

**REPUBLIC OF KENYA**



**MINISTRY OF LIVESTOCK AND FISHERIES DEVELOPMENT**



**FISHERIES DEPARTMENT**



**MARINE WATERS FRAME SURVEY 2006  
REPORT**

## TABLE OF CONTENT

TABLE OF CONTENT .....	2
LIST OF TABLES .....	3
EXECUTIVE SUMMARY .....	5
1.0 INTRODUCTION .....	7
2.0 OBJECTIVES AND METHODOLOGY .....	8
2.1 Objective .....	8
2.2 Methodology .....	9
3.0 RESULTS AND DISCUSSIONS .....	11
3.1: Landing Sites .....	17
3.2: Facilities at the landing sites .....	17
3.3 Distribution of fishers .....	18
3.4 Distribution of crafts .....	19
3.5 Mode of propulsion .....	21
3.6 Fishing gears .....	21
3.6.1 Gill nets .....	22
3.6.2 Long line hooks .....	26
3.6.3 Marine seine nets .....	26
a) Beach seines .....	26
c) Reef seines .....	27
3.6.4 Cast nets .....	28
3.6.5 Hand lines .....	28
3.6.6 Traps/baskets .....	28
3.6.7 Monofilaments .....	29
3.6.8 Trawl nets .....	30
3.6.8 Scoop nets .....	30
3.6.9 Ring nets .....	31
3.6.9 Trammel nets .....	31
3.6.10 Trolling lines .....	31
3.6.10 Spear guns/Harpoons .....	32
3.6.11 Other gears .....	32
4.0 DISCUSSION .....	33
5.0 CONCLUSIONS AND RECOMMENDATIONS .....	35
6.0 ACKNOWLEDGEMENTS .....	38
7.0 ANNEX A: TRAINING MANNUAL .....	39
8.0 ANNEX B: THE QUESTIONNAIRE .....	45

## **LIST OF TABLES**

Table 1: Summary of the 2004 and 2006 Marine Fisheries Frame Surveys ..... 12

## **LIST OF FIGURES**

Figure 1: Distribution of landing sites by districts 2006.....	17
Figure 2: Distribution of Fishers by Districts .....	18
Figure 3: Distribution of Fishing Crafts type by districts.....	20
Figure 4: Distribution of Fishing Craft type by Districts 2006 Frame Survey .....	20
Figure 5: Distribution of Fishing Crafts by mode of Propulsion 2006.....	21
Figure 6: Distribution of Gill nets by mesh sizes – Nationally.....	22
Figure 7: Distribution of Gill nets by mesh sizes – Lamu district.....	23
Figure 8: Distribution of Gill nets by mesh sizes – Tana River district .....	23
Figure 9: Distribution of Gill nets by mesh sizes –Malindi district.....	24
Figure 10: Distribution of Gill nets by mesh sizes – Kilifi district.....	24
Figure 11: Distribution of Gill nets by mesh sizes – Mombasa district.....	25
Figure 12: Distribution of Gill nets by mesh sizes –Kwale district.....	25
Figure 13: Distribution of Long line hooks by districts 2004 and 2006.....	26
Figure 14: Distribution of beach seines by districts 2004 and 2006.....	27
Figure 15: Distribution of trap/baskets 2004 and 2006 .....	29
Figure 17: Distribution of scoop nets – 2004 and 2006.....	31
Figure 18: Distribution of trolling lines 2004 and 2006 .....	32

## EXECUTIVE SUMMARY

The first ever complete Frame survey for marine waters was conducted by the Fisheries department in May 2004. The 2006 Frame Survey was the second exercise to be carried out on the entire coastline and was conducted from 22<sup>nd</sup> to 24<sup>th</sup> May 2006, exactly two years after the first one.

Data collection involved interviewing a person who has the knowledge of the landing site at the landing point and physically observing the reported entities. Crafts at the landing sites were measured to the nearest metre while the toilet, banda and portable water were subjected to thorough scrutiny to ascertain their sanitation. The results indicated that the landing sites were 115, five more than the previous survey, with the number of artisanal fishers standing at 10,276 using 2,368 fishing crafts as compared to 9,017 fishers and 2,233 fishing crafts during 2004 FS.

The gears used by the fishers showed markedly changes with some increasing in number, others remaining relatively the same while others actually reduced. The total number of gillnets was found to be 5,916 compared to 7,374 gillnets recorded in 2004. This reduction was more on the < 5 inches gillnets than those of > 5 gillnets and mainly on the northern coastline (Lamu and Tana River districts). The long line hooks also reduced to 8,224 from 10,908. Traps were 5,224, down from 6,318. The gears that increased in numbers were beach seines 560, up from 294; cast nets 812, up from 520; hand lines 6,540, up from 5,682; scoop net 764, up from 562 trolling lines 708, up from 608; spear guns 624 up from 473. Ring nets increased from one in 2004 to eleven in 2006. Monofilament nets increased from 902 to 1,050 during the same period. The use of sticks used for fishing of octopus and crabs increased from 958 in 2004 to 2,116 in 2006.

On the beach infrastructure, the most remarkable improvement was on all weather roads with 45% of the beaches now accessed compared to 32% coverage noted during the 2004 Frame survey. The effective management of the beaches also realized a boost after 70 of the beaches were found to have BMU from 47 in 2004. However sanitation was a problem as portable water and toilet facilities reduced by 50% and 30% respectively according to this Frame survey's definition of the said facilities. Most of the other facilities remained relatively the same with a < 10% deviation, except for the fish stores which increased to 7 from 3 earlier on reported in 2004.

Several areas of Frame survey data collection require addressing to come up with good survey results next time. First is the geo-referencing of the landing site and certifying the real ownership of the reported landing sites. From the technical point of view the traps used in the region vary in type and effort definition apart from targeting different species hence the need to separate them. Lobsters and Octopus fishing used gears that aren't in the default setting of the database and should therefore be included. There are other fish species of economic importance which should be included in the database and to get to this, we need to develop a training manual for enumerators that is clear and easy to understand for good data collection. There is need to develop a tool that will cover the issues on the ground.

## **1.0 INTRODUCTION**

Fisheries department currently under the ministry of Livestock and Fisheries Development is vested with the management of fisheries resources in Kenya. The fisheries sector plays a great role in the economy of the country providing food security, source of employment and hence poverty alleviation.

The coastal marine waters area is a major source of livelihood and employs 9,017 fishers (Frame survey report, 2004) with an estimated over 250,000 persons depending on coastal and marine fish production (United Nations Environmental Programme, 1988). The marine catch is estimated to represent approximately 5.0% of the total catch in the country (Fisheries statistical bulletin, 2004). The annual marine fisheries production in 2005 was estimated at 7,605 metric tones (Annual report, 2005) indicating a decline compared to the previous year. There is however a challenge to the management since the industry is emerging as a potential employer and especially to the school leavers, who have led to diversification in gear use and methods of fishing over the recent years.

Therefore any efforts towards successful exploitation of the multi-species fisheries must incorporate an understanding of the effort in relation to the target species which translates to the impacts of exploitation as clearly outlined in the Kyoto protocol (Kyoto declaration, 1995). It is also necessary information on the implementation of recommendations towards achieving the Millennium Development Goals on food security and improvement of livelihood through sustainable fisheries (United Nations Millennium Project, 2005).

The marine sector has, however, not received much attention from research and governance for a long time even when the fishery is important to coastal food security. The past development plans overlooked the fishing industry and little or no recognition of its role in the economy, hence less attention in implementation of the development plans. Although the implementation of recommendations from the Food Agricultural Organization funded aerial survey (1981) and the catch assessment survey (1984) suffered various financial and logistical constraints, the 2004 Frame Survey was the first ever completed survey in Kenya's marine waters.

The second marine waters FS funded by Government of Kenya (GOK) was conducted from 22<sup>nd</sup> to 24<sup>th</sup> May, 2006. The survey covered the whole coastline from Vanga in the South, (Kenya –Tanzania border) to Kiunga in the North (Kenya – Somali border)

This report gives an executive summary of the key findings with a brief introductory chapter followed by the results and discussion on the findings according to the objectives of the survey. Finally the report gives the concluding remarks and the recommendations on the improvement of future Frame surveys, fisheries management and development planning.

## **2.0 OBJECTIVES AND METHODOLOGY**

### **2.1 Objective**

The overall goal of the fisheries marine waters Frame survey was to collect, analyze and document critical data on the present fishing effort and the landing site facilities and developments in order to provide a sound basis for fisheries development planning and management decision making.

The specific objectives of the Frame survey included:

- ⇒ To secure data on the current fishing effort and other landing site facilities. This involved total enumeration of all fishing gears per fishing craft and the landing site facilities e.g. portable water, cold rooms, Bandas, Jetties, fish stores, accessibility by road, electricity supply etc.
- ⇒ To track changes in fishing effort characteristics of the coastal marine fisheries.
- ⇒ Provide accurate raising factors for estimating the total fish catch from marine waters.
- ⇒ To provide sampling Frames for other surveys that may be undertaken in the future.



## 2.2 Methodology

The 2006 marine fisheries Frame survey was funded entirely by the Government of Kenya. In order to accomplish this task a working structure was developed headed by the National coordinator who took charge of the overall responsibility and execution of all the Frame survey activities. There were also coordinators for the South Coast (Mombasa & Kwale Districts) central coast (Malindi & Kilifi districts) and the North Coast (Tana River & Lamu Districts). The District Fisheries Officers and their deputies supervised the enumeration of the fishing effort and landing site facilities. The actual enumeration was done by enumerators who were stationed at every landing site during the duration of the survey.

Several activities were conducted prior to the actual survey: In order to increase the awareness and stakeholder participation publicity was done through *barazas*. The District fisheries officers together with other Government administration officials conducted the publicity *barazas* in their areas of jurisdiction. The objectives and time schedule of the Frame survey was expounded during these fora.

Prior to the actual Frame survey 3-day training was conducted for supervisors in Mombasa who in turn trained enumerators in their respective districts. The importance of the trainings was to ensure that the enumerators understood the terminologies used in the Frame survey, interviewing techniques, and filling of the Frame survey questionnaires. The expected result was a harmonized activity throughout the exercise. Trainings were conducted using a developed training manual which was used as a guide in all enumerator's trainings in the districts.

The actual Frame survey was conducted for three days from 22nd to 24th May 2006. This involved total enumeration of fishing effort and landing site facilities using structured questionnaires. The enumerators were deployed at all the designated landing sites from 6.00 am to 6.00 pm during the three survey days. A total of 60 enumerators were engaged.

Filled Frame survey questionnaires were collected from the enumerators by supervisors and handed over to coordinators who checked for completeness and correctness.

Training of data entry officers commenced immediately after filling the questionnaires. Data entry training centered on the use and application of the Samaki database for four days. Actual data entry commenced immediately for the next 11 days after which the data was cleaned.

There was need after data entry to visit certain landing sites where suspect data was reported to check for its correctness during the ground truthing exercise.

Data analyses were done using samaki database and Ms/excel software. The table below summarizes the schedule of events during the Frame survey 2006.

<b>DATE</b>	<b>ACTIVITY</b>	<b>RESPONSIBLE.</b>
5th-12th May 2006	Preparation of training manual. Preparation of questionnaires. Survey logistics	National Coordinator.
5th-12th	Publicity Baraza's	DFO's
14th-18th May 2006	Training of supervisors	National Coordinator DFO's/Deputy DFO's Coordinator
18th – 21st May 2006	Training of Enumerators	Coordinator, Supervisors & National coordinator.
22nd – 25th May 2006	Frame survey.	National Coordinator, Coordinator, Enumerators, Supervisors.
26th – 29th May 2006	Filling of Frame survey questionnaire	National Coordinator Coordinators.
30th – 2nd June/2006	Data entry training (samaki database)	National coordinator Data entry officers.
2nd – 9th June /2006	Data entry.	National Coordinator Data entry officers
10th – 12th May 2006	Ground truthing	National coordinator Data entry officers.
12th – 14th	Data cleaning	National coordinator Data entry officers.

### **3.0 RESULTS AND DISCUSSIONS**

Detailed results of the Frame survey 2006 are presented in Table 1 and Figures 1 to 18 that follow. The table also compares the 2004 and 2006 results. The results are given by districts and separated into six major sections, viz: Landing sites, Fishers, Fishing crafts, Propulsion methods, Gears and Landing site facilities.

