of 4613 beds.

The distribution of the hotels by locality is as shown in table 1.19.

Table 1.19.

Hotel Distribution by Town

Town	No.of Hotels	No.of Beds
Watamu	20	4 004
Malindi	81	1 396
Mambrui	3	905
Total	104	6 305

Source: District Tourism Office, Malindi 1997.

The Tourism industry contributes a lot by providing employment and Market for products for other sectors such as fish, milk, meat, fruits, vegetables and construction materials.

Apart from Tourism Industry other Industrial activities are Minimal. Only the palm oil Extraction Industry is evident.

Industries which could be set up in the district include Salt Manufacturing as Salt is mined in Gongoni, Tannery to tap hides and skins from Livestock reared in the district. More Oil Extraction Industries to capture the coconut product in the district need to be established.

There is also need to start an Export processing zone in the district as there is an International Airport, Water Transport and the road network between Mombasa and Malindi is also fairly good.

The district has also potential for Milk processing Plants, especially in the areas like Marafa, Lango Baya and Gongoni where cattle farming is high.

Fish Processing can also be started in Malindi Town, Mambui and Watamu. The Mambui Plant can capture both fresh water fish and fish from the ocean.

Cassava being grown a lot in the district can also stimulate the establishment of a Starch Industry in parts of the district such as Marafa.

Commercial Trade and Services

Formal Sector

The Formal Sector activities in the district are mainly concentrated in Malindi and Watamu. This is due to the availability of basic infrastructure such as Water, Electricity and Communication Network i.e, Roads, Airport , Telephone services and availability of a ready market.

Formal Sector activities include Banks, Hotels, Supermarkets, Chemists, Bookshops, Motor Vehicle Spare Parts shops, Stationery shops, Restaurants, Government Services, Local Authority Services, Transport Services such as car hire firms, Tour Companies are also available.

Other Formal Sector Activities are to be found in Watamu though to a small extent.

Table 1.20

Number of Licensed Businesses by Category

CATEGORY	Year		
	1994	1996	1997
Regulated trade	2 799	2 563	1 549
Wholesale	101	89	52
Catering	253	289	196
Motor vehicle repairs	33	29	12
Manufacturing	30	27	17
Distribution	19	19	12
Miscellaneous	338	326	222
Total	3 573	3 342	2 157

Source: District trade Development Office Malindi 1997

Table 1.20 shows the number of licenses issued for various categories of businesses in the district. The general number of licenses has been declining between 1994 and 1997. This could be attributed to decline in the tourist industry which is the main consumer of goods and services in the district.

Informal Sector

There is a very large Informal Sector with various economic activities undertaken in the whole district. They span from the traditional to modern industrial activities.

In almost the whole district, informal sector activities include basket making, pot making, hair saloon, agricultural products hawking, small carpentry workshop, dress making shops, hoe making, small roadside tea kiosks, shoe repair, masonry and dealing in second hand clothes and shoes. In major trading centres motor vehicle garages, welding works, radio and television repair shops, and curio making/selling shops are evident.

The Informal Sector is an income earning source for many people and at the same time they act as training institutions for many school leavers who join the Sector before being absorbed in the formal sector.

Informal sector activities contribute a lot to solving unemployment problem but the growth of the sector especially in the rural areas has been very slow due to lack of good infrastructure (i.e. Poor roads, lack of electricity, telephone services and water). This has led to their being concentrated in major urban centres.

Other obstacles to the development of this sector are lack of Credit Facilities, low technology and Skills, scarcity of Markets and lack of Information especially concerning pricing, market outlets and training.

SOCIO-ECONOMIC INFRASTRUCTURE FOR INDUSTRIALIZATION

The Development of a robust network of Infrastructure facilities within the district is an essential prerequisite for Industrial Development.

During the current plan period the District will focus on Improving the following Socio-Economic Infrastructure facilities namely, Communication Network, Water facilities, Energy Sources Educational facilities and Health Facilities.

Communication Network.

The major communication Infrastructure within the district include roads, water transport, Air transport, Postal and telecommunication services.

The District has a total of 1122.5 Kms of Road Network of which 66.6 Km is of bitumen Standard 404.6 Km of gravel roads and 651.3 Km of earth roads. The Road Network distribution by Division is as indicated hereunder.

Table 1.21.

Road Network Distribution by Type (Km)

Division	Bitumen	Gravel	Earth	Total
Malindi	44.6	185.0	357.7	587.3
Magarini	22.0	59.1	18.0	99.1
Marafa	0.0	160.5	275.6	4336.1
TOTAL	66.6	404.6	651.3	1122.5

Source: District Roads Office Malindi, 1997

55 percent of the roads network are all-weather roads. Efforts will be made during the current plan period to improve the Earth roads especially those leading to Market Centres and High Agricultural produce areas with the District. The Malindi Garsen Road which transverses through Magarini Division is currently being tarmacked and when complete will place 62 Kms of the Division Roads under Bitumen Standard. The tarmacking of this area will in-addition to opening up the area, greatly enhance transportation of Salt from the Salt extraction Industries currently operating within the Division. Generally most of the roads have low volume of traffic except the Malindi Garsen Road which has a high volume of traffic.

The District is served by only one Airport at Malindi which was recently elevated to International Status. The Airport handles an average of 7,100 Aircraft and 50,000 passengers annually.

Water transport is another major form of communication in the district especially for the fishing Industry. The district has four designated ports namely Malindi, Watamu, Mamburui and Ngomeni. However due to the existing alternative means of communication the water transport has not been fully exploited.

The district is served by six post offices with four within Malindi Division and Magarini and Marafa with one post office each. The post offices have a total of 2000 rental Boxes of whom 99.9 percent are leased and handle an average of 859 Kg of Mail every week as indicated in the table.

Table 1.22.

District Postal and Telecommunication Services

Division	No. of Post Offices	No. of Rental Boxes	Rental Boxes Leased	Average Mail per Week (Kg)	Telephone Lines Available	Telephone Connected	Public Call Boxes
Malindi	4	2700	2700	852	3900	3169	71
Magarini	1	100	98	4	300	72	4
Marafa	1	100	98	3	70	13	1
TOTAL	6	2900	2896	859	4270	3254	76

Source: Post Office Malindi, 1997

The Post offices are in fairly good condition and have high utilization rates.

On Telecommunication Services the district has three Automatic telephone exchanges(2 in Malindi and one in Magarini) and one Manual Exchange at Marafa.

There are 4270 telephone lines of whom 76% of the lines are connected. All the telephone exchanges are fairly new.

The utilization rate for Malindi is quite high while the utilization is low in Magarini and Marafa Divisions.

Water Facilities.

The main Sources of Water for the district include Rivers, Boreholes and Dams as indicated in Table 1.23.

Table 1.23.

Distribution of Water facilities by Division.

Division	Km of Pipeline	Boreholes	Shallow Wells	Dams	Pans
Malindi	155	22	484	8	10
Magarini	64	22	156	25	25
Marafa	50	5	31	1	9
TOTAL	269	49	671	34	44

Source: District Water Office Malindi, 1997.

The District has 269 Km of water pipeline, 49 boreholes, 671 shallow wells 34 dams and 44 pans.

Malindi Division relies mainly on surface water from river Sabaki and shallow wells.

The Baricho water supply whose source is Sabaki River supplies Malindi and Watamu towns. Villages along the pipeline are also served with water through water kiosks. The water supply is maintained by the National Water corporation and also serves Kilifi and Mombasa Districts. The utilization rate for the facility is very high. It serves 60 percent of the district population, mainly within Malindi Division and small pockets of Marafa Division.

Magarini division relies mainly on sub-surface and ground water sources in form of wells and boreholes. The Division has at least 6 small and medium water supply systems whose main source of water are wells and boreholes. The supply systems are maintained by the Community, local NGO's Salt Extraction Industries and Tourist Hotels operating within the area. One NGO has installed a desalination Plant which desalinates Sea Water for Domestic use.

Marafa Division has the lowest number of water facilities, with only 31 shallow wells and 5 Boreholes. Efforts are currently being made to revive the Magarini Settlement Water project which stalled due to lack of funding. The project was served from 15 boreholes from four well fields and has a total of 180 Km of pipe Network designed to serve all the settlers of the Magarini Settlement Scheme which falls within Marafa and Magarini Divisions. Currently Five Community Water Project Committees are operational with technical and financial assistance from the GOK and Kenya Freedom From Hunger (KFFH) Organisation.

Energy Supply

Wood fuels, Petroleum Fuels and Electricity are the major sources of Energy in Malindi District.

91 percent of the rural Households and 27 percent of urban Households use wood fuels in form of firewood as their main source of cooking fuel. All the divisions have adequate supply of wood fuel resources though this source of energy may not be sustained due to its high utilization levels within the rural areas. Petroleum fuel in form of Kerosene accounts for 78 percent energy fuels by Households for lighting while other forms of fuels are used for Industrial purposes, road, water, and Air transport. The major Petroleum companies where the demand is high.

The District is connected to the National Electricity Grid and all the areas along the coast line have electricity. There is adequate supply of electricity within the region and the various Hotels, Factories, Business premises and Households have no difficulty in obtaining electricity.

However Marafa Division, most of Magarini division and the Malindi hinterland have no electricity. There is a need to start rural electrification projects in these areas as they have potential for small cottage Industries and Agro Processing Industries.

Other energy sources within the district include cooking gas, charcoal and solar energy though their use is minimal.

The potential for utilizing wind power for energy exists though it has not been fully exploited. Several wind mills are however being used within Magarini Division to pump water from Wells and Boreholes.

Educational Facilities

The District has a total of 108 Pre-Primary schools, 104 Primary schools, 11 Secondary schools, 4 units offering Special Education and 5 Youth Polytechnics.

The District has no other training facilities.

a) Pre-Primary Schools

The district has a total of 108 pre-primary schools with a total enrolment of 7,341 children and 191 teachers.

The schools distribution, enrolment and teachers by division is as indicated hereunder.

Table 1.24.

Pre-primary School Enrolment by Division

Division	No.of Schools	Enrolment			No. of Teachers	Pupil/Teacher Ratio	Pupil/Sex Ratio
		Boys	Girls	Total			
Malindi	51	1882	1702	3584	118	30.4	1.11
Magarini	23	859	917	1685	33	51.1	0.937
Marafa	34	1137	935	2072	40	51.8	1.22
TOTAL	108	3878	3554	7341	191	38.4	

Source: District Education Office Malindi, 1997

In terms of distribution of Pre-primary Schools, Malindi Division leads with 47 percent of the schools and 49 percent of the total enrolment while Magarini has the least no of schools. On average we have more boys than girls attending the Pre-Primary Schools though in Magarini Division the girls are slightly more than girls.

The utilization of the Pre-school facilities is quite moderate with an average of 68 children per school and a pupil teacher ratio of 38 children per teacher.

66 percent of the schools are sponsored by parents 26 percent by religious organizations while only 6 percent are run by the County Council.

b) Primary Schools

There are 104 primary schools within the District with a total enrolment of 47,502 pupils and 1,117 teachers, as shown in the table below.

Table 1.25.

Primary School Enrolment

Division	No. of Schools	No. of Streams	Enrolment			No. of Teache rs	Pupil/Te acher Ratio	Pupil/ Sex Ratio
			Boys	Girls	Total			
Malindi	50	650	15966	14929	30895	636	48.6	1.07
Magarini	20	228	4514	2836	7350	271	27.1	1.59
Marafa	34	321	5641	3616	9257	210	44.1	1.56
TOTAL	104	1199	26121	21381	47502	1117	42.5	1.22

Source: District Education Office Malindi, 1997

Malindi Division has 48 percent of the total Primary Schools and 65 percent of the total Primary School population. The utilization rate within this division is quite high with an average of 49 pupils per teacher and an average of 13 streams per school. With a pupil sex ratio of 107 boys per every 100 girls this division has fared well as compared to the others.

Magarini Division has only 19 percent of the total Primary Schools and a school population share of 15 percent. The utilization rate is quite low with an average of 27 pupils per teacher and 368 pupils per school. The pupil sex ratio is very high with an average of 159 boys per every 100 girls.

Marafa Division with 19 percent of the total pupil population has a moderate utilization rate with 44 pupils per teacher and a pupil sex ratio of 156.

The low female school enrolment is attributed to early marriages and traditional attitude towards girl child education amongst many parents.

On Primary School physical facilities e.g. class rooms and workshops it is noted that only 48 percent of the facilities are complete while 8 percent are at various stages of implementation

Secondary Schools

The district has a total of eleven secondary schools of whom only two are private schools. Seven of the schools are co-educational while two are for boys only and two for girls only.

The secondary schools have total enrolment of 1,777 students and 124 teachers as indicated in table below:

Table 1.26.

Secondary School Enrolment

DIVISION	No. of School s	No. of Strea ms	Enrolment			No. of Teachers	Student /Teach ers Ratio	Student Sex Ratio
			Boys	Girls	Total			
Malindi	9	44	1068	421	1498	104	14.4	2.54
Magarini	1	4	125	39	164	11	14.9	3.21
marafa	1	4	95	29	124	9	13.8	3.28
TOTAL	11	52	1288	489	1777	124	14.3	2.63

Source: District Education Office Malindi, 1997

The Utilisation of the secondary schools is low with an average of 34 students per stream and 14 students per teacher. The girls enrolment is also very low with an average of 263 boys for every one 100 girls. This implies that girls constitute only 27 percent of the total population. The low enrolment of girls is attributed to the poor performance of girls in KCPE examinations and the low value attached to female education amongst parents coupled with early marriages.

On secondary school physical facilities only required are complete while only 21% are currently under construction.

The district has only 4 units offering special education all within Malindi Division, The schools have a total enrolment of 37 pupils and four teachers.

Youth Polytechnics

There are five youth polytechnics in the district with a total enrolment of 206 students and 17 instructors. Malindi Division has three polytechnics while Magarini and Marafa Divisions have one each.

The polytechnics offer courses in tailoring, Carpentry and Masonry. The utilization levels of the polytechnics is low except for Gede Youth Polytechnic where utilization rate is high.

Health Facilities

The District has a total of 65 health facilities of whom 19 are Government maintained while 46 are Private/NGO maintained. The distribution of the health facilities by Division, type of facility and maintenance agency is as shown in table 1.27.

Table 1.27

District Health Facilities

DIVISION	HOSPITALS		HEALTH CENTRES		DISPENSARIES		TOTAL
	GOK	NON GOK	GOK	NON GOK	GOK	NON GOK	
Malindi	1	2		14	6	21	44
Magarini	-	-	-	-	6	6	12
Marafa	-	-	1	-	5	3	9
Sub - Total	1	2	1	14	17	30	65
Grand Total	3		15		47		65

Source: Medical Officer of Health Malindi 1997.

The district has a total of three (3) hospitals, fifteen (15) Health centres/Nursing Homes and Forty seven (47) Dispensaries/Private clinics. Malindi Division has the highest number of Health Facilities while Marafa Division has the lowest. The District Hospital has an average outpatient attendance of 1426 patients per week and an inpatient bed occupancy rate of 125 percent. The hospital has 135 inpatient beds while the two private hospitals have 46 inpatient beds. The district hospital is currently over utilized.

The dispensaries operating within Malindi and Magarini Divisions have high utilization rates with an average of 2200 outpatients per month. Due to congestion at the Government Dispensaries and Hospital, more patients are opting to private medical facilities as evidenced by the ever increasing number of private clinics and nursing homes.

The district has a Doctor/Population ratio of 1:14500.

WELFARE INDICATORS

Employment Levels

Employment Levels have a direct linkage on the overall improvement of the well being of the population through the generation of income.

The district has an estimated labour force of 119,944 persons (1997) and is expected to rise to 129,674 in 1999 and reach 140,192 by the end of the Plan Period. The labour force here refers to all persons who are economically active and are capable of engaging in gainful employment.

It is estimated that 24% of the labour force is engaged in wage employment within Public Service & Private Sector. Only 8 percent of the labour force is engaged in self employment as owners of the respective business enterprises. 68 percent of the labour force is engaged as unpaid family workers mainly within the Agricultural Sector or as Home makers (house wives). A comparison of the employment levels by gender indicates that of the total labour force 57% are females while 43% are male. However it is observed that 88 percent of females are engaged as unpaid family workers or home makers (House wives), and do not therefore earn any income.

