


FISHERY COUNTRY PROFILE	Food and Agriculture Organization of the United Nations	FID/CP/KEN
PROFIL DE LA PÊCHE PAR PAYS	Organisation des Nations Unies pour l'alimentation et l'agriculture	
RESUMEN INFORMATIVO SOBRE LA PESCA POR	Organización de las Naciones Unidas para la Agricultura y la Alimentación	April 2007

THE REPUBLIC OF KENYA

1. GENERAL ECONOMIC DATA

Area:	582 650 km ²
Shelf area (to 200 m):	ca. 6 500 km ²
EEZ:	142 400 km ²
Length of coastline (Indian Ocean):	ca. 640 km
Water area (varies with rains)	10 500 - 11 500 km ²
Population (2005):	30 million
GGDP (2005):	US\$ 18.0 billion
GNI per caput (2005):	US\$ 530
Agricultural GDP (2005):	27.4% of GDP
Fisheries GDP (2005):	0.5% of GDP

Note: (1) Value of fish to the fishers plus export value.

2. FISHERIES DATA

Commodity balance (2003):

	Production	Import	Export	Total supply	Per caput supply
	t live weight				kg/year
Fish for direct human consumption	120 343	8 093	39 173	89 413	2.8
Fish for animal feed and other purposes	191	ND	ND	ND	-

Estimated employment (2006):	63 000
Fishers:	55 000
Fish farmers:	7 800
Secondary sector:	800 000
Gross value of landings (ex-vessel prices, 2005):	US\$ 104.5 million
Trade (2005):	
Value of imports:	US\$ 7 759 000
Value of exports:	US\$ 49 684 000

3. FISHERY AREAS AND MAIN RESOURCES

Both inland and marine waters are fished but the bulk of fish landings (ca 95 per cent) is from inland fisheries, of which Lake Victoria contributes about 92 per cent. Marine capture fisheries are only 4 per cent and aquaculture 1 per cent of total national fish production.

3.2 Inland subsector

The main catches are Nile perch (*Lates niloticus*), freshwater sardine, known locally as *Omena* (*Rastrineobola argentea*), Nile tilapia (*Oreochromis niloticus*) and cichlids (*Haplochromis* spp.).

Nile perch and Nile tilapia are exotic species, while the other two are endemic to Lake Victoria. The Nile perch, *Omena* and tilapia are the three major species of commercial importance. The *Haplochromis* species are not of much value to the fishers as they are not the preferred fish by the local community. The haplochromine population declined significantly in the 1980s and 1990s during the Nile perch population boom, and there is reason to believe that there is an interrelation between the two fish stocks, as Nile perch is known to be a voracious feeder on other fish species, including auto-predation.

3.2 Marine subsector

The marine fisheries resources are both inshore and offshore. The inshore fish species are overexploited by local fishers, while the offshore resources outside the territorial waters are exploited mainly by Distant Waters Fishing Nations (DWFN). The marine fisheries contribute on average only 4 per cent of the total national fish landings. The local fishers lack capacity to exploit deeper water resources. The major marine fish species include:

- *Demersal species* — the major catches are rabbit fish, scavengers, parrot fish, pouter and black skin.
- *Pelagic species* — mainly cavalla jacks, mullets, mackerels, barracudas, king fish, bonitos/tunas and sail fish.
- *Crustaceans* — lobsters, prawns and crabs.
- *Migratory species* — tuna and tuna-like species.

4. FISHERY SECTOR STRUCTURE

4.1 Overall fishery sector

Fishing in Kenya, until the discovery of Nile perch as an export commodity in the early 1990s, has basically a subsistence occupation for the lake and coastal communities. The government also did not recognize the importance of fisheries as a contributor to the macro-economy and therefore did not pay much attention in terms of resource allocation for the development of the sector.

Most fishing in Kenya is artisanal, with a little industrial fishing by prawn trawlers. The deep sea (EEZ) fishery resources are currently exploited by DWFNs through a licensing system. Only a small quantity of catch from the EEZ is landed in Kenya, primarily tuna loins for processing for export.

Currently capture fisheries, mainly from Lake Victoria, earn local fishers over Kenya shillings (K Sh) 7 billion, while exports earn the country K Sh 5 billion (US\$ 50 million) in foreign exchange annually.

There has been a deliberate paradigm shift in fisheries management in Kenya, from command-and-control to a highly participatory ecosystem approach, aiming to ensure that fisheries become sustainable and self-sustaining so as to substantially contribute to the country's economy.

The Poverty Reduction Strategy Paper (PRSP) of 2000 and the Economic Recovery Strategy (ERS) Paper of 2003 highlight specific priority actions that the government must implement to ensure poverty reduction, wealth and employment creation, and to achieve a rapid turn around of the economy. In the PRSP, the core poverty alleviation activities were identified and prioritized for resource allocation, with all fisheries activities classified as core elements due to their direct impact on a large rural population. The ERS, which is predicated on PRSP, is a clear road map towards the realization of wealth and employment creation in the period 2003–2007. The strategy also identifies sustainable use of natural resources, which includes fisheries, as areas that ought to be targeted for rapid economic growth.

The government has been putting in place an enabling environment to promote investment activities in order to achieve economic recovery within the specified period. The agenda for creating the enabling environment is guided by the government's policy of maintenance of a stable macroeconomic framework within the context of structural reforms that will lead to wealth and employment creation. The government therefore recognizes and is committed to a policy of sustainable development through judicious exploitation and use of natural resources. This commitment is clearly demonstrated by the creation of the Ministry of Livestock and Fisheries Development, responsible for policy formulation in the development and sustainable use of fisheries resources in the country.

The Fisheries Department of the Ministry of Livestock and Fisheries Development has the mandate to manage and develop fisheries. The Department's major roles are to ensure sustainable exploitation of fisheries resources; to promote aquaculture development; to assure quality and safety of fish and fishery products; and to facilitate fish marketing in order to maximize the benefits that can be derived from fisheries. The contribution of fisheries to local incomes, subsistence and food nutrition is significant, as this occurs in areas with the highest incidences of poverty in the country.

4.2 Marine subsector

4.2.1 Means of fishing and production

The Kenyan coastline is 640 km long and forms part of the western border of the Indian Ocean. It consists of 12 n.mi. of territorial waters and an EEZ extending to 200 n.mi., with a total area of 142 400 km². It lies within the tropical zone extending from Kiunga in Lamu District at 1.5°S to Vanga in Kwale District at 4.5°S. Kenya has claimed, delineated and demarcated her EEZ, and is now in the process of delineating and claiming the Legal Continental Shelf. The EEZ's most distinctive feature is the almost continuous fringing coral reef that runs parallel to the coast. The coral reefs occupy the shallow inshore zone, extending offshore to about 45 m depth, and at a distance of 0.5 km to 2 km from the shoreline, except where river systems enter the sea, creating conditions of low salinity and high turbidity, which limit coral growth. Other features are mangrove areas, sandy shores, mudflats and rocky shores. The continental shelf drops dramatically in areas such as Malindi, while elsewhere, such as Lamu, the fall-off is gradual.

