

Status of Marine Fisheries Resources in India – An Overview

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The fisheries sector plays an important role in Indian economy and its contribution to the GDP is about one percent. Export earnings from marine sector have increased from Rs. 3.92 crores in 1961-62 to Rs. 12,901.47 crores in 2010-11 with 11.8% growth during 2009-10. There are 0.99 million active fishermen employed directly and 0.61 million employed indirectly with the marine fisheries sector. The total fisher folk population in the country is 4.00 million and there are about 1,94,490 fishing crafts operated in the country for harvesting marine fishery resources (CMFRI, 2010). Out of this about 72,500 are mechanized crafts, 71,300 are motorized and the rest are non-mechanized. In mechanized sector there are about 35,200 trawlers. Fishing by all these crafts are concentrated in the depth zone up to 100 m. The traditional crafts and motorized crafts are concentrated more in the east coast (72% and 58%) where as the mechanized vessels are more along the west coast (58%).

India is a tropical country with multi-species fishery in the marine sector. Various types of fishing crafts and gears are used for fishing from the seas. The development of fisheries sector in India can be classified into three phases. Prior to 1965-66 is the first phase when landings were mainly by non-mechanized indigenous crafts and gears and the landings remained below one million tonnes during this phase. The second phase is the period upto 1985-86 and the important features of this phase were increased mechanization, improved gear materials, introduction of motorization of country crafts, expansion of export trade etc. The last phase is the period after 1986. This phase featured intensification of mechanization, motorization of country crafts, multi-day voyage fishing etc. The average contribution from west coast is 67% and that from the east coast is 33%. The overall percentage contribution from the four regions are NE 11.4%, SE 22.0%, SW 35.2% and NW 31.4%. Pelagic fin fishes formed 55%, Demersal 26%, Crustaceans 15% and Mollusca 4%. As per the Silas committee (2000), the potential yield of marine fishery resources in the Indian EEZ is 3.93 million tonnes.

There are about 2000 marine species that are caught from the Indian seas. Over years changes have occurred in the type of fishing, crafts and gears used, time spend in the sea for harvesting the resources, storage and infrastructural facilities, commercial

importance, export demand etc. Fish is one of the costliest items of food in the present days. The gross revenue from the marine fish landings during 2009-10 at the point of first sales (landing centre) was estimated at Rs.19,753 crores (CMFRI, 2011). There are more resources that are exported now and from India marine products are exported to nearly 100 countries. Since marine fishery resources are renewable and not in-exhaustible management and conservation of these resources are very much essential for sustained production from the seas. Thus, monitoring the harvest of different marine fishery resources is of great concern. With this view, Central Marine Fisheries Research Institute (CMFRI) has developed a sampling design for collecting the required information and to estimate marine fish landings along with effort expended. The sampling design adopted is based on stratified multi-stage random sampling technique, with stratification over space and time. The harvest potential of each of the commercially important marine fishery resources have to be periodically revalidated along with the optimum size of different types of fleets operating in the fishery.

Table 1: Profile of Indian Marine Fisheries

Component	Profile
Physical Component	
Length of coastline	8129 km
Exclusive economic zone	2.02 million km ²
Continental shelf	0.50 million km ²
Inshore area (< 50 m depth)	0.18 million km ²
Fishing villages	3288
Human Component	
Marine fishers population	4.0 million
Active fishers population	0.99 million
Fishermen families	0.86 million
Infrastructure Component	
Landing centers	1511
Major fishing harbours	6
Minor fishing harbours	27
Mechanised vessels	72559
Motorised vessels	71313
Non-motorised vessels	50618

Estimation of Marine fish landings in India

India is one among few countries where a system based on sampling theory is used to collect marine fish catch statistics. The sampling design adopted by the CMFRI to estimate marine fish landings is based on stratified multistage random sampling technique, stratification being done over space and time. CMFRI initiated the process of collection of data on marine fish catch, effort, biological parameters

etc. based on scientific principles way back in 1947. In 1959 CMFRI initiated collection of marine fish landings data along the west coast of India through a stratified multistage sampling design. The sampling design became operational in 1961 for both east and west coasts.