Skilled labour accounts for only 5 percent of the total labour force. The district therefore has high

levels of unskilled labour. This phenomenon is probably due to the lack of training Institutions with the district and the general low levels of Education within the labour force.

The district has a serious problem of child labour especially within the salt extraction Industry in Gongoni. The Informal Sector (hawking and Housemaids), in the pineapple farms and Beach boys. This is due to large numbers of school dropouts, poverty in many families and preference of employers to employ children so as to underpay them.

Incomes

The main sources of income in the District include the Agricultural/Livestock production Sectors, wage employment Sector, Commercial Business, Tourism Sector and Fisheries.

Agriculture/Livestock.

Income accruing from sales of major food and cash crops is as shown in table 1.28 below.

Table 1.28

Production and Values of main Crops

Product	Production(tons)	Value(K.Pounds)'000
Maize	42 220	3798
Cashewnuts	832	4158
Coconuts	5 677	7096
Mangoes	9044	9044
Pineapples	16618	24928
Citrus	9816	8834
Water Melon	7240	10860
Cotton	17	22
Cow Peas	282	428
Green Grams	105	157
Cassava	13000	7
Total		69333

Source: District Agricultural Office Malindi, 1997

From the table Pineapples, Cassava, Mangoes and Coconuts are leading in value.

The earnings from sale of livestock and livestock products within the district is as shown in table 1.29.

Table 1.29
Livestock Production Sales.

Product	Production(Tons)	Value(K.Pounds)'000
Meat	2000	15000
Milk	1000(Lts)	1800
Eggs	1.2m(No.)	480
Poultry	120	1080
Honey	20	8
Shoats	900	2700
Hides & Skins	897	234
Total		21202

Source: District Livestock Production Office, Malindi, 1997.

From the table it is observed that income from sale of Livestock is higher as compared to sale of livestock products like milk and eggs.

Wage Earnings: Total earnings from wage employment in the District increased from 13 million Kenya Pounds in 1993 to 33 Million in 1995. This indicates an increase in earnings by 250 percent, over the period and it is expected that this trend will continue. -

The wage earnings by Sector are as indicated in table 1.30

Table 1.30.
Earning by Sector (K.Pounds '000'

Sector	Year		
	1993	1994	1995
Agriculture & Forest.	158	321	4504
Manufacturing	423	1050	746
Electricity & Water	367	400	2888
Construction	216	818	1193
Wholesale & Retail, Trade, Restaurant & Hotel	6072	5219	6936
Transport & Communication	548	1146	1145
Finance, Insurance, Real Estate & Business	1259	2542	1542
Community, Social & Personnel Services	4093	17724	14339
TOTAL	13136	29221	33292

Source: Statistical Abstract, 1996

The Community, Social and Personal Services Industry has the highest earnings constituting 43 % of the total earnings. This Industry's earnings have increased over time as they constituted 31% of the wage earnings in 1994. The Manufacturing Industry has the lowest earnings constituting only 2% of the total in 1995. It is observed from the Agricultural/Forest Industry increased from 1% in 1993 to 14% in 1995.

In 1995 earning from Malindi were about 5% the total earning for the whole Province. However, this was a drop as in 1994 Malindi had 6% of the total earnings in the whole Province.

Informal Sector: Informal Sector in the district include carpentry, Garages, Hair saloons, shoe shining, hawking, Tour Guide and roadside hotels.

Income Distribution

Income Distribution can be categorized according to sectors and locality and seasons. For locality, income in the urban centres are higher than those in the rural areas. People living in Malindi Town and Watamu tend to have high income than those living in the rural areas. This is due to presence of Formal activities in Urban areas unlike rural areas where most economic activities are Informal.

Income distribution can also depend on season. During the high tourism season: i.e. August to March, income tend to be high due to many tourist related activities. The season is characterised

by high demand of Agricultural produce, transport, accommodation, Tour guiding Services, fish products and Livestock products. During the low Tourist season (between popularly known as "KUSI" that is between March and July, income of people tend to go down. On sectors, Distribution of income from the Agriculture tend to low because prices of Agricultural produce lack market, inaccessible roads, overproduction leading to low prices..

Infant Mortality Rate

The Infant Mortality rate stand at 85:1000. The figure is high than the National average which stands at 66:1000. The main reason for this high figure has been due to high rate of malnutrition cases in district. Lack of enough health facilities especially in the rural areas, persistent food shortages in the district, and Low immunization coverage. Other causes in death of under five years are Malaria, pneumonia, anaemia and acute respiratory infection diseases.

Disease Incidence

The most prevalent diseases in the district are Malaria, upper respiratory tract infections, skin diseases and diarrhoea diseases.

Table 1.31 Shows top ten course of Morbidity ad their percentage of prevalence

Table 1.31
Major Disease Incidence

DISEASE	NO. OF CASES	PERCENTAGE
Malaria	59621	24.3%
Diseases of the U.R.T.I.	40,570	16.5%
Skin disease	14807	6.0%
Diarrhoea	12855	5.2%
U.T.I.	6578	2.7%
Anaemia	3600	2.7%
Eye Infection	3096	1.5%
Pneumonia	3036	1.3%
Accidents (including burns etc	2679	1.2%
Total	249644	100%

Source: Medical Officer of Health, Malindi, 1997

Malaria cases are very high in the district accelerating to about 24.3% of all reported cases in the district. This is because of presence of Mosquitoes in the district. The climatic conditions in the district also favour the breeding of mosquitoes.

The major predisposing factor for nearly all the diseases include poor hygiene conditions, weakness in preventive health care and health education.

HIV/Aids has not been indicated as a major disease but there are rampant cases of the of its

related opportunistic diseases affecting the labour force manpower.

The effect of these diseases on Industrialization include loss on manpower due to death, loss of productive man-hours due to sick offs. Diseases also affect savings as a lot of financial resources are used to purchase curative drugs instead of being invested on Industrial activities.

Nutrition

Nutrition status among children determines the future quality and quantity of Labour for Industrial development. Food availability of the people living in Malindi district is limited due to the fact that farmers produce only maize and cassava rather than food rich in proteins and vitamins. Even the maize and Cassava produced is also not enough. Incomes of the majority of people is also low and unable to purchase nutritious food. Other factors leading to Malnutrition include presence of diseases such as Malaria and diarrhoea, poor feeding habits, ignorance on the part of mothers due to low education influence of traditional beliefs and taboos.

Major indicator used to assess nutritional level of the under five are height and weight for age, weight for height and weight for age.

Records of children visiting growth monitoring centres in the district indicate that 10 percent of the children are underweight as shown in table 1.32.

Table 1.32

CHILD HEALTH AND NUTRITION

Division	Children Aged 0 - 11 Months		Children Aged 12 - 35 Months		Children Aged 36 - 59 Months		Grand Total	
	Under Weight	Total	Under Weight	Total	Under Weight	Total	Under Weight	Total
Malindi	784	11961	140	1116	35	165	959	13242
% under weight	6.5		12.5		21.5		7.2	
Magarini	82	222	92	197	84	126	258	545
% Under Weight	36.9		46.7		66.7		47.3	
Marafa	270	4260	339	1000	60	214	669	54745
% Under Weight	6.3		33.9		28.0		12.2	
Total	1136	16443	571	2313	179	505	1886	19261
% Under weight	6.9		24.7		35		9.8	

Source: Ministry of Health Malindi, 1997

From the table, Magarini division has the highest percentage of underweight children (47%) while Malindi has the lowest (7.2%).

The nutritional status of the children deteriorates with age as only 6.9% of the children aged 0-11 months are under weight while 35% of the children aged 36-59 are underweight. This trend is evident in all the divisions.

The figure might be slightly high because as many cases of Malnutrition are not reported then such conclusion could be misleading.

Food Availability

The main food crop grown in the district is maize but the consumption of maize normally outstrips the production thus making Malindi a food deficit district.

The main Contributing factors to the food deficit include low rainfall and poor soils which are not suitable for growing of maize. Farmers should diversify and plant other drought resistant crops such as millet and sorghum.

Areas most affected by shortage of food include Chakama, Lango Baya and Jilore Locations in Malindi Division, all parts of Marafa and Magarini Divisions.

Irrigation potential in the district is high but the area currently under irrigation is too small to meet the demand.

To offset the deficit the district relies on imports from other districts while those who are very poor rely on famine relief food distributed by the Government monthly. School children from the Semi Arid land rely on the school feeding programme.

Social Dimensions of Development

Due to the adverse effect of liberalisation and Structural Adjustment Programme, the Government started the Social Dimensions of Development Programme (SDD) as a short term programme intending to act as a safety net for vulnerable groups in order to safeguard their basic needs and to integrate them fully into mainstream of the economy.

Some of the target groups in the district include slum dwellers in Malindi Town, Unemployed, Peasant farmers, Small Scale Livestock farmers, beach boys, Jua Kali Artisans, elderly persons, destitute children and disabled.

The sectors in the district target for intervention include food production, education, health employment generation, infrastructure improvement and environment conservation. Malindi district formed the District Social Dimensions of Development Committee which has been meeting every month.

Amongst the issues the committee has been deliberating on are food situation especially distributing food to families affected by drought and recently families affected by floods.

The Committee has also been taking issues concerning water availability, roads, health and Education Development in the district.

SUPPORTING DEVELOPMENT INSTITUTIONS

In order for the district to develop several Institutions are being put in place essentially for resource mobilization and implementation of various programmes and projects meant to create an enabling environment for Industrialization to prosper.

This Sector discusses the existing Institutional framework of Malindi District. Paying attention to the DDC and its Sub-Committee, Local Authorities, Voluntary agencies, Regional Authority and Parastatals, Co-operatives, Harambee movement as well as banks and non-banks and non-bank financial institutions.

The District Development Committee and its Sub-Committee.

The Malindi DDC first met in May, 1997 after the District was formed in December, 1996. The Committee has been registering good attendance with representatives from both the Civil Service and the elected leaders. Several proposals from the District Executive Committee have been endorsed.

In order to capture felt needs of the local Community in the grassroots level, the Divisional Development Committees and Locational Development Committees were re-activated and have since responded very well.

Amongst the achievements the DDC has accomplished include the making as a top priority Land Adjudication and issuing of Title Deeds so that people can Invest in their Land. This will promote cash crop farming and also many farmers can obtain loans from various financial Institution. The DDC has also set aside Land for Jua Kali Artisans within the Municipality so that when funds are available sheds could be constructed.

The Committee has been instrumental in urging the local people to diversify and not depend on tourism alone. Several Committees have been strengthened to work out modalities of promoting Agricultural and Industrial Sector. These are the District Agricultural Advisory Committee and the District Joint Loan Board. Another Committee is the District Small Scale and Jua Kali Advisory Committee which was also formed to facilitate and initiate the culture of Trade and Industrialization especially in the rural areas.

The DDC has also set up new priorities to open up the rural areas by setting new priorities on roads, water and Rural Electrification.

The District Planning Unit has also started meeting although the membership is small as most members are not in place.

The Special-purpose Sub-Committees of the DDC, which include the District Education Board, District Tender Board, District Health Management Board, District Agricultural Advisory Committee, Project Steering Committee of Coast ASAL programme and the Social Dimension of Development Committee have also been formed and have contributed valuable suggestion for discussion in the DDC.

The District Industrial Development Committee is also in the process of being formed to discuss strategies for promoting Industrialization in the district.

Local Authorities

At present there are two local Authorities namely the Malindi Municipal Council and Malindi County Council. Malindi Municipal Council has Continued to provide essential services despite financial constraints. The Council has been collecting refuse, runs a Health Centre and runs a fire station.

The council is in the process of completing a new bus park and a modern market to promote business. The Council has also set aside land for expansion of the Airport so that it can operate as an International Airport.

The Council has also been setting aside land for trading purpose. The Municipal Council has also been maintaining roads although availability of funds is the stumbling block.

In order to promote private Investment, the Council has been in the forefront. Drawings and plans for construction have been receiving prompt attention when presented for approval.

Once the Malindi County Council is fully established, it's major task should be promote rural development. People should be provided with Land in the rural trading centres to start up Industrial and Business activities. Amongst the essential needed in these centres are water, telephone, electricity and good roads.

Voluntary Agencies

Malindi district does not have many non-Governmental organizations. The few available ones include:

Magarini Integrated Development Programme: The organization promotes Agriculture, provision of Water, Credit Improvement of Health Services especially Primary Health Care.

The project covers Magarini Division and parts of Marafa Division.

many projects the programme has undertaken include the sinking of boreholes, construction of Dams, provision of water tanks especially in schools, introduction of ox-plough to promote agriculture.

Action Aid: This is an NGO which operates in Lango Baya and Chakama Location in Malindi. The NGO is new in the District and its main activities will be building community institutions which will undertake the improvements of Education under the SPREED II Education programme. Action Aid will also Concern itself with tackling other issues such as food shortage and promotion of Youth Involvement in Development.

Kenya Women Finance Trust: The organization implement a credit programme for women undertaking off-farm activities. The women groups are normally given a group loan meant to benefit individual members of the group.

Heifer Project International: The NGO operate in Gede Location, Malindi Division. Its major objective is to improve Livestock production. The organization provides groups with Dairy Cattle which will provide milk for sale aimed at improving their income and overall wellbeing

Regional Authorities and Parastatals

Coast Development Authority (CDA): The Authority is charged with the responsibility of planning, facilitating and co-ordinating development activities in the whole Province and in the southern part of North Eastern province. Its efforts are geared towards food-sufficiency, environment Conservation, increase income through Industrial promotion both in the rural areas and urban centres. The Authority promotes research and tries to build linkage between researchers and consumers of research findings.

In the district the authority's much concern is with promotion of Irrigation projects, cashewnuts rehabilitation, soya bean promotion, Fisheries Development, simple animal Health Care and Livestock multiplication.

Kenya Post and Telecommunication Corporation (KP&TC): The Organisation has a regional Office in Malindi.

There are post offices in Malindi, Gongoni and Watamu. STD telecommunication services are available in Mamburi Malindi Gongoni Watamu and Gede. Manual telephones are in Marafa and Lango Baya.

Banks and Credit Facilities

Banks available in the district are Barclays (Malindi Town and Watamu) Kenya Commercial Bank, Trust Bank, Standard Chartered Bank, Post Bank and Habib Bank in Malindi Town.

The local communities have not benefitted much from these banks especially in terms of obtaining loans because they lack security.

Other sources of finance in the district are Kenya Industrial Estate and Kenya Women Finance Trust. These have been advancing loans but they are limited in operations due to lack of enough personnel to cover the whole district. The District Joint Board has also been giving out loans although they are limited by funds and high defaulting rate.

Harambee Movement.

The Harambee Movement has assisted many projects in the district. Recently major Harambees were held nationally where the district benefitted. The district received about Kshs.5.3 Million from the National Youth Development Fund and about Ksh.4.9 Million from the National Women Development Fund.

Other Harambees have been held in most parts of the district to assist schools, health projects and water projects.

Co-operative Movement

Malindi district has a total of thirty four (34) registered co-operative societies. Out of which 16 are active and 18 are dormant.

The distribution of the co-operative societies are as shown in the table below:-

Table 1.29

Number of Societies Per Division

Division	Active	Dormant	Total
Malindi	14	13	27
Marafa	0	3	3
Magarini	2	2	4
Total	16	18	34

Source: District Co-operative Office, Malindi, 1997.

The district has 16 active co-operative societies with Malindi Division having the most.

The co-operative societies in the district can be categorized in two - savings and credit co-operative societies which are the majority and Marketing Co-operative Societies which include Dry Produce Marketing, Horticultural Marketing, Fishermen, Handcraft marketing, and multi purpose (quarry) Marketing Societies. Marketing Societies are four (4) while the Saving and Credit societies are twelve (12).

CHAPTER TWO
CONSTRAINTS AND STRATEGIES FOR INDUSTRIALIZATION

CONSTRAINTS AND STRATEGIES FOR INDUSTRIALIZATION

Major Constraints

Having looked at Chapter one where Resource potential and how resources are being exploited in the district.

This sector works at some of the major factors which may inhibit the rate of Industrialization in the district. The factors range from inadequate infrastructure facilities, inadequate and poorly developed raw material for industrialization, underdeveloped human resources Inaccessibility to credit and poor marketing system.

Inadequate Infrastructure Facilities

Infrastructure facilities are important in the development of an area as they address people needs for transport, health school energy and market. Deficiency in the availability of some of these is noticeable in the district.

Roads : Of the district's total classified road network of 1122.5km only 66.6 are of Bitumen representing 59 %.

