

Current status of tuna fisheries in India

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Tuna fisheries in India have undergone significant changes in recent years. Though the coastal multi-species fishery is the mainstay for harvesting tunas and tuna-like fishes, targeted fishery for exploiting the high value tunas is emerging. Awareness has been created among the stakeholders that the continental shelf resources are more or less fully utilized and that further avenue for development lies in harvesting the oceanic tuna stocks. Fishing capacity from the shelf fishery is being diverted, with appropriate modifications, for harvesting the oceanic tuna resources. The production of tunas and tuna-like fishes has gone up to an all time high of 158,458 tonnes during the year 2008, out of which 24.2% was formed of oceanic tunas and 35% by neritic tunas. Exports of tunas and tuna products have shown remarkable growth with an all time high export figure of 37,302 tonnes in the year 2007-08.

1. General fishery statistics

a. Data collection

- In the coastal fishery around mainland India, the Central Marine Fisheries Research Institute (CMFRI), under the Indian Council of Agricultural Research (ICAR), collects data on fish landings through a multi-stage random sampling procedure.
- For the island groups of Lakshadweep and Andaman & Nicobar, the landing data reported by the respective Union Territory Governments for the fiscal year April 2008 – March 2009 are considered.
- From the oceanic fishery, the voyage reports received by the Fishery Survey of India (FSI) from the vessels operating under the Letter of Permission (LOP) scheme formed the data source. During the year 2008, reports were received from 30 vessels. As the catches are in gilled and gutted form, the nominal catch was worked out by applying a raising factor of 1.15.
- The exports data is collated by the Marine Products Export Development Authority (MPEDA), under the Ministry of Commerce, based on actual export documents.

b. Catch by species, area and gear

- Tunas and tuna-like fishes landed in the coastal fishery during the year 2008 from the different geographical segments of the Indian EEZ was 89,985 tonnes from the west coast of mainland, 52,127 tonnes from the east coast, 9,644 tonnes from Lakshadweep islands and 3,863 tonnes from Andaman and Nicobar.
- The aggregate catch of tunas and tuna-like fishes reported from the coastal fishery during the year was 155,619 tonnes, out of which the larger tunas formed 23.5%, neritic tunas 35.7%, billfishes 4.0% and seerfishes 36.8%.
- The production from the Fishing Areas 51 and 57 was 99,629 tonnes and 55,990 tonnes (Table 1), i.e., 64% and 36% respectively. While higher percentage (65.7%) of yellowfin tuna was taken from the Area 57, the skipjack was harvested more (88.8%) from the Area 51. The neritic tunas, except kawakawa, were obtained in higher proportion from the fishing area 51, whereas the catch of kawakawa was found to be more or less equal from both the fishing areas.
- The tuna fishery was supported by ten species; four oceanic species and six neritic species. Oceanic species formed 38.9% and neritic species 60.1%. Among the oceanic species, skipjack and yellowfin were dominant contributing 22,060 tonnes and 13,507 tonnes respectively. Among the neritic tunas, kawakawa was dominant (58.4%) followed by longtail tuna (13.5%), frigate tuna (11.1%) and other species.
- In the tuna landings from the coastal fishery, 43.8% was obtained in gillnet followed by hook and line (16.4%), purse-seine (11.8%), pole and line (9.7%), ring seine (7.5%) and the remaining by other gear combinations. The catch details obtained by different gears are given in Table 2.
- The nominal catch of tunas and allied species from the oceanic fishery was 2,839 tonnes (Table 3), out of which yellowfin tuna contributed 59.2% and bigeye tuna 0.21%. Billfishes accounted for about 30% of the catch.
- The cumulative catch of oceanic tunas from the coastal and oceanic fishery was 38,323 tonnes, formed of skipjack (57.6%), yellowfin (36.6%), albacore (2.7%) and bigeye tuna (0.1%).

Table 1. Nominal catch of tuna and tuna-like fishes from the coastal fishery in India : 2008

(unit : tonnes)