Table 1: Summary of the 2004 and 2006 Marine Fisheries Frame Surveys

ITEM		YEAR	LAMU	T/RIVER	MALINDI	KILIFI	MOMBASA	KWALE	TOTAL
<b>No. of Landing sites</b>		2004	22	4	12	14	23	35	110
		2006	22	3	16	15	28	31	115
<b>No. of Fishers</b>		2004	2,134	247	1,778	1,104	957	2,797	9,017
		2006	1,978	475	2,022	1,466	1349	2,986	10,154
<b>Boat fishers</b>		2004	1,994	163	1,465	690	957	2,189	7,458
		2006	1,950	399	1,969	1416	1279	2,688	9,601
<b>Foot fishers</b>		2004	140	84	313	414	0	608	1,559
		2006	28	76	53	50	70	398	675
<b>No. of fishing Boats</b>		2004	395	49	447	253	292	797	2,233
		2006	347	56	434	350	455	726	2,368
<b>Craft pointed at one end (Mashua)</b>		2004	173	15	144	16	14	21	383
		2006	138	26	205	13	35	52	470
<b>Craft pointed at both ends (Ngalawa)</b>		2004	2	4	8	42	0	80	136
		2006	2	6	2	49	3	92	154
<b>Hori</b>		2004	174	1	84	9	24	3	295
		2006	149	0	56	35	7	9	256
<b>Dugout/Mtumbwi</b>		2004	41	29	177	176	215	669	1,307
		2006	36	24	120	235	399	550	1,362
<b>Dau/Mtanyingi</b>		2004	5	0	34	10	39	24	112
		2006	1	0	51	12	3	17	84
<b>Other crafts</b>		2004	0	0	0	0	0	0	0
		2006	21	0	0	6	9	6	42
<b>Propulsion</b>	<b>In board engine</b>	2004	15	1	29	3	10	8	66
		2006	9	2	27	1	17	5	61
	<b>Out board engine</b>	2004	1	0	27	19	14	8	69

			2006	6	3	37	22	24	41	133
	<b>Paddles</b>		2004	30	28	201	172	255	337	1,023
			2006	32	23	121	252	351	212	991
	<b>Sails</b>		2004	349	20	190	59	13	444	1,072
			2006	300	28	249	74	62	466	1,179
	<b>Pole/Pondo</b>		2004	0	0	0	0	0	0	0
			2006	0	0	0	0	1	2	3
<b>Gill nets</b>		<b>&lt;2.5</b>	2004	52	46	34	22	30	256	440
			2006	50	0	32	56	136	272	546
		<b>2.5</b>	2004	0	6	170	60	24	448	708
			2006	0	8	94	62	44	370	578
		<b>3</b>	2004	658	42	68	34	86	403	1,290
			2006	84	8	44	18	120	424	698
		<b>3.5</b>	2004	70	44	16	14	36	18	198
			2006	6	0	20	8	12	44	90
		<b>4</b>	2004	108	92	230	20	24	104	578
			2006	38	8	252	0	44	132	474
		<b>4.5</b>	2004	62	22	202	8	0	0	294
			2006	24	4	120	0	10	36	194
		<b>Total&lt;5</b>	2004	<b>950</b>	<b>252</b>	<b>720</b>	<b>158</b>	<b>200</b>	<b>1,229</b>	<b>3,508</b>
			2006	<b>202</b>	<b>28</b>	<b>562</b>	<b>144</b>	<b>366</b>	<b>1,278</b>	<b>2,580</b>
		<b>5</b>	2004	112	246	446	22	10	66	902
			2006	72	26	192	2	4	30	326
		<b>5.5</b>	2004	20	20	50	0	0	0	90
			2006	4	26	22	0	4	6	62
		<b>6</b>	2004	944	202	794	124	4	62	2,130
			2006	370	234	1422	56	20	110	2,212
		<b>6.5</b>	2004	20	6	62	0	0	14	96
			2006	10	0	0	0	0	0	10
		<b>7</b>	2004	120	6	28	8	2	14	178
			2006	48	0	132	0	0	38	218
		<b>7.5</b>	2004	26	0	0	0	0	0	26

			2006	4	0	0	0	0	0	4
		8	2004	58	62	72	0	0	24	216
			2006	68	4	62	6	32	6	178
		9	2004	36	10	20	2	2	2	72
			2006	14	0	20	2	14	4	54
		10	2004	0	0	26	0	0	50	76
			2006	0	0	82	0	0	14	96
		>10	2004	22	22	0	8	0	78	130
			2006	84	6	20	8	4	54	176
		Total>5	2004	1,358	574	1,498	164	18	310	3,916
			2006	674	296	1,952	74	78	262	3,336
<b>Total Gill nets</b>			2004	2,308	820	2,168	322	218	1,538	7,374
			2006	876	324	2,514	218	444	1,540	5,916
<b>Marine Seine Nets</b>										
	<b>Beach Seines</b>		2004	102	2	50	0	60	80	294
			2006	370	2	14	40	58	76	560
	<b>Prawn seine</b>		2004	55	27	53	5	8	78	226
			2006	86	32	51	1	72	22	264
	<b>Reef seine</b>		2004	0	0	113	9	2	34	158
			2006	12	0	78	0	0	56	146
<b>Long lines hooks</b>			2004	1,140	5,992	440	1,150	1,446	440	10,908
			2006	798	128	956	340	5,330	672	8,224
<b>Cast Nets</b>			2004	14	0	128	136	118	124	520
			2006	0	0	24	252	282	254	812
<b>Hook and line/Hand lines</b>			2004	648	160	946	1,194	542	2,192	5,682
			2006	440	156	1404	1,226	804	2,510	6,540
<b>Traps/Baskets</b>			2004	352	8	1,226	112	550	4,070	6,318
			2006	286	0	798	98	370	3,672	5,224
<b>Monofilament nets</b>			2004	358	10	148	240	94	52	902
			2006	196	100	262	120	68	304	1050
<b>Trawl nets</b>			2004	0	0	0	0	21	0	21

			2006	0	0	0	0	20	0	20
<b>Scoop nets</b>			2004	276	116	22	34	0	114	562
			2006	440	0	106	22	2	194	764
<b>Ring nets</b>			2004	0	0	0	0	0	1	1
			2006	0	0	0	0	1	10	11
<b>Trammel nets</b>			2004	0	3	10	0	9	6	28
			2006	6	0	0	0	17	0	23
<b>Trolling lines</b>			2004	27	0	252	121	38	170	608
			2006	34	0	275	0	94	97	500
<b>Spear gun/Harpoons</b>			2004	0	4	1	240	1	203	473
			2006	0	0	3	158	25	438	624
<b>Other gears</b>			2004	160	0	0	4	28	764	958
			2006	506	0	422	248	36	904	2116
<b>Total Crafts</b>			2004	824	72	800	316	433	1,166	3,591
			2006	850	84	590	556	619	942	3,641
<b>Derelict Crafts</b>			2004	145	19	207	57	120	233	781
			2006	130	25	97	104	134	166	656
<b>Transport Crafts</b>			2004	257	4	126	5	19	124	535
			2006	334	3	57	2	20	48	464
<b>Fish carriers</b>			2004	27	0	0	1	2	12	42
			2006	39	0	2	0	10	2	53
<b>Fishing Crafts</b>			2004	395	49	447	253	292	797	2,233
			2006	347	56	434	350	455	726	2,368
<b>Landing site facilities</b>										
	<b>Bandas</b>		2004	2	0	2	2	2	6	15
			2006	2	0	0	0	2	8	12
	<b>Cold rooms working</b>		2004	0	0	1	0	1	0	2
			2006	0	0	0	0	1	0	1
	<b>Cold rooms non-working</b>		2004	1	0	1	0	0	1	3
			2006	0	0	0	0	0	1	1
	<b>Pontoon/Jetty</b>		2004	6	0	3	2	2	2	15

			2006	1	1	0	3	3	4	12
	<b>Fish stores</b>		2004	0	0	2	0	1	0	3
			2006	1	1	1	1	2	1	7
	<b>All weather roads</b>		2004	7	0	5	6	13	4	35
			2006	6	1	11	7	16	10	51
	<b>Net repair</b>		2004	12	3	8	11	13	10	57
			2006	0	3	11	12	9	15	50
	<b>Boat repair</b>		2004	13	2	7	8	12	12	54
			2006	0	2	9	10	10	15	46
	<b>Electricity</b>		2004	0	0	1	2	8	3	14
			2006	0	0	2	1	9	3	15
	<b>BMU based at the beach</b>		2004	9	2	10	4	3	19	47
			2006	7	3	14	11	16	19	70
<b>Potable water</b>			2004	8	0	7	2	7	6	30
			2006	0	0	3	1	7	4	15
<b>Toilet facility</b>			2004	4	0	3	2	4	4	19
			2006	2	0	2	2	4	2	12



### 3.1: Landing Sites

The total number of landing sites increased slightly from 110 in 2004 to 115 in 2006, (Table 1). The changes were as follows by districts; in Lamu district there was no change as they remained 22, in Tana River they decreased from 4 to 3, in Malindi they increased from 12 to 16, in Kilifi they also increased from 14 to 15, in Mombasa they increased from 23 to 28, in Kwale they decreased from 35 to 31. The overall observed increase/decrease could possibly be a result of certain landing sites having more/less than five fishing crafts in 2006. A landing site was defined as fish landing point where 5 or more fishing (non-derelict) crafts land fish on daily basis.

Most of the landing sites were found in Kwale district (31%), Mombasa (21%), Lamu (20%), Kilifi (13%), Malindi (11%) and Tana River having the least at 4%, Figure 1.

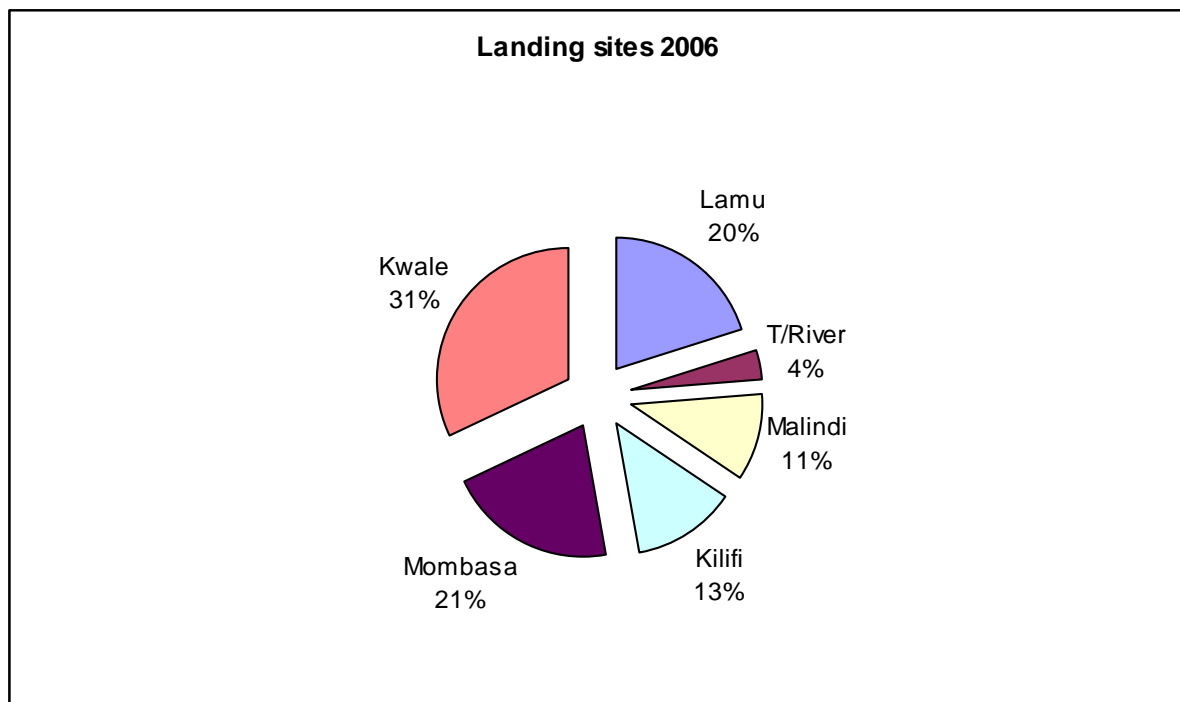


Figure 1: Distribution of landing sites by districts 2006

### 3.2: Facilities at the landing sites

Facilities observed during the 2006 Frame survey included Bandas (Fish shed), cold rooms, pontoons/jetties, potable water, Electricity supply, fish stores, all weather roads, boat repair, net repair and toilets. Only ten percent

(10%) of the landing sites had fish bandas while 44% were accessible by all weather roads. 13% of the total landing sites had electricity supply and portable water. One in every ten landing sites had pontoon/jetty and toilets while those with fish stores were 6% and those served by Beach Management Units (BMUs) 61%.

### 3.3 Distribution of fishers

Artisanal fishers in the marine waters have steadily increased from an estimated figure of 7,500 in the mid 1990s to 9,017 in May 2004 and 10,276 in May 2006. Just like the fish landing sites, most fishers in 2006 were found in Kwale district (2,986) followed by Malindi (2,022) with Tana River having the least at 475 (Figure 2). Of the total number of fishers 9,601 (93%) were boat fishers while the rest 675 (7%) were foot fishers.