The tarmac cover Matsangoni (border between Kilifi and Malindi) and Malindi Town Gede - Watamu Malindi Town - Casuarina and the under construction Malindi Marereni Road. Malindi Town is also served by tarmac although full of potholes. The rest of the district is served by earth roads which become impassable during rainy season.

The road constrain hinder the supply of farm produces to the market and the most cases farmers are forced to carry their produce on head then walk very long distances to the nearby market.

The bad roads have tended to increase the prices of local farm produce as a result consumers prefer buying goods from outside the district which come with big tract and cost cheaper. This scenario makes rural Industrialization slow as profits are low leading to low savings and investments.

Water - Supply of Water continue to be a major constraint to the Industrialization and general development of the district. Areas of Marafa Division, Magarini Division and some area of Malindi Division experience persistent water shortage during the dry seasons

Some of the available water supply system are old and not functional. These water systems were designed for fewer people and demand thus unable to cater for the current increasing population. The numerous boreholes, pans and dams which were constructed a long time ago are not in operation. The dams are full of silt while equipments for the boreholes have broken down.

Electricity - Only Malindi Town, Watamu Gede Marikebuni are served by electricity. The rest of the district has no power. The area in the hinterland have a potential for starting up agro - based Industries and small Jua Kali Industries. Such industries would include fish processing, fruit canning, fruit storage, Mining, sand harvesting, milk processing.

Telecommunication - The Standard Trunk Dialling facilities are found in Malindi Town, Watamu and Gongoni while Marafa is served by Manual Exchange facilities.

Most rural market centres have no access to telephone services. Privately owned Fax machines are also to be found in Malindi Town though not widely used by people.

Inadequate and Poorly Developed Raw Material for Industrialization.

The potential for Industrialization lies in the Agricultural Sector and Tourism Sector. Agriculture sector acting as a source of Industrial inputs.

The Agricultural Sector has not been able to supply necessary raw material to enable Industries especially agro based to operate. This is due to:- firstly the production of coconut as a major cash crop in the district is hindered by pest and poor maintenance of the trees. Cashewnuts have also been experiencing a decline in acreage and yield due to diseases, age trees and negligence. Lack of planting materials and low prices also has discouraged the local farmers.

On Horticulture the potential is high especially along the coastal strip for oranges, mangoes and citrus fruit. In the interior bananas along river Sabaki, while in Marafa Division there is high potential for pineapples.

The development of these horticulture has been hampered by small acarage, unavailability of storage facilities. Other reasons are poor transport due to bad roads and scarcity of markets.

Technical advice from the Extension Officers from Agriculture and Livestock has not been available due to shortage of staff. Most locations do not have extension staff who would translate Research on new and improved varieties of crops to farmers. Farmers in the district continue to use traditional methods of production and storage.

Another constrain to raw material development especially Agriculture and Livestock is Wildlife menace. Wildlife destroy crops and sometimes transmit diseases to animals in areas bordering the national park and forest. This has reduced farmers production morale.

The Land tenure system where most people do not have Tittle Deeds has made many people not to invest so much on cash crops. Land ownership uncertainty has discourage Cashewnuts and Coconut crops development such that many people prefer growing food crops which have a shorter life span.

Under - Developed Human Resources

Human resources as a factor of production is important for Industrialization. An important aspect of human resource is the level of education and skill development.

Basic education is generally low amongst the population.

Many schools are characterized by low enrolment , absence of physical facilities and shortage of staff especially in most rural schools.

Youth Training Polytechnics in the district are few and the available ones are either non-operational or have problems ranging from lack of training facilities, material and personnel.

In the district apart from two Commercial Colleges there are no any Government Colleges to absorb School leavers.

The level of illiteracy in the district is very high. According to Welfare Monitoring Survey II of 1994 literacy stood at 52% (Kilifi District). With the high illiteracy rate the diseases incidence among infants has also tended to be very high. The district has high infant Mortality and Morbidity rate which have tended to affect the productivity of the people.

Inaccessibility to Credit

Credit is one important aspect in Investment. Credit has to be available and accessible. In the district the growth of agriculture, Livestock, Fisheries and Jua Kali has been inhibited by inaccessibility to credit. Formal Credit System like bank have terms which many people can not meet.

Absence of Title Deeds has made many people being not able to obtain loans as they do not have alternative security. Organisations such as the Kenya Women Finance Trust which might benefit people have a policy of loaning only off-farm activities, cannot meet the high demand. The Joint Loan Board is also limited in Finance cannot loan many people.

Poor Marketing System

Marketing of good and service in all the sector like Agriculture, Livestock, Tourism and Fisheries is poor in the district this is due to:-

Lack of storage facilities for highly perishable commodities such as vegetable, meat, milk, fish and fruits. This has led to people sell their produce at a throw away price as its not possible to postpone selling. The Co-operative Movement in the district is not strong. There are few co-operative societies in the district and the existing ones are poorly managed and not oriented to marketing.

Transport is another problem due to poor roads.

Lack of market information is another problem. Farmers and other producers of good and service have no place where they can access information on prices and market outlets.

In many parts of the district there are no elaborate market day where producers can display their products but sellers are forced to move from one place to another.

On Tourism the district has a lot of tourist potential but there is no system to market the district for both domestic and International Tourist.

The Tourist Information available is produced by various hotels for their own clientele. There is no documents showing hotels, bed capacity, rates, places of attraction Tour guidelines in an organised way.

On the Jua Kali sector the district does not have Jua kali exhibitions, documents showing what is produced by local artists and who is producing raw materials.

STRATEGIES

After looking at the major constraints to Industrialization, this section tries to give possible solution to trying to overcome the constraints so as to achieve Industrialization in the district.

Some of the strategies are:- Infrastructure development, Development of local raw material, Development of Human Resources. accessibility to credit and improvement of the Market system.

Development of Local Raw Material

Raw material is an important factor of production. The major raw material for industrial development in the district are agricultural produces. There is a need to increase their output, farmers should be encouraged through extension services to increase their acreage and also produce high quality farm produce. The department of agriculture should strengthen linkage between research, training and farm activities to achieve the desired output.

Irrigation potential should be exploited especially along river Sabaki. The small irrigation schemes should be for production of high income generating crops such as vegetables.

There is a need for the District to diversify with more and more people being encouraged to not only grow maize, coconuts and cashewnuts but to also keep high yielding cows, venture into fishing, both in the ocean and fresh water of River Sabaki. Better methods of fishing and storage will be encouraged so as to improve their quantity and quality.

Improvement of the Market System

For the income of the people to improve they should be able to market whatever they produce.

In order for them to Market properly, well developed Market System will be in place to provide amongst other information on prices of goods and services, market outlets, sources of raw material.

Due to the nature of some products which are perishable there is need to have storage facilities. The storage facilities guarantee a high return in all seasons.

In order for people to market their products, Licensing structure should be reviewed. Licensing paid to local authority and different Government department increase the prices of goods thus being unable to compete with imports.

In order for local products to be penetrator local and International Market the producer have to be trained on marketing tactics of producing high quality products, good packaging and advertising.

Accessibility to Credit

Accessibility of Credit should be made possible through introduction of Group Loan Scheme like the one with the Kenya Women Finance Trust. Due to the fact that most people do not have collateral, issuing of Tittle Deeds should be speeded up so that many people can obtain Loan from banks. Banks and Non-Banking financial Institutions should also design Credit Scheme to benefit the rural people.

Development of Human Resources

More effort will be made to improve the education in the district by providing facilities to school such as Laboratories, workshop and classrooms. Another aspect in human resource development is to improve existing Youth Polytechnics which will produce skilled manpower. The Private Sector should also provide more commercial colleges to train more people. There should be a linkage between the labour Market and the training Institutions. Forums be organized where trainers meet potential employees to discuss on skill requirements.

Human health should also be improved by providing adequate Medical Services to combating life threatening infections like Malnutrition, Malaria and other disease affecting human resources development. Efforts should be made to equip and staff and the available health facilities and also provide them drugs.

Infrastructure Development

Efforts should be made to improve the road conditions in the district. The Malindi - Voi road serve the Agriculture and Livestock rich areas. Other roads which will be improved are Marafa to the Junction of Malindi Garsen road. These roads are impassable during the rainy season making accessibility to the Market impossible.

Other roads which need improvement are the feeder roads like Mere - Madunguni road, Kibao Cha Fundisa - Adu road, Gede - Mijomboni road, Chakama road, Marafa - Baricho road and Marafa - Garashi road.

On Water, efforts will be geared towards provision of water especially in the semi arid areas. Targeted for completion are Mida - Matsangoni water pipeline, Marafa water supply, Malindi - Kakuyuni pipeline, Ganda - Mayungu pipeline, Malindi - Mambrui pipeline. Other water resources such as Dams should be de-silted , Boreholes , tanks, shallow wells and pans will be rehabilitated. In order to boost rural Industrialization, power supply has to be extended to the rural areas. This will attract small scale rural based Industries under the Rural Electrification Programme. The intended power will cover Malindi -Lango Baya area and sabaki-Marafa area.

Telephone and Postal Services are to be expanded in the rural centres with high priority being given to magarini and marafa divisions. Market centres.

CHAPTER THREE

INTRODUCTION.

Having looked at the major constraints and strategies in the District, this chapter explores different projects and programmes which are on going and proposed meant to tackle the bottlenecks to industrial transformation.

Industrialization calls for an integrated approach where the Government through various departments, local authorities and non-governmental organisations play an important role of creating an enabling environment for the private sector to flourish. The private sector needs water electricity, telecommunication, raw material, land and manpower to be able to invest in any undertaking.

This section is divided into three areas namely; Sectoral Policies, District objectives and targets and projects and programmes in the plan period.

OFFICE OF THE PRESIDENT

Sectoral Policy Objectives

The main policy Objectives of the sector are:-

- Improve the efficiency of the police force.
- Strengthen the education, training and counselling required to ensure well qualified police and security personnel.
- Improve the efficiency of the police force by providing the much needed facilities.
- Promote the efficiency of the police by providing the much needed facilities.
- Keep citizen informed about government policies and activities.
- Effective administration of the Focus For Rural Development Strategy.
- To sensitize wananchi on the need to register births and deaths immediately they occur.

DISTRICT SPECIFIC OBJECTIVES AND TARGETS

POLICE DEPARTMENT

OBJECTIVE Ensure law and order prevails

TARGET Construction of Police Posts

PROVINCIAL ADMINISTRATION

OBJECTIVE Ensure efficient coordination and co-operation amongst Government departments.

TARGET Construction of a district headquarters which will accommodate all departments.

National Registration Bureau

Objective Register all legible Kenyan citizens.

Target Ensure all legible persons are issued with the new identity cards.

PROJECTS AND PROGRAMMES PRIORITIES

Police Department

A. On-going Projects

Project Name Location/Division	Description of Activities
1. Tourist Police block. Malindi Location Malindi Division	Completion of staff houses for officers attached to Tourist Police Unit. Funding Source: MCTA

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Mayungu Police Post Watamu Location Malindi Division	1	Construction of a Police post, Staff quarters and armoury. Justification: Mayungu is a Tourist area with many hotels but far from a police station. Funding Source: GOK/Donor

Provincial Administration

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
District Headquarters. Malindi Location Malindi Division	1	Construction of district headquarters block which will accommodate all departments. Justification: Many departments are scattered in privately rented buildings. Funding Source: GOK/Harambee

National Registration Bureau

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Second generation identity cards. District wide	Issuing of high security document to all eligible people. Funding Source: GOK

HOME AFFAIRS AND NATIONAL HERITAGE

Sectoral Policy and Objectives

The policy objectives of the sector are to:-

- Construct and maintain prison facilities that ensure holding while protecting prisoners from epidemic and ill-health.
- Ensure that prisoners are adequately fed, clothed and rehabilitated.
- Provide transport to the courts when so ordered and on transfer to any other prison when need arises.
- To provide counselling services to couples with marital problems where the welfare of children has been affected.
- Registration of voluntary and statutory organisations which look into the welfare of children.
- Investigate cases of needy delinquent children and make appropriate recommendation to the courts for necessary action.
- Assist in the repatriation of stranded children who have been abandoned or lost.
- Prosecute parents who have neglected their children or fail to provide them with basic necessities.

- Investigation of cases of neglected, orphaned and abandoned children who are in need of protection and care as well as cases of delinquent/destitute children and recommend to the Juvenile Court the mode of their assistance.
- Rehabilitation of children committed to approved schools with a view to integrating them back to their families.

District Specific Objectives and Targets

Children Department

Objective: Reduce incidence of child labour.

Target: Elimination of child labourers in the beaches, salt works and pineapple farms

Probation department

Objective: Minimise prison population and help in resettlement of adjudged offenders.

Target: Enhance community based rehabilitation through Barazas and home visits to ensure that recurrence of crime is minimised.

Prison Department

Objective: Develop the skills of inmates in agriculture and technical field.

Target: Training inmates in basic crafts and agricultural activities.

PROJECTS AND PROGRAMMES PRIORITIES

Children Department

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Programme on child labour. Gongoni Location Magarini Division	To return to school children working in salt works. Funding Source: ILO/IPEC Geneva

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Child labour in Tourist industry. District wide	1	Elimination of beach boys and girls in tourist industry which may expose potential human resource to risks and underdevelopment. Justification: To reduce the threat caused by beach boys and girls on the tourism industry and expose the children to education opportunities. Funding Source: UNICEF
Malindi J.R.Home Malindi Location Malindi Division	2	Erection of a brick wall at Malindi J.R.Home Justification: To stop trespass and encroachment of the compound threatening future development and rehabilitation programme Funding Source: GOK
Malindi J.R.Home Malindi Location Malindi Division	3	Upgrading of Malindi J.R.Home to a rehabilitation centre/Junior approved school. Justification: Cases of drug addiction and delinquency are on the increase and need a place for guidance , counselling and training. Funding Source: GOK/Donor

Prisons Department

A. On-Going Project

Project Name	Location/Division	Description of Activities
1. Orchard Project	Malindi Location Malindi Division	Installation of pump to be used for irrigation in growing orchards and other fruit trees. Funding Source: GOK
2. Prison Industries	Malindi Location Malindi Division	Strengthening of the workshop by providing modern tools. Funding Source: GOK

Probation and After Care Department

A. On-Going Projects

Project Name	Location/Division	Description of Activities
1. Community based rehabilitation	District wide	Helping resettlement of adjudged offenders in the community in which they had wronged. Funding Source: GOK

TOURISM AND WILDLIFE

Sectoral Policy Objectives

The policy objectives of the sector are:-

- To maximise fish production on a sustainable yield basis in order to achieve optimum economic and social benefits.
- Increase the income of the fishermen.
- To promote the fishing industry.
- To develop and manage wildlife through various conservation measures and management plans.
- To conserve game reserves and parks both as a national heritage and an attraction to the tourist industry.
- Promote wildlife development and protect the environment.
- Stimulate tourism as a means of encouraging local employment and a source of foreign exchange by developing tourist attractions, expansion and improvement of infrastructure in the parks.

District Objectives and Targets

Tourism Department

Objective Development of Curio trade.

Target Establish 3 Curio markets in the district main towns.

Fisheries Department

Objectives: Increased fish production and marketing in the district.

Targets: Open up 5 more fish landing stations and 5 reception centres.

Start up a credit scheme/training/extension and gear exchange programme.

PROJECTS AND PROGRAMMES PRIORITIES

Tourism Department

B. New Project Proposals

Project Name	Location/Division	Priority Ranking	Description of Activities
Malindi African Curio Market.		1	Development of new market centres for beach operators.
Malindi Location	Malindi Division		<u>Justification:</u> The present marketing centres are scattered and lack basic social amenities.
			<u>Funding Source:</u> GOK

Fisheries Department

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Rehabilitation of boat yard. Malindi Location Malindi Division	Purchase of cogwheel and repair of existing workshop machines. Funding Source: GOK
2.	Rehabilitation of ponds in Ngomeni. Gongoni Location Magarini Division	Construction of dykes, repair of wall and digging out the ponds to remove mud. Funding Source: GOK

B: New Project Proposals

	Project Name Division/Location	Priority Ranking	Description of activities
	Gazetement of landing beaches/sites District wide	1	5 landing beaches/sites:- Mto Kilifi, Kinyaole, Kichwa cha kati, Mambrui and Mida to be gazetted. Justification: For ease of carrying fisheries management measures vis statistics revenue and conservation. Funding Source: GOK
	Construction of fish reception centres. District wide	2	Construction of 5 reception centres. Justification: For hygienic handling of fish during landing and marketing. Funding Source: GOK
	Construction of patrol boats Malindi Station. Malindi Location Malindi Division	3	Construction of a 32 feet long V-shaped hard board boat with at least 2 in-board engines. Justification: To improve surveillance and law enforcement measures to reach trawlers in deep sea. Funding Source: GOK
	Credit to fishermen/Training and extension gear exchange. District wide	3	To give gears, engine boats and provide training and extension services. Justification: To increase production through modern gears and reduce time

taken to go and come from fishing grounds by motorising the boats.

