

Fishery and stock status of neritic tunas and allied resources in the Indian coastal waters

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ABSTRACT

Tunas and allied resource are exploited from coastal waters by a variety of small to medium fleets operating different varieties of gears. The catch was constituted by neritic tunas, small sized oceanic tunas like skipjacks and Spanish mackerel from shelf areas. Targeted fishery prevailed only for Spanish mackerels, whereas tunas mostly formed incidental catch in most gears. Their fishery is mostly coastal based and restricted to limited areas along the coast. Neritic tunas with a contribution of 65% in total tuna catch formed the mainstay of the National tuna landings with a catch of 45,571 ton during 2020. Catch during the year registered a marginal decline as compared to 2019. The neritic tuna fishery was supported by five species, namely; kawakawa (*Euthynnus affinis*, 28,310 t), frigate tuna (*Auxis thazard*, 5,840 t), bullet tuna (*Auxis rochei*, 6,888 t), longtail tuna (*Thunnus tonggol*, 4,052 t) and bonito (*Sarda orientalis*, 481 t). Spanish mackerels contributed 37,219 ton to the landings and was represented by narrowbarred Spanish mackerel (*Somberomores commerson*, 23,478 t) Indo-Pacific king mackerel (*Somberomores guttatus*, 13,419 t) and streaked Spanish mackerel (*Somberomores lineolatus*, 13 t). Fishery biological observations and stock assessment of component species indicated that neritic tuna stocks in general is healthy, with fairly high spawning stock biomass and are being fishing at sustainable levels.

Introduction

India with a vast EEZ of 2.02 million km² supports rich fishery diversity with large abundance owing to high coastal productivity. Fishery along the region was supported by over 1100 species, with around 800 supporting regular fishery. Exploratory surveys, fishery and productivity studies indicated an annual harvest potential of 5.5 million tonnes for the EEZ. The harvest potential for the neritic tunas and allied species is 215,281 tonnes forming 4.5% of the total potential. Coastal traditional fishers depend on this rich resource for their sustenance for years and traditionally use different means to harvest the resource. The fishing priority is mainly decided by the fishers themselves mainly based on the resources availability and local demands. As a result, except for few major resources, no targeted fishery exists along the coast. Coastal tunas and allied species were fished along with several other resources using different resources.

Resources

Five species of neritic tunas and three species of Spanish mackerel and wahoo supported the fishery along the region. Kawakawa (*Euthynnus affinis*), frigate tuna (*Auxis thazard*), bullet tunas (*Auxis rochei*), longtail tuna (*Thunnus tonggol*) and bonito (*Sarda orientalis*) supported tuna fishery. Spanish mackerels contributing to the fishery are narrowbarred Spanish mackerel (*Somberomores commerson*) Indo-Pacific king mackerel (*Somberomores guttatus*) and streaked Spanish mackerel (*Somberomores lineolatus*). The annual exploitable potential of neritic tunas is 117,448 tons with major share of it is by Kawakawa (51,556 t). Potential of Spanish mackerel is 97,221 t with major part, 67,960 t by narrow-barred Spanish mackerel.

Fishery

Fishery wealth is being exploited by a variety of non-mechanised, motorised and small to medium mechanized boats operating variety of gears like gillnets, hooks and lines seines trawls and dolnets, Fishing activity is mainly restricted to continental shelf and adjacent oceanic waters. Targeted fishery exists for neritic tunas along the coast, except for streaked

Spanish mackerels and were taken as part of a mixed catch of a larger variety of other resources.

Neretic tuna and allied resources contributed 83,181t to the marine fishery of the state. Neritic tuna landings alone was 45,602 t during the year 2020 which represent 55.3% of the total neritic resources. The species and contribution are kawakawa (28,318 t), frigate tuna (5,840 t), bullet tuna (6,888 t), longtail tuna (4,052 t) and bonito (504 t).

Spanish mackerels contributed 37,580 ton to the landings and was represented by narrowbarred Spanish mackerel (23,482 t) Indo-Pacific king mackerel (13,777 t), streaked Spanish mackerel (129 t) and the rest by wahoo.