The Kenyan marine waters support a wide variety of fish species, including finfish, both pelagic (king fish, barracuda, mullets, queen fish, etc.) and demersal (rabbit fish, snapper, rock cod, scavenger, etc.), crustaceans (prawns, lobsters, crabs, etc.), and molluscs (squids and octopus). These are commercially exploited and therefore support the economy and livelihoods of the coastal residents. The most productive fishing areas are on the north coast, in the Lamu area, including Kiunga, Kizingitini and Faza; Malindi and Tana River delta; and on the south coast around Majoreni and Vanga. Fishing by local fishers is restricted to inshore areas within the reef ecosystem because the fishers lack vessels to venture offshore to exploit other resources in the EEZ.

Artisanal fishing activities are undertaken by more than 10 000 fishers, of which 9 600 are boat fishers using 2 400 boats and 675 are foot fishers, according to the 2006 Kenya Marine Frame Survey. Of the fishing crafts along the coast, 135 are motorized, 991 use paddles while 1 179 use sails for propulsion. The most common fishing gear are gillnets, traditional traps, seine nets, long-line hooks, hook-and-line and traps.

Fishing in the territorial waters is carried out by 5 trawlers, which fish for shrimp, although they also harvest large quantities of by-catch, some of which is discarded. Most of the finfish caught by trawlers as by-catch and those harvested by small-scale fishers, are consumed locally, while shrimp is exported. Experimental shrimp fishing within the legal 5 n.mi. from the shore, which has been on-going for the last 4 years, is currently banned, as a result of resource user

conflicts. The government and other stakeholders are looking into ways of resolving the conflicts by using the data collected to arrive at a sustainable fishing regime acceptable to all stakeholders. The prawn fishery is not under threat, but shrimp harvesting threatens other fisheries whose juveniles are caught as by-catch. The trawlers have over the years imposed a voluntary 4-month (November to March) closed fishing season to protect berried shrimps. The offshore fishing operations in 2005 and 2006 in Kenya's EEZ involved DWFN vessels: 33 purse seiners and 30 long-liners, all foreign vessels licensed by the Kenyan government. There has been steady increase in the number of licensed vessels since 2003, when the government took a keen interest in illegal fishing and occasionally used the Kenya Navy to patrol the EEZ. The number of licensed foreign fishing vessels stabilized in 2005. The country is in the process of establishing an effective Monitoring Control and Surveillance (MCS) system, but currently none exists, and therefore, there is reason to believe that there are many other foreign vessels operating illegally.

Annual marine fish production from artisanal fishery in Kenya during 1980 to 2005 show a high of 9 972 t in 1990 and a low of 4 336 t in 1993. For the most of the period, production fluctuated between 6 000 and almost 10 000 t. Overfishing in inshore area has continued to cause a decline in fish catches, while the deeper territorial waters remain underexploited due to lack of deep sea fishing capacity by the local fishers. The EEZ is estimated to have an annual potential of more than 150 000 t, according to a desk study conducted in 2002 with Commonwealth Secretariat assistance. The actual amount harvested by DWFNs is not known, because their activities are not monitored, due to poor MCS. A significant amount of tuna is landed by the foreign vessels in Mombassa for either transshipment or local processing.

4.2.2 Sport fishing

Kenya enjoys a reputation as one of the world's great big game sports fishing destinations. Kenya's marine waters contain most of the major target game species, primarily billfishes, especially sailfish, swordfishes, the marlins, sharks and some tunas. Sport fishers are registered in the several sport-fishing clubs, which coordinate the fishing activity and record data. The peak sport fishing season is in September to March. The clubs have a large number of high quality boats and trained crews. The popular sport fishing areas are Malindi, Watamu, Shimoni and Lamu . In 2005, 30 sport-fishing clubs were registered.

There is also an underdeveloped but popular angling recreational activity in trout rivers in central and western Kenya, and also in inland lakes such as Lake Naivasha. There is need to start a stocking programme and concession some of the rivers to ensure expeditious development of this fishery.

4.3 Inland sub sector

4.3.1 Freshwater capture fisheries

Freshwater fishery accounts for about 95 per cent of Kenya's total fish production, principally from Lake Victoria. Kenya is endowed with extensive inland waters, covering between 10 500 and 11 500 km² depending on rainfall, but it is the country's 6 per cent share of Lake Victoria that accounts for almost all (96 per cent) national freshwater fish production. Other freshwater-bodies of commercial importance include lakes Turkana (Kenya's largest freshwater body), Naivasha, Baringo, Jipe and the Tana River dams. The major rivers include Tana, Nzoia, Kuja, Yala and Athi/Sabaki.

Fishing in Kenya is mainly small scale, by artisanal fishers using small un-motorized fishing crafts propelled by sail and paddle. Fishing gear includes gillnets, long-lines and seine nets. Beach seines are now banned. From 1963 to the 1970s, freshwater fish production remained below 50 000 t per year, but steadily increased from the early 1980s, reaching over 140 000 t in 1989, and then remained at 180 000 t on average until 2001. The highest recorded landed volume was 209 438 t in 1999, after which catches fell steadily to a low of 112 720 t in 2003. The decline

was caused by the increase in fishing effort due to high demand, especially for Nile perch for export. However, action was taken by the Department of Fisheries to restore the lake fisheries and landings increased, with 127 700 t in 2004 and 139 026 t in 2005.

Lake Victoria is the second-largest freshwater body in the world, with a surface area of 68 800 km², of which 35 088 km² (51 per cent) is in Tanzania, 29 584 km² (43 per cent) is in Uganda, and 4 128 km² (6 per cent) is in Kenya. It has a shoreline of 3 450 km, of which 1 150 km (33 per cent) is in Tanzania, 1 750 km (51 per cent) is in Uganda and 550 km (16 per cent) is in Kenya. The lake has a catchment area of 192 890 km² (Uganda 30 880 km², 16 per cent; Kenya 42 460 km², 22 per cent; Tanzania 84 920 km², 44 per cent; Rwanda 21 120 km², 11 per cent; Burundi 13 510 km², 7 per cent) with a rapidly growing population of over 30 million people. Lake Victoria is the most important fishery in the country, earning over K Sh 4 billion (US\$ 50 million) annually in foreign exchange from the export of Nile perch products and over K Sh 6.5 billion to the fishers.

Lake Victoria has a multi-species fishery of tilapiines and haplochromines, cichlids and more than 20 genera of non-cichlid fish, including Mormyrus, catfish, cyprinids and lungfish. There has been a steady decrease in fish diversity and quantity due to increase in fishing effort as a result of commercialization of fishing in the last two decades.