Increase awareness amongst fishermen on the potential of the sector through extension education.

To encourage fishermen to use methods which are environmental friendly by using low destructive fishing gears at subsidised prices.

Funding Source: GOK

Rehabilitation of laboratory at Malindi Office.

4

Purchase of meldehyde, ethyl alcohol, ammonia solution, sulphuric acid, hydrochloric acid, sodium hydroxide, potassium permanganate, syringes and potassium nitrate and other related equipment.

Malindi Division

Justification: Improve quality control and increase quality requirement.

Funding Source: GOK

Rehabilitation of Ngomeni fish landing depot

5

Renovation of the entire structure.

Gongoni Location
Magarini Division

Justification: To prevent erosion of sand at the frontage.

Funding Source: GOK

AGRICULTURE, LIVESTOCK DEVELOPMENT AND MARKETING

Sectoral Policy Objectives

The sectoral policy objectives of this sector include:

- Production of a wide range of food crop products to feed the Nation.
- Production for export to earn foreign exchange.
- Exercising statutory duties pertaining to control and treatment of livestock diseases.
- Ensuring efficient and effective management of food.
- Ensuring that foodstuffs are geographically distributed so that all members of the population nutritionally adequate diet throughout the year.

District Specific Objectives and Targets

Livestock Department

Objective Training of farmers on modern livestock technic and staff training during monthly workshops.

Target Train 20 groups with more than 10 members every year.

10 monthly workshops every year.

26 supervision every year.

Objective To provide training support to small holder dairy group and individuals.

Target Conduct 3 training sessions per year.

Objective Strengthen range management.

Target Re-organise and rehabilitate 2 registered ranches.

Objective Improvement of local goats.

Target Provide 20 quality breeding Galla bucks to groups and individuals every year.

Objective To improve local Zebus.

Target Increase servicing bulls from 2 to 20.

Objective To increase honey production.

Target Conduct 6 to 8 group training every year.

Objective Increase the production of Rabbits.

Target Identify and train 60 farmers and youth clubs in Rabbit keeping.

Objective Improve marketing of livestock.

Target Establish 2 auction yards.

Conduct 5 training on livestock sales.

Veterinary Department

Objective Improve veterinary clinical services.

Target Provide treatment of reported disease cases through providing adequate medical care.

Objective Ensure improved animal health through tick control services.

Target Strengthen all dip committee and encourage effective dipping.

Objective Increase milk and meat production through AI services.

Target Encourage private AI in form of co-operative groups.

Ensure at least 1 private AI service in every location.

Agriculture Department

Objective To increase food production.

Target Complete 4 irrigation schemes.

Objective Improve land use.

Target Establish 3 soil and water conservation catchments every year.

Objective Increase the income of the people.

Target Rehabilitate cashewnut and coconut crops.

Objective Encourage the growth of fruits crops.

Target Encourage private fruit processing plants.

PROJECTS AND PROGRAMMES PRIORITIES

Agriculture

A. On-going Projects

Project Name Location/Division	Description of Activities
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- | | | |
|----|---|---|
| 1. | Chakama Irrigation Scheme.

Chakama Location Malindi Division | Completion of the scheme (main canals and distribution boxes)

<u>Funding Source:</u> GOK |
| 2. | Sabaki Irrigation Scheme.

Malindi Location Malindi Division | Completion of the scheme (main canals and distribution boxes)

<u>Funding Source:</u> GOK |
| 3. | Cashewnut rehabilitation project.

Gede Location Malindi division | Improvement of cashewnut production through pruning, weeding, pest and disease control and planting seedlings from high yielder.

<u>Funding Source:</u> GOK |
| 4. | Fertilizer extension project.

Gede & Watamu Locations Malindi Division | To verify FURP recommendations and to carry out demonstrations.

<u>Funding Source:</u> GTZ |
| 5. | Mongotini Irrigation Project

Goshi Location Malindi Division | Completion of the scheme (main canals and distribution boxes)

<u>Funding Source:</u> GOK |
| 6. | National Soil Conservation Project

District wide | Soil and water conservation.

Run off control.

Water harvesting and water management.

Agro-forestry.

<u>Funding Source:</u> SIDA/GOK |
| 7. | National Extension Programme (NEP II)

District wide | Train staff in appropriate technology .

Develop appropriate extension messages for farmers.

Train farmers on appropriate post harvest and utilization technologies.

<u>Funding Source:</u> IFAD |
-

Livestock Department

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	National Extension Project (NEP II) District wide	Training of farmers on modern livestock keeping technic. Staff training during monthly workshop and MTS. Funding Source: IFAD
2.	Dairy production Project. Gede Location Malindi Division	To provide training support to small holder dairy groups and individuals. Funding Source: Heifer Project International.
3.	Manyeso Milk Marketing project. Gede Location Malindi Division	Collecting, cooling and sale of fresh milk from farmers. Supervise person with Heifers to remain group members assisted by Heifer Project International (HPI) Funding Source: Heifer Project International.
4.	Dairy Goats Project. District wide	Provide training support on modern dairy goats management. Identify sources of supply of breeding dairy goats for procurement. Funding Source: Heifer Project International/GOK.
5.	Range Management. District wide	Re-organise and rehabilitate registered and proposed ranches and productive units. Provide training support on ranching as a business. Funding Source: GOK
6.	Local Goats and sheep Improvement. District wide	Provide training support on small stock management. Providing quality, breeding Galla bucks, quality black head and dorper rams for breeding to groups and individuals. Funding Source: GOK
7.	Poultry Development Programme. Magarini Division Marafa	Provide training support to both staff and farmers on modern poultry management. Identify source of improved cockerels for crossing

	Division	with local poultry.
		Funding Source: Magarini Integrated Development Programme
8.	Local Zebu Cattle improvement project	Provide training support on appropriate husbandry practices.
	Marafa Division magarini Division	Identify sources of breeding bulls calves for upgrading of the Zebu cattle.
		Funding Source: Magarini Integrated Development Programme
9.	Bee Keeping Project	Provide training support in modern bee keeping technology.
	Marafa Division magarini Division	Identify source of supply for KTB Hives and harvesting kits.
		Funding Source: Magarini Integrated Development Programme
10.	Pig production project.	Provide training support on appropriate pigs management ass a business to interested groups.
	District wide	Identify source of breeding materials.
		Funding Source: GOK
11.	Rabbit production project.	Provide training support on appropriate management technic as a source of cheap protein.
	District wide	Identify breeding stock for farmers and youth clubs.
		Funding Source: GOK
12.	Donkey Production Project.	Provide training support on appropriate technologies.
	District wide	Identify source of breeding stock.
		Funding Source: GOK

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Auction Yard Project at Sabaki holding ground and Gongoni	1	Construction of appropriate infrastructure for the auction yard.
Malindi Location Malindi Division		Train farmers on marketing strategies to maximise profit.

Gongoni Location Magarini
Division

Justification: Current prices are not competitive.

There is too much livestock movement within Malindi town which is animal health hazard while their waste pollute the streets.

To raise Appropriation in Aid to the government.

Funding Source: Malindi County Council,
Malindi Municipal Council.

Veterinary Department

A. On-going Projects

Project Name Location/Division	Description of Activities
1. National Extension project (NEP II)	Increasing contact to farmers by technical personnel to sell extension packages at farm level.
District wide	Training of farmers both at farm level and training institutions
	Training of personnel
	Increased use of audio-visual aids
2. Tick control project (Agricultural sector adjustment operation II)	Funding Source: IFAD
	Provide acaricide namely almatix at a subsidised rate of sale by the government to farmers so as to assist the success of privatization of cattle dips.
District wide	Funding Source: GOK

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Revitalizing current existing Cattle dips.	1	To make dips strong structures for effective dipping.
District wide		Justification: To effectively control tick borne diseases and assist in the privatisation programme.
Construction of Vaccination crushes.	2	Funding Source: GOK
		To strengthen infrastructure for effective animal handling.

District wide

Justification: To be able to effectively vaccinate a cattle population of around 100,000 heads of cattle against rinderpest, CBPP.

Funding Source: GOK

Construction of offices.

3

To accommodate departmental staff to run their services well.

District Headquarters,
Marafa Division Malindi
Division
Magarini Division

Justification: Easy identification by farmer and their requests for services.

Funding Source: GOK

RESEARCH, TECHNICAL TRAINING AND TECHNOLOGY

Sectoral Policy Objectives

The major policy objectives of the sector are:-

- To train and equip school leavers (both primary and secondary) with the relevant technical skills in line with the needs of the informal sector.
- Ensure incorporation of entrepreneurship education in technical education and vocational training in order to enhance income generation through self employment.
- Design and mount short-term skills upgrading and management courses for the Informal Sector operators so as to improve their productivity.
- Establish and strengthen mechanisms that facilitate the application of scientific and technical findings production in both public and private sectors.

District Specific Objectives and Target

Applied technology

Objective: To develop the Jua Kali by providing good working environment.

Target: Construct 2 Jua Kali sheds in the district.

Youth Training Department

Objective: Improve skills of school leavers.

Target: Provide equipment to 6 existing youth polytechnic and establish 3 more youth polytechnic in the District.

PROJECTS AND PROGRAMME PRIORITIES

Applied Technology

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Nyayo Jua Kali Shed.	1	Construction of workshops.
Malindi Location Malindi Division		<u>Justification:</u> It will serve the giant Malindi Jua Kali Association.
		<u>Funding Source:</u> GOK
Nyayo Jua Kali Shed.	2	Construction of workshops.
Magarini Location Magarini Division		<u>Justification:</u> It will serve the Jua Kalis in Magarini.
		<u>Funding Source:</u> GOK

Youth Training

A. On-going Projects

	Project Name Location/Division	Description of Activities
1	Upweoni Community Development Centre. Malindi Division Malindi location	Provision of equipment and training tools . Strengthening of management. <u>Funding Source:</u> GOK/Community
2.	Kakuyuni Youth Polytechnic. Malindi Division Goshi location	Construction of a permanent workshop and girls hostel. Provision of equipment and tools. <u>Funding Source:</u> GOK/Community.
3.	Mapimo Youth Polytechnic. Magarini Division Gongoni location	Construction of permanent workshops,hostels and staff houses. Provision of equipment and tools. <u>Funding Source:</u> GOK/Community
4.	Adu youth polytechnic. Marafa Division Adu location.	Construction of permanent workshops,hostels and staff houses. Provision of equipment and tools. <u>Funding Source:</u> GOK/Community

5. Jilore Youth Polytechnic.
Jilore Location Malindi Division
Completion of workshop (installation of doors, windows and plastering of walls)
Provision of equipment and tools.
Funding Source: GOK/Community
6. Gede Youth Polytechnic.
Gede Location Malindi Division
Construction of permanent workshops, hostels and staff houses.
Provision of equipment and tools.
Funding Source: GOK/Community
7. Marafa Youth Polytechnic.
Marafa Location Marafa Division.
Construction of staff houses and hostel.
Provision of equipment and tools.
Funding Source: GOK/Community

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Langobaya Youth Polytechnic. Langobaya Location Malindi Division	1	Construction of youth polytechnic with hostels and staff quarters. Provision of tools and equipment. Justification: There is no youth polytechnic in the location to cater for school leavers. Funding Source: GOK/Community
Marereni Youth Polytechnic. Fundissa Location Magarini Division	2	Construction of youth polytechnic with hostels and staff quarters. Provision of tools and equipment. Justification: There is no youth polytechnic in the location to cater for school leavers. Funding Source: GOK/Community
Mida/Majaoni youth polytechnic. Gede Location Malindi Division	3	Construction of youth polytechnic with hostels and staff quarters. Provision of tools and equipment. Justification: There is no youth polytechnic in the location to cater for school leavers. Funding Source: GOK/Community

ENERGY

Sectoral Policy Objectives

The policy objectives of the energy sector are to :-

- Promote conservation of all forms of energy
- Increase wood production and efficiency in wood utilization
- Encourage domestic wood fuel substitution where possible
- Promote and develop alternative sources of energy to lessen reliance on imported energy.
- Intensify rural electrification to cope with the increased demand for electricity in rural areas through the Rural Electrification Programme.

District Specific Objectives and Target

Objective Promote the growth of agro-based industries in the rural areas with high potential.

Target Supply electricity to Ganda - Madunguni, Marafa, Dabaso through the rural electrification programme.

PROJECT AND PROGRAMMES PRIORITIES

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Rural Electrification	1	Electrification of Malindi - Ganda - Madunguni. Marikabuni - Marafa. Kijiwetanga - Msoloni - Mayungu. Kibaoni - Fundissa T/Centre Timboni - Dabaso <u>Justification:</u> These are high potential area in the district which can stimulate agro-based industries. The electricity will also serve a lot of institutions and people. <u>Funding Source:</u> GOK

COMMERCE AND INDUSTRY

Sectoral Policy Objectives

The major objectives of the sector are:-

- Encourage dispersal, growth, and development of industries and businesses.
- Stimulation of the growth and promotion of quality of domestic products to meet the requirements of local consumers and for export
- Promote effective competition in the distribution sector with a view to increasing its efficiency and ensuring availability of essential commodities.
- Increase the role of indigenous entrepreneurs in manufacturing and trade.
- Promote fair trade and consumer's interests through standards, weights and measures.
- Bring about long term balance between export earnings outlay in imports.

District Specific Objectives and Targets

Trade Department

Objectives: Establish a credit scheme where businessmen can obtain loans.

Target: Form a Malindi Trade Development joint Loan Board and licence approximately 2500 businesses

Objective: Improve enterprenuer skills on delivery of services

Target: Conduct 4 seminars for 120 small traders every. year.

Industry Department

Objective: Promote the development of trade an industry.

Target: Carry out 1 District industrial potential survey which will identify resource endowment, infrastructure facilities and projected demand conditions.

PROJECT AND PROGRAMME PRIORITIES

Trade Department

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Malindi Trade Development joint loan Board.	Extension of credit facilities to small scale enterprenuers through boards revolving funds.
	District wide	Funding Source: GOK/Malindi County Council

Department of Industry

B. New Project Proposal

Project Name/Location/ Division	Priority	Description of Activities
District Industrial Potential Survey	1	<p>To identify specific project ideas in the light of the resource endowments infrastructure facilities and projected demand needs.</p> <p>Prepare project profile for the identified project ideas/proposals with the aim of promoting them on a regional national and international Level.</p> <p>To identify interpreneurs and their level of skills and management capabilities in industrial activities with a view of providing technological and management skills through training</p> <p>Justification: There is no such information in the District.</p> <p>Funding Source: GOK</p>

CO-OPERATIVE DEVELOPMENT

Sectoral Policy Objectives

The major policy objectives of the Co-operative sector are to:-

- To ensure that Cooperative Societies are well organised and protect the financial interests of their members.
- Improve the management of Cooperative Societies through training programmes for managers, members and community leaders.
- Promote the contribution of Co-operative Societies to the production, processing and marketing of major agricultural products and encourage Co-operative Societies to engage in employment generating activities, particularly in small scale enterprises.

District Specific Objectives and targets

Objective: Strengthen the Co-operative movement

Target: Revive 18 dormant societies and conduct training, education and management seminars to all the societies officials.

PROJECT AND PROGRAMME PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Intensive Co-op Management improvement scheme. District wide	Members education programme Field days Committee members seminars Staff training Accounts follow-ups and inspections. Arranging Study tours. <u>Funding Source:</u> GOK/NORDIC/KUSCCO/MOVEMENT

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Revitalisation of the co- operative sector. District wide	1	Reviving the dormant societies in the district. Encouraging societies to diversify their activities <u>Justification:</u> There are many dormant societies in the District. <u>Funding Source:</u> GOK

ENVIRONMENT AND NATURAL RESOURCES

Sectoral policy objectives

- To conserve gazetted natural forests with the aim of protecting water catchment areas, conserving biodiversity and protecting endangered tree species from extinction.
- To allow controlled licensed exploitation of various forest produce in order to earn government revenue and support the various industries which use forest produce as their raw materials.
- To undertake a tree planting programme in order to establish industrial tree plantations and also carry out enrichment planting with mixed indigenous tree species in gazetted forest areas where logging has taken place.
- To carry out a Forestry Extension programme aimed at conserving the natural woodlands

outside the gazetted forests and to facilitate adoption agro-forestry practices by farmers.

