



Marine Finfish Resources of India: Distribution, Commercial Exploitation, Utilization Pattern and Trade

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The world's fisheries provide more than 2.6 billion people with at least 20 per cent of their average annual per capita protein intake (FAO, 2007). Globally, fish has been attracting increased attention not only as an item of connoisseur's delight and preferred food for health conscious elite but as a source of employment, livelihood and food security to several millions of poor people in the developing world. Capture fisheries and aquaculture supplied the world with about 142 million tonnes of fish in 2008 (Table 1). Asia contributes to 63.17 per cent of total fish production in the world. However, South Asia's contribution is only 6 per cent. India occupies a prime position amongst South Asian countries in fish production. While Bangladesh (17 per cent), Pakistan (9 per cent), Sri Lanka (3 per cent), Nepal have only small shares, India contributes to 71 per cent in this region (FAO, 2008).

Table 7.1 Fish Production in India and the World and its Per cent contribution to World fish Production (in mmt) Source: handbook on Fisheries and Aquaculture ICAR, New Delhi

Year	Capture fish Production		Aquaculture Production		Total fish Production	
	Global	India	Global	India	Global	India
2005	92.0	3,691	44.3	2.967	136.3	6.659(4.88 %)
2006	89.7	3.845	47.3	3.180	137.0	7.025(5.13 %)
2007	89.9	3.859	49.9	3.112	139.8	6.971(4.99 %)
2008	89.7	4.105	52.5	3.479	142.2	7.584(5.33 %)
2010	90.0	4.02*	55.1	4.27*	145.1	8.290(5.71 %)

Fisheries sector is an important player in the overall socio-economic development of India. The fisheries sector contributed 76913 crores to the GDP (at current prices) during 2009-10 which is 0.96 per cent of the total GDP at factor cost and 5.4 per cent of the GDP at factor cost from agriculture forestry and fishing. During 2010-11, the export of marine products reached over 8 lakh tonnes valued at Rs 12,901.47 crores and US\$ 2.857 billion (Report of the working group, Planning commission, 2011). Indian marine fisheries which existed as a sustenance fishery for years, underwent a series of change with the advent of mechanisation in 1950s, evolving itself into a multi-billion dollar industry. India has earned US\$ 2.84 billion mark in the export of marine products from the country (MPEDA, 2011).

India is one of major fish producing countries in the world contributing over 3 per cent of both marine and freshwater fishes to the world production (Srinath and Pillai, 2006) with third position in capture fisheries and second in aquaculture. India has an Exclusive Economic Zone (EEZ) covering a total area of 2.02 million sq. km (fig 1), i.e., 0.86 million sq. km on the west coast including the Lakshadweep Islands and 1.16 million sq. km on the east coast, including the Andaman and Nicobar Islands and a continental shelf of half a million sq. km (Vivekanandan *et al.*, 2003).

The marine fisheries sector has high potential for rural development, domestic nutritional security, employment generation, gender mainstreaming as well as export earnings. The first formal step towards the development and management of marine fisheries in India was the enactment of the Indian Fisheries Act of 1897, delegating various erstwhile provinces with the responsibility of fisheries administration and management (BOBP, 1982; Bensam, 1999). To increase fish production from the seas, the different Five-Year Plans took adequate care by developing the marine fisheries by mechanization of indigenous craft, introduction of mechanized vessels, and improvement of fishing implements, establishment of infrastructure facilities for processing and storage and to establish a strong R & D facility (James and Rao, 1992).

Table 7.2 Indian marine fisheries statistics at a glance

Gross value at landing centre	19,753 crores
At retail point	28,51 crores
Export earnings	US\$ 2.84 billion
per cent in export earnings	3 per cent
Domestic markets	81 per cent fresh, 5 per cent frozen, 6 per cent dry, 5 per cent fish meal
Per capita fish consumption	2.85 kg (0.3-39)
Share in GDP	1.1 per cent
Share in agricultural GDP	5.4 per cent

Indian fisheries sector has been witnessing a steady growth since the First Five Year Plan. The marine fish production increased from 0.53 million t in 1950-51 to a maximum of 3.3 million t in 2010-11.

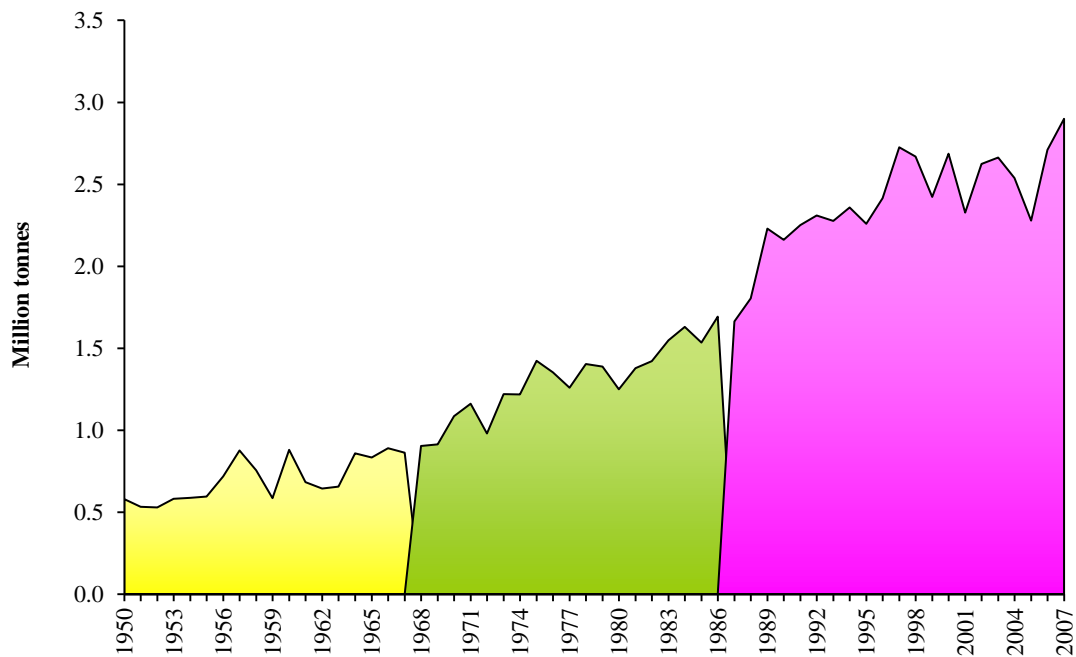


Figure 7.1 Three phases of development of Indian marine fisheries (Source: handbook on Fisheries and Aquaculture ICAR, New Delhi) 2010.