Table 2: Indian Marine Fisheries Statistics

Gross value at landing centre	Rs. 19,753 crores
At retail points	Rs. 28,511 crores
Export earnings	US\$ 3.5 billion
Percentage in total exports	3%
Domestic markets	81% fresh; 5% frozen; 6% dry; 5% fish meal
Per capita fish consumption	2.58 kg (range 0.3 - 39)
Share in GDP	1.1%
Share in agricultural GDP	5.4%

Marine Fish Production

Table 3: Top-ten Resources by Value (Landing centre prices)

Rank	Resource/ Stock	Rs. Billion	US\$ Million
1	Penaeid shrimps	43.4	964.4
2	Sardines	10.7	237.8
3	Cephalopods	9.0	200.0
4	Seerfishes	6.0	133.4
5	Pomfrets	5.8	128.9
6	Croakers	4.6	102.2
7	Carangids	4.6	102.2
8	Mackerel	3.9	86.7
9	Perches	3.9	86.7
10	Bombay duck	2.5	55.6
	Others	15.6	346.7
	TOTAL	110	2446.6

Table 4: Top-ten Resources by Quantity (lakh tonnes)

Name of fish	Average landings (2008-2012)	Percentage
Oil sardine	5.35	15.28
Penaeid prawns	2.48	7.07
Indian mackerel	2.12	6.04
CROAKERS	2.01	5.73
RIBBON FISHES	1.86	5.32
Non-penaeid prawns	1.67	4.78
Threadfin breams	1.55	4.42
BOMBAYDUCK	1.11	3.17
Other sardines	1.16	3.31
Catfishes	0.93	2.66
Total	20.24	

Table 5: State wise contribution in marine fish landings (lakh tonnes)

State	2012		Average (2008-2012)	
	Landings	%	Landings	%
Kerala	8.39	21.31	6.76	19.29
Gujarat & Daman-Diu	8.28	21.03	6.68	19.06
Tamil Nadu	6.45	16.38	5.49	15.67
Karnataka	4.75	12.07	3.73	10.64
Maharashtra	3.15	8.00	3.04	8.68
Andhra Pradesh	3.04	7.72	2.60	7.42
Orissa	2.48	6.30	2.67	7.62
West Bengal	1.55	3.94	3.07	8.76
Goa	0.72	1.83	0.80	2.28
Pondicherry	0.56	1.42	0.20	0.57
Total	39.37	100.00	35.04	100.00

Table 6: Gear wise contribution in marine fish landings (2008-2012 average)

Gear Name	Landings (lakh tonnes)	%	CPUE (Kg/unit)	CPUE (Kg/hour)
Mechanized Trawl-net	17.76	50.68	1472	48
Mechanized Dolnet	2.35	6.71	590	58
Mechanized Gillnet	1.92	5.48	547	17
Mechanized Purseine	2.06	5.88	2550	411
Mechanized Ringseine	2.20	6.28	3002	1264
Mechanized Bagnet	0.36	1.03	395	65
Mechanized Hooks & Lines	0.05	0.14	420	11
Other mechanized gears	0.26	0.74	2915	26
Outboard Gillnet	3.08	8.79	76	13
Outboard Ringseine	2.61	7.45	1021	462
Outboard Hooks & Lines	0.59	1.68	80	14
Outboard Bagnet	0.37	1.06	208	38
Outboard Boatseine	0.15	0.43	195	68
Outboard Purseine	0.14	0.40	743	286
Other outboard gears	0.22	0.63	88	17
Non-mechanized gears	0.92	2.63	48	15
Total	35.04	100.00		

What do we exploit from the sea?

Marine fisheries in India is a multi-species fishery. Around 1400 finfish species are harvested from the sea of which 263 are commercially important. Apart from this 36 species of penaeid shrimps and 34 species of cephalopods are also harvested in which 15 species of penaeids and 8 species of cephalopos are commercially important.

How the exploitation is carried out?