The overall mean number of fishers per landing site was 98 in 2006 up from 82 in 2004. In 2006 Tana River district had the highest mean number of fishers per landing site at 158 followed by Malindi 126, Kilifi 98, Kwale 96 and the least concentration, 41 fishers per landing site in Mombasa district.

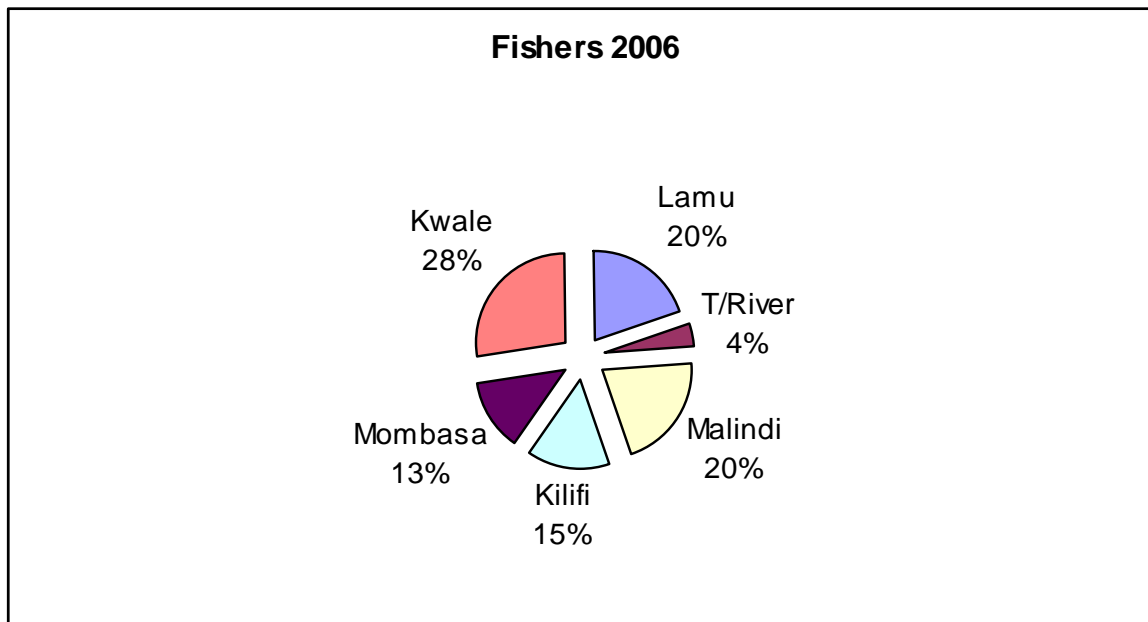


Figure 2: Distribution of Fishers by Districts

### 3.4 Distribution of crafts

During the 2004 and 2006 Frame Surveys the fishing craft types were dominated by Dugout/Mtumbwi with a contribution of 58.3% in 2004 and 57.5% in 2006. In 2006, the second most common fishing craft was craft pointed at one end (Mashua) with 21.5%, Hori (10.8%), craft pointed at both ends (Ngalawa) 6.5% and last were Dau/Mtanyingi with a mere contribution of 3.5% (Figure 3). 1.8% were fishing crafts captured as others not described above. There were a total of 3,641 crafts for all of the landing sites, out of which 2,368 were fishing crafts, 656 derelict, 464 transport crafts and 53 fish carriers in the marine fishery waters. In 2004 there were 3,591 crafts of which 2,233 were fishing crafts, 781 derelict, 535 transport crafts, and 42 fish carriers. In 2006, most fishing crafts were found in Kwale district (726) followed by Mombasa (455), Malindi (434), Kilifi (350), Lamu and Tana River district having least at 56, (Figure 4).

Derelict crafts were highest in Kwale and Mombasa districts with 166 and 134 crafts respectively while Lamu had 130, Kilifi 104, Malindi 97, and the least numbers of derelict crafts were counted in Tana River with only 25, (Table 1).

Lamu district had the highest number of transport crafts (334) followed by Malindi with 57. Kilifi and Tana River had the least with only 2 and 3 crafts respectively.

Distribution of mean number of active fishing crafts per landing site in 2006 indicated that Malindi district had the highest number (27), followed by Kwale and Kilifi with 23 each, Tana River 19 and Mombasa and Lamu 16 each. On average the number of active fishing crafts per landing site was 21.

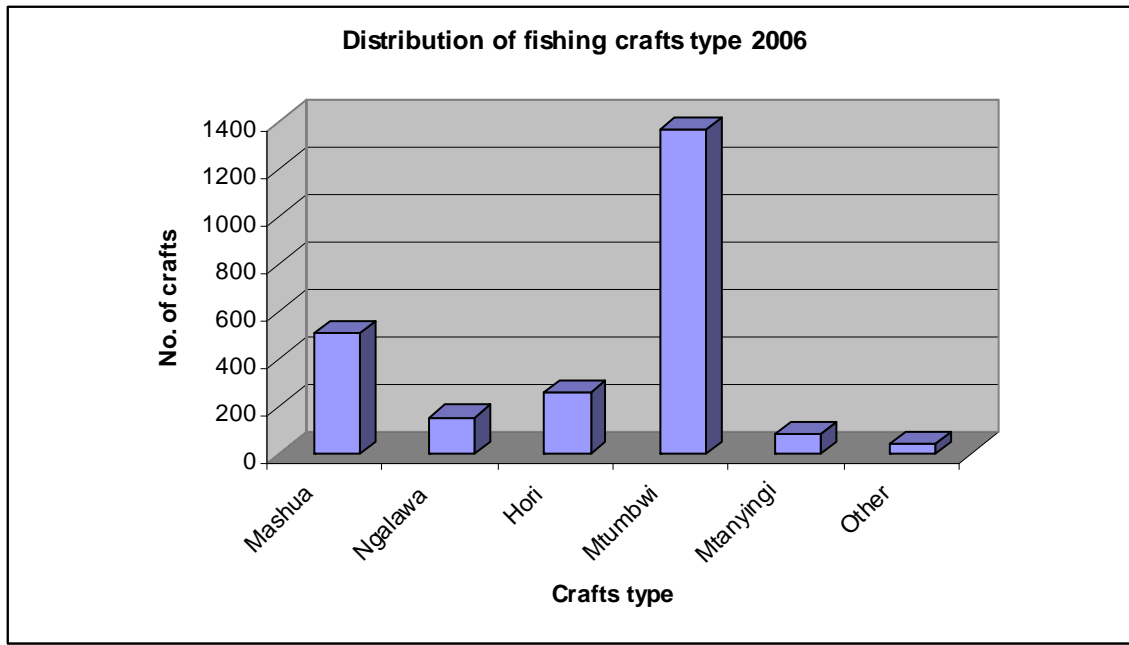


Figure 3: Distribution of Fishing Crafts type by districts

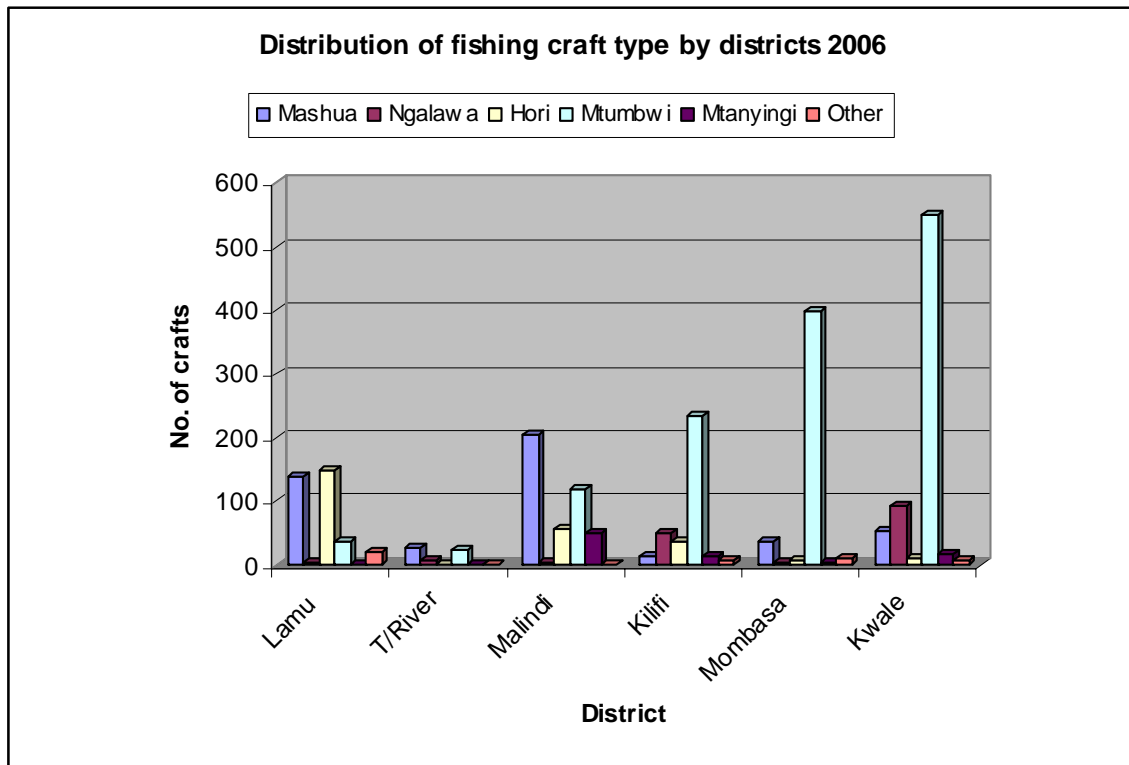


Figure 4: Distribution of Fishing Craft type by Districts 2006 Frame Survey

### 3.5 Mode of propulsion

Fishing crafts of different modes of propulsion i.e. sails and motors increased but paddled crafts had a slight decrease in 2006 compared to 2004 Frame Survey. In 2006 majority of the fishing crafts (1,180) (49.8%) in marine waters were using sails while 1,023 (41.8%) fishing crafts used paddles. The rest, 231 (9.8%) fishing crafts were motorized with outboard and inboard engines while 3 were propelled by Pole/Pondo, (Figure 5).

Majority of the motorized fishing crafts were found in Malindi district (64) followed by Kilifi (60), Kwale (46), and Mombasa (41) and Lamu (15). Tana River district had only 5 motorized fishing crafts.

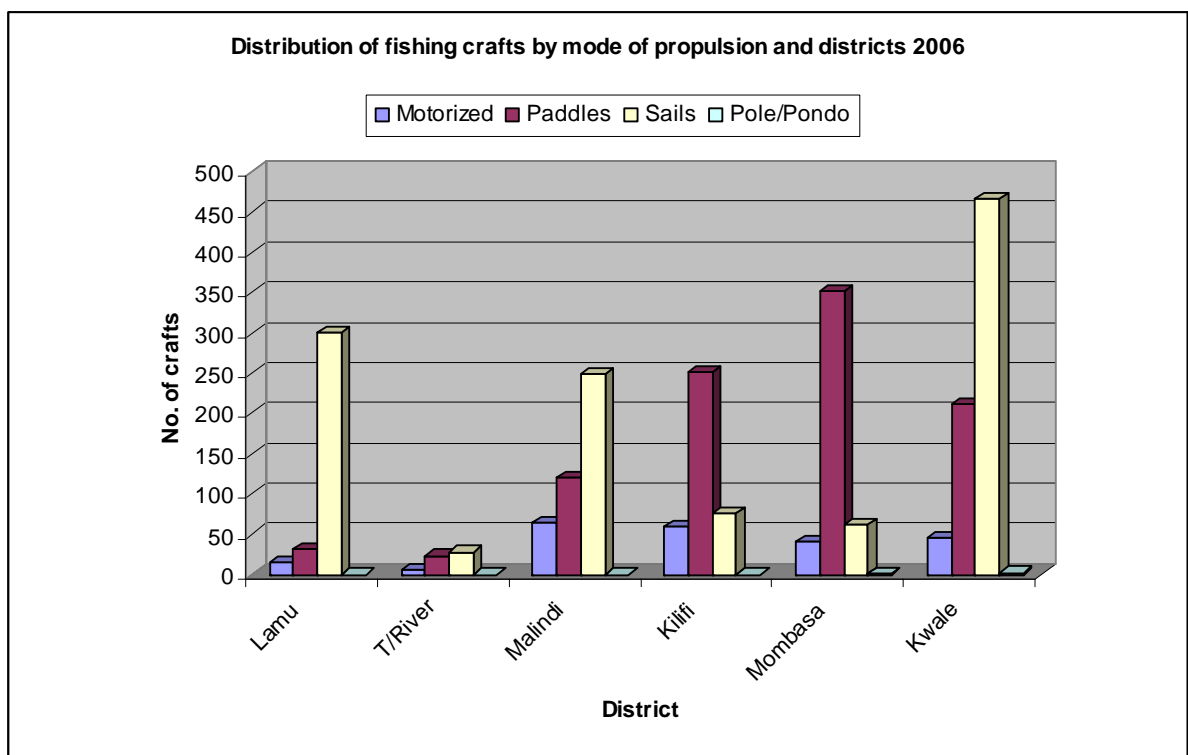


Figure 5: Distribution of Fishing Crafts by mode of Propulsion 2006

### 3.6 Fishing gears

Fishing gears recorded included gill nets, long line hooks, beach seines, prawn seines, reef seines, cast nets, hand lines, monofilament, trawl nets, scoop nets, ring nets, trammel nets, trolling lines, spear guns/harpoons and trap/baskets.