The growth of marine fisheries in India can be demarcated into three phases (Srinath and Pillai, 2006). The **I Phase** which extends from 1950s to late 1960s witnessed a slow, but steady growth in fisheries where non-mechanised craft and gears were operated (Fig 1). **Phase II** (late 1960s-mid 80s) was marked with use of improved gear materials, export trade expansion, increased mechanisation, initiation of motorisation of country craft and intensification of fishery activities. The **III Phase** which extends from mid80s to the present is characterised by intensification of mechanised fishing, growth in motorisation and multiday fishing, extension of fishing grounds, seasonal fishery ban, introduction of molluscan aquaculture, open sea cage farming and breeding and hatchery development of marine finfishes for aquaculture. The developments in fish harvest technology has been in areas of craft technology and mechanization of propulsion, introduction of synthetic gear material, acoustic fish detection and satellite-based remote sensing techniques, advances in electronic navigation, provisions for on-board fish processing and preservation. Thus, the fishing industry in the last five decades has undergone significant developments leading to improvements in the working conditions and reducing the drudgery of fishermen.

The Indian marine waters harbour around 1 707 species of fish, of which about 200 species are commercially significant. The estimated landings from the marine capture fisheries stand at 3.220 mmt (CMFRI, 2010), with a growth rate of 4.62 per cent. The gross value of the marine fish landings at the landing centre level is estimated at Rs.19 753 crores and at the retail level at Rs.28 511 crores (Narayankumar, 2011). Kerala has emerged as the leading producer of marine fish in the country during 2009-2010, followed by Gujarat, Maharashtra and Tamil Nadu

About 35 per cent of Indian population eats fish. Thus, annual per capita consumption of fish eating population is projected about 16.8 kg in 2010, and would rise to 18.5 kg by 2020. Under the baseline scenario, the additional fish demand from the year

2000 to 2020 would be about 3.21 million tonnes (Ref. Pradumankumar et al-handbook on Fisheries and Aquaculture ICAR, New Delhi). Out of this, 52 per cent would be met from Indian major carps (IMC) followed by other freshwater fish (38 per cent), Pelagic low value sardine mackerel, anchovies etc (14 per cent) and Demersal low value fish like rays, lizard fish, nemipterids, catfish, soles etc (3.3 per cent). The additional consumption of shrimp, Demersal high value (rocks cods, snappers, letherinids, threadfins etc and Molluscs species would decline by 9 per cent. The aquaculture has been found to hold the key for meeting the future demand challenges.

About 0.933 million people are employed in the sector on full-time basis, 1.01 million on part-time basis and 1.39 million are engaged in other ancillary activities. Major fish production comes from the coastal resources. As per the early estimates of NMFC, 2010, there are about 8.63 lakh fisher's families in the mainland and about 9.26 lakh people are engaged as active fishers. The estimated marine resource potential of the Indian EEZ is 4.24 million metric tonnes (mmt) at the present exploitation rates. In marine fisheries, while inshore waters have been almost exploited to the sustainable levels (CMFRI, 2011), contributions from the deep sea have been insignificant. The trend based surveys have indicated that in the depth range up to 100 m, which contributes to about 86 per cent of the total exploited resources; practically there is little possibility of witnessing quantitative increase in production. However, the depth ranges beyond 100 m have avenues of expansion, albeit more in qualitative terms. In this domain, the possibility revolves around oceanic resources like tuna, bill fishes and allied species whose combined potential is pegged at 0.2 mmt with the lucrative yellow fin tuna contributing to the tune of 40 per cent to it.

Present scenario of capture fisheries

The period 1960 -70s saw a gradual increase in fisheries production from 0.63 million t in 1960 to 1 mt in 1970; a twenty year period (1950-1970) was required to raise production by double. Another 20 year period (1970 - 1989) was required to cross the 2 million t mark. During 1989 - 2010, fishery production did not have a smooth sail, but increased by leap and bounds. However, the period 2005 -10 witnessed a meteoric increase in production by over 45 per cent i.e. 1.03 million tonnes (m.t) compared to that of 2005. Production has now touched 3.3 m.t in 2010

State-wise production

Among the coastal states, Kerala, followed by Tamil Nadu, Gujarat, West Bengal and Maharashtra together contribute a major share (59.2 per cent) to the marine fish production of the country. However, considering the production per unit length of coast line, West Bengal has the maximum productivity of 2,259 t/km followed by 953 t/km by Karnataka, 878 t/km by Kerala, 682 t/km by Goa, 496 t/km by Tamil Nadu and 439 t/km by Maharashtra. While the east coast has 57.2 per cent of the total coastline, it contributes only 28.8 per cent of the total marine fish production, with rest 70.2 per cent contributed by west coast.

Table 7.3. State-wise marine fish landings in India in lakh tones (average for 2006-10)

	Average landings	per cent
Kerala	5.99	18.44
Gujarat	5.83	17.96
Tamil nadu	4.90	15.08
West Bengal	3.39	10.43
Karnataka	3.34	10.28
Maharashtra	3.04	9.36
Odisha	2.54	7.83
Andhra Pradesh	2.41	7.43
Goa	0.90	2.79
Puducherry	0.13	0.39

On the East coast, Tamil Nadu was the major contributor followed by West Bengal and Orissa. Marine fish production has shown a steady increase in Tamil Nadu from 1.23 lakh t in 1960 to 5.09 lakh t in 2010. The increase was prominent in West Bengal from 0.9 lakh t in 1960 to 3.6 lakh t in 2010. Marine fish production has been more or less steady in Andhra Pradesh during 1960-2010. In Orissa, the production has increased from 0.3 lakh t in 1976 to 2.9 lakh t in 2010; the production showed a tremendous increase of 2 lakh t during the last five years.

On the west coast, Kerala was the major contributor with an increase in annual landings from 2.68 lakh tonnes in 1960 to 6.08 lakh t in 2010. Highest marine fish production of Kerala was in 1990-91 when it touched 6.62 lakh t. Gujarat on the other hand increased its production to 5.85 lakh t in 2010 from 0.95 lakh t in 1960, showing over a six fold increase during the last 50 years; the increase has been very prominent during the last 14 years. Maharashtra showed a steady increase in production from 1.2 lakh tonnes in 1960 to 2.4 lakh t upto 2002 (4.5 lakh t) after which the production has shown a grave decline and now stands at 2.4 lakh t.