The marine fishery resources from the Indian seas are harvested using more than 35 different types of craft gear combinations. The major crafts used are of three different categories namely mechanized, motorized and non-motorized. The mechanized sector include trawlers, gill-netters and inboard vessels. Most of the crafts in the mechanized sector use machines for both propulsion and operation of the gear. The motorized sector exclusively consists of crafts fitted with outboard engines. The non-motorized sector consists of traditional vessels made up of wood, fibre glass, thermo coal etc. and do not use any machine power either for propulsion or for operation of the gear. Major gears used in the marine fisheries sector are trawl nets, gill nets, bag nets, hooks & lines and seines.

Trawl fisheries

It is the major gear accounting for 51% of landings. Number of trawlers and engine horse power increased over time. Deep sea fishing upto 400 m depth from 1999. The medium trawlers undertake multi-day voyages. They carry different trawl nets having different cod-end mesh sizes (15 to 35 mm) to target sea high value resources. Penaeid shrimps form the main catch. High opening trawls catch squid, cuttle fish and fishes. Finfishes exploited by trawls belong to 21 major groups.

Seine Fisheries

Ring Seine is the most popular seining method for the pelagics along Kerala coast. Purse seiners operated in Kerala, Karnataka, Goa and Maharashtra. Main species - small pelagics such as oil sardine, lesser sardines, anchovies and mackerel.

Gillnet Fisheries

The gillnet catches increased by more than 4 times in recent years (5.8 lakh t in 2008). Share of mechanized gillnetters increased compared to outboard gillnetters. Small meshed gillnets catch clupeids and croakers. Large meshed gill nets catch sharks, seerfish, mackerels, catfishes, pomfrets, tunas and carangids

Bag net Fisheries

Major gear used by artisanal fishers along NW and NE coasts. Gujarat and Maharashtra, a fixed variety of bag nets (Dolnets). Dolnets operate upto 40 m. 80% of the bag net fisheries come from the mechanized dolnetters. Resources caught are non-penaeid shrimps (*Acetes indicus*), Bombay duck (*Harpadon nehereus*), golden anchovy (*Coilia dussumeiri*) as well as penaeid shrimps and ribbonfishes.

Hooks and Line Fisheries

Contributes to 2% of the all India marine fish catch. Targets large pelagic fishes such as sharks, tunas and barracudas. Development schemes promote H&L fisheries particularly the modern version - long line fishing for tunas.

Artisanal Fisheries

It dwindled with the advent of mechanization from 88 % in 1960 to 2 % recently. Catamaran and plank built boats have been motorised.

Bivalve fishery

Clams and mussels mainly in inland waters and bays; hand picking and by dredge. Kerala leads in the production of clams - 66,000 tons (t) in 2008-09

Marine Fisheries Management in India

In India, fishery in general is open access fishery which is governed by different acts introduced by the government over the years

- Indian Fisheries Act, 1897
- The Wild Life (Protection) Act, 1972
- MFR (regulation) Bill, 1978 formulated after the EEZ declaration
- MFRA of maritime states enacted from 1980 in all maritime states
- Maritime Zones of India Act, 1981
- Environment (Protection) Act, 1986

Regulatory Measures

- Closed season
- Closed fishing areas
- Marine Protected Areas (MPAs)
- Protected Species
- Ban on certain destructive fishing gears and methods
- Minimum mesh size regulation
- Minimum legal size at capture
- Use of Turtle Excluder Device (TED) in trawls in Orissa

Table 7: Closed Season for Mechanized Sector

State	Months	Days
Gujarat	June - August	45
Maharashtra	June - August	45
Goa	June - August	60
Karnataka	June - August	45
Kerala	June - August	45
Tamil Nadu	April - May	45
Andhra Pradesh	April - May	45
Orissa	April - May	45
West Bengal	April - May	45