Sl.No.	Species	FAO Area 51	FAO Area 57	Total
Tunas				
1	Yellowfin tuna, <i>Thunnus albacares</i>	4628	8879	13507
2	Bigeye tuna, <i>Thunnus obesus</i>	6	11	17
3	Skipjack, <i>Katsuwonus pelamis</i>	19590	2470	22060
4	Albacore tuna, <i>Thunnus alalunga</i>	430	621	1051
5	Longtail tuna, <i>Thunnus tonggol</i>	7486	28	7514
6	Bullet tuna, <i>Auxis rochei</i>	2839	24	2863
7	Frigate tuna, <i>Auxis thazard</i>	3979	2207	6186
8	Kawakawa, <i>Euthynnus affinis</i>	16116	16285	32401
9	Striped bonito, <i>Sarda orientalis</i>	2470	1416	3886
10	Dogtooth tuna, <i>Gymnosarda unicolor</i>	14	-	14
11	Neritic tunas NEI	-	2640	2640
Tunas total		57558	34521	92139
Billfishes				
12	Swordfish, <i>Xiphias gladius</i>	918	65	883
13	Sailfish, <i>Istiophorus platypterus</i>	3018	1389	4407
14	Marlin	767	116	883
15	Billfishes NEI	-	2	2
Billfishes total		4603	1572	6175
Seerfishes				
16	Narrow barred seerfish, <i>Scromberomorus commerson</i>	22985	9170	32155
17	Indo-Pacific seerfish, <i>S.guttatus</i>	14372	9392	23764
18	Streaked seerfish, <i>S. lineolatus</i>	8	4	12
19	Korean seerfish, <i>S. koreanus</i>	-	3	3
20	Wahoo, <i>Acanthocybium solandri</i>	8	53	61
21	Seerfishes NEI	95	1215	1310
Seerfishes total		37468	19837	57305
GRAND TOTAL		99629	55990	155619

Table 2. Gear- wise nominal catch of tuna and tuna-like fishes from the coastal fishery in India : 2008

(unit : tonnes)

Species	Gillnet	Purse seine	Ring seine	Pole & line	Hook & line	Gillnet / HL	Others (*)	Total
Yellowfin tuna	4622	227	-	448	4189	994	3027	13507
Bigeye tuna	6	-	-	-	11	-	-	17
Skipjack	11222	15	297	8522	431	519	1054	22060
Albacore tuna	430	-	-	-	-	-	621	1051
Longtail tuna	4814	1225	22	-	194	-	1259	7514
Bullet tuna	79	147	-	-	2603	17	17	2863
Frigate tuna	2373	3387	32	-	272	79	43	6186
Kawakawa	14942	5855	5948	-	4038	163	1455	32401
Striped bonito	1820	1	571	-	736	3	755	3886
Dogtooth tuna	14	-	-	-	-	-	-	14
Neritic tunas NEI	-	-	-	-	2640	-	-	2640
Tunas total	40322	10857	6870	8970	15114	1775	8231	92139
Swordfish	326	-	-	-	68	397	92	883
Sailfish	3222	-	-	101	881	170	33	4407
Black marlin	313	-	-	-	156	414	-	883
Billfishes NEI	-	-	-	-	2	-	-	2
Billfishes total	3861	-	-	101	1107	981	125	6175
Narrow barred seerfish	20109	1683	1255	-	4594	164	4350	32155
Indo-Pacific seerfish	18914	611	40	-	369	-	3830	23764
Streaked seerfish	8	1	-	-	-	-	3	12
Korean seerfish	2	-	-	-	1	-	-	3
Wahoo	55	-	-	-	2	4	-	61
Seerfishes NEI	-	-	-	90	1215	-	5	1310
Seerfishes total	39088	2295	1295	90	6181	168	8188	57305
GRAND TOTAL	83271	13152	8165	9161	22402	2924	16544	155619

(*) Includes bag net, trawl net, trawl / HL etc.,

Table 3. Nominal catch of tunas and allied species from the oceanic fishery

(unit : tonnes)

Species	LOP vessels	FSI vessels	Total
Yellowfin tuna	1672	9.9	1682
Bigeeye tuna	6	-	6
Skipjack	-	0.3	-
Sailfish	311	-	311
Swordfish	299	0.5	300
Marlin	238	0.8	239
Billfishes NEI	-	2.1	2
Others	296	3.3	299
TOTAL	2822	16.9	2839

Table 4. Structure of tuna longline fleet in India : 2008

OAL (M)	Converted vessels		LOP vessels	Total
	MPEDA scheme	MOA scheme		
12.0 – 15.9	147	-	-	147
16.0 – 19.9	66	-	-	66
20.0 – 23.9	11	9	21	41
24.0 – 39.9	1	1	4	6
40.0 – 59.9	-	-	27	27
Unspecified	-	-	8	8
Total	225	10	60	295