Resource-wise production

The fishery resources of India is constituted by a large variety of species (nearly 1,570 species of finfishes and about 1,000 species of shellfishes) co-existing in the same grounds (Srinath and Pillai, 2009). Among these, only 200 species of finfishes and shellfishes are commercially important. Region-wise studies show that pelagics contribute to the major share of the landings in the southwest (SW) and southeast (SE) and northwest (NW) regions, while landings are poor in the northeast (NE) (Fig.3). On the other hand, demersals are exploited more in the northwest NW and SE and to a lesser extent in SW; however, landings are poor in the NE. Crustacean resources especially the non-penaeids dominate the landings in the NW and to a lesser amount in the SW; landings are less from the SE and NE waters.

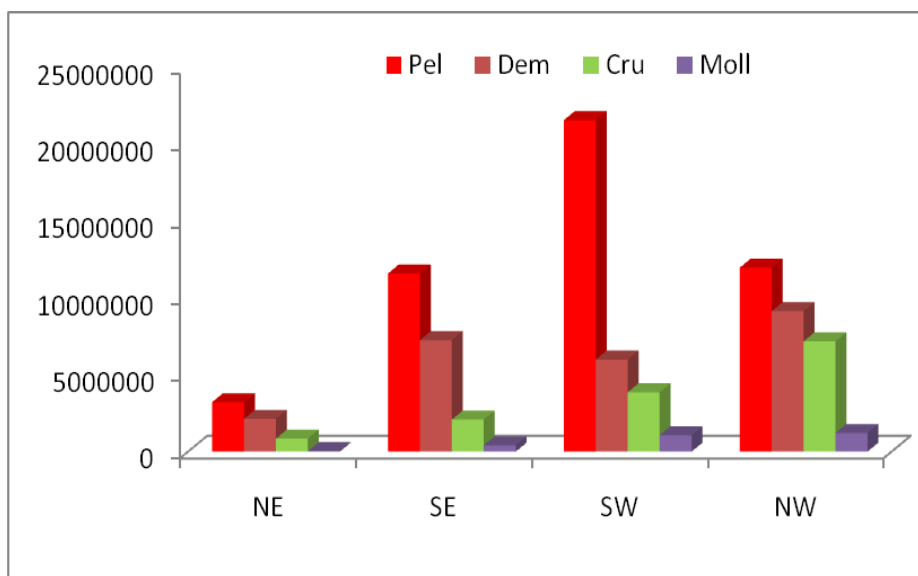


Figure 7.2 Resource-wise region-wise landings during 1961-2010

Important groups of marine fisheries resources of the country and their composition are as follows: (i) Pelagic resources (oil sardine, mackerel, seer fish, tuna, lesser sardine, anchovies and ribbon fishes); (ii) demersal resources (perches, sciaenids, catfishes, polynemids, flat fishes, pomfrets, eels, sharks, skates, rays and fishes which are mainly caught by trawls); (iii) Mid-water resources (Bombay duck, silver-bellies and horse mackerel); (iv) Crustacean resources (prawns, shrimps, lobsters and crabs); (v) Molluscan resources (oysters, mussels, clams, chanks, squids and cuttlefishes); and (vi) Seaweed resources.

Table 7.4 Important species groups (all-India average 2006-10) in lakh tonnes

Name of fish	Avg landings	Per cent
Oil sardine	4.48	14.60
Penaeid prawns	2.16	7.05
Indian mackerel	1.87	6.09
Croakers	1.71	5.57
Ribbon fishes	1.64	5.35
Non-penaeid prawns	1.58	5.14
Threadfin breams	1.18	3.86
Bomaby duck	1.11	3.62
Other sardines	0.98	3.21
Catfish	0.81	2.64

Annual average landings of all major resources have shown considerable increase over the period; however very high change was noticed in oil sardine landings, non-penaeids, pomfrets and cephalopods during the last 5 years (Table 5). No significant increase was noticed for perches, mackerel and ribbonfish, croakers, carangids and penaeid prawns. Contrary to this, landings of apex predators like elasmobranchs, after registering an increase during 2000-04 has shown a decline during 2006-10. Landings of Bombay duck, lesser sardines, silver bellies however, did not show much variation.

Table 7.5 Annual average landings (in 1000 tonnes) for major exploited resources

Species	1985-89	2000-2004	2006-2010
Elasmobranchs	53.5	60.3	48.0
Cat fish	50.6	53.9	80.7
Oil sardine	141.7	353	426.7
Other sardines	75.5	87.4	103.7
Bombay duck	93.2	109.8	106.9
Perches	89.1	197.1	215.2
Croakers	103.3	131.7	163.1
Ribbon fish	79.1	166.7	161.7
Carangids	105.1	122.2	152.3
Silverbellies	60.2	51.3	68.7
Pomfrets	37.1	38.9	144.5
Mackerel	123	114.1	179.5
Seer fish	34.8	47.9	53.1
Tunnies	28.6	42.3	66.6
Flat fish	29.7	43	41.1
Penaeid prawns	144.2	194.2	208.4
Non-Penaeid prawns	58.8	137.6	160.9
Cephalopods	40.3	109.4	137.1

(Source: CMFRI Annual Reports)

Sector-wise landing

Even though the size of the Indian fishing vessels, in general, range from 5 m OAL (overall length) to 30 m OAL, most of the fishing vessels are below 20 m OAL. Fishing vessels of this category would qualify to be called 'small-scale' and this would include all fishing methods that are employed by these vessels including trawling, purse-seining, gill-netting and long-lining. Thus, small-scale fisheries contribute almost the entire marine fish production of India (Mathew, 2003, Vivekanandan and Mohamed, 2009).

While mechanized fishing sector of the country produces 73 per cent of the all India marine landings, motorized and artisanal sectors contribute 25 per cent and 2 per cent respectively. (CMFRI, 2010). The pattern of marine fish landings in India during the past fifty years clearly reveals that the contribution by the artisanal sector to the total production was significant up to the sixties. As a result of the popularization and consequent expansion of mechanized fishing during the subsequent periods along with the motorization of artisanal crafts, the contribution by the artisanal sector declined considerably.

Major fisheries of India

The major fisheries of India is depicted in Table 7.6

Table 7.6 Classification of Indian marine fisheries based on different criteria

Realm-wise	Broad resource group-wise	Major species-wise (exceeding 100,000 tonnes)	Vessel-wise	Gear-wise
Pelagic fisheries [55]	Finfish [80.5]	Oil sardine [15.0]	Non-mechanized [4.8]	Trawl [44.0]
Demersal fisheries [45]	Crustacean [14.9]	Croakers [5.2]	Motorized [24.9]	Seining [19.2]
	Molluscan [4.6]	Bombay duck [4.1]	Mechanized [70.3]	Gillnets [18.4]
		Threadfin breams [3.9]		Hooks and lines [2.0]
		Carangids [7.5]		Bag nets [11.0]
		Ribbonfish [5.6]		Artisanal [4.8]
		Mackerel [5.5]		
		Penaeid shrimp [6.8]		
		Non-penaeid shrimp [5.4]		
		Cephalopods [4.4]		

Trawl Fisheries

Trawling is the major gear used to exploit marine resources from all along India's 8,129 km coastline. While the number of trawlers increased twice, the estimated efficiency (engine horsepower) increased by nearly 4 times, from 951,200 hp (1980) to 3,448,570 hp (1998) (Vivekanandan and Mohamed, 2009). From 1999, the trawlers are also employed for deep sea fishing up to 400 m depth by modifying the winch drum and the trawl net. CMFRI census currently shows that 29,241 trawlers are registered and the states of Gujarat and Tamil Nadu have the maximum number of trawlers.