### 3.6.1 Gill nets

Numbers and mesh sizes of gill nets from < 2 ½ inches to > 10 inches were enumerated. From the results there were two peaks at 3 inches and at 6 inches (Figure 6). The highest concentration of the gill nets in 2006 was in Malindi district with 2,514 unlike in 2004 when they were observed in Lamu. Malindi district was followed by Kwale (1,540) and Lamu (876). Nationally the total number of the gill nets was found to be 5,916 as opposed to 7,374 in 2004. The most common mesh size was 6 inches with 2,212 nets followed by 3 inches with 698 and 2½ inches at 578.

Out of the total number of gill nets 2,580 nets (or 43.6%) gill were found to be below 5 inches (127 mm) as compared to 3,336 (or 56.4%) gill nets of 5 inches and above.

In 2006 most of the gill nets which were below 5 inches were recorded in Kwale district with 1,278 gill nets followed by Malindi district with 562, Mombasa with 366, Lamu with 202, Kilifi with 144 and lastly Tana River with only 28.

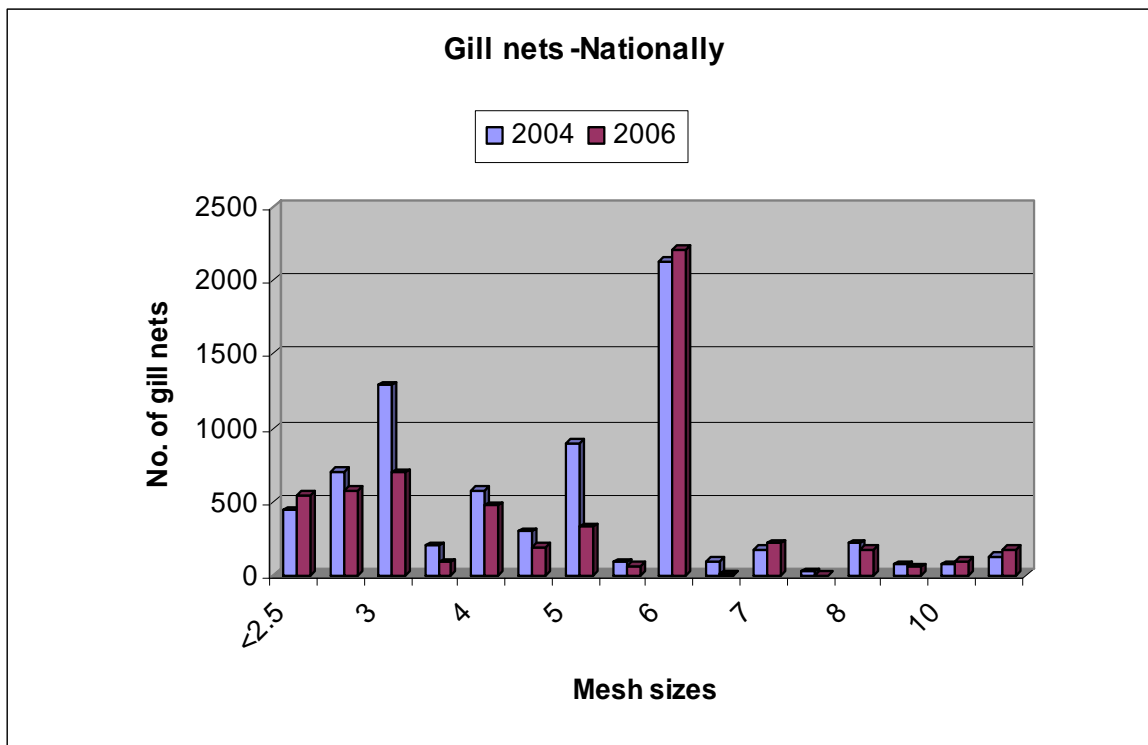


Figure 6: Distribution of Gill nets by mesh sizes – Nationally

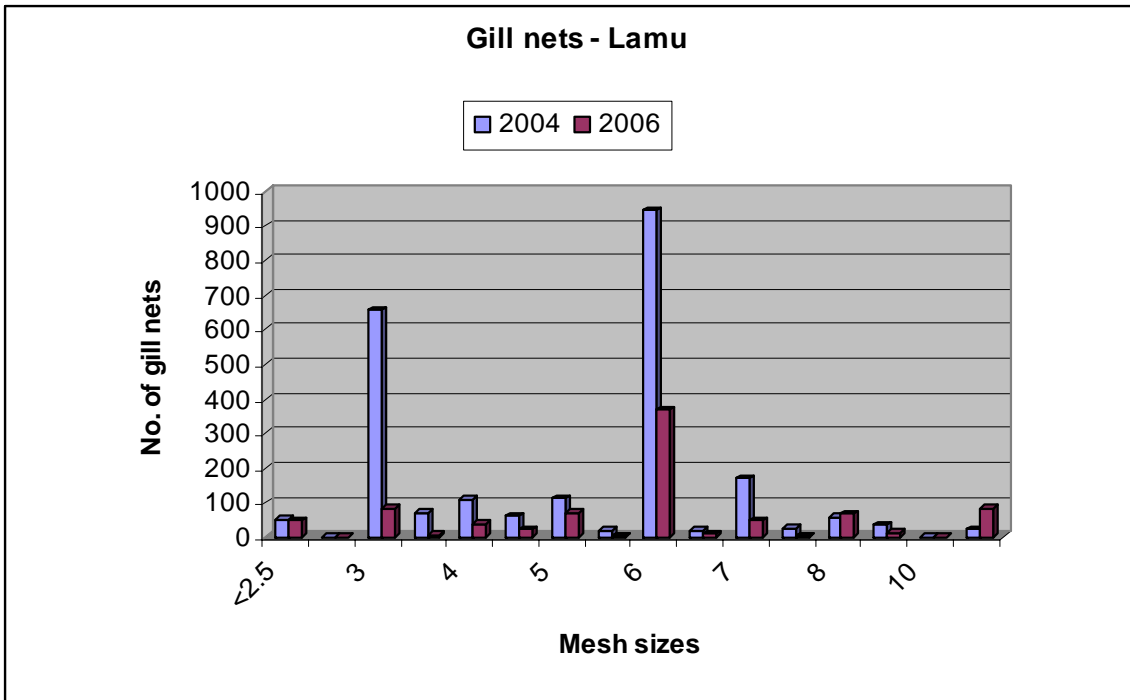


Figure 7: Distribution of Gill nets by mesh sizes – Lamu district

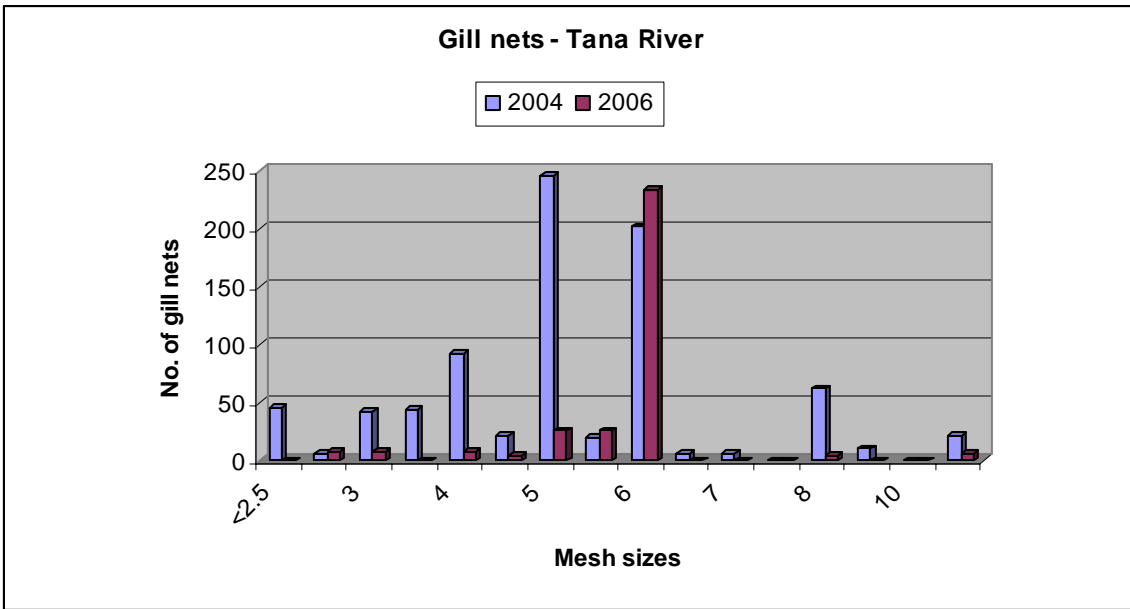


Figure 8: Distribution of Gill nets by mesh sizes – Tana River district

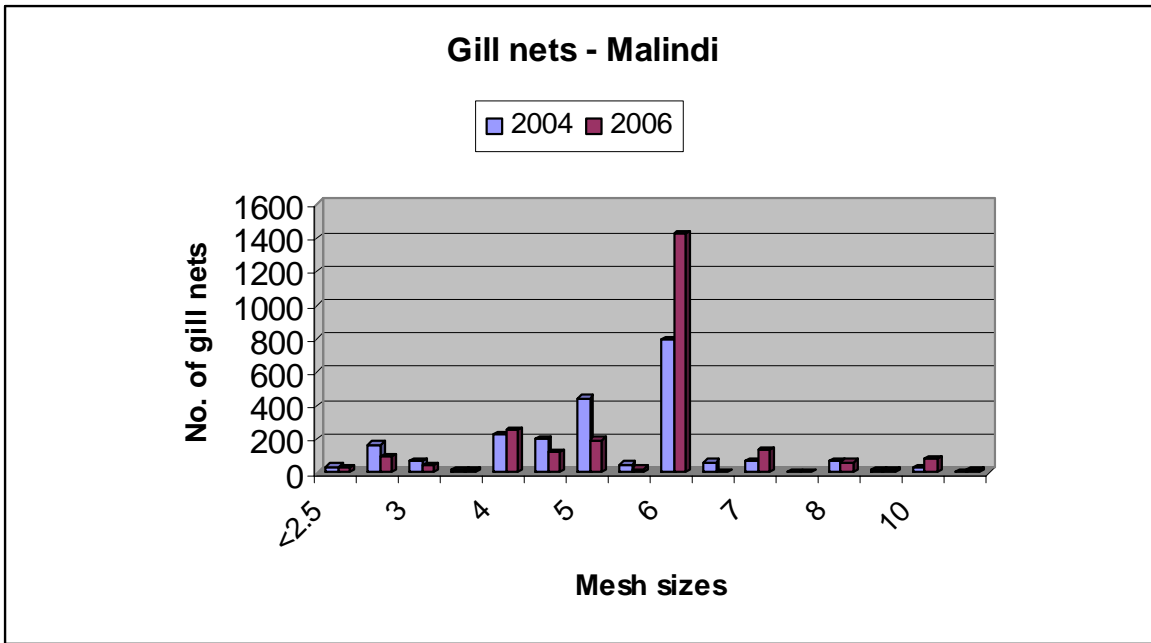


Figure 9: Distribution of Gill nets by mesh sizes –Malindi district

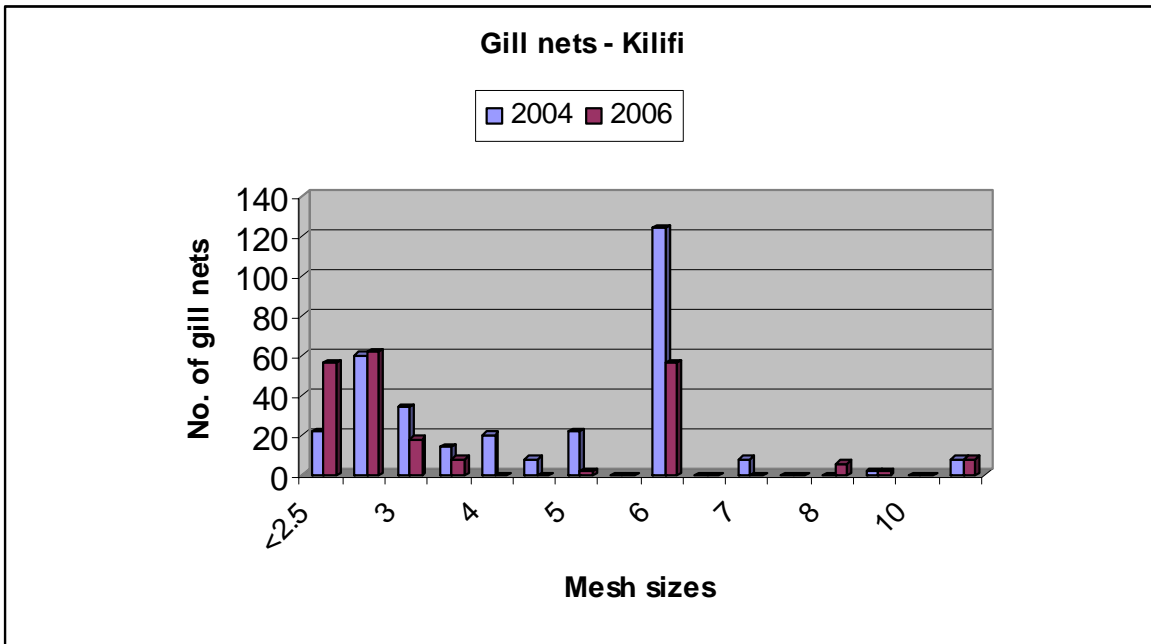


Figure 10: Distribution of Gill nets by mesh sizes – Kilifi district



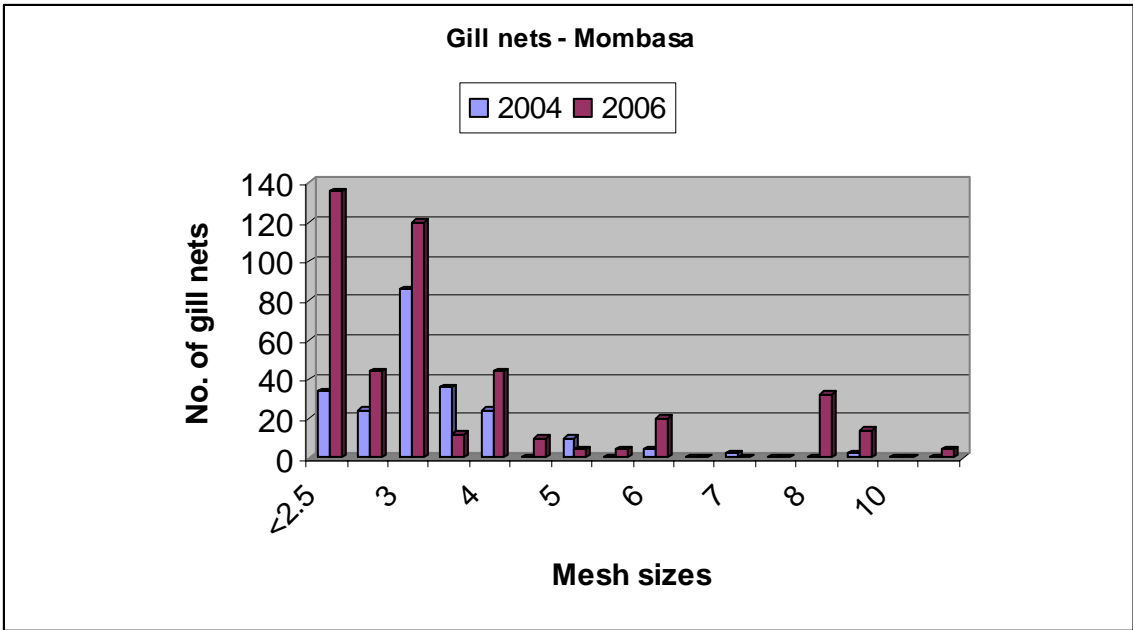


Figure 11: Distribution of Gill nets by mesh sizes – Mombasa district

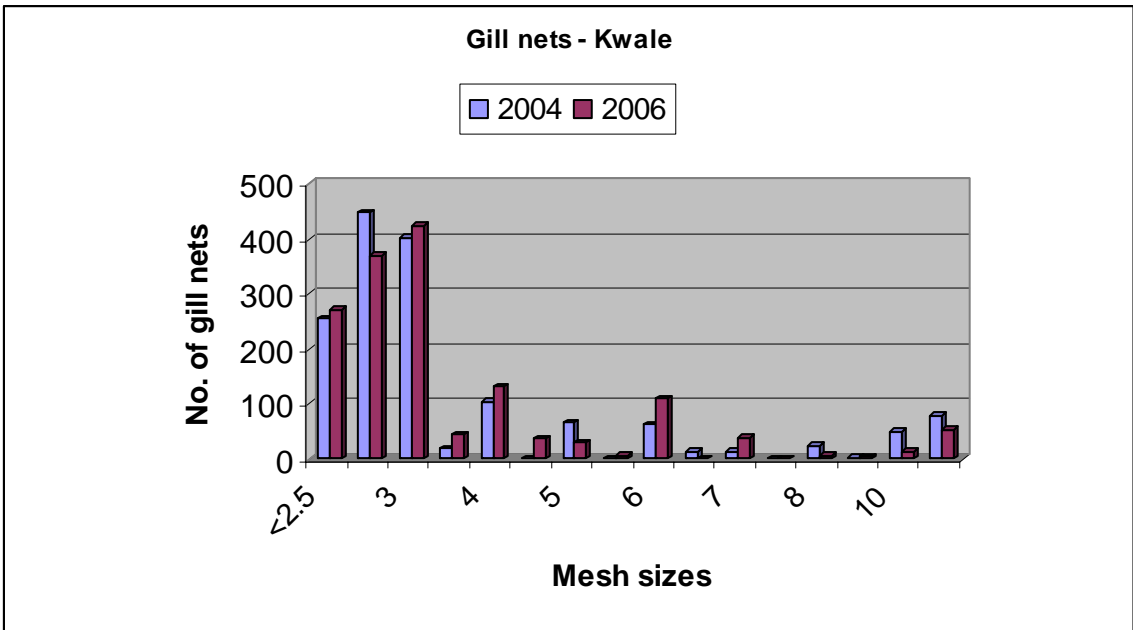


Figure 12: Distribution of Gill nets by mesh sizes – Kwale district