The introduced species, especially Nile Perch and Nile tilapia, have been responsible for the increasing total annual fish catches since the early 1980s. Following the increase in the Nile perch stock in the lake, a commercial artisanal fishery developed and subsequently the fish processing industry for export evolved. The incentive created by the ready market of the fish processing plants fuelled a rapid increase in fishing effort. Fish landings declined in the 1990s due to indiscriminate exploitation of the fisheries. The mean fish size has been declining steadily since the 1980s as fishers have been progressively switching to smaller meshed gillnets, and juvenile Nile perch are increasingly exploited through use of illegal beach seines.

From the early 1980s to 2004, species composition was dominated by *Lates niloticus*, *Rastrineobola argentea* and *Oreochromis niloticus* in that order. In 2005, the species catch composition for the first time in many years was dominated by *Rastrineobola argentea*, contributing about 41 per cent while *Lates niloticus* contributed 38.5 per cent and *Tilapia niloticus* 16 per cent. The dramatic increase in *Rastrineobola argentea*, in 2005 has not yet been explained but the stringent participatory measures for management of *Omena* fishery, including closed seasons, and also the notable decline in the predatory Nile perch, may have contributed.

Lake Turkana is Africa's fourth-largest lake, with an area of 7 400 km² lying in a low, closed basin, 365 m above sea level in the arid northwest of Kenya. Over 90 per cent of the annual water discharge by volume is from river Omo, originating in Ethiopia, while the rest is from the seasonal rivers Kerio and Turkwell. The lake has many unique characteristics, such as drastic lake level fluctuations, low fish species diversity and intermittent peak production in fish, especially tilapia. With no surface outlet, the water budget is a balance between river- inflow and evaporation, which imposes special physical chemical conditions, making the lake saline. The commercial fishery is based on 12 species, namely *Oreochromis niloticus*, *Lates niloticus*, *Hydrocynus forskalii*, *Mormyrus* spp., *Labeo horie*, *Bagrus* spp., *Distichodus niloticus*, *Citharinus* spp., *Barbus* spp., *Clarias lazera*, *Aletes* spp., and *Synodontis schall*.

From the 1960s to the mid-1970s, nominal catches from the Kenyan part of the lake were generally no more than 5 000 t/year. A huge increase occurred, rising to a catch of 17 044 t in 1976, and thereafter catches continued in the range of 7 000 to 15 000 t/year until 1988, when production collapsed to the 1 000 to 4 000 t/year level until 1997. Since 1998 production has fluctuated between 2 000 and 10 000 t/year.

A valuable fishery developed in the mid-1970s as rising water levels created ideal breeding and feeding conditions for *Oreochromis niloticus* in Ferguson's gulf. As many as 7 000 fishers

were operating on the lake in the early 1980s, including many migrants from Lake Victoria. Reasonable infrastructural development was implemented in the context of the high production levels and future expectations, including a fish processing plant and an all-weather road linking the lake area into the national highway network 300 km to the south. Ensuing years witnessed a gradual drying up of Ferguson's Gulf, oil price spikes, and withdrawal of many fishers to Lake Victoria to cash on the rapidly developing Nile perch fishery. By the early 1990s, the number of fishers was down to around 1 500. In the 1970s and 1980s, Lake Turkana supported a lucrative export operation of dried fish to the Democratic Republic of Congo (DRC), through a fishers' cooperative society. The DRC market collapsed in the late 1990s due to economic instability.

Lake Naivasha lies in a closed basin in the central rift Valley, with an area of about 115 km², fluctuating according to rainfall. The lake supports a small commercial fishery based on four finfish species and one crustacean species, namely *Oreochromis leucostictus*, *Tilapia zillii*, *Micropterus salmoides* (Black bass), *Cyprinus carpio* (Common carp) and *Procambrus clarkii* (crayfish). *Barbus amphigramma* and *Lebistes reticulata* (guppy) are also present but not commercially exploited. Sport angling is also practised. In the latter half of the 1980s the number of active fishers was reported to be 200 to 300, and the number of fishing craft between 50 and 100. Besides the increase in legal fishers, illegal fishers also increased, and this increased fishing effort led to fishery collapse, forcing many fishers to abandon fishing, which had become unprofitable. The situation began to reverse in 2002, following a paradigm shift in fisheries management that encouraged wider stakeholder participation in management decisions. This process saw reduction in fishing craft number, from 133 to 40, and fishers from 300 to 120; a voluntary annual closed season from June to September each year; and improved fish production. There was also reduction in the illegal fishers although this has remained a problem because of the poor MCS system. Species composition in the catches has drastically changed, from tilapiines dominating up to 2002, but common carp (an inadvertent introduction) dominant since then.

Lake Baringo is a Rift Valley lake with an area of 130 km². The lake is shallow, with a mean depth of about 5.6 m, and becoming shallower due to increasing siltation. The lake is fed from the south by rivers Ndaui, Chemeron, Perkerra, Molo and Arabel. All these except Molo are seasonal.

Lake Baringo fishery is based on six fish species, namely *Oreochromis niloticus*, *Barbus gregorii*, *Barbus lineomaculatus*, *Clarias mossambicus*, *Labeo cylindricus* and the recently introduced *Protopterus aethiopicus*. *Labeo cylindricus* is the only species that is not commercially exploited. Fishing is passive, mainly by gillnetting and hand line. The steadily declining fish catch has been attributed to poor lake productivity, mainly due to the heavy siltation. This led to stakeholders deciding to close fishing for two years, 2002 and 2003, in the hope that production would recover. This measure did not bear fruit as fish landings in 2004 and 2005 were 63 and 43 t, respectively, down from 468 t in 2000 and 117 t in 2001. The lake currently supports on average 134 fishers and 66 fishing craft. Strangely, in 2001, prior to the two-year fishing closure, there were fewer fishers (75) and craft (25).

Other lakes and rivers support minor fisheries, namely:

- Lake Victoria Basin: rivers Gucha/Migori, Mara Nzoia, Sondu and Yala;
- Rift Valley Basin: rivers Suam-Turkwel, Kerio, Ewaso Nyiro, Lessos Reservoir and Turkwel Gorge Reservoir;
- Athi River Basin: rivers Athi/Galana/Sabaki and Voi, lakes Chala and Jipe;
- Tana River Basin: upper Tana River and impoundments including Masinga, Kamburu, Gitaru Kindaruma reservoirs, and lower Tana River and floodplain with numerous small lakes, including lakes Balisa and Shakababo. Several streams in the central and western highlands have been stocked with trout and provide sports fishing opportunities.

4.3.2 Freshwater aquaculture

Aquaculture was introduced in Kenya at the beginning of the last century. However, it has not performed as well as would have been expected.

Aquaculture has the potential to contribute significantly to wealth creation, employment and food security. Kenya is endowed with climatic diversity, natural features and resources that favour the culture of a wide variety of species. It is estimated that there are 1.4 million hectare of land potentially available for aquaculture production, yet only 170 ha were in use in 2005, when there were 10 000 effective small pond units, mostly farming tilapia and common carp. The small-scale ponds were owned by 7 800 farmers. Limited amounts of catfish are also being raised. Larger-scale commercial units in the highlands around Mount Kenya are devoted to trout production, whilst those at the coast are primarily involved in tilapia culture. There is small amount of crocodile and shrimp farming by a few entrepreneurs, for domestic consumption. The Fisheries Department runs a fish culture station at Sagana, a trout station at Kiganjo, in central Kenya, and several demonstration centres and smaller fish culture stations in various parts of western Kenya.