Penaeid shrimps are the mainstay of the trawl fishery and catches showed more than 5-fold increase between 1960 (32,000 tonnes) and 2005 and at present contributes nearly 7-8 per cent of the all India marine fish production. The introduction of high opening bottom trawls has reduced the dependence of trawlers on shrimps as the chief revenue earner and cuttlefishes and squids have also emerged as principal income earners (Mohamed, 2006). The finfishes exploited by trawls belong to 21 major fish groups, out of which, sciaenids contributed maximum (18.4 per cent) to the demersal landings along the Indian coast, followed by threadfin breams (17.3 per cent). Each region is characterized by dominance of specific finfish groups. Whereas the NE coast is characterized by the dominance of sciaenids, catfish and pomfrets (together contributing 74.0 per cent to the demersal landings), the SE coast is characterized by the dominance of silverbellies and pig

face breams, the SW coast by the threadfin breams and other perches, and the NW coast by the sciaenids, catfish and threadfin breams (Vivekanandan and Mohamed, 2009).

Table 7.7 State-wise detail of fishing vessels in India

Sl. No	State/Union Territory	Mechanized Vessels	Motorized Vessels	Non Motorized Vessels	Total
1.	West Bengal	6829	1776	10041	18646
2.	Odisha	3577	4719	15444	23740
3.	Andhra Pradesh	2541	14112	24386	41039
4.	Tamil Nadu	7711	22478	24231	54420
5.	Pondichery	627	2306	1524	4457
6.	Kerala	5504	14151	9522	29177
7.	Karnataka	4373	3705	7577	15655
8.	Goa	1087	932	532	2551
9.	Maharashtra	13053	3382	7073	23508
10.	Gujarat	13047	7367	3729	24152
11.	Daman & Diu	562	654	211	1427
12.	Andaman & Nicobar	165	781	1837	2783
13.	Lakshadweep	667	376	1341	2384
14.	India	59743	76748	107448	243939

Seine Fisheries

With the advent of mechanization during the 1970s, the purse seines with larger nets and power blocks became the method of choice along the SW coast. A modification to the traditional boat seine vessels to make it more efficient was the mini purse seines or locally called as the Ring Seine which has become the most popular seining method for the pelagics along Kerala coast. Currently there are close to 1000 purse seiners mainly in the states of Karnataka (>50 per cent), Goa and Maharashtra and more than 240 ring seiners mainly in the states of Kerala (>70 per cent) and Tamil Nadu. Ring seines continue to be operated from traditional crafts fitted with outboard or inboard engines. The main species harvested by seines are the small pelagics such as oil sardine, lesser sardines, anchovies and mackerel. A fishery for this resource has recently emerged along the SE, NW and NE coast and this has been attributed to the phenomenon of climate change (Vivekanandan and Mohamed, 2009).

Gillnet Fisheries

Gillnets are traditional gears which are being used by fishermen to capture pelagic fishes both large and small. The gillnet catches which ranged from 100,000 to 135,000 t during the 1980s and 1990s, increased by more than 4-times in recent years. Gillnetting has become popular among fishers due to less capital intensive, could be selectively operated depending on availability and demand and can be operated at areas where bottom is not suitable for trawling (Vivekanandan and Mohamed, 2009). Trend in gillnet catch during the last 5 years in India show that the share of mechanized gillnetters (MGN) is increasing as compared to outboard gillnetters (OBGN). As compared to trawls, gillnets exploit only a few species and up to 60 species have been recorded from drift gillnets along the Indian coasts. Clupeids and croakers are mostly exploited by small meshed gillnets and large meshed gillnets exploit mostly sharks, seerfishes, mackerels, catfishes, pomfrets, tunas and carangids. Average productivity of this gear has been estimated as 13.7 kg/h and maximum was observed along the SW followed by NE coasts.

Bag net Fisheries

Bag nets are a major gear used by artisanal fishers along NW and NE coasts. In Gujarat and Maharashtra, the fixed variety of bag nets is called Dolnets. They are operated up to a depth of 40 m by employing mechanized crafts and also outboard engine crafts and currently there are about 8,862 dolnetters. Because the volumes are high (~300,000 t), it also contributes a substantial portion (11 per cent) of the all India catch estimates. The average catch rates are about 72.5kg/h and the catches are principally comprised of non-penaeid shrimps (mainly the Kiddi shrimp *Acetes indicus*), the mid-water carnivore Bombay duck (*Harpadon nehereus*) and the golden anchovy *Coiliadus sumeiri*. Other species include penaeid shrimps and ribbonfishes. Being a bag net, the dolnet exploits the resources indiscriminately. The non-penaeid shrimps, which are epipelagic and occurring in high abundance, such as *A. indicus* (length range 20-35 mm) and *Nematopalaemontenuipes* (length range 40-60 mm) constitute the principal by-catch.

Hooks and Line Fisheries

H&L contribute just about 2 per cent of the all India marine fish catch. This gear mainly targets the large pelagic fishes such as sharks, tunas and barracudas. The development of H&L fisheries has been mainly in the motorization of the traditional boats, and this class of vessels still contributes to the bulk of the estimated catches. Several development schemes of the government has targeted promotion of H&L fisheries particularly the modern version of long line fishing for tunas. As long line fishing for yellow fin tunas has been proven to be lucrative the world over, and since these resources are relatively untapped from Indian waters, many idle large shrimp trawlers (>17 m LOA) in the NE coast have been recently converted to long liners. Consequently, the yellow fin tuna catch has increased significantly from 9,086 t in 2007 to 13,206 t in 2008 and many tuna products including loin and sashimi grade are exported to the Far East.

Artisanal Fisheries

The artisanal fisheries sector has dwindled with the advent of mechanization. The contribution to the total catches decreased from an overwhelming 88 per cent in 1960s to about 2 per cent presently and continues to show a decreasing trend. However, the artisanal fishers were instrumental in bringing innovation in their fishing gears, and to withstand competition from the mechanized sector, motorized their crafts, initially with outboard engines and lately with inboard engines as well. The development of the Ring

Seine fishery for small pelagics along the SW coast is a typical example of this innovative spirit.