- To provide appropriate forum for exchange of environmental information as well as discuss national trends and key issues in the integration of environmental consideration in the development process.
- Assessment and evaluation of the impact of development activities on the environment.
- Sustainable watershed management and environment amelioration through silvicultural sound forest management of natural and industrial forest component.
- Reclamation and regeneration of forest cover in ASAL through appropriate techniques.
- Intensification of mineral resource development through decentralization and careful exploitation of mineral resources while caring for the environment.

District Specific Objectives and Targets

Forest Department

Objectives: Establishment of community/group nurseries for fuel, fodder and re-afforestation.

Target: Establish tree nurseries in all locations in the district.

Objective: Promote forestry through extension services in association with related sectors for good land resource management.

Target: Establishment of community nurseries in all location.

PROJECTS AND PROGRAMME PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Coast ASAL Project District wide	Establishment of community/Group based nurseries for fuel and fodder trees. Re-afforestation of degraded settlement, water catchment and stock watering areas. Improving natural resource management. Promotion of Agro-forestry through enhanced support to extension programme. <u>Funding Source:</u> GOK/IFAD
2.	Arabuko Sokoke forest management. Malindi Division	Protection and conservation of indigenous forest block through regulation of exploitation and to ensure sustainability. Promotion of participatory conservation by adjacent communities through extension and promotion of alternative source of domestic wood needs.

Encourage eco-tourism as another source of income from the forest fauna and flora.

Funding Source: GOK/EU

LAND RECLAMATION, REGIONAL AND WATER DEVELOPMENT

Sectoral Policy Objectives

The major objectives of the sector are:-

- Planning, Utilization and conservation of water resources;
- Development and distribution of sufficient and safe water to all rural and urban areas of the country for domestic, agricultural, livestock and industrial use;
- Monitoring and assessment of water quality in order to protect consumers from the dangers of pollution of the water resources;
- Encouraging beneficiaries to be involved in the planning; implementations and operation and maintenance of water supplies.

District Specific Objectives and Targets

Water Department

Objective Ensure the distribution of water in the rural and urban areas for domestic, agricultural, livestock and industrial use.

Target Complete 1 water pipeline.

Scoop 25 pans in the drier areas of the District.

Construct 3 dams.

Rehabilitate 2 rural water supply systems.

Coast Development Authority

Objective Improve animal health care.

Target Train 8 bare foot vets on simple animal health care then provide them with kits.

Objective Increase food production in the ASAL areas through seed bulking.

Target Establish 1 multiplication and distribution centre for Coast Composite and Pwani Hybrid.

Objective Encourage small scale agrobased industries.

Target Provide equipment and starting capital for small food processing industries e.g. Cashewnut pan roasting and small dairies.

PROJECT AND PROGRAMME PRIORITIES

A: On-going Projects

	Project Name Location/Division	Description of Activities
1.	Mida-Matsangoni water pipeline Gede location Malindi Division	Laying of a 6" diameter mainline from Mida to Matsangoni trading centre. Funding Source: NWC & PC and community.
2.	Kadzifitseni Dam Marafa Division	Construction of a Dam. Funding Source: Magarini Integrated Development Programme
3.	Kadzandani Bore holes 3No. Marafa Division	Cleaning of the Boreholes and re-equipping with pumping unit. Funding Source: Magarini Integrated Development Programme
4.	Marafa Health Centre Water Supply Marafa Location Marafa Division	Construction of 30m ³ ferrocement tank. Funding Source: GOK
5.	Marafa Water Supply Rehabilitation. Marafa Location Marafa Division	Replacement of as 3Km Pipeline of 2.5" UPVC from G.I.S. to Makanda. Funding Source: GOK
6.	Mjanaheri and Bura Ndogo open well. Magarini Division	Rehabilitation and equipping to completion of them wells Funding Source: Magarini Integrated Development Programme

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Adu-Kamale, Wakala-Dakacha, Kata & Kamale Dams Marafa Division	1	Excavation and construction of ancillary structures Justification: Provide Water for both people and livestock in an arid area hardest hit by drought.

		Funding Source: EEC/GOK
25No. Pans in various locations	2	Scooping and construction of ancillary structures.
Marafa Division Magarini Division		Justification: Provide water for people and livestock in a semi-arid area with good potential.
		Funding Source: GOK
Rehabilitation and upgrading of 26No. shallow wells.	3	Cleaning, covering & installation of hand pumps.
Magarini Division		Justification: The existing water holes are the only source of water during dry period. These sources needs to be improved to make them reliable.
		Funding Source: GOK/IFAD
Marafa, Kadzandani, Wakala & Dakacha & Pumwani Boreholes	4	Sinking and equipping complete with pumps and engine (9No.) Boreholes.
Marafa Division		Justification: They are the main sources of water in this arid area. They need to be increased.
		Funding Source: GOK
20No. Ferrocement tanks of capacities 30M ³ , 50M ³ , 100M ³ .	5	Construction to completion with guttering.
15No. in Marafa Division.		Justification: Providing drinking water to institutions e.g. Schools, Dispensaries, Administrative offices etc.
5No. in Magarini Division		Funding Source: GOK/IFAD

Coast Development Authority (CDA)

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Simple animal health care. Magarini Division	To train barefoot vets on simple health care, provide barefoot vets with drugs, acaricide and equipment. Funding Source: GOK
2.	Mongotini irrigation project. Goshi Location Malindi Division	Mobilize community along the Sabaki river to utilize the water resource base for economic activities - high value crop farming.

		<u>Funding Source:</u> GOK/Donor
3.	Soya bean promotion programme. Malindi Division	Pilot project to promote production and utilization of Soya bean at farm level as a protein source. <u>Funding Source:</u> GOK
4.	Fisheries Development Programme. Malindi division	Facilitation of fishermen clubs and cooperatives to acquire modern fishing gear and leadership training. <u>Funding Source:</u> GOK/Donor
5.	Seed bulking project at Magarini. Magarini Division	Multiplication and distribution of Coast Composite and Pwani Hybrid. <u>Funding Source:</u> GOK/Donor
6.	Livestock multiplication centres. Malindi Division Magarini Division	Provision of breeding stock to livestock farmers in the district. <u>Funding Source:</u> GOK/Donor
7.	Promotion of cottage industry. Malindi Division Magarini Division	Promote groups or individuals in the liberalized economy to venture into small scale food processing industries e.g. Cashewnut pan roasting and small dairies, fruit processing. <u>Funding Source:</u> GOK/Donor

HEALTH

Sectoral Policy Objective

The overall policy objective of the sector is to direct its financial and other resources to those projects and programmes that will lead to the achievement of the Government's long term goal of providing health services within easy reach of all Kenyans. This would involve restructuring of the health sector. Emphasis will be laid on preventive, promotive and rehabilitative services without ignoring curative services.

Other objectives are to:

- Increase effectiveness, coverage and accessibility of health services with active community participation.
- Intensify activities aimed at control, prevention and eradication of diseases.
- Provide adequate diagnostic therapeutic and rehabilitative services.
- Promote and develop cost effective research aimed at promoting peoples health.

Ministry of Health

District Specific objectives and Target

Objective Improve the health of the people.

Target Provide both medical and non-medical equipment to 6 health facilities.

Reduce infant mortality rate to 70/1000.

PROJECT AND PROGRAMME PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Mizijini Dispensary Marafa Location Marafa Division	Construction of 2 staff houses (category F). Provision of both medical and non-medical equipment. <u>Funding Source:</u> GOK
2.	Adu Health Centre Adu Location Marafa Division	Completion of remaining works (windows, doors, fitting, painting and plumbing works) Provision of medical and non-medical equipment. Construction of 30M ³ ferrocement water tank, kitchen and laundry. <u>Funding Source:</u> GOK
3.	Garashi Health Centre. Garashi Location Marafa Division	Completion of remaining works (windows, doors, fitting, painting and plumbing works) Provision of medical and non-medical equipment. Construction of 30M ³ ferrocement water tank, kitchen, laundry and V.I.P latrine. <u>Funding Source:</u> GOK

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Malindi district hospital Malindi Location malindi Division	1	Carrying out repair works to the existing blocks. Provide both medical and non-medical equipment.

		Construction of a new kitchen and laundry block.
		Construction of a new operating theatre, male and female wards, isolation block, intensive care unit and X-ray block.
		Justification: The existing block is old with leaking roof and faded paints.
		The block is too congested, most equipment are old and/or missing.
		The existing kitchen and laundry are small and in a state of disrepair.
		The isolation and I.C.U. are non-existent.
		Funding Source: GOK
Training of traditional birth attendants.	2	Residential training of 300 traditional birth attendants and equipping them with kits.
Magarini Division Marafa Division		Justification: Many pregnant mothers deliver unsafely in most areas which are far from health facilities.
		Funding Source: GOK
Training of community health workers.	3	Residential training for 400 community health workers.
Marafa Division Magarini Division		Opening up growth monitoring centres.
		Assist the community to open and operate BAMAKO initiative centres.
		Justification: Most areas are underserved in the provision of dispensaries and health centres.
		High ignorance rate on matters pertaining to health and diseases among the community.
		Funding Source: GOK
Mosquito control programme.	4	Larviciding with appropriate chemicals all mosquito breeding grounds.
District wide		Drain all stagnant water.
		Encourage community to clear grass.
		Carry out residual spraying with an

		appropriate insecticide for all adult mosquitoes.
		Justification: There is a high incidence of Malaria in the district.
		Funding Source: GOK
Water and Sanitation project.	5	Encouragement of the community to construct and use V.I.P. latrines for excreta disposal.
Magarini Division		Encourage the construction of water jars, tanks and earth pans to provide source for safe water.
		Justification: Diseases as a result of defective sanitation are high so are the diseases due to lack of water or use of contaminated water.
		Funding Source: GOK

CULTURE AND SOCIAL SERVICES

Sectoral Policy Objectives

The objectives of the sector:-

- Mobilize local communities for self reliance in basic needs and involvement in development planning processes.
- Promote and raise the status of women through programmes focused on women groups in income generating activities and in decision making at all levels.
- Identify, train, rehabilitate and resettle disabled persons for self-reliance.
- Improve sports facilities by establishing district stadia and other facilities that can promote sporting talents.
- Encourage sports talents from the grassroots by strengthening the District Sports Administration.
- Promote the preservation and role of culture through visual arts, oral traditions, popularisation of Kiswahili and other national languages for identity and pride.
- Intensify Adult Education to eradicate illiteracy.
- Provide reading materials in the districts through National Library Services.

District Specific Objectives and Targets

Sports Department

Objectives: Improve sporting activities in the district.

Target: Establish 1 stadium in the district, 3 playing fields (1 per Division)
Strengthen management of sports association and clubs.

Adult Education

Objectives: Promote literacy in the district

Target: Increase adult learners from 800 to 1200.
Recruit 50 more part time teachers.
Open 30 more Adult centres for learners

Social Services

Objectives: Involve the community in the ASAL areas in project identification and implementation with a view of alleviating poverty.

Target: Conduct 3 village workshops per year in ASAL areas .

Objective: Increase efforts on vocational rehabilitation.

Target: Open up a register of all disabled persons then establish 50 working groups for self employment
Form rehabilitation committees at all administrative levels.

Objective: Reduce child mortality rate

Target: Put up a family life training centre.

Adult Education

PROJECT AND PROGRAMME PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Literacy education District wide	Teaching/Learning reading writing and numerals. <u>Funding Source:</u> GOK
2.	Integrated Programme District wide	Teaching concepts in functional literacy. <u>Funding Source:</u> GOK

3. Socio Economic projects. Initiative income generating projects.

District wide

Funding Source: GOK/Self help

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Post literacy Programme.	1	Needs assessment survey.
District wide		<p>Identification of existing materials.</p> <p>Training of personnel.</p> <p>Sensitise local leaders</p> <p>Collaboration with other agencies.</p> <p>Justification: Sustainability of basic education and enhance contribution to socio economic.</p> <p>Improve the level of education of school drop out.</p> <p>Provision of reading facilities to communities.</p> <p>Opportunity for continuity education.</p> <p>Knowledge and skills provision for self employment.</p> <p>Funding Source: GTZ/GOK</p>

Department of Social Services

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Community Development programme	Mobilization and motivation of people to participate in general development activities on self help.
	District wide	Funding Source: GOK
2.	Women development programme.	Promotion of gender and development so as to start income generating activities.
	District wide	Funding Source: GOK/Women Groups

3. Vocational rehabilitation.
District wide

Registration of disabled persons.
Skills development of disabled people.

Campaigning for prevention of various disabilities.

Formation of rehabilitation committees at all administrative levels.

Funding Source: The Community/GOK
4. Social welfare Programme
District Wide

Providing counselling services in areas like family planning, unemployed school leavers, street children and disabled.

Reduce short term felt needs like school fees, health expenses, relief of distress (family destitution through Barazas and short term seminars).

Funding Source: The Community/GOK
5. Youth Development Programme
District wide

Organising and mobilizing the youth to utilize their time in participation in development activities, educational activities and income generating activities.

Funding Source: The Community/GOK

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Family life training centre Malindi Location Malindi Division	1	Construction of the centre which will admit and treat malnourished children. Justification: There is high child mortality rate in the district. Funding Source: GOK
Credit Programme for women groups, self help and youth groups District wide	2	Train groups with viable projects on managerial skills, record keeping, decision making, leadership skills and project proposals writing skills. Justification: 98% of the groups lack the necessary skills to manage their projects. Funding Source: GOK/DONOR
Multi-purpose Building. Malindi Location Malindi Division	3	Construction of a building with a hall, offices, cafeteria, lodging and a nursery school to create facilities for meetings and other activities.

Justification: The community has no such facility.

It will be a source of revenue for women groups.

Funding Source:
Harambee/DONOR/GOK/Wel-wishers

Show room.

4

Construction of a showroom for youth groups and disabled persons to display their products and advertise their goods.

Malindi Location Malindi Division

Justification: The community has no such facility where it will open way for outside market.

Funding Source:
Harambee/DONOR/GOK/Wel-wishers

Department of sports

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Construction of a district stadium.	1	Establish one fully equipped sports stadium to provide a venue for national and local sports events.
Malindi location Malindi Division		<u>Justification:</u> This is a rapidly growing town without a sporting centre and facilities. <u>Funding Source:</u> GOK/Donor
Construction of sports grounds in all divisions of Malindi District.	2	Establish fully equipped sports ground for local sports events.
Malindi Division Marafa Division Magarini Division		<u>Justification:</u> To promote sports activities at grassroots level and tap local talents. <u>Funding Source:</u> GOK/Donor/Self Help
Social Halls	3	Construction of fully equipped halls in the divisional headquarters.
Magarini Division Malindi Division Marafa Division		<u>Justification:</u> to promote and cater for indoor games/sports facilities. <u>Funding Source:</u> GOK/Donor/Self Help

Expansion programmes for sports activities.	4	Start more sports clubs and associations.
District wide		Organise seminars and workshops for officials.
		Justification: To strengthen and promote sports administration in the district.
		Funding Source: GOK/Donor/Self Help
Sports research and resource centre.	5	Construction of a fully equipped resource centre for reference and information on local and international sports.
Malindi Location Malindi Division		Justification: To bring sportsmen together in learning more skills and acquiring relevant knowledge on particular sports discipline.
		Funding Source: GOK/Donor/Self Help

LANDS AND SETTLEMENT

Sectoral Policy Objectives

The objectives of the sector are to:-

- Ensure settlement of landless Kenyans in available Government and Trust land.
- Safeguard Public interest and property by ensuring a stable and orderly use of land to ensure that all future physical development plans are planned in the desired direction through enforcement of regulations.
- Ensure that all land is registered and plot owners issued with title deeds or lease certificates to enhance tenure security on land.

District Specific Objectives And Targets

Objective: Registration of adjudication areas so as to settle people.

Target: Adjudicate 7 areas and issue Title Deeds.