With the declining stocks in the capture fisheries, the government is adopting a strategy to expedite aquaculture growth, through a collaborative and participatory approach, involving both public and private sectors through Public-Private partnerships. To achieve this, there is need to develop solid base-line information, which is currently being developed through the on-going aquaculture inventory and data analysis. The Fisheries Department Statistical Bulletin figures show that production has remained constant at around 1000 t/year since 1985.

4.4 Catch profile

Quantity and value of fish catches to fishers, 2003 to 2005

	2003		2004		2005	
	Tonne	K Sh '000s	Tonne	K Sh '000s	Tonne	K Sh '000s
FRESHWATER						
Lake Victoria	105 866	6 240 298	115 747	6 851 079	133 526	6 675 685
Lake Turkana	4 080	69 223	9 069	148 935	2 493	86 471
Lake Naivasha	39	2 729	62	2 691	108	4 900
Lake Baringo	-	-	63	2 029	43	1 451
Lake Jipe/Dams	73	3 959	40	2 268	74	4 171
Tana River Dams	474	18 357	839	33 048	950	34 061
Fish Farming	1 012	100 629	1 035	106 925	1 047	137 020
Other areas	1 176	33 534	845	29 358	785	32 960
Total	112 720	6 468 729	127 700	7 176 333	139 026	6 976 719
MARINE FISH						
Lamu District	1 502	44 850	1 486	47 270	1 826	57 385
Tana River District	119	5 537	71	4 969	59	3 741
Malindi District	1 219	41 754	1 301	78 377	1 187	72 386
Kilifi District	395	35 836	376	22 673	385	23 982
Mombasa District	1 011	75 018	1 251	90 892	441	34 796
Kwale District	1 573	83 121	1 686	83 329	1 964	113 581
Total	5 819	286 116	6 171	327 510	5 862	305 871
CRUSTACEA						
Lamu District	187	40 165	200	48 375	159	41 608
Tana River District	88	25 290	101	33 894	18	7 927
Malindi District	64	13 308	85	19 426	84	15 305
Kilifi District	10	1 494	7	1 948	8	2 122
Mombasa District	324	79 500	738	95 291	89	13 993
Kwale District	83	16 590	75	22 174	83	18 323
TOTAL	756	176 347	1 206	221 108	441	99278
OTHER MARINE						
Lamu District	4	1 703	12	3 923	42	3 322
Tana River District	-	-	-	-	*	148
Malindi District	25	1 717	30	1 624	40	2 911
Kilifi District	38	2 185	31	1 580	34	1 846
Mombasa District	31	2 255	36	2 859	35	2 561
Kwale District	295	17 104	301	19 905	369	28 310
TOTAL	393	24 964	410	29 891	520	39098
MARINE TOTAL	6 968	487 427	7 805	578 593	6 823	444 247
GRAND TOTAL	119 688	6 956 156	134 737	7 731 448	145 849	7 420 966

SOURCE: Fisheries Department Statistical Bulletin 2006

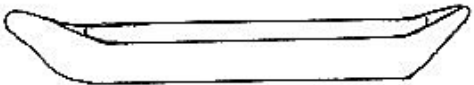
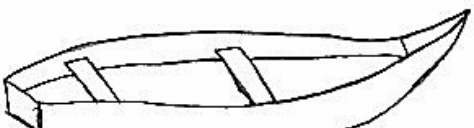
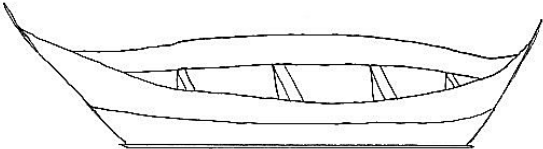
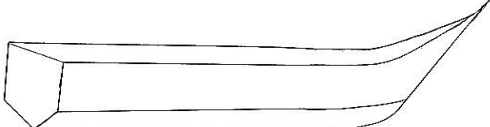
Freshwater and marine catches by species weight and value, 2003 to 2005

	2003		2004		2005	
	tonne	K Sh '000s	tonne	K Sh '000s	tonne	K Sh '000s
FRESHWATER						
<i>Alestes</i> spp.	55	155	5	177	200	5 472
<i>Bagrus</i> spp.	63	5 747	88	1 139	69	2 057
<i>Barbus</i> spp.	131	3 009	208	4 730	146	4 246
Black bass	7	490	4	303	9	656
<i>Clarias</i> spp.	1 545	77 937	1 710	96 649	1 353	95 168
<i>Rastronobola</i> spp.	31 659	711 154	34 679	793 065	54 019	755 153
<i>Labeo</i> spp.	949	8 925	3 820	38 702	497	13 291
<i>Haplochromis</i> spp.	1 020	31 079	1 066	32 430	4 832	103 945
<i>Lates niloticus</i>	55 175	4 375 501	61 440	4 818 221	52 368	4 581 207
<i>Momyrus</i> spp.	14	575	14	565	9	268
<i>Protopterus</i> spp.	867	45 609	854	45 067	777	41 457
<i>Schilbe</i> spp.	133	8 333	166	10 512	105	3 132
<i>Synodontis</i> spp.	240	6 334	662	11 533	342	9 499
<i>Tilapia niloticus</i>	15 982	1 022 878	18 121	1 208 154	22 231	1 271 541
Other <i>Tilapia</i> spp.	4 053	127 857	4 285	88 937	1 371	51 205
Trout	29	8 265	34	7 480	36	9 000
Crayfish	-	-	6	133	-	0
Carps	291	15 588	264	13 803	377	17 220
Eels		28	*	22	-	37
Sardines	7	217	*	4	-	0
<i>Citharinus</i> spp.	12	1 209	25	264	1	49
<i>Hydrocynus</i> spp.	36	361	-	-	31	827
<i>Distichodu niloticus</i>	109	10 958	41	414	40	1 242
Unspecified	190	5 447	281	9 927	213	10 047
TOTAL	112 567	6 467 295	127 773	7 182 231	139 026	6 976 719
MARINE FISH						
Demersal	2 842	120 023	2 812	134 742	3 123	145 224
Pelagic	1 819	99 066	1 929	107 057	2 080	124 219
Sharks & Rays	208	10 330	197	10 892	253	13 652
Sardines	119	4 153	108	3 922	107	4 606
Unspecified	831	52 544	957	59 789	299	18 170
TOTAL	5 819	286 116	6 003	316 402	5 862	305 871
CRUSTACEA						
Spiny Lobster	171	60 711	162	69 701	97	45 254
Prawns	383	87 660	393	112 533	162	27 895
Crabs	142	7 465	147	10 032	124	13 180
Others	60	20 511	504	28 840	58	12 949