Table 5. Export of tunas and tuna products from India during 2001–02 to 2007–08

Year	Quantity (tonnes)	Value	
		Rupees (million)	US \$ (million)
2001 - 02	1230	42.4	0.89
2002 - 03	3928	139.8	2.90
2003 - 04	6137	228.6	4.99
2004 - 05	8141	315.3	7.02
2005 - 06	16627	693.1	15.68
2007 - 07	23788	1303.8	29.54
2007 - 08	37302	2313.8	57.62
2008 - 09	31094	2679.6	61.12

c. Fleet structure

- The coastal fishery has a large assemblage of fishing boats, mainly gillnetters, purse-seiners, ring-seiners, hook and line boats etc. which are not targeted on tunas, but contributing significantly to the tuna landings.
- Pole and line boats are doing targeted fishing for tunas in the Lakshadweep waters and the number of boats engaged in the fishery is about 465.
- During the 10th five year plan (2002–2007), under the centrally sponsored scheme on “Development of marine fisheries, infrastructure and post-harvest operations”, the Ministry of Agriculture, Government of India has been providing subsidy of Rs.1.5 million (about US \$ 32,000) per vessel for conversion of existing trawlers above 20m OAL for tuna longline fishing. Under this scheme, ten shrimp trawlers in the size range of 21.5–24.0 m OAL were converted for tuna longline fishing.
- The Marine Products Export Development Authority (MPEDA) have introduced in the 10th five year plan a scheme for providing subsidy of Rs. 0.75 million (about US \$ 16,000) to existing vessels for conversion to tuna longline fishing. Under the scheme, 225 vessels in the size range of 13 – 24 m OAL have availed the subsidy and converted for tuna longline fishing.
- Under the Letter of Permission (LOP) scheme of the Ministry of Agriculture, 60 tuna longline vessels in the range of 21.6 - 58.7 m OAL, which are of foreign origin, but registered as Indian vessels, have been permitted for fishing in the Indian waters.

The structure of the tuna longline fleet is given in table 4. All the converted tuna longline vessels are using monofilament long lining system.

d. Recent trends in tuna fishery

- Production of oceanic tunas along the mainland coast registered continuous increase in recent years.
- The increase in production can be attributed to targeted fishing for oceanic tunas by traditional and mechanized sectors in recent years. Success of the traditional sector in oceanic tuna exploitation through motorization of crafts, introduction of FRP crafts and extension of fishing activities to deeper and distant waters has encouraged many operators to venture for the oceanic tuna fishery.

- At several locations along the mainland coast, fishing vessels are being modified / upgraded for multi-day tuna longline fishing with institutional support.
- Several shark longlining boats have switched over to tuna longline fishing. Besides, many shrimp trawlers are practicing troll line fishing for tunas while steaming to the fishing ground and back.
- Very significant part of oceanic tuna production is channalised for export markets fetching higher unit value realization.

e. Fine tuning of production statistics

Though the fleet of converted longline vessels has become an important sector of the fishery, the production data by this segment does not appear to have been fully reflected in the catch statistics. Apparently, some fine tuning of the production statistics seems necessary.

f. Exports

- The export of tunas and tuna products has shown remarkable growth from 1230 tonnes in the year 2001–02 to an all time high level of 37,302 tonnes in the year 2007-08 (Table 5).
- The exports are done in chilled form as well as in frozen condition. The product profile covers several diversified and value added items (Table 6).

2. Recent advances in tuna research

- Bar coding of six species of tunas from the southwest region and four species from the northwest region of the Indian EEZ has been standardized
- Fecundity and spawning season of five species of tuna from different regions along the Indian coast have been estimated.
- Preliminary stock assessment indicated that neritic tuna production is very close to the MSY level at many centers and that more than 88% of the resource potential is exploited.

Table 6. Product profile of tuna exports during 2007-08 and 2008-09

Item Name	Quantity exported (tonnes)	
	2007 - 08	2008 - 09
Chilled tuna	90	56
Chilled yellowfin tuna	74	52
Chilled yellowfin tuna loins	56	225
Chilled tuna (Gutted)	347	203
Chilled tuna total	566	535
Fr. tuna (yellowfin)	9509	7252
Fr. tuna (Skipjack)	9106	5946
Fr. tuna (Bigeye)	28	28
Fr. tuna (Longtail)	963	967
Fr. tuna (Whole)	1739	2543
Fr. fish fillet(tuna)	33	36
Fr. tuna (longtail)	158	53
Fr. tuna (Loins)	209	213
Frozen yellowfin tuna whole round IQF	6431	3670
IQF fish steak (Tuna)	90	58
Fr. tuna (Cubes)	1	89
IQF tuna (Skipjack)	2588	1669
IQF yellowfin tuna	1051	1197
Fr. tuna bellyflaps	11	40
Smoked frozen yellowfin tuna loins	27	18
Frozen tuna (Gutted)	1883	1203
Frozen tuna (Steak)	127	87
Yellowfin tuna loins(IQF)	124	291
Yellowfin tuna cubes(IQF)	1	165
Fr. yellowfin tuna roe	107	297
IQF yellowfin tuna HL Gutted tail off	2076	1805
Fr. tuna whole round(Skipjack)	0	2429
Fr. tuna yellowfin tuna chunk	0	23
Frozen tuna total	36261	30079
Fr. skipjack tuna chunks in brine (pouches)	0	69
Fr. yellowfin tuna chunks in brine (pouches)	0	71
Tuna in brine	0	141
Canned tuna	475	340
All Total	37302	31094