Physical Planning

Objective: To collect data and complete a technical report on conditions, resources and facilities in trading centres.

Target: Prepare 5 part development plans for fast growing centres in the district.

Magarini Settlement Scheme

Objective Settle the landless and accord security of tenure.

Target Complete demarcation of 1937 plots.

Allocation of 2460 plots.

Objective Improve the general socio-economic status of the local communities so as to enhance food security and sufficiency.

Target Registration of 8 schemes.

PROJECTS AND PROGRAMMES PRIORITIES

Magarini Settlement Scheme

A. On-going Projects

Project Name Location/Division	Description of Activities
1. Completion of phase one and two of the 8 schemes.	Complete demarcation and allocation in Marafa, Mizijini, Shauri Moyo, Pumwani I & II Schemes.
Marafa Division magarini Division	Registration of the schemes for issuance of titles. Repossession from defaulters of payments and abandoned plots in all the schemes.
<u>Funding Source:</u> GOK/Magarini Integrated Development Programme	

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Phase III - 3rd acquisition - Koromi and Kamale Schemes.	1	Demarcation and allocation of the 2 proposed schemes Koromi - 635 Plots Kamale - 570 Plots
Adu Location Marafa Division		Registration of the schemes Opening of access roads
<u>Justification:</u> Koromi settlement scheme is densely populated while Kamale is a remote area that requires opening up.		
<u>Funding Source:</u> GOK/Magarini Integrated Development Programme		

Land Adjudication and Settlement Department

a) On going Project

Project Name	Location/Division	Description of Activities
1.	Mbaoni/Masheheni Adjudication	Demarcation work
	Magarini Location Magarini Division	Funding Source: GOK

B . New Project Proposals

Project Name	Priority Ranking	Description of Activities
Location/Division		
Adjudication work	1	Adjudication of Marikebuni, Boma Upande, Fundissa, Marereni, Misumarini, Kibaoni & Dagamra
Magarini Division Marafa Division		Justification: This will open up these places as the people will be able to get title deeds.
		Funding Source: GOK

Physical Planning Department

A. On-Going Projects

Project Name	Location/Division	Description of Activities
1.	Kakuyuni Trading Centre	Reviewing of the Trading Centre Development Plan in collaboration with Town Engineer's Department.
	Goshi Location Malindi Division	Funding Source: GOK
2.	Watamu Township	Updating records on plot allocation with the aim of planning how open spaces and other vacant portions of land can be utilised.
	Watamu Location Malindi Division	Funding Source: GOK

B. New Project Proposals

Project Name	Location/Division	Priority Ranking	Description of Activities
Sabaki Trading Centre		1	Preparing comprehensive part Development Plan for these expanding and growing trading centres.
Msabaha Trading Centre			
Mijomboni Trading Centre			
Chembe/Kibabamshe			Justification: This will put an orderly growth of the centres.

Trading

Funding Source: GOK

Jimba/Gede Trading Centre

EDUCATION

Sectoral Policy Objectives

The major objective of the sector is to provide Universal Education and produce individuals who are properly socialised and possess the necessary knowledge, skills, attitudes and values that enable them to participate positively in nation-building. Specifically these objectives include:-

- To enhance and improve the relevance and quality of education at all levels.
- To expand access to and retention in education at primary and secondary levels especially in ASAL land and Urban slum areas of disabled children and girls.
- To strengthen the teaching of science, mathematics and more so practical subjects at primary and secondary levels.
- Strengthen the sector management, planning, budgeting and information systems.
- Realise sustainable levels of resource mobilization.

District Specific Objectives and Targets

Objective Improvement of pre-school education.

Target Training 99 pre-school teachers to satisfy the demand.

Objective To improve the 8-4-4 system of education.

Target Completion of 103 workshops and provide equipment in all primary schools.

Provide text books.

PROJECTS AND PROGRAMMES PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Ngalla Memorial Girls Secondary School. Watamu Location Malindi Division	Construction of a Laboratory and a girls dormitory. <u>Funding Source:</u> PTA
2.	Galana Secondary. Magarini Location Magarini	Construction of a boys and girls dormitories. <u>Funding Source:</u> PTA

- | | | |
|----|---------------------------------|---|
| | Division | |
| 3. | Gede Secondary School | Construction of a dinning hall and a kitchen. |
| | Gede Location Malindi Division | Funding Source: PTA |
| 4. | Kakuyuni Secondary School. | Completion of Staff houses, Kitchen/Dinning Hall. |
| | Goshi Location Malindi Division | Funding Source: PTA |

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
R.G.Ngalla Boys secondary School	1	Rehabilitation of refugee camp buildings to be used as a school.
Marafa Location Marafa Division		Justification: There is need for a boy secondary school in the division. Funding Source: PTA
Marafa Secondary School.	2	To construct a dining hall, Headmistress house and administration block.
Marafa Location Marafa Division		Justification: The school will be a girls boarding school so needs these facilities. Funding Source: PTA
Kakoneni Girls Secondary School	3	To construct a laboratory, Teachers houses and administration block.
Jilore Location Malindi Location		Justification: The school has no science laboratory, a head teachers house and an administration block. Funding Source: PTA
Ngalla Memorial Girls Secondary School	4	To construct a head teachers house and an administration block.
Watamu Location Malindi Division		Justification: As a girls school with a hostel needs the head teacher to stay around. Funding Source: PTA
Galana Secondary School.	5	To construct a Kitchen/Dinning hall.
Magarini Location Malindi Division		Justification: the school has a hostel but does not have a kitchen/dinning hall.

Barani secondary School.	6	Funding Source: PTA To Expand the existing administration block.
Malindi Location Malindi Division		Justification: The existing one is very small. Funding Source: PTA

Ministry of Transport and Communication

Sectoral Policy Objectives

The main objectives are to develop and sustain an efficient, adequate and safe transport system and effective modern communication network.

District Specific Objectives and Targets

Kenya Airports Authority

Objective Promote air transport communication network both locally and internationally.

Target Expand the recently upgraded Malindi Airport to international standards.

Kenya Posts and Telecommunication

Objective Modernisation of telecommunication network services.

Target Automating the switching and network facilities using digital technology in major urban centres (Watuamu, Mamburi, Gongoni, Malindi)

PROJECTS AND PROGRAMME PRIORITIES

Kenya Airports Authority

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Malindi Airport. Malindi location Malindi Division	Expansion of the airport through construction of immigration facilities anti-narcotic facilities, warehouses, fencing so that the airport can meet international standards.
		Funding Source: Kenya Airport Authority.

Kenya Posts and Telecommunication

A. On-going Projects

Project Name Location/Division	Description of Activities
1. Automation and expansion of Mamburi Telephone services.	Provision of a 300 line automatic digital exchange to serve Mamburi and Gongoni.
Magarini Location Magarini Division	Funding Source: Kenya Posts and Telecommunication Corporation.

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Automation using SRT system at - Ngomeni, Marafa, Kakoneni, Kakuyuni, Ganda and Baricho.	1	Provision of automatic telephone services using smaller radio systems. Justification: Funding Source: K.P & T.C
Improvement of Telecommunications trunk network.	2	Provision of a fully digital link with improved capacity. Justification: Funding Source: K.P & T.C
Malindi Division Magarini Division		
Improvement of distribution network for telecommunications in Malindi and Watamu areas.	3	Increase and modernise distribution links by using wireless local and optical fibre technologies. Justification: Funding Source: K.P & T.C
Malindi Division		

Ministry of information and broadcasting

District Specific Objectives and Targets

Objective To improve television reception.

Target Construct a television booster.

PROJECTS AND PROGRAMMES PRIORITIES

Kenya Broadcasting Corporation

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Television booster Gongoni location Magarini Division	1	Construction and installation of a television booster. <u>Justification:</u> Television reception in the district is very poor. <u>Funding Source:</u> KBC

KENYA WOMEN FINANCE TRUST

SECTORAL OBJECTIVE

To advance and promote the direct participation of economically active women in viable business to improve their economic and social status by providing sustainable financial and non-financial services.

DISTRICT SPECIFIC OBJECTIVE AND TARGETS

Objective: Access credit and non-financial services to the largest number of women entrepreneurs and also promote savings, mobilization among members.

Targets: Form 40 groups with a total membership of 1000 clients.

To disburse Ksh.11,168,000.00 per year.

PROJECT AND PROGRAMME PRIORITIES

A. On-going Projects

Project Name Location/Division	Description of Activities
1. Biashara Credit Scheme. Malindi Town Thalatha Mel Msabaha Gede Timboni Watamu Kwa Ndomo	Women entrepreneurs organise themselves into six groups of five. Disbursement of loans to individual women through these groups. Amount ranging from Ksh.20,000.00 to Ksh.100,000.00 <u>Funding Source:</u> KWFT

MINISTRY OF PUBLIC WORKS AND HOUSING

Sectoral Policy Objectives

The sector is charged with the responsibility of planning, designing, construction and maintenance of public roads and buildings. The major objectives are to:-

- Provide an efficient, adequate and reliable transport network.
- Ensure most effective use of existing road infrastructure, preservation of existing investments already made in the development of the road infrastructure, stimulation of rapid socio-economic development plus safer roads and environment.
- Intensify use of labour based technologies for road maintenance and rehabilitation.
- Provide decent and affordable shelter, coordinate activities and programmes aimed at improving slum and squatter settlement.

District Specific Objectives and Targets

Objectives To improve roads in the district.

Target Maintain 6 classified paved roads measuring 52.7km to the required standards.

Gravelling of 5 roads measuring 235.5km.

Earth roads improvement on 14 roads measuring 289.3km.

PROJECTS AND PROGRAMME PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Malindi - Kurawa Road No.B8	Construction of the road to bitumen standards including Bridges, Box Culverts, Culverts and other Drainage System. <u>Funding Source:</u> GOK/Japanese Government.
2.	Mida Culverts	Installation of Two lines of 900mm Diameter Culverts in Concrete surround, Construction of Aprons, Head walls, Wing walls and Gabion for protection for protection works. <u>Funding Source:</u> GOK
3.	Sabaki - Marafa Road No.D553	Grading of the Road to the required camber and opening of the Drains. <u>Funding Source:</u> GOK

4.	Malindi - Salagate Road No. C103	Grading of the Road to the required camber and Opening of the Drains.
Funding Source: GOK		
5.	Gede Forest Station	Construction of the Offices for the Gede Station (Ministry's role is only Supervisory)
Funding Source: GOK		

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Roads 2000	1	Rehabilitation and Maintenance of the following Gravel Roads.
District wide		<p>Alaskan Stadium - Salagate (109.8)</p> <p>Sabaki - Pishimwenga (64.7)</p> <p>Fundisa - Ramada (18.0)</p> <p>Karimboni - Hadu (32.5)</p> <p>Gede - Kakuyuni (10.5)</p> <p>Total Length = 235.5 Km.</p> <p>Rehabilitation and Maintenance of the following Earth Roads.</p> <p>Mambrui - Baricho (58.1)</p> <p>Pishimwenga - Mwahera (20.5)</p> <p>Msabaha - Mijikenda (16.0)</p> <p>Kadunguni - Sabaki River (17.5)</p> <p>Kakoeni - Sabaki River (2.0)</p> <p>Baricho - National Park (70.1)</p> <p>Shakahola - Wachifu (11.5)</p> <p>E895 - Kikombetele (6.0)</p> <p>Marafa - Karimboni (35.4)</p> <p>Pishimwenga - Langobaya (15.0)</p> <p>Kijego - Chakama (15.0)</p> <p>Mbuyuni - Pishimwenga (15.1)</p> <p>B8 - Gede National Park</p>

		(1.1)	
		B8 - Malindi Prison	(6.0)
		Total Length = 289.3 Km	
		Maintenance of the following paved roads.	
		Malindi - Matsangoni	(29.6)
		Malindi Alaskan Stadium	(0.6)
		Malindi E897	(2.7)
		Malindi - Casuarina Point	(4.9)
		Gede - Old Mosque ,	(11.8)
		E899 - Watamu	(3.1)
		Total Length = 52.7 Km	
		Justification: There is high agricultural potential areas and also the population is very high.	
		Funding Source: GOK	
MOPW & h District Headquarters and Site Camps at Fundissa, Marafa, Gede, Kakoneni and Sabaki.	2	Rehabilitation of Offices, Stores, Workshops Staff quarters, etc.	
District wide		Justification: The facilities will be needed for supervision and maintenance.	
		Funding Source: GOK	
Sabaki - Marafa Road No.D553	3	Construction of Sabaki to Marafa Road to Bitumen standard 35 Km	
Marafa Division		Justification: These are high agricultural potential areas and also the population is very high.	
		Funding Source: GOK	
Malindi - Pishimwenga Road No. C103 Pishimwenga - Baricho Road No.D553	4	Construction of Bitumen standards of C103 and D553	
Malindi Division		Justification: There is high agricultural potential areas and also the population is very high.	
		Funding Source: GOK	

Malindi District Headquarters	5	Design and Construction of a New District Headquarters for the District
Malindi Location Malindi Division		<p>Justification: The present office space and workshops are not adequate.</p> <p>Funding Source: GOK</p>
Baricho Bridge	6	Completion of the Baricho Bridge across the Sabaki River connecting Baricho - Langobaya
Langobaya Location Malindi Division		<p>Justification: These are high agricultural potential areas and also the population is very high.</p> <p>Funding Source: GOK</p>
Malindi Jetty	7	Extension of the Malindi Jetty
Malindi Location Malindi division		<p>Justification: There is high economic potential.</p> <p>Funding Source: GOK</p>

LOCAL GOVERNMENT

Sectoral Policy Objectives

The sector's broad policy objectives are to :-

- Promote policies that avoid excessive concentration in the largest cities by fostering growth of secondary towns and small urban centres.
- Support the provision of catalytic infrastructure such as supply, sewerage treatment facilities, power supply, roads and market/trading facilities in selected local authorities with the objective of providing incentives for private investment.
- Strengthen managerial and financial capacity of local authorities to formulate policy, manage authorities manpower and resources, and carry out the design, implementation and management of infrastructure investments as well as ensure that adequate funds are made available to complete projects on time.
- Improve the capacity of local authorities to provide municipal service on a sustainable basis by broadening utilities and realistic pricing of urban services.

MALINDI MUNICIPAL COUNCIL

PROJECTS AND PROGRAMME PRIORITIES

A. On-going Projects

	Project Name Location/Division	Description of Activities
1.	Main storm water outfall structure Malindi Town Malindi Division	Construction of a connecting feeder channels to the inlet structure to complete the storm water drainage into the sea. Funding Source: GOK
2.	Bus Park, Market. Malindi Town Malindi Division	Completion of the construction of Bus Park/Market. Funding Source: GOK/MTC

B: New Project Proposals

Project Name Division/Location	Priority Ranking	Description of activities
Fire Station Malindi Location Malindi Division	1	Construct a fire station and train personnel. Justification: To protect heavy investment in tourism from accidental fires. Funding Source: GOK/MMC
New Municipal Stadium Malindi Location Malindi Division	2	Construct a Modern Stadium for games and related social and public functions. Justification: The project will provide educational activities for the residents. Funding Source: GOK/MMC
Municipal Roads Malindi Division	3	Rehabilitation of all roads within the municipality. Justification: Most of the roads are not in a good state. Funding Source: GOK/MMC

DISTRICT DEVELOPMENT PLAN

MALINDI DISTRICT

CHAPTER THREE

**SECTORAL POLICIES AND
DISTRICT SPECIAL PROJECT AND PROGRAMMES**

Proposed Position : Senior Mechanical/Electrical Engineer
 Name of Firm : **Gauff Ingenieure**
 Name of Staff: **KHAN, Mohammed Akram**
 Profession : Mechanical/Electrical Engineer
 Date of Birth : 25th July 1941
 Years with Firm/Entity : 20 Nationality : Kenyan
 Membership in Professional Societies: M. I. Mech.E., Member, Institution of Mechanical Engineers (U.K.)
 MIEE, Member, Institution of Electrical Engineers (U.K.)
 C. Eng., Chartered Engineer, Engineering Council (U.K.)
 R.Eng. Registered Engineer, Government of Republic of Kenya.
 MIEK, Member, Institution of Engineers of Kenya
 Certificates from Caterpillar Training Centre, Geneva, Switzerland, in technical training techniques and on CAT equipment.
 Licensed under the Factories Act (Laws of Kenya) for inspection of plant. Electrician's Licence, Class 'C'.
 Detailed Tasks Assigned: Investigations, rehabilitative & new design for sewage pumping plant and associated equipment, raw and treated water pumping plant and associated equipment, borehole pumping plant and associated equipment and treatment plant dosing equipment and other mechanical plant and equipment, drafting of specifications and schedules.