TOTAL	756	176 347	1 206	221 106	441	99 278
MOLLUSCS						
Oysters	*	1	-	-	28	213
Squids	99	5 695	77	5 485	207	13 287
Octopus	214	9 829	249	11 642	198	12 521
Beche-de-mers	27	6 183	28	8 848	19	7 977
Others	53	3 256	53	3 916	68	5 100
TOTAL	393	24 964	407	29 891	520	39 098
TOTAL MARINE	6 968	487 427	7 805	578 593	6 823	444 247
GRAND TOTAL	119 535	6 954 722	135 578	7 760 824	145 849	7 420 966

4.5 Means of fishing and production

Main vessel types

Boat type or category	Description
Dugout boat 	Curved out of a whole log of a tree. Commonly 4 to 5 m long Entirely propelled by paddle Operated exclusively in the littoral areas, targeting Nile tilapia The main fishing gear used is gillnets, basket traps and hooks
Parachute 	Constructed from several planks of timber Flat bottomed Commonly 4 to 6 m long Entirely propelled by paddles Operated in the littoral areas, targeting Nile tilapia and other species The main gear is gillnets, cast nets, basket traps and hooks
Sesse pointed at both ends 	Constructed from several planks of timber V-shaped bottom with a keel Commonly 6 to 10 m long Mainly propelled by paddle or sails Versatile, being used in the Omena fishery with small seines; in the Nile tilapia fishery with gillnets, cast nets and basket traps; and in the Nile perch fishery with gillnets, beach seines, long-lines and hand lines
Sesse flat at one end (Paddled) 	Constructed from several planks of timber V-shaped bottom with a keel Commonly 5 to 12 m long Propelled by paddle, sail or outboard motor Versatile, being used in the Omena fishery with small seines; in the Nile tilapia fishery with gillnets, cast nets and basket traps; and in the Nile perch fishery with gillnets, beach seines, long-lines and hand lines

Number of Fishers	
Boat fishers	44 006
Foot fishers	257

Number of fishing craft by craft type	
Dug out	40
Parachute	3 096
Rafts	56
Sesse flat at one end	1 879
Sesse pointed at both ends	9 952
Other crafts	0
Total fishing craft	15 023

Number of craft by propulsion method	
Inboard engine	0
Outboard engine	1 302
Paddle	8 324
Sail	5 396

Fishing gear by type	
Gillnet	217 358
Beach seines (illegal)	553
Prawn seine	0
Reef seine	0
Long-lines	2 623 553
Cast nets (illegal)	114
Hook-and-line/handline	20 352
Trap/baskets	605
Monofilament net (illegal)	469

SOURCE: Fisheries Department Lake Victoria Frame Survey 2006

Artisanal marine fisheries fishing effort, 2006

Number of fishers, of which	10 154
Boat fishers	9 601
Foot fishers	675

Number of fishing craft by craft type	
Dugout	1 702
Parachute	0
Rafts	0
Sesse flat at one end	470
Sesse pointed at both ends	154
Other craft	42
Total fishing craft	2 368

Number of craft by propulsion method

Inboard engine	61
Outboard engine	133
Paddle	992
Sail	1 179
Pole/Pondo	3
<hr/>	
Fishing gear by type	
Gillnet	5 916
Beach seine (illegal)	560
Prawn seine	264
Reef seine	146
Long-lines (hooks)	8 224
Cast nets (illegal)	812
Hook-and-line/handlines	6 540
Trap/Basket	5 224
Monofilament net (illegal)	1 050

SOURCE: Fisheries Department Kenya Marine Frame Survey 2006

5. POST-HARVEST USE

5.1 Fish utilization

Types of fish products for human consumption include fillets (skin on or skinless), headless and gutted fish, fish maws, frames, belly flaps, fish oil, heads, chests, trimmings and cured fish. For fish meals, production fish wastes and *Rastrineobola argentea* (Omena) are used.

Fish consumption varies considerably between different geographical regions and population groups within the country. It is highest in the vicinity of the principal fisheries and in the major towns, and lowest in traditionally pastoral areas in the north and parts of the Rift Valley. Annual per capita supply of fish was estimated at 5.8 kg, according to FAO Food Balance Sheets for 1999, a figure which dropped to 1.9 kg in 2005, according to the Kenya Central Bureau of Statistics report on National Food Balance Sheets, 2000–2005. This reduced supply is due to population increase coupled with declining fish production. Production was 205 587 t in 1999 and 149 171 t in 2005.

Fresh fish is widely preferred by consumers, and is readily available in major urban centres and towns and in villages in the vicinity of landing sites. Frozen product from both the marine and Lake Victoria fish is also sold in up-country supermarkets, usually to higher-income consumers. Cured fish, whether in the form of smoked, sun-dried or salted product, is popular with lower-income urban consumers. Cured products are also heavily marketed in rural areas that are remote from major fisheries and distribution routes. The most widespread fish commodity is dried *Rastrineobola argentea* (Omena) from Lake Victoria, which has a relatively long shelf life and can be sold in small portions. Since the early 1990s, *Omena* has increasingly been utilized for the production of animal feed, a development that is viewed with concern because of the price pressures implied for local low-income consumers. The recent initiative for export of hygienically dried *Omena* has contributed to increased fishers earnings and created incentive for sustainable *Omena* fishery management.

Since the late 1980s, an important export market in frozen fillets and some fresh chilled product has developed with the boom of the Nile perch fishery on Lake Victoria. Concerns have been raised for some years now that the demand for Nile perch by processing companies has increased ex-vessel prices and diverted the product away from domestic consumers. Though this has been the generally voiced concern, Nile perch being an exotic and fatty fish is not the preferred food fish by the traditional fish consumers and the country does not have the capacity to absorb the large volume of harvested fish. This was evident during the fish export bans in 1996–1998, where the domestic market could not absorb the Nile perch catch, causing prices to drop drastically. However, the reported negative consequences of increased fish prices include the increased harvesting and trading of undersized fish on domestic markets, along with an increased traffic in industrial plant by-products. The Nile Perch ‘frames’ consisting of fish heads and skeletons left over from filleting operations, are often fried or smoked for local trade and consumption.

The processing of frozen and chilled fish for export requires development of an efficient cold chain infrastructure and stringent adherence to the developed Hazard Analysis Critical Control Point (HACCP) system. Product and system traceability of finished products must also be demonstrable. Filleting lines, chill rooms, freezers, cold rooms and refrigerated tracks, together with qualified fish inspectors, are essential in production of high standard fish products. Kenya has achieved all these requisites, which have helped support a lucrative K Sh 5 billion (US\$ 70 million) of fish exports. Drying racks and moisture measuring equipment, professional inspections and clean storage facilities have facilitated the export of value added *Omena* to Malawi and DRC.

5.2 Fish markets

Domestic markets comprise supermarket chains, butcheries, auction markets and local authority markets. Regionally, product goes to east Africa and COMESA. Product is exported to the European Union (EU), Israel, Japan, Malaysia, Australia, USA, Singapore, UAE and China.