Table 8: Spatial closures

State	Reserved for traditional vessels	Available to mechanized vessels

Goa	Up to 5 km	Beyond 5 km
Kerala	Up to 10 km	<25 GRT: 10-22 km; >25 GRT: beyond 23 km
Karnataka	Up to 6 km	<15m LOA: 6-20 km; >15m LOA: beyond 20 km
Maharashtra	Up to 5-10 fathom	Beyond 10 fathom depth
Tamil Nadu	Up to 3.4 nautical miles	Beyond to 3.4 nautical miles
Andhra Pradesh	Up to 10 km	<20m LOA: 10-23 km; >20m LOA: beyond 23 km
Orissa	Up to 5 km	<15m LOA: 5-10km; >15m LOA: beyond 20 km

MARINE PROTECTED AREAS (MPAs)

- Currently, there are 31 MPAs (majority in A&N)
- The current area under MPAs is 6.16 per cent of the area in the coastal biogeographic, which is proposed to be expanded to 7.12 per cent
- Oil wells in Bombay High and Godavari Basin also function as MPAs

Table 9: Protected Species (under Indian Wildlife Protection Act, 1972)

Species/ Group	Number
Molluscs	24 species
Elasmobranchs	10 species
Grouper fish	1 species
Sea horses	All species
Sea Cucumber	All species
Sponges and seafans	All species
Corals	All species
Turtles	All 5 species
Whales, dolphins, sea cow	All species

Table 10: Minimum Legal Sizes

Species	Weight (g)/ Length (mm)
<i>Panulirus polyphagus</i>	300 g
<i>P. homarus</i>	200 g
<i>P. ornatus</i>	500 g
<i>Thenus orientalis</i>	150 g
<i>Pampus argenteus</i>	200 g
<i>Loligo duvauceli</i>	80 mm
<i>Sepia pharaonis</i>	115 mm
<i>Octopus membranaceous</i>	45 mm

Ban on Destructive Fishing Methods

- Dynamite fishing
- Cyanide poisoning
- Pair trawling in GoM and Palk Bay
- Thalluvalai (minitrawl) in GoM and Palk Bay

Management and conservation of the resources

- Ecosystem-based fisheries management (EBFM) better than single species mgmt, ecosystem evaluation and modeling, can predict changes
- Bycatch reduction- BRDs and sem pelagic trawling
- Capacity reduction- limit entry, buyback
- Understanding climate variability and fisheries-improved information on climate and effects made available
- Implementation of CCRF -overexploitaton of stocks, damage to ecosystems, trade issues: ecolabeling
- Natural hazards – disaster management plans
- Mariculture- potential mariculture site identification
- Development of Infrastructure- post harvest loss -15%, public investment, VMS, better domestic marketing
- Diversification of vessels and deep sea fishing- 1.3 lakh t of deep sea resources- tuna longliners and squid jiggers
- Diversification of products -value added products
- Utilisation of fish waste to useful products
- Marine Protected Areas (MPAs)-area to expand to 7.12%

Habitat degradation

- water contamination
- enforcement of standards for water discharge
- maintaining the quality of river runoff

- reducing greenhouse gas emissions

Major items of export

Frozen Shrimp continued to be the major export value item accounting for 49.63% of the total US \$ earnings. Shrimp exports during the period increased by 24.86%, 42.97% and 37.99% in quantity, rupee value and US\$ value respectively. Fish, has retained its position as the principal export item in quantity terms and the second largest export item in value terms, accounted for a share of about 40.27% in quantity and 19.48% in US\$ earnings. Frozen Cuttlefish recorded a growth of 21.92% in rupee value and 15.58% in USD terms. Unit value also increased by 25.06%, however, there is a decline in quantity (7.59%). Export of Frozen Squid showed an increase of 21.53% in rupee value and 17.46% in US\$ realization. Unit value also increased by 32.95%. However, there is a decrease of 11.65% in terms of quantity. Live items also showed a growth of 8.76% in terms of rupee value and 3.18% in terms of US\$ realization compared to the previous year. Dried items showed a drastic decline in quantity, value and US\$ terms by 32.05%, 41.08%, and 44.56% respectively.