Bivalve fishery

Fishery exists for clams and mussels mainly in inland waters and bays; collection is by handpicking and by use of hand dredge operated from a dug out canoe. The meat is also sold both in internal markets as well as to export processing plants. The shell is also sold to cement and carbide factories. The State of Kerala leads India in the production of clams with estimated annual landings of about 66,000 tons (t) in 2008-09 (Suja and Mohamed, 2010). The estimated fishery from bivalves is approximately 1 lakh t.

Sea-weed production

The total production of seaweeds in India in 2005 was approximately 1,00,000 tons (wet weight) (Dhargalkar and Pereira, 2005). India produces 110-132 t of dry agar annually utilizing about 880-1100 tons of dry agarophytes. Annual algin production is 360 to 540 t from 3,600 to 5,400 t dry alginophytes. The surveys carried out by Central Salt and Marine and Chemical Research Institute (CSMCRI), Central Marine Fisheries Research Institute (CMFRI) and other research organizations have revealed vast seaweed resources along the coastal belts of South India. On the west coast, especially in the state of Gujarat, abundant seaweed resources are present on the intertidal and subtidal regions. These resources have great potential for the development of seaweed-based industries in India.

Fish processing and marketing

As per available data, approximately 67 per cent of the total fish produced in the country is consumed in fresh form and nearly 6 per cent is used for reduction into fishmeal (Report of the working group, planning commission, 2011). Altogether 23 per cent is consumed in processed and preserved form that includes 16 per cent used for drying, 7 per cent for freezing and less than one-half per cent for canning- almost all of these under medium and small- scale sectors. While over 0.6 million tonnes of fish produce exported from the country are subjected to some form of processing, bulk of the produce for domestic market is consumed fresh. Traditional methods of fish preservation like drying, salting and smoking are in vogue in coastal areas, while freezing, canning and production of *surimi* have been employed for exports. With increasing inter-state movement of fresh fish, chilling and icing have become important preservation methods for domestic marketing of fish produce. Along with battered and breaded products, ready-to-cook, ready-to-eat fish in modified atmosphere packages and fish-incorporated products like condiments and maricream form the range of value added products. The low valued fishes or byproducts are also subjected to processing for several industrial products, viz., fishmeal and oil; chitin and chitosan from the exoskeleton of shrimp, lobster, crab or squilla; fish maws from fish bladder; shark fin rays, etc.

Marine finfish exports and utilisation

The export of marine products in India both in terms of quantity and value has been more or less increasing at a steady pace since last five decades. The export in terms of value has increased from a meagre Rs. 3.9 crores in 1961-62 to Rs 10,048 crores in 2010. While frozen shrimp was the prime export commodity earlier, there has been considerable diversification in terms of both products and markets in the recent past. The shares of frozen shrimp and fresh/frozen fish to the total export are presently 21.0 and 40.0 per cent

in terms of quantity and 43.0 and 19.0 per cent in terms of value, respectively. During 2010-11 (April 2010 – March 2011), export earnings for the first time in the history of marine products exports from India touched US \$ 2.857 billion mark. In volume terms the exports aggregated to 813 091 mt, valued at Rs. 12 901.47 crores (Fig. 7.3).

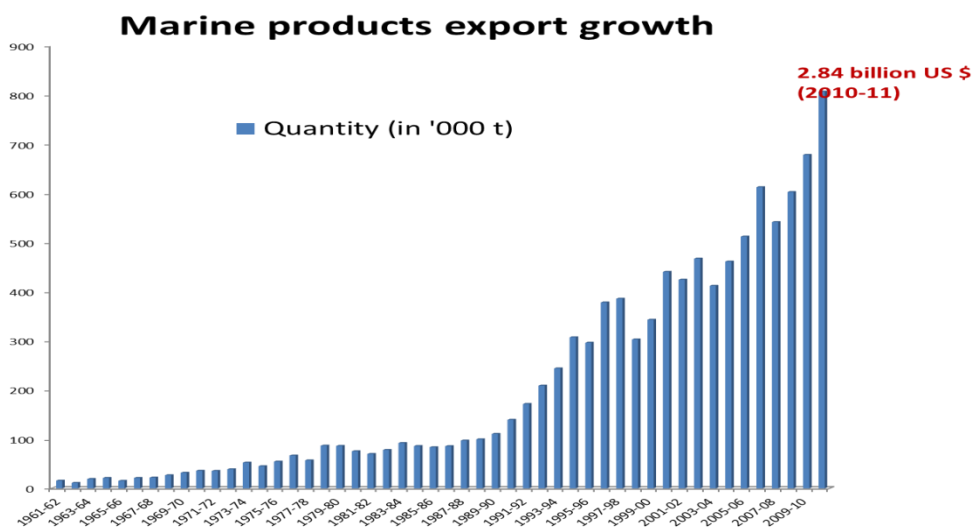


Figure 7.3 Indian marine products export over years

As regards overseas destinations, the European Union, Japan and USA have become important markets for fishery products. While USA has been the top importer of shrimps from India, squid and cuttlefish are two important commodities exported mainly to the EU and south-east Asian countries. In order to realize better export earnings in the coming years the country has to develop appropriate strategies for marketing of ornamental/live fishes and value added fishery better market potentials,

The marine finfish resources of India are marketed both in export and domestic markets (Fig 7.5 and 7.6). The export of marine fishery products from India has made substantial progress over

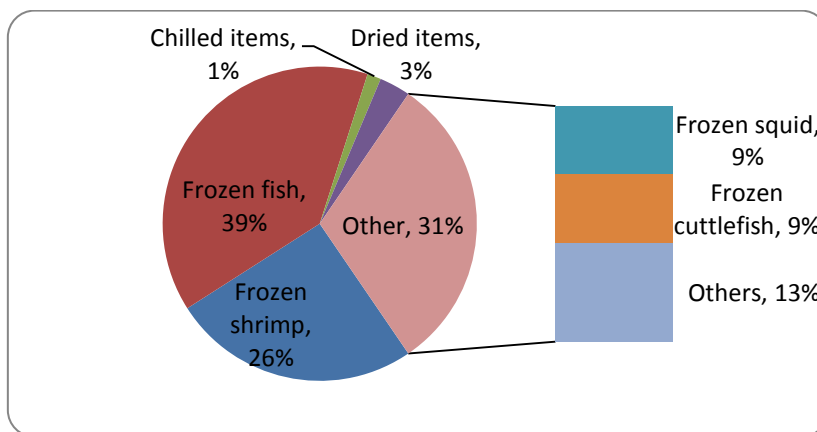


Figure 7.4 Item wise contribution to export quantity (per cent) of marine products from India during 2011-2012 the years.