6. FISHERY SECTOR PERFORMANCE

The Kenya fisheries subsector has the potential to significantly contribute to the national economy through employment creation, foreign exchange earnings, poverty reduction and food security support. This potential is yet to be realized. In 2005, fish production was approximately 149 000 t, mainly from inland fisheries, earning the fishers over K Sh 7 billion (US\$ 100 million). The subsector directly supports over 63 000 Kenyans as fishers, with approximately one million people directly or indirectly depending on the industry.

6.1 Economic role of fisheries in the national economy

The subsector contributed 0.5 per cent to GDP in 2005. This figure could be higher if value addition at the various stages of the supply chain are considered, and if post-harvest losses are minimized. The subsector growth was estimated at 4.1 per cent in 2004 (National Economic Survey, 2005). The subsector supported 63 000 fishers directly and about 800 000 individuals (processors, traders and other service providers) indirectly. Also in 2005, fish contributed 1.3 per cent and 0.2 per cent of protein and caloric supply, respectively (National Food Balance Sheets 2000–2005). Fish is an invaluable source of protein food to many Kenyans, especially those living in the vicinity of the major fisheries and towns. Roughly one-third of the national population is made up of people who, for historical and cultural reasons, are not traditional consumers of fish. Overall consumption levels must therefore be understood in a context wherein fish is a staple food item to one section of the community, whereas to another it is of little significance. Increased urbanization, the increasing awareness of fish as health food, and wider

availability of fresh, frozen and cured fish products in markets remote from landing centres, is inducing a greater demand for fish as food. Fishing has long been of crucial importance at the local community level as a source of subsistence and livelihood, but it was not until the emergence of the Lake Victoria Nile perch fishery that it became a prominent feature of the overall national economy. According to FAO/FISHSTAT data, the decade ending in 1996 witnessed an almost eightfold increase in the annual value of exports of fisheries products, mostly deriving from Lake Victoria. Kenya suffered three EU bans on her fish exports between 1996 and 2000, causing falls in revenues and badly affecting the economy of the Lake Victoria region. Fish processors were forced to reduce their operations drastically and lay off staff during these bans, but they later diversified the export markets to include other destinations to mitigate the effects of the ban. The ban was lifted in November 2000 in response to the introduction by the Kenyan Government of improved legislation and demonstrable hygiene standards in the fish processing industry. The government also gave guarantees and assurance of maintenance of necessary quality and safety standards of fish and systems. Kenya's fish products have thus continued to increase, earning the country an all-time high of US\$ 52 814 000 in 2005. Sport fishing is also an important facet of the tourist industry and contributes to that sector's earnings of foreign exchange.

6.2 Demand

Fish production from capture fisheries is declining globally and therefore does not meet the demands of the fast growing global population. This is also true for Kenya. There is urgent need to develop fish farming to supplement fish production from the wild, and Kenya is putting policies and strategies in place to expedite development and commercialization of fish farming to meet the rising demand.

6.3 Supply

Per capita supply of fish has declined by more than a half in six years, from 6.1 kg/year in 1999 to a mere 2.8 kg/year in 2005. A decline in natural fish production and an increase in population are responsible for the changed supply ratio.

6.4 Food security

In 2003, 89 413 tonnes (light weight) of fish were available for consumption in the country. This was the amount left after export and production of fish meal. Due to its high nutritional value and easy preservation through curing, the cured fish products would be ideal for supply of nutritious food to the food insecure and nutrient deficient population. The government is therefore looking into ways of promoting aquaculture and using the fish for food relief programmes.

6.5 Employment

The fisheries sector plays a significant role in employment and income generation. In 2005, there were 63 000 fishers, with the sector supporting a further million directly and indirectly, working as traders, processors, suppliers and merchants of fishing accessories and their employees, and dependants.

6.6 Rural development

Fisheries in Kenya play a social role in maintaining fishing communities in their native places. Fishing communities and fish farmers tend to stay within their areas of operation, thus reducing

rural-urban migration. Fisheries is basically a rural activity and if properly developed could trigger economic growth in the rural areas.

7. FISHERY SECTOR DEVELOPMENT

7.1 Development prospects and strategies

The fisheries sector in Kenya has the potential to develop and contribute to the national economy, but unfortunately this has not been recognized. Policy-makers and the private sector have until recently been unaware of the fisheries potential and therefore little attention has been paid to the sector in national development agendas and programmes. In 2003, the government created a Ministry of Livestock and Fisheries in an effort to expedite fisheries growth and development. There has been no fisheries policy in place and therefore the Department of Fisheries started to develop one, in 2004, through a participatory process involving all stakeholders in the sector, policy experts and development partners. The final draft policy document has been presented to the relevant Minister for the next process of transforming the draft document into a National Sessional Paper. This will give the sector the status it deserves.

7.1.1 Main Areas of Opportunities

Fish safety and quality control

- Development of a cold chain along the coast and Lake Victoria region through Public-Private Partnership, especially with the community through Beach Management Units (BMUs) at the grassroots level would expedite fisheries development. The poor physical infrastructure, especially poor access roads to landing sites and lack of electricity, impede fish industry development.
- Development of fish processing plants that include value addition processing to reduce the supply chain for realization of added income to the fishers and enhanced export earnings.
- Development of fisheries analytical laboratories to carry out regular fish, water and sediment sample analysis for various parameters to collect data on the Kenya's fish safety and quality, which would ensure sustained world market share. The laboratories would be designed to be self sustaining.

Aquaculture development

- Production of certified fish seed through development of a good breeding system and establishment of public and private hatcheries.
- Facilitation of certified fish feed production and distribution by the private sector, especially by small-scale fish-farmer groups.
- Cage farming, both marine and freshwater.
- Development and commercialization of small-scale aquaculture by ensuring market access for farmed fish.

Capture fishery

- Development of fishing ports to enhance fish transshipment and fish landings that would expedite development of marine fish processing and exports.
- Fishing gear manufacture for middle-level commercial fishery on the coast.
- Installation and management of a Vessel Monitoring System (VMS) to ensure resources fished in Kenya benefit Kenyans.

- Promotion of joint fishing and fish processing ventures between foreign fishing companies and Kenyan entrepreneurs.

Sport fishing

- Privatization of existing government fishing camps to expand recreational fisheries, especially angling.
- Promotion of small-scale sport-fishing enterprises.
- Develop integrated partnership programmes between the government and the private sector for trout river stocking.