### 3.6.2 Long line hooks

A total of 8,224 long line hooks were recorded during FS 2006 as compared to 10,908 that were recorded during the 2004 FS. During the FS 2006 the highest numbers of 5,330 hooks were recorded in Mombasa district. This was followed by Malindi district with 956 hooks, Lamu 798, Kwale 672, Kilifi 340 and the least was Tana River district with 128. The results of the two surveys are shown graphically in Figure 13.

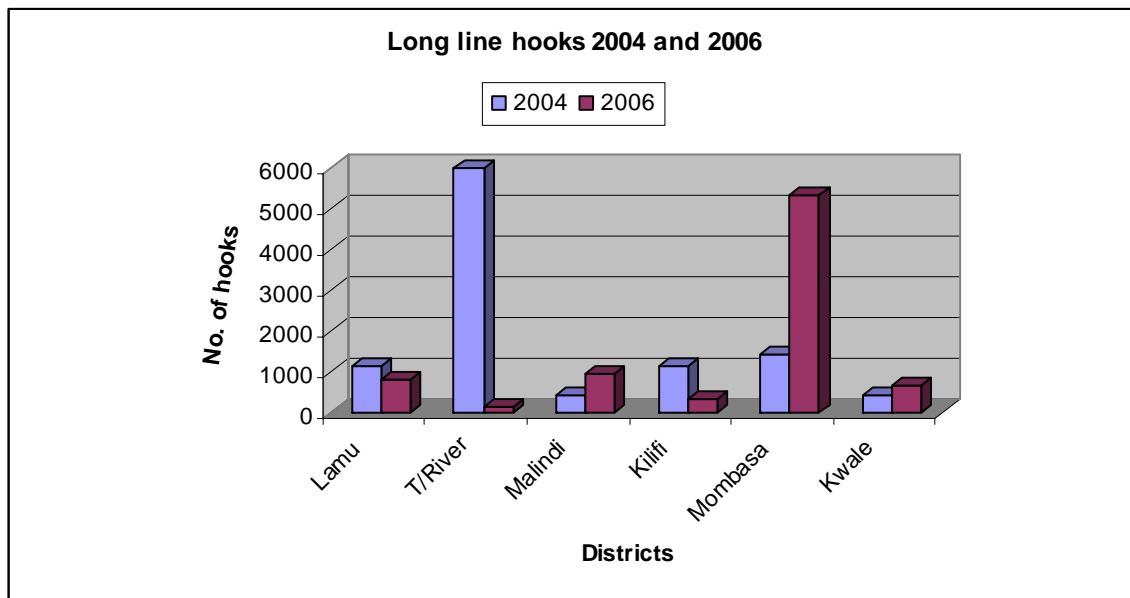


Figure 13: Distribution of Long line hooks by districts 2004 and 2006

### 3.6.3 Marine seine nets

There were three types of marine seine nets which were observed both during the 2004 and 2006 FS. These were beach seines, prawn seines and reef seines.

#### a) Beach seines

During the year 2006 FS, 560 beach seines were enumerated as compared to 294 recorded in the FS 2004. This indicates an increase of 90.5% within the two years. During the FS 2006 the highest number of beach seines were recorded in Lamu district with 370 (66.1%) followed by Kwale (76) while Mombasa had 58 beach seines. Tana River district had the least beach seines

(2) followed by Malindi (14). There was an increase of beach seines between the two surveys in all the districts apart from Tana River where they remained 2 and Malindi where there was a big decrease from 50 to 14 beach seines between 2004 and 2006 FS, figure 14.

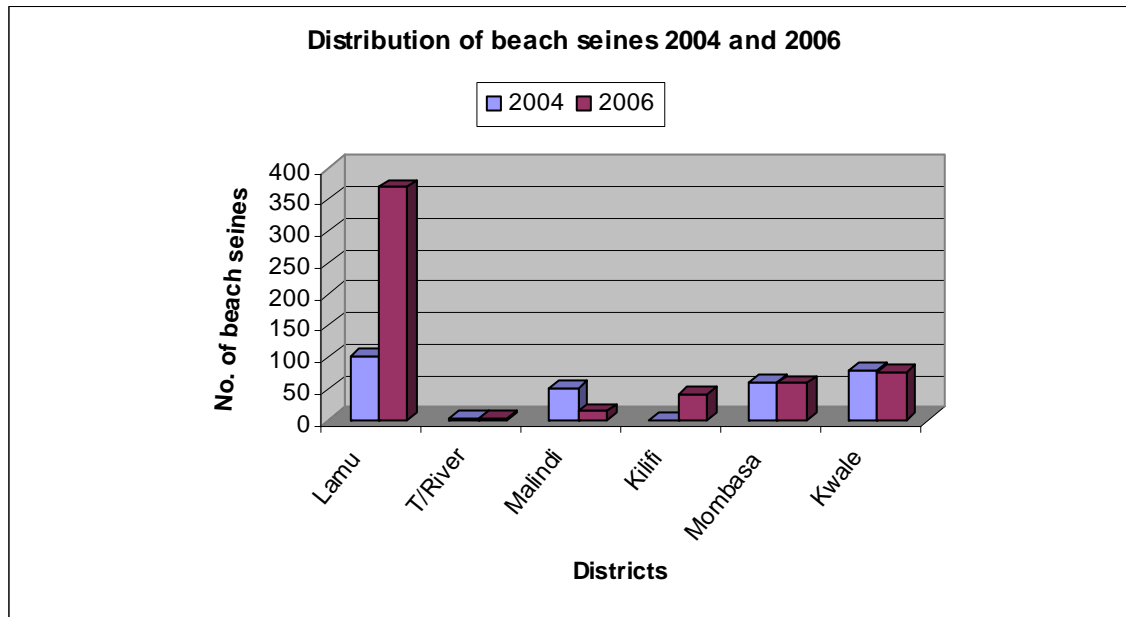


Figure 14: Distribution of beach seines by districts 2004 and 2006

### b) Prawn seines

During the FS 2006 a total of 264 prawn seines were recorded. Lamu district had the highest number of prawn seines at 86 followed by Mombasa with 72, Malindi 51, Tana River 32, Kwale 22 and least in Kilifi with 1. In 2004 prawn seines were 226 in total distributed as follows: Kwale 78, Lamu 55, Malindi 53, Tana River 27, Mombasa 8 and Kilifi 5.