A wide array of processed or value added products from marine finfishes are being exported to various countries. The major items in the marine fishery exports are the frozen products. Among the frozen products (Fig. 7.5), marine finfish is the major contributor in

terms of quantity exported (36 per cent), followed by frozen shrimp (26 per cent), frozen cuttlefish (9 per cent) and frozen squid (9 per cent). However, in terms of value (Fig. 6), frozen shrimp is the major contributor to the export earnings (55 per cent), leaving the frozen finfishes (16 per cent) to the second position, followed by frozen cuttlefish (8 per cent) and frozen squid (7 per cent). The market wise analysis shows that (Fig. 7.) China

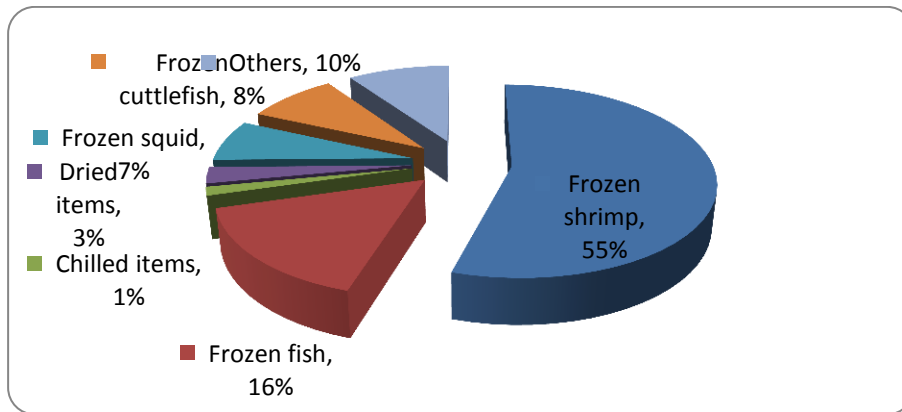


Figure 7.5 Item wise contribution to export value (per cent) of marine products from India during 2011-2012

Leads in the import of finfish from India (40 per cent) followed by Thailand (11 per cent), Tunisia (4 per cent), Malaysia (4 per cent), USA (2 per cent) and Japan (2 per cent). However in term of value, the Chinese market provides only 40 per cent to the total foreign exchange earnings from finfishes. The export of frozen finfishes from the country increased from 1.75 lakh tonnes during 2001-02 to 3.47 lakh tonnes in 2011-12, with an annual average export of 2.26 lakh tonnes worth of Rs. 1436 crores (Fig. 8). During 2011-2012, the foreign earnings from the export of frozen finfishes alone was Rs. 3482 crores.

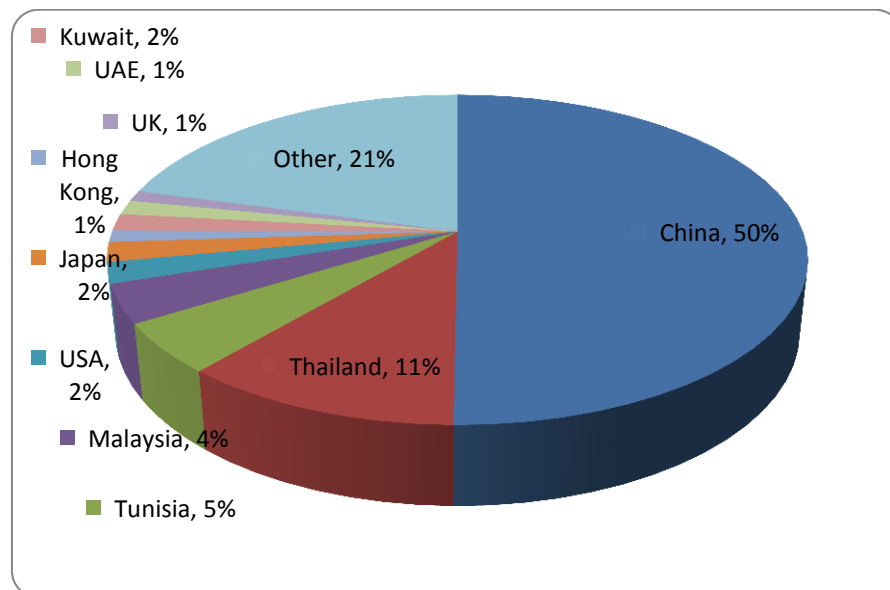


Figure 7.6 Major markets for the finfish export from India by quantity

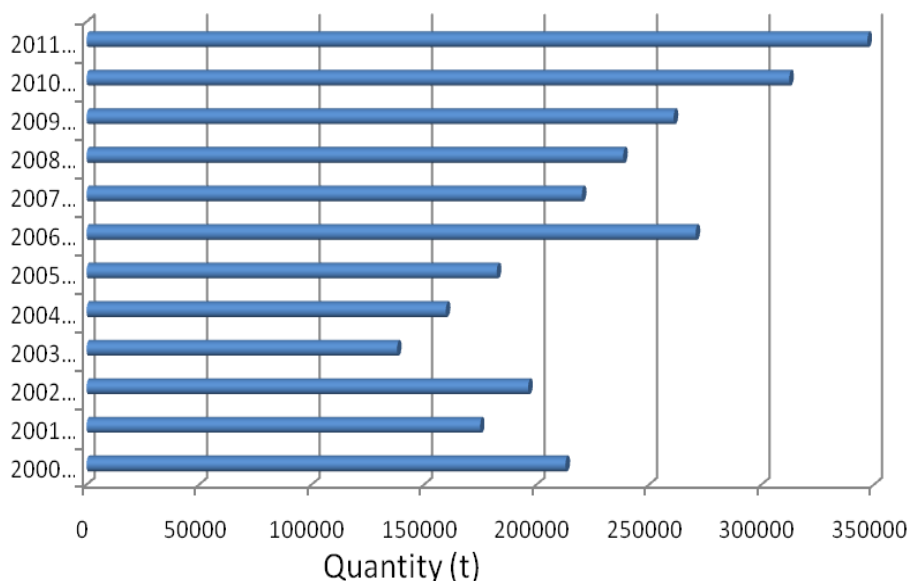


Figure 7.7 Export of frozen finfish from India during the period 2001 - 2012 (t)

About 83 per cent of the dried marine products exported from India were marine finfishes (Table 1). Among chilled items, the marine finfish components were 83 per cent with an average annual export of 5227 tonnes. Frozen finfish is the major form of export from India amounting 2.09 lakh tonnes with a share of 47 per cent to the total frozen products export from India. Item wise export shows that, among marine finfishes, frozen ribbon fish is the major export product with an export of 81,182 t, followed by frozen mackerel (14009 t), fish surimi (11261 t), frozen croaker (10397 t) and dried fish meal (5549 t).