7.1.2 Main Constraints to Development

The main constraints that impede development include:

- Poor physical and cold chain infrastructure.
- Lack of easy access to affordable credit.
- Lack of modern fishing ports to promote profitable exploitation of marine fish, including transshipments.
- Lack of capacity by fishers who are mainly small-scale to develop a strong bargaining power for their fish, due to their inability to organize themselves.
- Lack of skills for alternative livelihoods for fishers when fishing is inadequate to sustain them.
- Uncertainty of capture fisheries sustainability. Over 90 per cent of fish is from one source, Lake Victoria. Of particular concern is the status of the fragile and heavily exploited Lake Victoria shared resources by the three riparian states: Kenya, Tanzania and Uganda. The evidence available suggests that production is above the maximum sustainable yield and if this continues this may lead to the collapse of the fishery. It is therefore important that the fisheries resources are managed in a sustainable manner that will ensure the Lake Victoria fishery does not collapse.
- Inadequate and underdeveloped Monitoring Control and Surveillance (MCS) system, for capture fisheries, to ascertain sustainable development.
- There is no dynamic institutional arrangement that would facilitate private sector investment in fisheries and ensure market linkages and access for fishery products.
- There is no National Fisheries Policy in place, though a draft policy has been developed.

7.3 Research

The main fisheries research institution in Kenya is Kenya Marine and Fisheries Research Institute (KMFRI), which carries out both applied and basic fisheries research. However, due to financial resource constraints, research programmes are limited and unable fully to address fisheries management and development issues. The Fisheries Department has a research section that both coordinates fisheries research in various learning and research institutions and carries out simple applied fisheries research and survey with various collaborators and donors, to enhance fisheries management and development. Moi and Nairobi Universities collaborate with the Department of Fisheries to conduct fisheries research, especially aquaculture.

Research projects

- An appraisal of fish parasites of health concern in commercially important fish species inhabiting Lake Turkana.
- Monitoring prawn fishery in Malindi district – Ungwana bay on the Kenyan coast.

- Monitoring *Omena* fishery in Lake Victoria.
- A study on the ring net fishery in Kwale and Malindi districts.
- Integrated natural resource assessment in Bondo, Kwale and Mwingi districts.
- A study on post-harvest losses of fish, and value addition.
- A study on effects of credit and marketing post-harvest in fisheries.
- A study on pesticides and heavy metals in fish imported into the country.
- An appraisal of dam fishery in Thika, Maragua and Kiambu districts.
- An appraisal of LakeBaringo fishery.
- Research into certified fish seed and fish feed for aquaculture.
- Biodiversity issues associated with fishing and fishing gear effects on fragile ecosystems.
- Restoration programmes for degraded fish habitats.
- Experimental cage farming in man-made dams.
- Research projects associated with the EU-funded Implementation Fisheries Management Plan for Lake Victoria.

7.3 Education and training

Moi University and Nairobi University have included fisheries in their undergraduate curricula. Moi University has a Department of Fisheries, which trains Fisheries graduates. Four local universities and a number of international universities provide training to fisheries experts at postgraduate levels (Masters and PhD). The Ministry of Education has included fish farming and general fisheries in primary and secondary school curricula.

7.4 Foreign aid

7.4.1 Implementation of Fisheries Management Plan (IFMP) for Lake Victoria Project

This is an EU-funded project under the Lake Victoria Fisheries Organization (LVFO), which commenced in April 2003 and is scheduled to continue until August 2008. The objective is to contribute to sustainable resource use, economic growth, and development in the Lake Victoria basin, and covers the three riparian countries. The project aims to assist the three riparian countries in implementing the fisheries management measures in line with the approved Fisheries Management Plan (FMP) of LVFO.

The institutions involved in this project are:

- Fisheries Departments from the three riparian countries;
- Research institutes from the three riparian countries;
- Universities;
- Water Departments;
- Lake Victoria Fisheries Organization (LVFO); and
- Beach Management Units (BMUs).

7.4.2 Lake Victoria Environmental Management Project (LVEMP)

Phase I of LVEMP came to an end on 31 December 2005. The World Bank had sponsored a regional project that began in 1997, and covered several component areas in the Lake Victoria basin. Overall objectives of this project included:

- maximizing the sustainable use of basic benefits (food, employment, income, safe water supply, and maintenance of a disease-free environment);

- conservation of biodiversity and genetic resources; and
- harmonization of national management programmes in order to control and reverse environmental degradation.

LVEMP also included a fisheries research subcomponent, which was to provide information on the ecology of the lake and its basin, the biology of its flora and fauna, the impact of environmental factors on the lake system, and socio-economic implications of the use of the lake's resources (LVEMP Project Document, 1996). The respective national fisheries research institutes in Kenya, Tanzania and Uganda were assigned primary responsibility for implementing the fisheries research subcomponent. The fisheries management subcomponent was implemented by fisheries departments of the three Partner states.

Some of the major contributions to fisheries management from the project were:

- harmonization of fisheries legislations in quality assurance;
- stimulation of a paradigm shift towards co-management and community participation that enhanced MCS, fisheries statistics collection and law enforcement; and
- facilitation to conduct the biennial lakewide Frame Surveys in 2000, 2002 and 2004.

Phase II of LVEMP, which will focus more on investment in the lake basin, is set to commence in August 2007.

7.4.3 GTZ-Funded Fisheries HIV/AIDs Mainstreaming

The main objectives of the project include:

- Fisheries Department assistance to develop adequate responses to HIV/AIDs;
- to establish an information base on fisheries-specific HIV/AIDs factors and actors;
- to communicate messages to reduce the spread of HIV infection; and
- to mitigate negative impacts of HIV on fisheries.

This project was to have run from 1 September to 30 June 2006, but it is still ongoing at the time of writing.

7.4.4 GTZ-Funded Improvement of Gikomba Fish Market

This ongoing project aims to improve the health standards of the fish market and outputs will include:

- water storage tanks;
- clean and covered drainage system;
- waste bins and incinerators;
- lavatories;
- cold rooms;
- filleting stalls;
- ice making machine; and
- covered display counters.

7.4.5 Preparation of profiles for possible candidates for marine fisheries certification in Kenya by WWF

The objective is to identify appropriate fisheries for marine certification and look for strategies to mobilize funds for the certification process.

The expected outcomes include:

- a report on proceedings of meetings and consultations undertaken explaining the process of selection of candidate fisheries pre-assessment;
- a compiled list of completed questionnaires that were used in the process; and
- reports on fisheries profiles with detailed outlines of selected fish species.

The project was initiated on 1 November 2006 and due to terminate on 30 April 2007.

7.4.6 Fisheries Policy elaboration, with support from FAO, GTZ, DFID and USAID

The objective is to develop a National Fisheries Policy. A draft National Fisheries Policy was finalized in March 2006 and presented to the Minister for Livestock and Fisheries Development for the next processes.

7.4.7 Integrating BOMOSA cage fish farming system in reservoirs, ponds and temporary water bodies in eastern Africa, with EU support.

The project became active on 1 October 2006, with a planned duration of 36 months. Local institutions involved include Moi University, KMFRI, and the Fisheries Department. The expected outcome is increased freshwater fish production.

8. FISHERY SECTOR INSTITUTIONS

The main institution responsible for fisheries management is the Fisheries Department, and for research it is KMFRI. The major stakeholders include research institutions, training institutions, fishers, traders, processors, conservationists, environmentalists, public health agencies and non-governmental organizations (NGOs).