Key Qualifications

Mr. Khan has 35 years of professional experience primarily as a Mechanical Engineer in servicing, repairs, procurement, cost control and equipment management of construction equipment, including generators, and training of workshop and technical staff and in design and supervision of mechanical/electrical works.

Between 1994 and 1999 he has worked as Mechanical/Electrical Engineer on the Nationwide, World Bank funded, National Water Rehabilitation Project, Nigeria involving 29 water supply schemes in the States of Lagos, Ogun. Oyo and Osun.

This has involved study, design, testing of pumpsets, LV & HV equipment, transformers, generators, and treatment dosing systems, together with the elaboration of electro/mechanical technical specifications, and bills of quantities for both local and international competitive bidding, followed by bid evaluation and supervision and commissioning of such plant and equipment. He is therefore eminently suited to undertake the supervision of the various electro/mechanical inputs for this Project.

Countries worked in: Kenya, Nigeria,

Education

1961 - 1965 Engineering University, Lahore, Pakistan; B.Sc. Mech. Eng.
 1966 - 1968 Technical Cadet. Apprenticeship with Air Force including training at Royal Air Force, Henlow and Royal Air Force College, Cranwell, U.K.
 1967 - 1968 RAF College, Cranwell, England Mech./Elec. Eng. Certificate.
 1970 - 1973 University of Nairobi. M.Sc. (Eng); Part-time study.

Experience Record

- 1999 to date** **Gauff Consulting Engineers, Regional Office, Nairobi, Kenya, as Chief Mechanical / Electrical Engineer.** Responsible for all mechanical and electrical engineering for Gauff Ingenieure in Eastern & Central Africa, and anglophone West Africa.
- 1994 - 2000** **Gauff Consulting Engineers, Lagos, Nigeria. National Water Rehabilitation Project - zone D, Mechanical/Electrical Engineer:** Responsible for study & design aspects of Mechanical & Electrical Works for a total of 29 rural & urban water supply & treatment systems in Phase I of the project & establishment of priority ranking for rehabilitation. Out of these 26 systems were rehabilitated, 7 of which are for groundwater abstraction & the rest surface water. Physical rehabilitation under the project comprised rehabilitation of existing facilities by overhaul, repair or replacement of plant & equipment to restore the output of some water supply systems in the States to their original design capacities. Responsibilities included design of the required measures, compilation of contract documents, international tender evaluation & contract preparation. Under Phase 2, undertook contract supervision/reporting of rehabilitation/replacement & extension works involving water treatment plants up to 85,000 m³/d, submersible, axial-flow & centrifugal pumps up to 1,900 m³/h & 160 m heads, pump motors, including 1,100 kW with 3.3 kV, starters & starter panels with protection gear, including starters for slip ring motors, LV & HV works, transformers, generators, chemical dosing equipment, pipework etc. & drilling & equipping of boreholes, & final contract statements. etc
- Involved in checking of design & elaboration of technical specifications & Bills of Quantities for M/E part of Tender documents for Local & International Competitive Bidding, for on-the-job training during implementation & operation & maintenance training after rehabilitation, & for packaging & implementing several local & international procurement contracts for the supply of pumps for emergency works, vehicles & tool kits.
- A Leakage Detection & Repairs Programme was included an extension of the rehabilitation project. Responsible for technical specifications of materials & fittings such as repair couplers etc. Prepared estimates of quantities required for distribution networks in the four States of Zone D & compilation of tender documents. preparation of Bid Evaluation Reports after bid openings, and supervision of works.
- (1995 - 1997)** **Senior Resident Engineer** responsible for above 26 Water Schemes where mechanical and electrical plant refurbishment formed a significant part of the total works.
- (1997 - 1999)** **Chief Resident Engineer** responsible for all technical and administrative aspects of the above National Water Rehabilitation Project in Zone D.
- 1980 - 1994** **H.P. Gauff KG, Consulting Engineers, Nairobi, Kenya, as Mechanical Engineer**
(1980 - 1994) **Seconded to the Kenya Ministry of Public Works.** in charge of the management of all equipment of the Graveling, Bridging and Culverting Project for Rift Valley and Central Provinces.
- 1971 - 1979** **Gailey and Roberts Ltd., Nairobi, Kenya, Construction Equipment Division**
(1974 - 1979) **Field Service Manager** for over 200 items of heavy Caterpillar plant with Ministry of Works.
(1973 - 1974) **Part-time lecturer** with University of Nairobi, Department of Mechanical Engineering.
(1972 - 1974) **Application and Sales Engineer** for Caterpillar' earthmoving and 'Hyster' compacting equipment.
(1971 - 1972) **Service Mechanic,** involved in the practical repair of plant in the field and on the work floor.
- 1968 - 1970** **Kenya Airforce, Nairobi, Kenya, Officer,** commanding aircraft First Line Service.

Languages:

Language	Speaking	Reading	Writing
English	Excellent	Excellent	Excellent
Swahili	Excellent	Excellent	Excellent
Urdu	Excellent	Excellent	Excellent
Punjabi	Excellent	Excellent	Excellent

Certification: I the undersigned, certify that to the best of my knowledge and belief, these data correctly describe me, my qualifications, and my experience.

 [Signature of staff member or authorized representative of the firm]

Date: _____
 Day/Month/Year

SAND-STORAGE DAMS

KITUI DISTRICT

PROPOSAL HYDROLOGIC STUDY 2002

A CONTINUATION ON 'PROPOSAL HYDROLOGIC STUDY, 2001'

Nairobi, June 2002

CF 628

G.A.J. Frima 9247183

M.A. Huijsmans 9380358

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T.E. Wiersma 9953147

Preface

This proposal is a continuation on the proposal "Proposal hydrologic study, Kitui District, Kenya" written by P.B. Beimers, A.J. van Eijk, K.S. Lam and B. Roos in June 2001 Kitui.

As part of our study, Civil Engineering at Delft University of Technology, we have been involved in a project concerning mainly two subjects:

- Research to the possibilities of constructing stone masonry sand-storage dams in the southern parts of the Kitui District, an area notorious for its black cotton soil.
- Research on the hydrologic influences of a dam. For a period of four weeks the groundwater level was mapped around a dam constructed in the Mwiwe River. This resulted in a manual on monitoring the groundwater level in a dam area.

We have spent 16 weeks in Kenya (March - June). Our group consists of four students with a specialisation in hydraulic engineering. All the students are in their fourth year of the civil engineering curriculum.

The project has been initiated by our counterpart SASOL. SASOL is trying to know more about the hydrologic impact and possible constructional improvements of the sand-storage dams that are built in the Kitui District. This is the second time a group of students of TU Delft has worked with SASOL Foundation. Part of the work experience was to continue with the proposal on hydrologic studies written by last years group (2001).

We would like to thank Ir. M.W. Ertsen and Ir. R. Boekelman of Delft University of Technology for their guidance. We thank SASOL and Sam Mutiso for providing a water level (Sokia C3330) that was of great essence to our study on the groundwater level around the dam in the Mwiwe River.

We also owe our thanks to Mutua Isika, Prof. G-C.M. Mutiso and Milu Muyanga for the social-economic report on sand-storage dams that they have written the past year.

Our thanks also go to James Wambua who operated in Kathini as our Field Assistant; without his help our time in the field would have encountered a lot of difficulties.

The Kathini community has been very hospitable to us, providing us with accommodation, nice food and co-operation in the field.

Last but not least, we would like to thank our sponsors for their financial support. Without their support this project would not have been possible.

First sponsor:

Mos Grondmechanica Rhoon

Second sponsor:

Van Oord ACZ dredging

Donator:

Wavin

Fund international stages of the Delft University of Technology

Waterleiding Maatschappij Overijssel

WSO fund

Hydron Zuid-Holland

We wish all companies' involved good luck in achieving their goals and we hope that in the future all water problems can be solved.

Nairobi, June 2002

Anton Frima
Markus Huijsmans
Niek van der Sluijs
Tjitske Wiersma

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1. Introduction

One of the main problems in arid and semi-arid areas, as Kitui District, is adequate water for a large part of the population. To solve this problem, a non-governmental organisation, called SASOL, builds sand-storage dams in the Kitui District. Along with the local communities, SASOL has built 216 sand-storage dams up till now (June, 2002). The objectives of SASOL are not only to provide water to the people of Kitui, but also prove that sand-storage techniques are very useful for water supply in arid and semi-arid areas. To investigate the effects of the sand-storage dam projects, SASOL has just finished off a research on the social-economic impact of the dams (summary is added in Appendix III). The next step is a study on the impact on the environment.

The main target for our group of students, doing this work experience, was to investigate the groundwater level around a dam in the Mwiwe River in such a way that makes it possible to apply this technique to other projects. This investigation has resulted in a manual on monitoring the groundwater level around a sand-storage dam. A second target was to write a proposal for proceeding with a study on groundwater behaviour and a continued detailed hydrologic research on the effects of sand-storage dams. In this proposal an objective for further hydrologic studies is formulated.

To come to this proposal we reviewed last year's proposal on hydrologic studies and discussed our field research with Prof. C.G.M. Mutiso, chairman of the SASOL-board and co-ordinator of the research program and Sam Mutiso, field manager of SASOL. The findings from our field research on the dam in the Mwiwe River and the groundwater levels around this dam are used to set up this proposal.

This proposal is supposed to be the starting point for following (groups of) students, who will carry out the research.

In the next chapter a description of problems and circumstances in Kitui District is given along with a description of SASOL and a short introduction to groundwater dams. In chapter 3 interesting hydrologic issues of the dams are described and an objective is formulated. Chapters 4, 5 and 6 hand out ideas on these hydrologic subjects. Chapter 7 is about the problem approach.

2. Backgrounds

2.1 Kitui District

Kitui Town is located in Eastern Kenya. [4] It is the administrative centre for the Kitui district, which is one of the twelve districts that make up the Eastern Province. The district covers an area of 20,556 square kilometres, including 6,369 square kilometres of the Tsavo National Park, inhabited by wildlife. It is divided in eight administrative divisions. In figure 2.1 a map of Kenya, including the location of Kitui district, is shown.

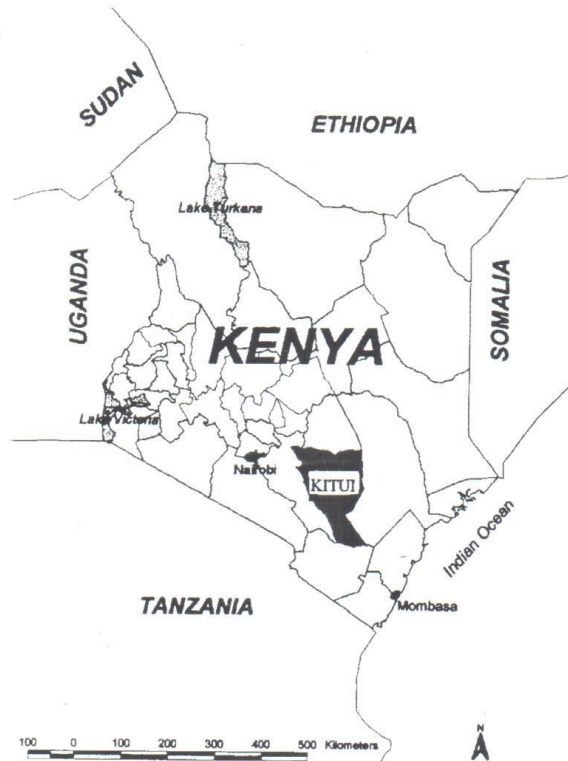


Figure 2.1: Map of Kenya

The Kitui district lies between 400 and 1,800 meters above sea level. The Yatta Plateau lies in the Southeast of the district between the rivers Athi and Tiva. The eastern side is almost flat with shallow widely spaced valleys and with some hills. In the higher part of the district they have more rainfall and therefore more productive areas. The main crops in the district are corn and beans.

The climate is hot and dry as in arid and semi-arid areas. The rainfall is very erratic and the rate of evaporation is high. The potential evaporation is over 2000 mm per year. That makes intensive use of the land hard. In the district there are two rain seasons, from April till June and from November till January. One in the three rain seasons is a total failure. Dry periods

are between June to September and January to February. The amount of rainfall depends on the location in the district and the topography. The higher areas receive 500-760 mm per year and the lower part less than 500 mm per year. The minimum temperature is 20 °C degrees and maximum over 30 °C degrees.

The population of Kitui District was estimated to be more than 624.000 on 2001 (213 persons per square kilometre) and is growing at a rate of 3.3 % per year. There are slightly more female than male.

The main problem in the area is inadequate water for a larger part of the population as there are only a few water sources such as rivers and springs. The major sources of water are perennial rivers. To access water, people and animals have to travel for long distances especially during the dry season and drought. In some areas people walk for 25-30 kilometres in search of water. Most rainwater is not harnessed. It finds its way to the Indian Ocean. If this rainwater can be stored, it can be used during the dry season and drought.

2.2 SASOL

SASOL (Sahelian Solutions Foundation), which is a non-governmental organisation (NGO), was founded in 1990 to solve the lack of sufficient household and production water. Together with local communities SASOL has been constructing dams in an area of 600 sq. km. In pursuit of its objectives SASOL, in co-operation with local people, build sand dams, shallow-wells and rainwater storage tanks for community members. The available water is of a good quality since there is no use of pesticides or industrial pollution. SASOL focuses on an area about 600 sq. kilometres in the Central Division (765 km²) because it has the highest population density of all the divisions.

The sand dams are preferred by SASOL because of the low costs per cubic meter of water and the sufficient quantities of water that can be stored. Also the fact that good locations for these sand dams are widely available in the project area makes it valuable to focus on them.

A “sand-storage dam” is constructed above the surface and collects the water in the sediment that, during the course of its life span, settles behind the dam. The water is held upstream from the dam. Wells are built either in the river channel or in close proximity to the river.

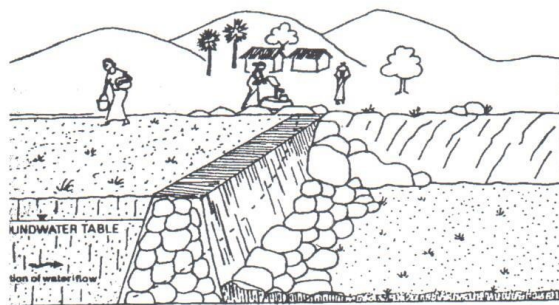


Figure 2.2: principle of a sand-storage dam [2]

SASOL has constructed over three hundred sand-storage dams in co-operation with the local communities in the central part of the Kitui district. The effects of the dams have become noticeable. People, who had to walk many kilometres for household water in dry periods, are now supplied with clean water during the whole year.

In the future, SASOL wants to keep on building dams southwards from the sand/ rock area to the Tsavo East National Park. The population density in this region is lower and the soil differs from the situation in the present building area. To finance these dams, SASOL has found funds from the European Union.

DF(1)

3. Problem description

3.1 Problem analysis and our research (Mwiwe River)

One of the main problems in semi-arid areas like the Kitui District is adequate water for a large part of the population. In Kitui, SASOL provides water by building sand-storage dams. One of SASOL's objectives is to prove that this technique is very useful for water supply in arid and semi-arid areas. SASOL does not only want to prove the technique, but also wants to improve it.

Many effects are claimed, such as a change in the amount of water downstream, recharging of the banks, decreasing erosion, but as yet there is no scientific proof. Mapping these effects could give more insight in the situation. It will give a clear view on whether the effects are positive or negative.

SASOL has plans to start projects on agriculture and environment. Insight in the availability of groundwater is required to locate suitable places for shallow- and deep-rooted crops and to make a better estimation for the needed irrigation. SASOL also wants to prove scientifically that the communities who live downstream of the dam are not negatively influenced by the dam. They want to prove that the amount of water does not decrease downstream of the dam.

The knowledge on the characteristics (porosity, capacity et cetera) of the reservoir is very little at the moment. More insight in these characteristics would be handy for the use of the reservoir and is likely to improve the design of it.