Table 7.8 Contribution of finfish to the various marine products export categories from India

Items	Total export (t)	Finfish export (t)	Share of finfish (per cent)
Frozen	443666	209764	47
Chilled	7631	5227	68
Dried	17178	14220	83
Othes	69751	11274	16
Total	538226	240485	

Table 7.9 Contribution of different resources to the total marine finfish exports from India

Fishery Resource	Quantity (t)	Per cent
Ribbonfish	83507	35
Croakers	27546	11
Tuna	18797	8
Mackerel	14010	6
Pomfrets	11976	5
Total	143860	60

Among the fishery resources, ribbonfish products were the major contributor (Table 10) with a share of 35 per cent to the total marine finfish exports. The other major resources were croakers (11 per cent), Tuna (8 per cent), mackerel (6 per cent) and pomfrets (5 per cent).

Ribbonfishes contributed about 42 per cent of the total frozen marine finfish exports (Fig. 9), followed by Croakers (14 per cent), Tuna (11 per cent), Mackerel (7 per cent) and Lizardfishes (3 per cent). Sardines, king fish and reef codes were contributed 2 per cent each to the frozen marine finfish exports of India. Among the tunas, yellowfin tuna export was 36 per cent, followed by skipjack tuna (27 per cent) (Fig. 7.9)

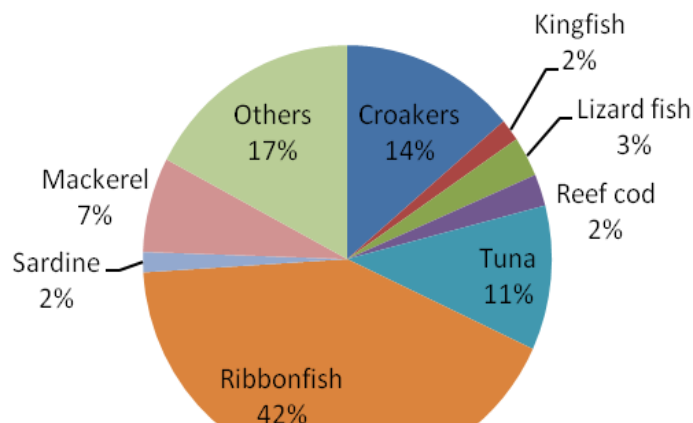


Figure 7.8 Contribution by different fish groups to the total frozen fish exports

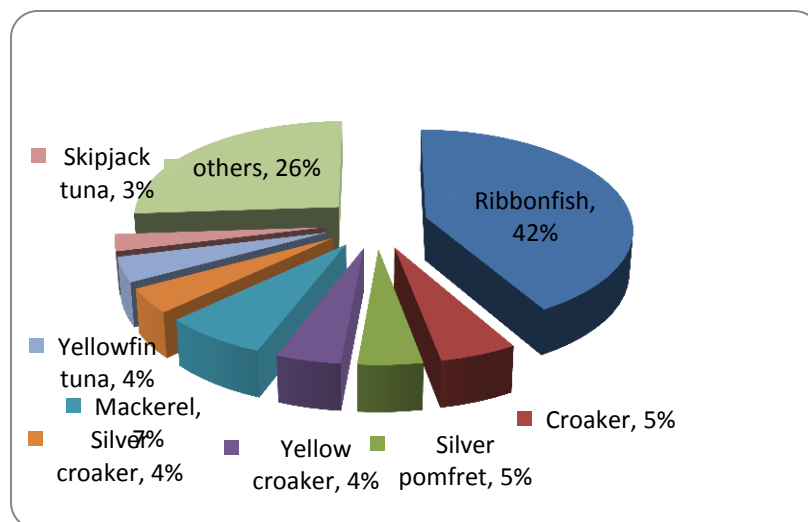


Figure 7.9 Item wise export of frozen marine finfishes in India

Among the chilled products, chilled fish contributed about 39 per cent of the total chilled fish exports (Fig. 11) followed by chilled pomfrets (15.3 per cent), chilled threadfins (13.3 per cent), reef cods (8.8 per cent), kingfish (3.7 per cent), Tuna (2.9 per cent) and Guttled tuna (2.0 per cent). The dried finfish products (Fig. 12) exported were dominated by

dried fish meal (39 per cent) followed by dried whole fish (38.5 per cent), dried salted fish (9.09 per cent), dried Bombay duck (4.27 per cent) and dried fish maws (4.27 per cent). The major component in the frozen finfish export basket was ribbonfishes (42 per cent) followed by croakers (14 per cent) and Tuna (11 per cent).

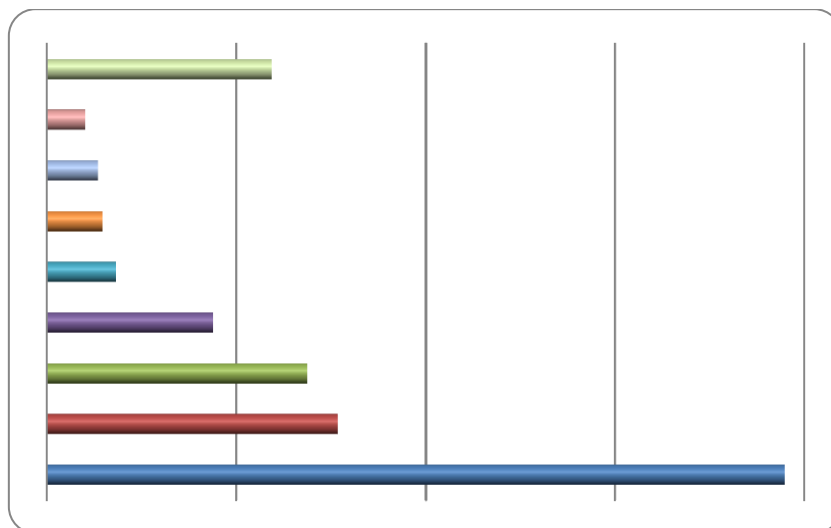


Figure 7.10 Contribution (per cent) of various finfish groups to the export of chilled items in India