### c) Reef seines

146 reef seines were recorded during the FS 2006 which was a drop by 7.6 % compared to 158 in 2004. Of these, Malindi district had 78; Kwale 56 and Lamu 12 while none was recorded in Mombasa, Kilifi and Tana River. 158 reef seines were recorded during the FS 2004. Of these, Malindi district had 113, Kwale had 34, Kilifi 9 and Mombasa 2 while Lamu and Tana River had none.

### **3.6.4 Cast nets**

812 cast nets were recorded during the 2006 FS. Mombasa district had the highest number of cast nets (282) followed by Kwale 254, Kilifi 252 and Malindi 24. None was recorded in Lamu and Tana River.

In 2004, 520 cast nets were recorded. Kilifi district had the highest number of cast nets (136), followed by Malindi 128, Kwale 124, Mombasa 118 and Lamu had 14. Again none was recorded in Tana River.

### **3.6.5 Hand lines**

A total of 6,540 hand lines were recorded during the 2006 FS mainly in Kwale, Mombasa, Kilifi and Mombasa districts. In the year 2004 FS, a total of 5,682 hand lines were recorded mainly in Kwale, Kilifi and Malindi districts.

### **3.6.6 Traps/baskets**

During the FS 2006 there was a decrease in the number of traps/baskets by 17.3%. Traps/ Baskets were a common gear especially in Kwale and Malindi districts. A total of 5,224 traps were recorded. Kwale district had the highest number traps (3,672) followed by Malindi with 798, Mombasa 370, Lamu 286 and Kilifi 98. Tana River had no traps/baskets.

Traps/ baskets were a common gear during the 2004 FS especially in Kwale and Malindi districts, (Figure 15). A total of 6,318 traps were recorded. Kwale district had the highest number at 4,070 traps followed by Malindi with 1,226, Mombasa 550, Lamu 358, Kilifi 112 and Tana River had only 8.

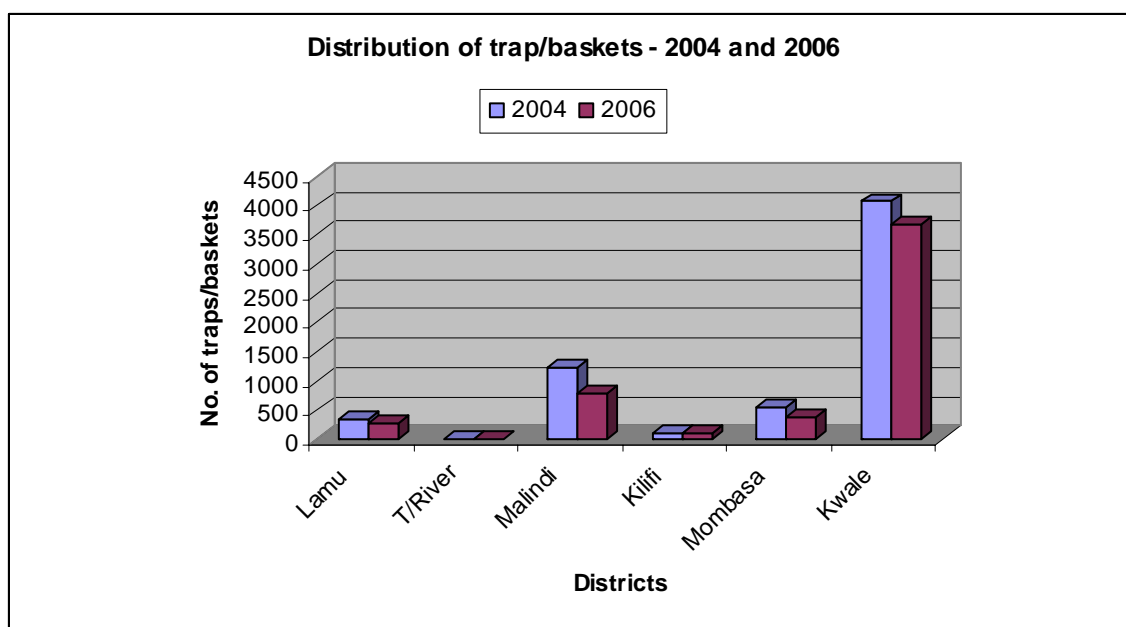


Figure 15: Distribution of trap/baskets 2004 and 2006

### 3.6.7 Monofilaments

In 2006, there was a 16.4% increase in the number of monofilament from 902 during 2004 FS to 1,050. In 2006, Kwale district had the highest number of monofilament (304) followed by Malindi 262, Lamu 196, Kilifi 120 and the least were recorded in Tana River (100).

During FS 2004 Lamu district had the highest number of monofilament nets with 358 of them out of the 902 total. Kilifi district followed with 240, Malindi 148, Mombasa 94, Kwale 52 and lastly Tana River district with only 10. There was a significant variance in the number of the monofilament between the two year in all the districts, Figure 16.

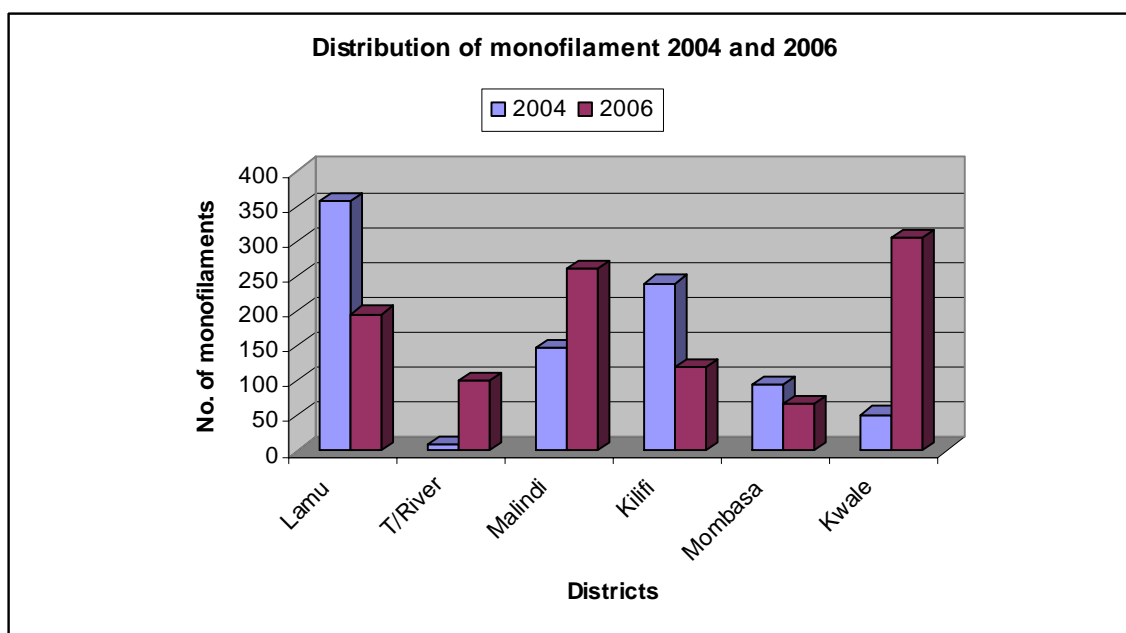


Figure 16: Distribution of monofilaments – 2004 and 2006

### 3.6.8 Trawl nets

21 trawl nets recorded in 2004 while only 20 were recorded in 2006. These were all recorded in Ganjoni location, Island division of Mombasa district. These are gears used by trawlers targeting prawns.

### 3.6.8 Scoop nets

In 2006 a total of 764 scoop nets were recorded during the Frame survey 2004. The highest number of scoop nets was recorded in Lamu district with 440 of the total. Lamu was followed by Kwale 194, Malindi 106, Kilifi 22 and Mombasa 2 while Tana River had none.

A total of 562 scoop nets were recorded during the survey. 276 were recorded in Lamu district, 116 in Tana River, 114 in Kwale, 34 in Kilifi and 22 in Malindi. Mombasa district had no single scoop net.

Just like the distribution of monofilament nets, there was a great variance in the numbers of scoop nets per district between the two surveys, Figure 17.

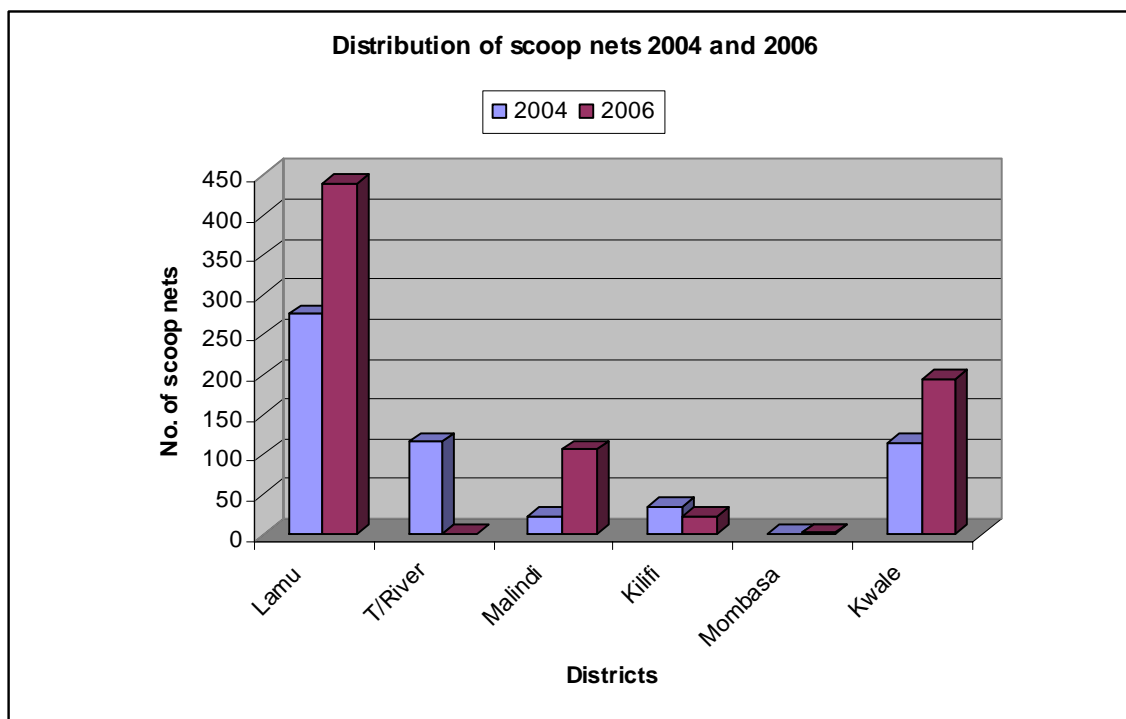


Figure 17: Distribution of scoop nets – 2004 and 2006

### 3.6.9 Ring nets

During the 2004 FS one ring net was recorded in Kinondo location of Kwale district. However, in 2006 the number had risen to 11 with 10 from Kwale and one from to Mombasa district.

### 3.6.9 Trammel nets

During the 2006 FS trammel nets were recorded in two districts namely Mombasa with 17 and Lamu with 6. In 2004 trammel nets were recorded in four districts namely Malindi 10, Mombasa 9, Kwale 6 and Tana River 3. There were no records on trammel net in Lamu and Kilifi districts.

### 3.6.10 Trolling lines

708 trolling lines were recorded during the 2006 FS. In Malindi 275 trolling lines were recorded while 170 were in Kwale, 121 in Kilifi, 38 in Mombasa and 34 in Lamu. Tana River had no trolling line. In 2004, a total of 608 trolling lines were recorded along the whole coastline in May 2004. Malindi district had 252 trolling lines, Kwale had 170, Kilifi 121, Mombasa 38 and

Lamu had 38. Just like in 2006 Tana River district did not have any trolling line, figure 18.