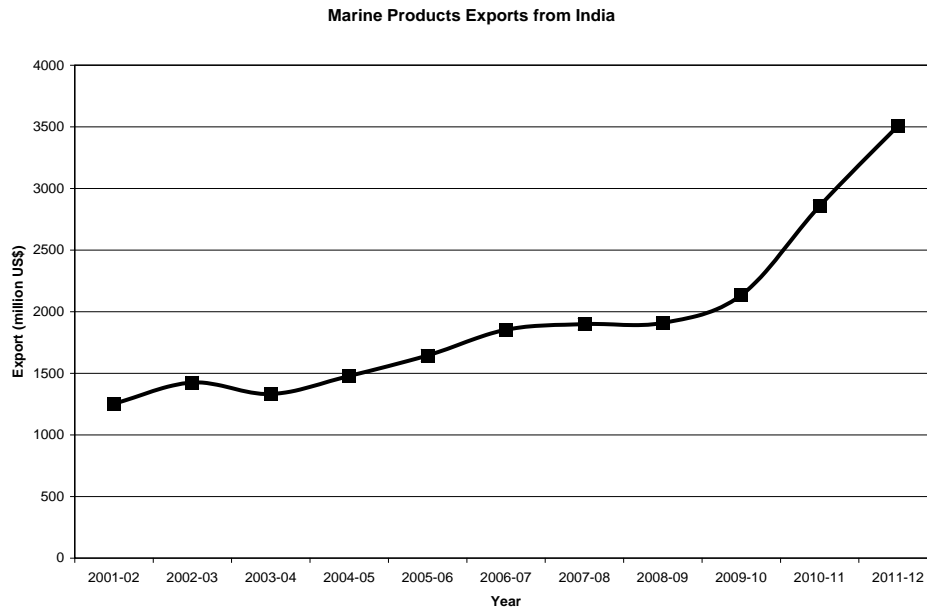


Fig. 1: Marine Products Exports from India

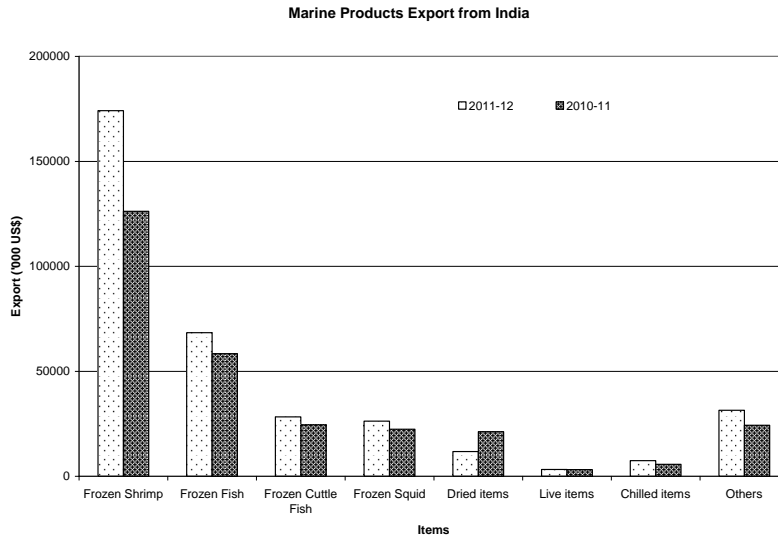


Fig. 2: Marine Products Exports from India

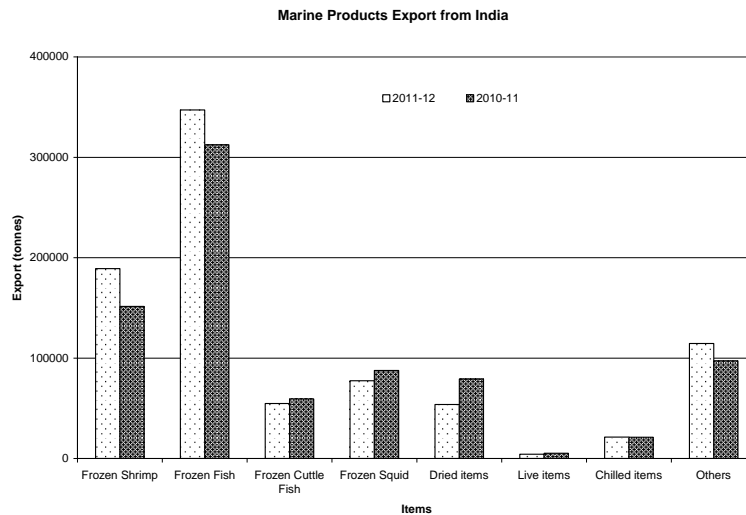


Fig. 3: Marine Products Exports from India

Major export markets

As per the current status the largest buyer of Indian marine products is South East Asia with 39.9% share in volume and 25.09% share in value (US\$). The next highest buyer is European Union with 22.96% share in volume followed by USA 18.17%, Japan 13.01%, China 7.51%, Middle East 5.33% and 7.5% to other countries. Export to South East Asia recorded a growth of 45.01% in volume and 87.51% in US\$ realization. This is mainly due to the increased export of Frozen Shrimp, Frozen Fish and Chilled items. Exports to United States registered a growth of 36.45% in quantity and 45.39% in value (US\$ realization) and this is mainly due to increased export of Frozen Shrimp and cephalopods.

Exports of Vannamei shrimp showed a tremendous increase in US market by 212 % in quantity and 209% in US \$ realization. Export to Japan also registered a positive growth of 21.33% in