There were about 9 products made of ribbon fishes utilised in the export market, with 97 per cent export was in the form of frozen whole fish. Apart from frozen products, minor quantities of this resource are utilised as surimi and chilled and dried products as well. Tuna are exported as 20 different products from India (Table 11), with the highest representation by frozen yellowfin tuna (42 per cent) followed by frozen skipjack tuna (28 per cent), frozen whole tuna (6 per cent) and IQF skipjack tuna (5 per cent). Other than frozen products, small quantities of tuna are exported in the form of chilled products. The other major resource among marine finfishes is the croakers, which are exported as 5 types of products. The major items are frozen products such as frozen croaker (38 per cent), followed by frozen yellow croaker (32 per cent) and frozen silver croaker (29 per cent). Minor quantities of surimi croaker (2 per cent) also exported from India. Pomfrets were exported as 12 products, among which, frozen silver pomfret is the major export item (72 per cent) followed by frozen black pomfret (8.7 per cent), chilled pomfret (6.7 per cent), frozen white pomfret (3.7 per cent) and IQF silver pomfret (3.5 per cent). Mackerels are mainly exported as frozen mackerel (62 per cent) and IQF mackerel (38 per cent).

Table 7.10 Various forms of tuna exported from India

Product	Quantity (t)	per cent
Frozen Yellow fin tuna	7882	41.93
Frozen Skipjack tuna	5336	28.39
Frozen Whole tuna	1179	6.27
Frozen Skipjack IQF	893	4.75
Frozen Yellow fin gutted IQF	731	3.89
Frozen Tuna gutted	629	3.34
Frozen Yellow fin IQF	515	2.74
Frozen longtail tuna	489	2.60

Frozen Skipjack tuna whole round	351	1.87
Chilled tuna	154	0.82
Frozen Tonggol tuna	128	0.68
Frozen Tuna loins	126	0.67
Chilled gutted tuna	105	0.56
Frozen Bigeye tuna	90	0.48
Frozen Yellow fin tuna roe	53	0.28
Chilled Yellow fin tuna loins	40	0.21
Frozen Tuna streaks	39	0.21
Frozen Tuna streak IQF	37	0.20
Frozen Tuna cubes	17	0.09
Frozen Yellow fin tuna chunk	3	0.01
Total	18797	100

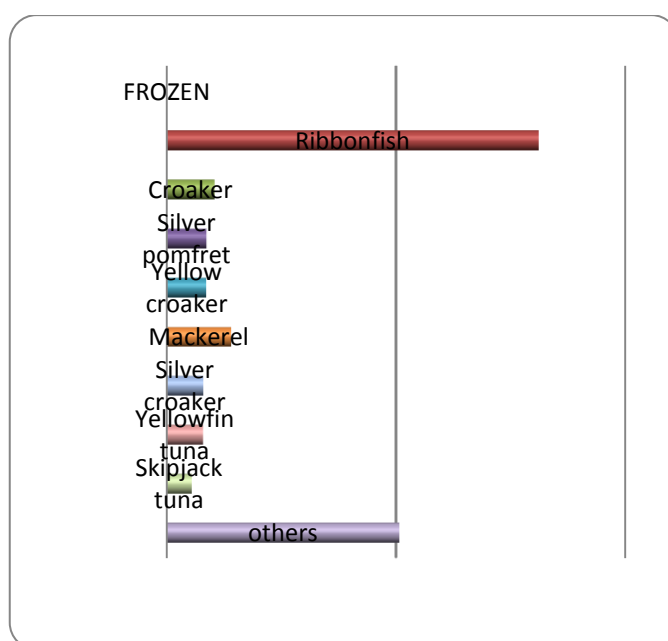


Figure 7.11 Major items in the annual average export of frozen marine finfish (t) from India

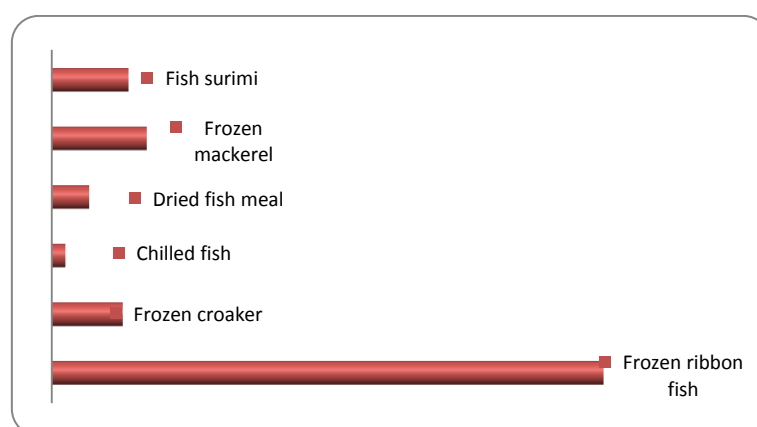


Figure 7.12 Major items (quantity t) in the export of marine finfish from India

Issues in Marketing and Trade

Marketing of fish and fishery products in the country is still unorganised, except in a few towns and cities, with municipalities and other local bodies looking into the marketing aspects (Working group report, Planning commission, 2011). About 75 per cent of fish produced in the country is marketed domestically through wholesale, major and minor retail (including roadside) markets. Majority of domestic markets lack proper fish storing and handling facilities. Other concerns are with regard to transportation system including roads, refrigerated vehicles, availability of potable water, good quality ice, electricity and waste disposal system. There is considerable time lag during the transportation of fish from the landing centre to the interior markets, which results in poor quality of the material leading to high nutritional and post-harvest losses. A study in the Ernakulam District of Kerala and West Godavari District of Andhra Pradesh showed the post-harvest losses in fish to the extent of 15 per cent, amounting to over Rs 2,700 crores annually on a national basis. There exists a cold chain in case of fish production from Kolleru Lake region of Andhra Pradesh (East Godavari and Krishna districts), where fish are transported in insulated trucks with ice to distances of over 2,000 km, with Kolkata being the major market. Hence, public investments to expand access to rural infrastructure and services such as rural roads and transport services, primary and secondary fish markets, telecommunications, and electricity, will be critical to reducing transaction costs and physical losses and to enhancing transparency and competitiveness in traditional fish markets.

Infrastructure development

The infrastructural requirements of the fisheries sector are manifold. Ranging from construction of Fishing Harbours (FH) and Fish Landing Centres (FLCs) to establishment of hygienic domestic markets and setting up of cold chains, the prime objective is to ensure that spoilage is reduced and fish reaches the consumers in the best possible condition. While the PPP concept has picked up in many other infrastructure development sectors, it is yet to take roots in the fisheries sector. Establishment of FH/FLCs and cold chains are some of the areas where PPP mode can work well and the NFDB could facilitate the process.