9. GENERAL LEGAL FRAMEWORK

The main fishery legal framework is contained in the Fisheries Act, Chapter 378 of the Laws of Kenya, whose Principal Law covers six areas: (1) Preliminary; and Interpretation. (2) Administration: Fisheries development measures; and Fisheries management measures. (3) Registration of local fishing vessels. (4) Licensing provisions: General licensing provisions; Fishing and entry into Kenya fishery waters by foreign fishing vessels; and Foreign vessel's fishing licences. (5) Offences and Enforcement: Prohibited methods of fishing; Powers of officers; Forfeiture; and Compounding of offences. (6) General Provisions: Conduct of prosecutions; Marine mammals; and Minister's power to make regulations.

The Act has provisions to make binding and enforceable Regulations through published Legal and Gazette notices.

10. MANAGEMENT APPLIED TO THE MAIN FISHERIES

10.1 *The main fisheries management systems in Kenya.*

10.1.1 Open-access fishing regime

This is has been practised since time immemorial in Kenya and is currently causing uncontrollable fishing effort, resulting in resource overexploitation. Though the open-access system is seen as detrimental to fisheries, any attempt to change it would be resisted, especially by politicians and the communities that have known and believe that it is their right to fish wherever and whenever they wish to do so. Such fisheries are the main livelihood activity for these communities.

Since control of fisheries exploitation through restriction of access to fishing is sensitive, the government has been involving the fishing community in the licensing process, where only those who adhere to the rules are cleared by the Beach Management Units (BMUs) to be licensed. This

process not only restricts if not prevents new entrants into the fishery, but it also helps to reduce the use of illegal gear and methods, as those with illegal gear would not be licensed.

10.1.2 Co-management

There has been a paradigm shift from a command-and-control form of management to one involving resource users in decision-making processes, the implementation of fisheries measures collectively decided upon, and enforcement. The fishery users learn to appreciate ownership of the fishery resource, and they therefore shift from an exploitative attitude, where the fisher's aim is to get the most and the best before anyone else does, to caring about ecosystem sustainability. The co-management paradigm shift has been ongoing for over five years, with major achievements being:

- Gradual and steady reversal of the fisheries decline and tangible indication of fishery recovery.
- Reduction in illegal gear use, as demonstrated by biennial Frame Surveys.
- Amicable resource user and cross-border conflict resolution.
- Formation of BMUs.
- Participatory law enforcement and fisheries development.

10.1.3 Participatory approaches to fisheries management

The Department of Fisheries realized command-and-control forms of management, where the government makes policy decisions and expects the resource users to comply without question, had failed the fisheries ecosystem. The users regarded the fishery as belonging to the government and therefore felt no responsibility towards its sustainability, as they had no sense of ownership. Another complication is the constant "blame game" by resource users, who accuse each other of resource mismanagement, as none understood the role of another. The participatory approach brings all stakeholders together to discuss and come to a consensus, which is not always easy, but once an agreement has been reached, compliance is usually very high.

10.2 Institutional arrangements

10.2.1 Open access fishing

The Department of Fisheries and BMUs are involved in the licensing process and law enforcement. Sometimes the police are involved in the law enforcement to make it more effective.

10.2.2 Co-management activities

Fisheries policy in Kenya encourages fisheries managers to take a co-management approach to fisheries management. In order to improve fisheries subsector performance, the Fisheries Department and the relevant stakeholders have undertaken several activities in regard to fisheries resources management, utilization, processing and marketing. The Department has found it beneficial to incorporate the fisher communities in fisheries resource management through the formation of BMUs for co-management. It has also involved the fish processors and traders. The Department has formulated guidelines for BMU operations, and BMU Legislation is in its last stages of preparation.

10.2.3 Participatory approaches

The fisheries policy shift in Kenya allows participatory approaches to the management of fisheries. This approach to resource management emphasizes ownership of the fisheries resource by the resource users. Fisheries managers consult the fishers and other stakeholders, including researchers, NGOs and other interested groups, through stakeholder meetings when developing policies and legislation to manage resources. This consultative process encourages resource users

to participate effectively in the implementation of corrective measures, and tangible success has been realized.

10.2.4 Rights-based approaches to fisheries management

This management form is not practised in Kenya.

10.3 Management measures

Fisheries management comprises a wide range of activities designed to ensure rational and responsible use of aquatic resources. The main objectives of fisheries management in Kenya is to create an enabling environment for a vibrant fishery industry based on sustainable resource exploitation, providing optimal and sustainable benefits, alleviating poverty, and creating wealth, taking into consideration gender equity.

The strategies being applied are considered below.

10.3.1 Comprehensive rational planning

This involves research and understanding of the resource system that would lead to effective management and control. Research provides the best estimates of stock parameters and provides information on the best-practice guidelines that can be used for managing the resource sustainability.

10.3.2 Use of control variables.

This aims at achieving the biological, ecological, economic and social objectives of the fisheries. Control variable include:

- input controls to restrict fishing effort and reduce fishing mortality and overfishing; and
- technical measures, which involve limiting size of harvested fish, closed seasons and closed areas.

10.3.3 Co-management

This is the partnership arrangement whereby government, local resource users, external agents and other fisheries stakeholders share the responsibility and authority for decision-making in the management of fisheries resources.

10.3.4 Stock assessment

This is basically carried out by KMFRI, although traditional knowledge and catch records remain quite useful to management.

10.3.5 Governance

This includes policy and legal instruments development, with MCS as an essential tool to ensure sound utilization of the resource.

6. ECONOMIC INCENTIVES

Fisheries, due to its marginalization by policy-makers, does not enjoy tax exemption benefits as do other sectors, except for refrigeration equipment. There is a plan, however, to reduce taxes on fishing equipment and gear to make fishing more affordable, though there is the danger that this might increase fishing effort, and this must be prepared for, even before any incentive is put into effect.

11. RECREATIONAL SUBSECTOR

Recreational fisheries in Kenya comprise of big game fishing in marine waters, and angling in rivers and dams. The trout rivers are not very well stocked and the government is now planning to

partner the private sector to achieve optimal stocking densities of trout rivers to attract international and local anglers.

An ornamental fishery is found based on the coral reef, and many marine aquarium fish are exported to various world destinations.

12. AQUACULTURE SUBSECTOR

Though aquaculture has the potential for development due to the favourable geographical and climatic conditions, the subsector is not significant in the Kenyan economy and is therefore not very well covered in the country's national development plans. The Aquaculture Collaborative Research Support Program (A/CRSP), funded by USAID and implemented by the Fisheries Department, Oregon University (USA) and Moi University, demonstrated the success of commercialization of small-scale fish farming through a project that involved small-scale contact farmers. Since then there has been a sensitization programme to promote small-scale fish farming in the country. This has been done through training programmes on pond management, enterprise budgeting and business plan development to attract bank and microfinance credits for development.

13. FISHING COMMUNITIES

Fishing communities in Kenya have not been organized in the past, but the government and development partners are now working with the community to establish grassroots Beach Management Units that will spearhead sustainable development and management of the fisheries resources. This process aims to give the BMUs legal identity to empower the community.