3.2 Problem definition

- SASOL wants to start new projects on environment and agriculture in the areas where sand-storage dams are already present. For these new projects, SASOL needs information about the availability of groundwater around the dams. This information is also wanted to gain more knowledge on the amounts of water at the downstream side of the dam.
- Many effects of series of sand-storage dams are claimed, but none of them have been proven scientifically.
- Little is known about the characteristics of the reservoir of sand-storage dams, although it is an important aspect of the dam. More insight in the characteristics will probably improve the technique of building the dams and optimise the use.

3.3 Objectives of the hydrologic study

- Set up a measuring system on groundwater levels to gain more insight in the behaviour of the groundwater around the dams.
- Gain knowledge on changes in the vegetation to find out what the effects of the dam are on its surroundings.
- Gain data on rainfall and evaporation to set up a useful discharge research
- Map out and quantify the hydrologic effects of a series of dams.

- Get insight in the characteristics of the reservoir and improve the sand-storage technique with this insight

4. The hydrologic system

To determine the annual capacity and recharge of a dam and its reservoir it is preferable to link the dam's performance to rain, evaporation, absorption by vegetation and evapotranspiration. Figures on these phenomena are still unknown to SASOL and should be obtained by measurement and research. Experts on hydrologic systems (perhaps students at the University of Technology Delft) could perform studies on these subjects in the Kitui District.

4.1 Rain

To change seasonal rivers back into perennial rivers, the ecological system has to change. This environmental change will take a lot of years.

To monitor this possible change in season or the average rainfall per year, accurate data on rainfall has to be gathered. If this data is not at hand at any organisation it is important to set up a system of rain gages throughout the Kitui District, for instance at every primary or secondary school in the area.

4.2 Evaporation

Evaporation from sand reservoirs is already mentioned earlier. After rainfall water does not only evaporate from the river, but also from the ground surface in the catchment area. The amount of water that evaporates from the ground straight into the air depends on the soil characteristics, porosity and humidity. Especially with regard to rainfall and forming of clouds it is interesting to look into evaporation.

4.3 Absorption by vegetation and evapotranspiration

Vegetation is a significant consumer of rainfall- and groundwater. Vegetation does not only use the water for growing and producing oxygen through photosynthesis, but it also evaporates water into the air. Each plant or tree has its own characteristics and evaporates a different amount of water. Mapping the vegetation in an area can shine a light on its influence on the hydrologic system.

5. Groundwater level

5.1 *Recommendations after field research*

In June 2002 student group CF 628 from UTD did research on the groundwater level around a sand storage dam in the Mwiwe River near Kathini. A manual on monitoring the groundwater level was developed. In "A manual on monitoring groundwater levels" is explained how to determine the groundwater behaviour around a newly build sand-storage dam. In this manual recommendations are made throughout various chapters. A short list is given below:

- Permeability
Knowing the permeability is necessary to gain detailed insight in the flow pattern of groundwater. At this time, no test equipment is in use by or available to SASOL. Geologists could use their expertise and know-how to help SASOL determine the permeability of various layers encountered in different areas and at different depths. The use of the 'Falling head test', resulting from Darcy's Law, can be used fairly easily to determine the permeability k if equipment for this test can be found.
- Placing pipes in dry period
Placing of pipes to monitor groundwater levels should be done in the dry periods to reach the lowest groundwater level to prevent collapsing soil in target holes. Also it is recommended to do research on the pipe material and placing method.
- Porosity
To know more on storage capacity as well in the sediment reservoir as in the riverbanks it is important to know the porosity of various layers. During the placing of the pipes as described in the manual it is recommended to conserve the samples taken from the ground and to determine its porosity and permeability. A simple method for determining the porosity should be available in the field.

5.2 *Manual*

As mentioned in section 4.1, a manual has been written on monitoring the groundwater level over a certain period. Up till now, the set up of the manual has been tested but has not yet been applied to a sand-storage dam by SASOL. Applying the manual to a future dam can shine lights on various subjects that have not been proven scientifically. Monitoring the groundwater level is a time-consuming activity that will take several years. Only after a long period can obtained data be used to draw substantial conclusions.

Possible next group → dry season

In the manual, it is recommended to place monitoring pipes in the dry seasons. In this period, around September, a group of students can investigate methods for placing pipes and work with SASOL on setting up a system to monitor a future dam's performance.

Activities carried out by a next group can consist in the following:

- Research on pipe material and placing method
- Set out cross sections (described in the manual) and place pipes if the location of a future dam is determined
- Geologic research on determined system location

Vegetation study

The next group can use the results of the vegetation study (as described in chapter 7 of "A manual on monitoring the groundwater table around a sand-storage dam") when choosing the pipe locations. Because they will place the pipes during dry season, it will probably be worthwhile to walk up- and down the river with an expert (David M. Mwanja, Livestock Production Department of Kitui) again. He can tell something about the differences between dry and rainy season. The trees, which can give an indication of the groundwater level, are still there. The sight with the Sokkia is probably better, because many bushes and crops are not there in dry season or at least they have no leaves.

This group will use the vegetation study as part of their measuring system, just to pick locations and evaluate the measuring results. It would also be very useful to set up a vegetation study, which can be used apart from any other measuring system or hydrologic research, to find out more about the groundwater level, erosion, agriculture potentials etc. This study cannot be done by students of the University of Technology Delft. It should be done by students who are specialized on this subject (for example from the University of Wageningen, The Netherlands).

6. River morphology

It is striking to see the significant change in the morphology of seasonal rivers caused by a series of sand-storage dams. The riverbed, most of the time an eroded gorge, is raised and the same applies for the courses that lead into the river. Because the riverbed is raised, erosion of the banks is reduced, SASOL claims. Raising the water level encourages vegetation along the riverbanks and improves the stability of the banks.

The sand-storage dams do not only have positive effects on the erosion of the river. During the filling of the reservoir with sediment, most of the sediment that is carried by the river settles in the reservoir upstream of the dam. This leads to erosion downstream, because the sediment-carrying capacity of the flow is interrupted. The flow will give erosion directly after the dam.

A study on these side effects can probably link the raise of the riverbed to the effects on erosion.

The downstream-effects are interesting and a study on the extent of erosion would make it possible to estimate the effect and to foresee possible problems in advance.

In the following sections various subjects of river morphology are explained.

6.1 *Change in river flow*

One of the biggest questions is the effect of the dams on the river flow, especially the effects downstream of a series of dams. A series of dams affect the river flow, by flattening the gradient of the riverbed. Question is if this reduces the available water downstream. Some claim that less water would be available downstream, while others argue that levelling of the flood wave makes that water is available for a longer period downstream. Seepage from the dam reservoir can feed the riverbed downstream, from where it can be abstracted by use of scoop-holes.

Studying the changes in river flow and groundwater level in the riverbed can point out what the effects of building a series of dams in a seasonal river area are. And most importantly, what the effects on the downstream water availability are. The outcome of this research could possibly lead to a recommendation of an optimal distance between the dams. It is also interesting to determine how the negative side effects downstream of the dam can be reduced and how the positive side effects can be intensified.

How far does the influence of a single dam go, what is the additional value of a series of dams, compared to a single dam?

6.2 *Discharge*

In the manual mentioned earlier a rather easy method is described to determine the discharge in the river at a certain time. A main interest to SASOL is to see whether a series of dam changes a rivers discharge by spreading out the peaks in the discharge over a longer period of time. Water held in the different reservoirs is believed to extend the period of river flow by slowing water down. Monitoring the discharge intensively throughout a long period of time can prove this assumption. On the long run, a river might prove itself turning from a seasonal river into a perennial river.

6.3 Reservoir

As targeted by a sand-storage dam, sediment transported by the river will settle upstream of the dam creating a sand-reservoir with a certain storage capacity. This storage capacity depends on a certain amount of parameters as pointed out below. Each of these subjects can be studied in the future to shine more light on a dam's performance.

Sediment type

The sediment that has settled behind the dam determines the porosity of a reservoir. The porosity is an important parameter for the volume of water that can be stored, and the permeability is important for the rate of abstraction. For example: flat areas create reservoirs with a large area of influence, but fine sediment with a low porosity and permeability settles behind the dam.

The relation between the kind of sediment transported by the river and the flow velocity is important. Studying this relation could give information for the suitability of a certain area for building sand-storage dams.

The effect of building a sand-storage dam in stages is recommended in literature to prevent fine particles to settle. Fine sediment lowers the porosity and layers of fine sediment decrease the permeability, which could give problems with the recharge of the reservoir. SASOL builds its dams in one go; the question is if this is harmful to the sediment that settles in the reservoir.

Gradient of sand bed behind sand-storage dam

The sand bed behind a sand-storage dam often has a gradient. The area of influence depends on this gradient. Insight in this gradient could give a better estimation of the area of influence and the storage capacity of the dam. In Appendix IV a short description on how to determine the gradient is given.

Water flow in sand bed of river and reservoir

During floods the sand bed of the seasonal river is filled with water. This water slowly flows downstream towards the dam. Calculations from last years proposal [5] show that the water level in the bed has a gradient, even after a long time. This means that the available water in the reservoir is much larger than if it is assumed that it does not have a gradient. This assumption is made in the formulas for estimation of the reservoir capacity.

Also the area of influence is much bigger, which could make it possible to enlarge the distance between the dams.

Evaporation from the bed

One of the big advantages of water-storage below the surface is a reduction of the evaporation. A study to evaporation from the sand bed from a seasonal river in the South West Africa [12], shows that, compared with a water level on the surface, evaporation is halved when the groundwater table is 30 cm below the surface and reduced to 20 percent when the groundwater table is 60 cm below the surface.

Knowledge on this phenomenon around SASOL's dams can be useful to estimate a dam's performance.

Lateral flow in and from the banks

Flow in or from the banks can significantly influence the available water as well influence the groundwater in the banks. As pointed out in the manual [11], water always flows to the

lowest point. The system explained in the manual is likely to give details on the groundwater flow in lateral direction. This flow can be linked to rainfall data and discharges measured in different sections.

Possible benefits of a study on reservoir characteristics

Better insight in the reservoir characteristics could be useful for:

- Determination of the sphere of influence of a sand-storage dam. This can lead to an optimisation of the optimal distance between the dams and to a more efficient series of dams.
- Better estimation of the storage capacity of the dams. Present calculations assume that the water level in the reservoir is horizontal. Since this assumption is very unlikely, determining the gradient can prove an increase of present storage capacity.
- Optimal use of the reservoir. The reservoir could be filled by controlled seepage of the dam upstream. This results in a very large reservoir, where water can be abstracted along the full length.

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Appendix III Social economical impact (by Mutua Isika, G-C.M Mutiso and Milu Muyanga)

Kitui dams and food security

SASOL, founded in 1990, assists Kitui communities to address household and production water scarcity through the sand dam technology.

The planning objective was to shorten the distances to water sources to below two kilometres whilst making water available for alternative production systems. Typically, women walk 10-15 km to water sources in the district. To date, 320 dams have been constructed in central Kitui. Globally, this project has the highest number of sand dams. The distant second project, globally, is found in Machakos- the neighbouring district, at Utooni, with 120 dams. These two projects have the highest concentration of sand dams anywhere in the world.

Construction of sand dams is economically and socially effective since the technology is simple and lends itself to participatory development. Communities contribute labour, sand and stones, artisan housing and food for the people working on dams as well as the artisan.

Sand dams are not new in Kitui. An ex-World War 1 soldier, Mr. Nzamba, constructed the oldest dam, in 1928, at Mathima Location, Mutomo division. He had seen the technology in his travels. It is still functioning. The colonial government built a few more in the fifties. Since then a few more have been built by an assortment of development organizations. The technology has gone through the most severe test of all - time. The lifetime of the newly constructed dams is expected to be more than 100 years with minimal maintenance. The dense construction adapted in Kitui regenerates ephemeral rivers run all year long.

Data from an ongoing Social and Economic Impact Study indicates that the sand dams have immediate impacts on cost of water. For example, at Mbitini market the price of water was reduced by 75%, from Ksh. 20 to Ksh. 5, as a result of the construction of the sand dams. But perhaps most significant is the transformation of production. With increased quantity of water, the local people grow kales (*Sukuma wiki*), tomatoes, onions, improved varieties of mangoes, bananas, sugarcane, bee keeping and horticultural and tree seedling nurseries. Fishing, which was uncommon in the area, is a new economic activity. Brick making is on the rise.

In year 2001, Ithumula/Maluma Sub-location, Chuluni Division, was able to meet tomato demand for Kitui town, thereby blocking suppliers from outside the district. At this rate, this technology and maximum utilization of the availed water for production will definitely reverse the vegetable and fruit supply chains in the District for the district has been a net importer. Kitui District, an ASAL district has begun to export some vegetables and fruits, mainly improved mangoes, among other products.

District wide interview data from the study shows that households owning land adjacent to the regenerated rivers are now earning over Ksh 100,000 in the dry three months of August, September and October from bucket irrigated vegetables. Income from horticultural trees is on the rise, though yet to be aggregated and documented. There are 1,969 households in Maluma/Ithumula sub-location. 38.5% of the interviewed households reported that they were engaged in vegetable planting the first year after completion of the dams. Conservatively assuming that only 2% of the households did serious planting, the first year, and further

averaging down the household earned income to Ksh 90,000, with an average household having 8 people, the dry months per capita income is Ksh. 3,750. This compares to the mean income from food sales of Ksh. 125 as reported in the 1999 Welfare Study by CBS. The vegetable household incomes translate to Ksh 3.1m. during the first year of adoption for the entire Maluma/Ithumula region. This figure is collaborated by the local councillor who estimated that Ksh.4 m. was earned in the sub location. For the whole district, keeping the same assumptions, the dams could generate Ksh. 118 m. during the dry three months whilst using the land for other production during the rest of the year. We should note that there was no extension effort on this new production. With these incomes, the whole district can move into a higher economic plane dramatically. Further, from a health point of view, consumption of vegetables and horticultural produce has impacted positively on health, especially of women and children. This is the way to fight poverty.

The impact of the dams is not just in terms of incomes and health. Sociologically organising for the dam construction has led communities to improve leadership, more systematic community organisation and prioritisation of development, including identification of interrelationships between sectors. They are more conscious of the fact that they can bring positive development with their own skills and resources. More systematic organising has led to dealing with community issues like shortage of wood for cooking and construction etc. Households are able to plan their consumption of farm products. Sanitation has also improved. Key in this is the construction of toilets. These issues are part of the training for dam construction.

SASOL sought technical co-operation with the ministry responsible for water and the local universities and failed for the first ten years. It sought and got technical backup from Department of Civil Engineering, Technical University- Delft, The Netherlands. Technical evaluation of the sand dams technology was done in the 2001. This year technical evaluation of water quality, especially for human consumption, will be done. A trans-disciplinary group from Amsterdam, Technical University-Delft, Leiden and the University of Nairobi, will study the sustainability of the dam system this year. Video documentation of construction techniques is done and is available from Ukweli studio. An impact assessment video will soon be available from the same source.

Four staff members of SASOL have trained with TU-Delft and IRC. It is expected that each year a number of SASOL staff will be sent for training. At the same time a project of training University of Nairobi students in the project area will start this year.

Water AID (UK), DFID, SIDA and SIMAVI are the main development collaborators in this project.

Appendix IV: Method to determine the changing gradient of the riverbed

When a dam is placed in a river, sediment is collected upstream of the dam. The sediment settles in front of the dam, which will cause the riverbed to rise. The angle under which the riverbed flows will decline.

The storage capacity of the dam is determined by the gradient of the impermeable layer and the water level in the reservoir. When there is a constant stream in the river, the water level in the riverbed has a gradient, which is nearly equivalent to that of the sediment in the riverbed. When these gradients are measured calculations can be done on the storage capacity of the dam and discharges throughout the year.

To determine the change in gradient of the riverbed the situation has to be recorded at the beginning.

With a water level (Sokkia C3330) the level of the riverbed can be measured compared to a reference point. The water level can also read the distance from the Sokkia to the measuring staff. One starts at the location where the dam is going to be built and measures the height differences between points upstream as well as the distance between these points. The gradient can then easily be determined by dividing the change of height by the distance travelled.

When the reservoir is totally filled with sediment the new gradient can be determined using the same method. The increase of volume of sediment by the placing of the dam can be calculated by using the dimensions of the riverbed: width, height and length of the reservoir. It is not to say that the water level in dry seasons is the same as the gradient of the riverbed, but using "A manual on monitoring the groundwater table around a sand-storage dam" the water table in the riverbed can be determined.