(Source: MPEDA)

3. National Research Programmes currently in place

- Survey of oceanic tunas and allied resources in the Indian EEZ by deploying four tuna longliners, two each on the Arabian sea and Bay of Bengal, is being undertaken by the Fishery Survey of India (FSI), under the Ministry of Agriculture. Data on resource distribution, CPUE, by-catches and environmental conditions are being collected. Biological studies of all the species occurring are also undertaken.
- A project for “Locating tuna habitat through satellite remote sensing”, jointly by the Fishery Survey of India and the Space Applications Centre (SAC) of the Indian Space Research Organization (ISRO), is in progress.
- A project on “Strategies for sustaining tuna fisheries along the coast of India” is being undertaken by the CMFRI, with the objective of studying the impact of exploitation on the neritic tuna stocks and to suggest strategies for sustainable development. The project period is 2008–2012 and it is being implemented from four centers viz., Veraval (northwest coast), Cochin (southwest coast), Tuticorin (southeast coast) and Vishakapatnam (northeast coast).
- A project on “A value chain on oceanic tuna fisheries in Lakshadweep Sea” with funding support from the National Agricultural Innovative Project (NAIP) has been initiated from 2008. The major activities under the project are resource assessment, trophic modeling, technology development and demonstration for conversion of existing pole and line boats for longlining, improvement of handling practices on board and at landing centers, production of value added products, development of fisheries management advisories, social impact analysis and transfer of technology. The project is being implemented with the participation of the Central Marine Fisheries Research Institute (CMFRI), Fishery Survey of India (FSI), Central Institute of Fisheries Technology (CIFT) and the Department of Fisheries, Union Territory of Lakshadweep.
- Research on “Trophic ecology of large pelagic predatory fishes in the western Indian EEZ” by a scientist from the FSI as part of Ph.D programme is in progress. Trophic studies of tunas form the most significant part of the work.
- Research work on “Dynamics of fishery, biology and utilization of coastal tunas occurring in the northwestern Indian EEZ” by a scientist from the FSI as part of Ph.D programme is in progress. DNA bar coding to identify phylogenetic relationship within the species and between the species through Cytochrome Oxidase I (CO I) gene is an important component in the study.

4. Implementation of the recommendations of the Scientific Committee

Several recommendations of the Scientific Committee / IOTC are being implemented. A Working Group has been constituted under the chairmanship of the Joint Secretary (Fy.), Ministry of Agriculture, with members from the Ministry, Indian Council of Agricultural Research (ICAR) and relevant Research and Development institutions, viz., FSI, CMFRI and MPEDA, for monitoring the implementation of various IOTC resolutions and recommendations. At the FSI, an IOTC cell has been set up to follow up necessary actions. Some of the specific recommendations implemented are given below:

- Logbook has been designed for tuna longliners and it is proposed to print and distribute to the tuna longline operators.
- Studies are being undertaken on depredation from four tuna longline survey vessels of the Government of India.
- Studies on by-catch are being undertaken from four tuna longline survey vessels of the Government of India.
- The commercial vessels, through the logbook proposed to be introduced, are being advised to report on the depredation, occurrence of turtles, by-catches and discards in the longline fishery.
- For conservation / protection of sea turtles, several measures including fabrication and popularization of TEDs, conducting awareness campaigns and protection under Wildlife Protection Act have been implemented.
- A National Plan of Action for Conservation of Sharks (NPOA-sharks) and also a Regional Plan of Action, jointly by Bangladesh, India, Maldives and Sri Lanka is contemplated. Consultation process is in progress.

5. Conclusion

India is poised for a quantum jump in harvesting of oceanic tunas, with its indigenous fleet. The fishing capacity is being built up. Necessary R & D support is being provided by the government institutions. There is, however, scope for fine tuning of the data collection process from the targeted fishery and this issue is receiving government's attention. The country is committed to the conservation and management measures within the framework of the IOTC for sustainability of the tuna fishery.