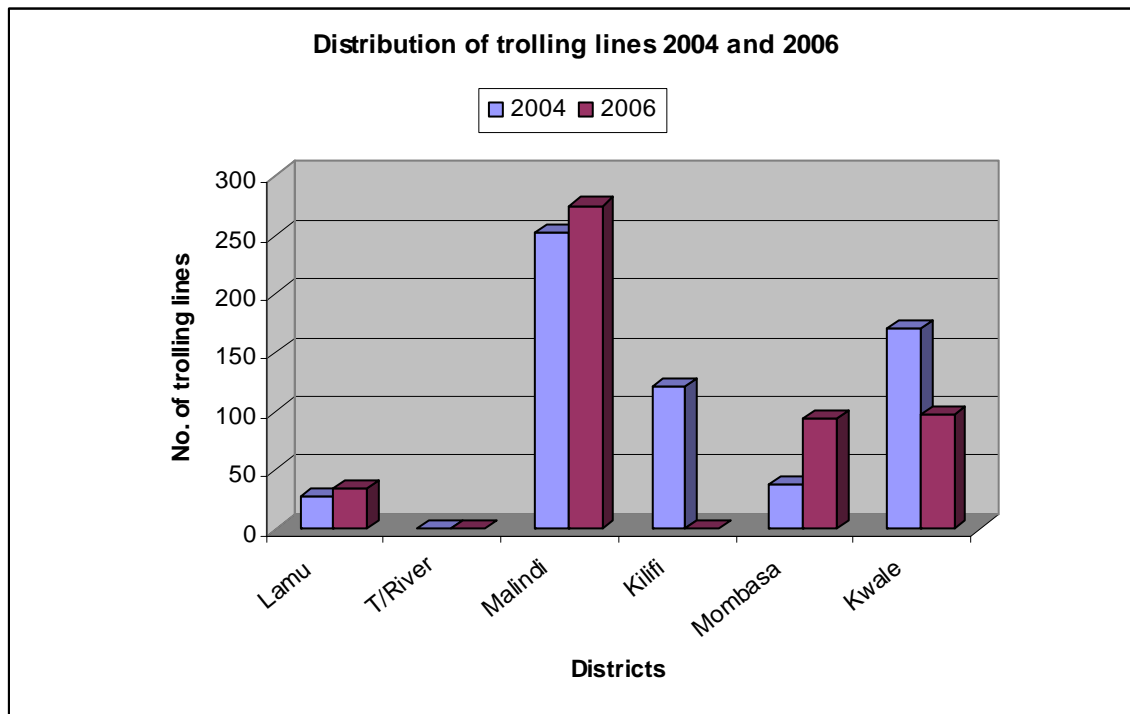


Figure 18: Distribution of trolling lines 2004 and 2006

### 3.6.10 Spear guns/Harpoons

Out of the 624 Spear guns/ Harpoons which were recorded during the 2006 FS, 438 of them were in Kwale district, 158 in Kilifi, 25 in Mombasa and 3 in Malindi. Lamu and Tana River had no spear guns/harpoons.

Just like in 2006 spear guns/harpoons were not common in the districts apart from Kilifi and Kwale districts were 240 and 203 of them were recorded respectively. In Tana River district 4 spear guns/harpoons were recorded, Malindi and Mombasa districts recorded one each and Lamu had none.

### 3.6.11 Other gears

A total of 2,116 of other gears apart from the ones mentioned above were recorded during the Frame survey 2006 as opposed to 958 which were



recorded in 2004. The gears which were recorded as other gear were actually sticks mainly used to fish for crabs and octopus.

#### **4.0 DISCUSSION**

From the survey results, it is apparent that there is a reasonable increase in the number of fishers hence an employment opportunity. This indicates an increase in effort at the rate of 10% within the two years. Whereas the Frame survey data has addressed various aspects of the fishery, the age structure of the fishers is not documented, although there is clear evidence on the increase in spear guns which can be attributed to the increase in young fishers in the marine waters. Therefore, surveys such as this need to incorporate the age structure for a better understanding of the gear /effort distribution among various age groups. This can also be useful information for designing effort control measures as well as an understanding of the dynamics in gear use in relation to other fishery regulating factors, which shape the nature of the fishery. Fishers are said to switch from fishing to tourism activities depending on the prevailing season. Since the two Frame surveys have been carried out during the same fishing season, the interaction between fishing activities and the tourism industry can not be captured from the two survey data and needs further investigation.

There was a remarkable reduction of over 70% in the number of foot fishers between the two surveys. While on one hand, the number of foot fishers decreased the number of boat fishers increased on the other hand, hence it could be assumed from the results that some foot fishers in 2004 had joined boat fishing during the Frame survey 2006. This change needs further investigations to ascertain the status quo.

There was a distinct pattern in the distribution of the fishing crafts. The dugout /Mtumbwi was the most used fishing craft in the southern coastline while crafts pointed at one end (Mashua) and Hori are more used in the North coast. From the survey, it was clear that more of the small sized gillnets are found in the South coast while the North coast has the majority of the large meshed gillnets. Based on the craft distribution and the gill nets distribution, it is apparent that the dugouts use more of the small mesh sized gillnets while the Mashua/Hori use more of the large sized gillnets. It appears that the small mesh sized gillnets target the demersals while the large mesh sized gill nets usually target the pelagics. Taking the distribution of the fishing vessels and the gill nets into consideration, the above results

could mean that the fishery in the North coast and the South coast are distinct during the South East Monsoon. A Frame survey during the North East monsoon is however important to show whether the two fisheries are completely different and might need separate management plans.

Most of the fishing crafts were found to use the sails and paddles as a means of propulsion. The motorized fishing boats were still few in both surveys indicating less reliance on engines as the means of propulsion. It is worth noting here that the number of motorized boats were more of the sports fishing boats than for the artisanal fishers. This shows that the capacity of the fishers to move especially during the Kusi when the sea is rough is seriously hampered and relates to the low artisanal catch which is approximately 7,00 metric tons. From this survey data, the exploitation of the reefs could be more intense, a fact noted by the catch assessment survey (Fisheries department) where there is an increase in the catches of mixed demersals. There is need to look into this category known as mixed demersals so as to understand the species composition.

Although the reduction of the gill nets was noted throughout the coastline, the small meshed sizes reduced by 26% while the large sized ones reduced by 15%. The most drastic changes in the gillnets was noted to have taken place in Lamu and Tana River districts. This reduction needs to be probed further as the fishers could have migrated from their earmarked stations during the two surveys.

From the survey results, there was an increase in the number of illegal gears used by the fishers. The beach seines increased by 90% while the monofilament nets increased by 16%. An increase of 32% was also noted in the use of spear guns. The three gears are illegal and their use in the marine waters needs immediate attention, as it is apparent that they are the only gears showing increment in usage.

The recreational fishery which mainly uses the trolling lines targets top-level predators (e.g. *Thunnus albacores*) while the traditional hook and line fishery targets a mixture of demersal species such as snappers and scavengers depending on the age and experience of the fisher. These two gears showed a consistent increase in number between the two surveys. Apart from the hook and line and the trolling lines, the prawn seines and the cast nets also increased in number. The latter gears usually target the prawns which are highly seasonal.

Ring net fishery although a new method in the Kenyan marine waters showed a considerable increase. During the 2004 Frame survey, only one

ring net was recorded in Kwale, while in 2006, the number had risen to 10 while Mombasa district one was recorded. The large increase in catches from Kwale district could be associated to the gear. An interview with a ring net fisher revealed that the gear catches between one and three tons per day depending on the season.

From the survey data, there was an increase in the category of gears known as others which harvests crabs and octopus. There is need to understand the fishery since it seems to be on the increase. The use of longline hooks along the coast showed a major shift in the survey. In 2004, Tana river recorded the highest number with 5,992 hooks followed by Mombasa with 1,446 hooks. During 2006 Frame survey, Tana river had only 128 longlines hooks while Mombasa had 5,330. The increment in Mombasa was associated to the inclusion of Sakoba (a long liner) with 2,800 hooks, while that of Tana River needs further scrutiny to understand the trend of this highly dynamic gear.

## **5.0 CONCLUSIONS AND RECOMMENDATIONS**

In the second Frame survey, the data capture was more focused and generated good data that could be used to develop a better survey next time. A lot of questions regarding the status of fishing in the marine waters can now be answered courtesy of the Frame survey. The results of the frame survey show that there was an increase in effort in terms of fishing gears compared to the 2004 Frame Survey. An increase in the use of beach seines and spear guns is noted as well as the use of ring net common in Kwale district. This information can be used by management to regulate the fishing effort (fishers, fishing crafts and gears) as well as the removal of the illegal fishing gears. The Frame survey results can also be used as sampling frame for a number of other surveys including catch assessment surveys, socio-economic surveys, and stock assessment.

The already computed data on the infrastructure is useful in planning and development of the fisheries sector.

Although the Frame survey was successful, there were gaps noted in the training manual, the database, as well as gaps identified from the analysis which can be used to capture more data for use in future Frame surveys.

### **Recommendations**

- ❖ The use of beach seines is still high in the coastal marine waters. According to the Frame survey results, the number has increased twofold hence it is recommended that strict enforcement on the use of beach seines in all the districts;
- ❖ The results indicated a 31% increase on the use of spear gun. This increase is evident in Mombasa and Kwale although it is also used in Kilifi district. With increase in population and increased unemployment, it could be possible that most young fishers joining the fishery may have led to the increased use of spear guns since it's a gear that is easy to mobilize. There is need to carry out a study in order to understand the ecological and social economic impacts on the use of spear guns with a view of improving the gear characteristic and catching methods and reviewing the existing legislation; The use of spear guns is mainly by the youth who are joining the fishery after completing their education. The ban on the gear should be addressed as the increment is making all round surveillance important, or the review of the ban. A socioeconomic study on the impact of the gear on the fishery ought to be carried out to give the department a good management decision making platform.
- ❖ The Frame survey results indicated an increase in the use of ring nets in Kwale district. A total of eleven ring nets were enumerated compared to one ring net in 2004. As a new and emerging fishing gear targeting the pelagics, it is important to study the gear selectivity, ecological, and socio-economic impacts to generate data to support the development of an appropriate legislation to guide the use of this gear. The department needs to develop a mechanism for disseminating the information to fisher community as a way of creating awareness. Such information should be incorporated in the BMUs management plans;
- ❖ While the recreational and gill net fishery exhibit seasonal variations (throughout the year), the traditional artisanal fishery is seasonal by definition (i.e. most of the gear can only be operated at Kasi kasi and not throughout the year).Owing to the seasonality of the coastal marine fisheries, it is highly recommended that two Frame surveys in future should be conducted biannual. This means a survey during the Kusi season and the other one during Kazi Kazi season in order to capture the changes in fishing effort between the seasons.

- ❖ In order to improve on the Frame survey data collection and analysis, the Samaki database needs to be improved to capture the following fields:
  1. Target species should be increased to capture the following other important species (Billfish, crabs, grunter, sardines etc)
  2. Review the upper limit of the horsepower of engines used in vessel propulsion. The present upper limit of 240 horsepower was evidently unable to capture the capacity of the bigger sport fishing/trawler crafts during data entry.
  3. Review gear types to include other important gears such as hook sticks targeting crabs and octopus, distinguish the traps (Uzio and Malema) during data collection since they target different species and nature of deployment is different.
  4. Adjust the Samaki database to capture by default the crafts pointed at one side as “Mashua”, and crafts pointed at both ends as “Ngalawa” for ease of data entry.
  5. Review the upper limit of the long lines hooks per vessel. It was difficult to capture the total number of hooks of the long liner vessel due to this limitation. At the moment it only accepts 2,800 hooks per craft as the upper limit.
  6. Data collection and Samaki database should capture land ownership status of the landing sites.
  7. Geo-referencing of the landing sites so that they can be captured in the database before the next Frame survey.
  
- ❖ Several aspects of the Frame Survey ought to be looked into to improve on the quality of the next survey. The general definition of gears and crafts as well as fish landing site facilities appears to be theoretical and may be difficult to understand. There is need to develop a training manual for enumerators that is clear and easy to understand for good data collection. This could be done by taking photographs and mapping of the landing sites in order to geo-reference the landing sites and certifying the real ownership of the noted landing sites. It is recommended that further documentation on the same be done.
  
- ❖ A thorough understanding of the age structure of the coast fishers and gender factor ought to be undertaken. The more experienced (and older) hook and line fishers harvest particular species of fish, while the younger and less experienced hook and line fishers harvest different ones that are easy to catch.

## **6.0 ACKNOWLEDGEMENTS**

The Department of Fisheries is very grateful to the Government of Kenya through the Permanent secretary Ministry of Livestock and Fisheries Development for having funded the Frame survey exercise. The Department is also thankful to the officers who were stationed at the coastal districts of the marine waters for having conducted the survey successfully.

Last but not least the Department is grateful to every one who participated in one way or another during the whole survey exercise.

## **7.0 ANNEX A: TRAINING MANNUAL**

### **THE QUESTIONNAIRE**

#### **Census Units and Variables**

In the Frame Survey the main variable shall be the fishing boat within each landing site. The census variables include boat type, length of the boat, mode of propulsion, number of crew, gear type and size, and species targeted. Facilities within the landing site will also be enumerated.

#### **Filling of the Questionnaire**

The Questionnaire is in three (3) sheets. Sheet 1 gives the basic definitions used in the survey. Sheet 2 captures data on the location of the landing site, numbers of all categories of boats at the landing including transport and derelict crafts as well as general information on beach facilities and staffing. Sheet 3 captures boat and gear details of all fishing crafts.

Most of the items in sheet 2 shall be filled in by interview with a beach leader, or any other person with good knowledge of that area but the interviews should be supported by physical verification of the variables that are physically present e.g. toilets and derelict crafts.