quantity and 22.35% in US \$ terms. Exports of chilled items showed a tremendous increase in Japanese market by 120.12% in quantity and 220.34% in US \$ realization. Exports to China showed a drastic decline of 46.89% in quantity and 40.17% in US\$ terms. The marine products exports have strengthened India’s presence in South East Asia. There is a significant increase in exports to South East Asian Countries compared to the previous year. Export of Fr. Shrimp to South East Asia has registered a growth of about 222.43% in volume and 356.36% in US\$ terms. Export of Fr. Shrimp to USA has also showed a growth of about 47.68% in volume and 47.55% in US\$ terms. Export of Vannamei shrimp had also picked up. We have exported about 40787 MT of Vannamei shrimp during this period. Export to Middle East countries showed an increase of 25.98 % in US\$ realization but declined in quantity by 13.25%. The details are given in the following table.

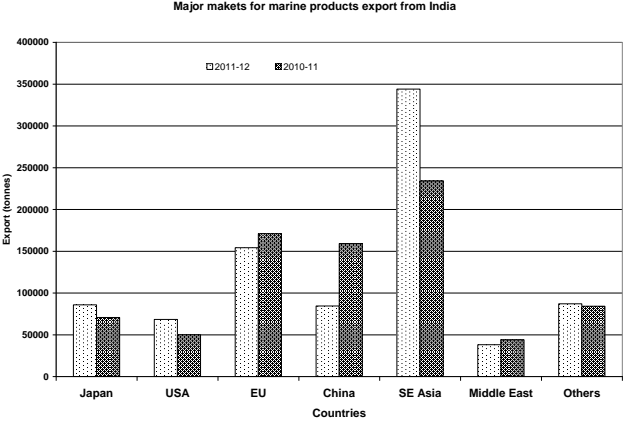


Fig. 5: Major Markets for marine products export from India

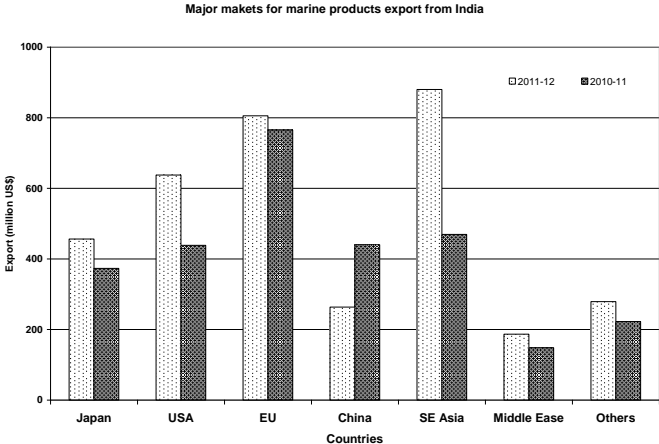


Fig. 6: Major Markets for marine products export from India