The filling in of sheet 3 requires that the characteristics of each fishing boat be entered in one row. These include the boat details (Registration number, type, length and propulsion), the targeted fish species, crew and gear composition. Entries of all fishing boats at a given landing should be numerically serialized with each boat occupying one row.

#### **Measurement of Boat length**

Most boat owners know the length of their boats but this is usually in feet and the enumerator should covert it to approximate length in metres by diving by a factor of three. In case the fisher doesn't know the length of the boat, the enumerator should use a metre-rule, tape measure or a rope with knots at one-metre intervals. The length should be measured from the hind to the front tip

### **Measurement of mesh sizes**

For gears where a record of mesh size is required i.e. gillnets and small seines i.e. stretched mesh should be measured i.e. diagonally from knot to knot.

### **Mode of propulsion of boat**

For fishing boats using inboard engine, engine are given code 1 whereas those using outboard engine motors are given code 2. Those using paddles have code 3 and sails code 4. The code should be recorded in column 35(PROP) of sheet 3 and the horsepower of engine in column 36(HP).

The commonly targeted fish species should also be recorded by codes in column 37 of sheet 3. The respective codes are given in sheet 1

### **Consistency checks**

Supervisors should conduct consistency checks immediately they receive the questionnaires from the field.

## **FISHING CRAFTS**

Fishing Craft refers to a device used to access the fishing ground. Crafts / boats have evolved quite significantly from a single log, rafters, and dugout canoes all through to large planked boats and non-planked boats. Depending on locality, same craft may be referred to by different names, or slight structural or operational modifications may exist.

### ***(a) Types of fishing Craft***

#### **1. Dug out canoes (Mtumbwi)**

Is a craft curved out of a log of wood / tree trunk. It has no joints or planks

#### **2. Hori**

Flat bottomed fishing boat used mostly in the shallow waters propelled by sail/paddles. It is strengthened by ribs (mataruma) on sides and the floor



### **3. Ngarawa**

Is a craft pointed on both end and have outriggers on both sides(mirengo) propelled using sail

### **4. Dau (Dutanyingi)**

Flat bottomed fishing craft with ribs at the bottom and pointed at one end

### **5. Dhow/Mashua -**

Is a craft pointed on one end ,V-shaped bottom and sail propelled or engine

Jahazi is a bigger Mashua normally more than 12 meters

### ***Craft length***

Standard length to be used will be in meters but not feet

### **Propulsion:**

Method of propulsion

1. Inboard
2. Out board
3. Paddles/Oars (makasia)
4. Sails (tanga)
5. Pole (Pondo)

### ***Gear types***

A fishing gear refers to any device actually used to capture fish from the water. It may be a net, a hook, any type of trap, be it traditional or modern, plus all the accessories that go with this.

### **Traditional Traps (TR)**

- **Uzio (U)** A fence either made of sticks or netting material which is stationary used to trap fish during high tides ( targets mullets, sardines)
- **Malema (M)** Traditional basket trap made of palm tree leaves bait is put inside(targets rabbitfish, parrotfish)

### **Seine Nets (SN)**

- **Prawn seine net (kidima) (P)** Two inches gill net operated by three people pulled towards the beach targeting (prawns)
- **Beach seine Juya (B)** A bag shaped net with wings pulled towards the beach by manpower ,used by 15-30 people (targets cuttlefish, mud bream)

- **Reef seine/ Juya (R)** Like a beach seine but operated from two boat off shore (targets Shark. Sardines, half beak)

**Gill net (Jarife) (GN)**

A sheet of twine held vertically with help of floats and Sinkers and set in a straight line in the water column (seabed, mid water or surface).

- **Drift kuogeresha (D)** This is a gill net set without anchors and suspended in water column and is unattended (targets shark, tuna bonito, king fish)
- **Set Net malasha (S)** This is a gill net which is anchored( targets rays, sharks, snappers)

**Trammel net (TN)** It has a triple wall net, the outer two wall have a bigger mesh size than the inner wall and have been developed from gill net ( targets lobsters herrings)

**Mono filament net (nyavu ya mkano) (MN)** It is a gill net made from a single nylon filament (targets mullets, pouter fish)

**Cast Net (CN)** It is a bell /skirt -shaped gill net tied to a string held by The operator. It is thrown into the water where it Spread out and sinks at the bottom where once pulled Out, scoops out what it entraps (targets prawns, sardines, mullets)

**Ring net (Nyavu ya kufunga) (RN)** It is a surrounding net used to encircle fish and closed at the bottom to form a purse which traps fish (targets mackerel, bonito tuna)

**Scoop Nets (SC)** Scoop nets are bag like with a frame at the mouth and are operated at the surface and reef rock to scoop fish or individual fish that are close. (targets Lobster, sardines, aquarium fish)

**Trawl nets (TW)** A bag of netting set and actively dragged along the water column (mid- or bottom) in order to sieve fish it encounters from the water. It is essentially operated from a trawl boat (targets prawns)

**Spear Gun /Harpoons (SG)** Made of wood or iron bar and old tube used to shoot fish. (targets Snappers, rabbit fish, and rock cod octopus, lobsters)

**Hook and line (HL)** Refers to a single twine on which baited hook(s) is/ are attached. (targets red snapper, rock cod)

**Long line (sunati) (LL)** Refers to a single twine (manila) on which a series of Snoods (short branches) are attached at intervals. At the end Of each snood is attached a baited hook and mainline Anchored in the deep waters to fish by itself.  
(targets king fish, sharks tuna blue marlish)

**Trolling (scud) (TL)** Baited hook(s) on a line(s) attached to moving craft as common with sport fishing.

**Others specify (OT)**

### *Landing site Facilities*

Banda	Permanent structure made of permanent building materials, cement, and concrete. Hygienically acceptable for handling fresh fish after landing
Toilets facilities	Availability of toilet at/ within the landing site (pit latrines or flash toilets), which is currently in use.
Portable water	Good quality water from a tap or protected well, suitable for drinking.
Cold Rooms	permanent insulated structure in which fresh fish can be kept chilled
Non-working cold room	This therefore refers to a permanent structure in which Fresh fish cannot be kept chilled
Electricity supply	Presence of electricity poles and wires
All weather road	A road motorable throughout the year. May be murrum or tarmac.
Pontoons	Floating facility protruding into the Ocean to facilitate landing of crafts.
Jetty	Fixed facility protruding into the ocean to facilitate Landing of fishing crafts.
Fish stores	A structure built to hold fish at the beach. Does not Include cold room.
Boat repairer	A person skilled in construction and repairs boats
Net repairer	A person skilled in mounting and repairs nets

## Terminologies

Frame Survey	Total counting of sampling variables
Interviewer	Person asking questions/ recording responses.
Interviewee	Person being asked questions (one who responds to questions).
Landing Site	Where there are 5 or more fishing crafts land fish (non-derelict) boats.
Census unit	Landing site
Sampling Units & Variables	Refers to the units being counted e.g. boat, crew, etc.
Status/ Rank	Position held in the community or at the landing site
Fishing craft	-Refers to the device used to access the fishing ground. Also called boat or vessel.
Derelict Craft	-All crafts, which have not been used for fishing, for six month.
Fish Transport Craft	- Non-fishing craft used to ferry fish and fishery Product.
Crew	Persons who actually go to the ocean to do fishing
Pondo	A long pole for propelling and steering fishing craft

## 8.0 ANNEX B: THE QUESTIONNAIRE

### FRAME SURVEY 2004 QUESTIONNAIRE

SHEET 1

#### NOTES ON CRAFT

Total craft	= all craft on the beach
Fishing craft	=all crafts that are fishing
Derelict craft	= all damaged craft not repaired in the last 6 months or more
Transport craft	= craft used for transportation of fish and fisheries products

#### CODING

##### CRAFT TYPE

1. Craft pointed at one end (mashua)
2. Craft pointed at both ends(ngalawa)
3. Hori
4. Dugout/mtumbwi
5. Dau/mtanyingi
6. Other (specified)

**Length:** measured in meters

**Propulsion:** method of propulsion:- state *main* method

1. Inboard engine (state horsepower) e.g 1(15)=1 Inboard engine of 15 HP  
1(15,15) = 2 inboard engine of 15 &15 HP
2. Out board engine (state horsepower)e.g2(15)=1engine of15HP  
E.g. 2(25, 25) =2 engines of 25HP and 25 HP
3. Paddles
4. Sails
5. pole/Pondo
6. Footfisher

**CREW** =Number of fishermen who normally accompany the boat per shift

##### GEAR TYPES

**GN** Gill nets- state number per mesh size

**MO** State method of operation

1=Set Net

2= Drift net

**LL** Long Lines: state number hooks

**SN** Seine Net: state number of complete outfit

Prawn seine net-**PS**

Beach seine net –**BS**

Reef seine net- **RS**

**TW** Trawl net: state number of complete outfit

**CN** Cast net: state number of complete outfit

**RN** Ring nets state numbers of complete outfit

**MN** Mono filament: state number of complete outfit

**TN** Trammel Net: state number of complete outfit

**HL** Hook and line: state number of lines

**TR** Traps: state number

**SC** Scoop net: state number

**TL** state number of trolling line

**SG** Spear gun/Harpoons state numbers

**OT** other gears not specified above: state type and numbers

**SPECIES TARGETTED**

These Are the actual species that the respondent targets and not what he/she catches

- |                         |                      |
|-------------------------|----------------------|
| 1. <i>Rabbit Fish</i>   | <i>Tafi</i>          |
| 2. <i>Scavengers</i>    | <i>Tangu</i>         |
| 3. <i>Snapper</i>       | <i>pali</i>          |
| 4. <i>Cavalla jacks</i> | <i>Kolekole</i>      |
| 5. <i>Mulletts</i>      | <i>Mkizi</i>         |
| 6. <i>King fish</i>     | <i>Nguru</i>         |
| 7. <i>Tuna</i>          | <i>Jodari/kiboma</i> |
| 8. <i>Shark</i>         | <i>papa</i>          |
| 9. <i>Prawns</i>        | <i>Kamba</i>         |
| 10. <i>Octopus</i>      | <i>pweza</i>         |
| 11. <i>Lobsters</i>     | <i>kamba mawe</i>    |
| 12. <i>Others</i>       |                      |

**FRAME SURVEY: MARINE WATERS 2004 SHEET2**

**SUMMARY DETAILS OF NUMBER OF CRAFT ON BEACH AND FACILITIES**

1. NAME OF RECORDER (AS IN ID)-----	I
2. STATUS/RANK OF RESPONDANT-----	2
3. DATE-----	3
4. DISTRICT/COUNTY-----	4
5. SUB-COUNTY-----	5
6. LOCATION/PARISH-----	6
7. NAME OF LANDING SITE-----	7

**CRAFT SUMMARY**

8. TOTAL NUMBER OF CRAFTS ON SITE-----	8
9. DERELICT CRAFTS-----	9
10.FISH TRANSPORT CRAFT(NON FISHING)-----	10
11.FISHING CRAFT WITH OUTBOARD ENGINE-----	11
12.FISHING CRAFT WITH IN-BOARD ENGINE-----	12
13.FISHING CRAFTS USING PADDLES ONLY-----	13
14.FISHING CRAFTS USING SAILS-----	14
15 FISHING CRAFT USING PONDO	15

**FACILITIES SUMMARY**

16.BANDA (1) YES (2) NO	16
17.COLD ROOM (1) WORKING (2) NOT WORKING (3) NONE	17
18a.PONTOON (1) YES (2) NO	18a
18b.JETTY (1) YES (2) NO	18b
19 FISH STORE 1) YES (2) NO	19
20a.ELECTRICITY SUPPLY (1) YES (2) NO	20a
20b.IF NO HOW FAR IS THE NEAREST SUPPLY -(KM) (1) <1 (2) 1-5 (3) 6-10 (4) >10	20 b
21.TOILET FACILITY (1) YES (2) NO	21
22.POTABLE WATER (1) YES (2) NO	22
23a.LANDING SITE ACCESSIBLE BY ALL WEATHER ROAD (1) YES (2) NO	23a
23b.IF "NO" HOW FAR IS THE NEAREST ALL WEATHER ROAD - KM (1) <1 (2) 1-5 (3) 6-10 (4) >10	23b
24a.NUMBER OF SKILLED NET REPAIRERS	24a
24b NUMBER OF SKILLEDBOAT BUILDERS	24b

**FISHERIES DEPARTMENT STAFFING**

25a. IS LANDING SITE SERVED BY FD STAFF (1) YES (2) NO	25a
25b. HOW MANY DAYS PER WEEK (1) 1 (2) 2 (3) 3 (4) 4 (5) 5 (6) Other specify	25b

**ADDITIONAL INFORMATION**

26. DO FISHERMEN LAND AT THIS LANDING SITE FOR (1)<5 MONTHS PER YEAR (2) > 5 MONTHS PER YEAR	26
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