Major part of the tunas were landed by sines (55%) followed by gillnets (27%) and hooks and lines (7.3%). Spanish mackerels were landed mainly by trawls (39%), followed by gillnets (29%) and hooks and lines (9.5%)

Gear-wise contribution of neritic tunas in 2020

Species/ Group	Name of gear and landings in tons										
	Bagnet	Boat seine	Gillnet	Gillnet +HL	H & L	Purse seine	Ring Seine	Shore-seine	Trawl +HL	Trawl	Others
Kawakawa	63	387	6006	942	2119	14303	2651	14	507	1318	9
Frigatetuna	0	18	1956	382	323	1995	1043	0	5	119	0
Bullet tuna	0	200	1131	940	739	2990	782	85	2	19	0
Longtail tuna	40	0	2503	0	29	1121	0	0	4	353	0
Oriental bonito	11	1	224	11	122	0	0	0	24	109	0
Total	114	605	11821	2275	3332	20409	4477	99	542	1919	9

Gear-wise contribution of Spanish mackerels in 2020

Species/ Group	Name of gear and landings in tons										
	Bagnet	Boat seine	Gillnet	Gillnet +HL	H & L	Purse seine	Ring seine	Shore-seine	Trawl +HL	Trawl	Others
Narrow-barred Spanish mackerel	129	230	4555	949	3061	4065	461	10	1515	8503	3
Indo-Pacific king mackerel	190	27	5612	86	458	799	113	25	47	6062	358
Wahoo	0	0	63	11	62	0	3	0	35	19	0
Others	0	0	0	1	0	0	0	0	1	127	0
Total	319	257	10230	1048	3581	4864	577	35	1597	14711	361

Catch rate.

Annual landing rate per unit of operation is also very meager for both tunas and Spanish mackerels. The highest CPUE of 389.6 kg was observed for tunas in purse seines, followed

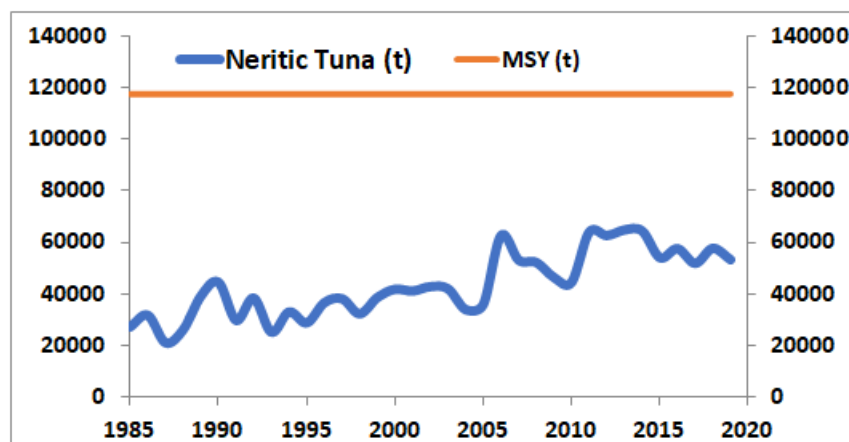
by in gillnets (42.8 k) and ring seines (23.9 kg). For Spanish mackerels it was the highest, 168.2 kg in trawls, followed by in purseseines (92.8 kg) and gillnets (19.7 kg). Catch rate (CPUE in kg) of neritic tunas and Spanish mackerels in different gears

Resource	Bagnet	Boat-seine	Gillnet	Gillnet +HL	H & L	Purse seine	Ring seine	Shore seine	Trawl +HL	Trawl	Others
Neritic tunas	0.4	15.	4.	42.	9.	389.	23.	4.	57.	2.	0.
Spanish mackerel	1.0	6.4	3.7	19.7	10.1	92.8	3.1	1.7	168.2	17.7	6.3

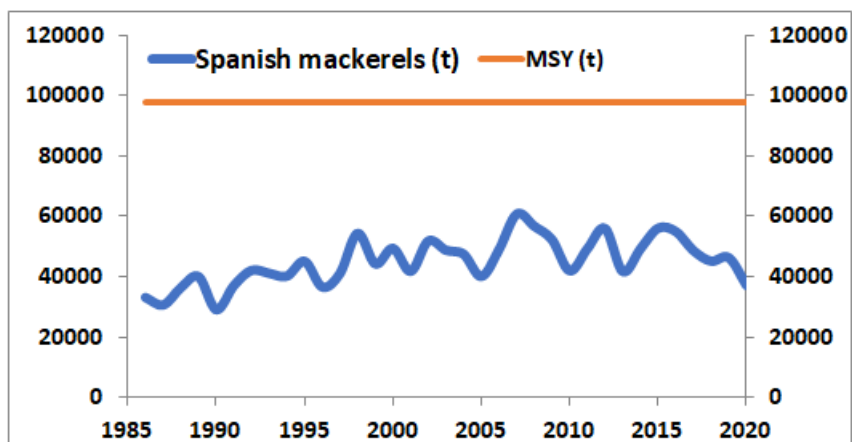
The poor catch rates in almost all gears indicated that they were being harvested as a non-target resource in all gears. Other major resources generally landed along with them are barracudas, leather jackets, rainbow runners, needle fishes, mahi mahi, kingfishes and types of reef fishes.

Landing trend

Neritic tunas registered gradual increase over the years with wide inter-annual fluctuation from 27,000 t in 1985 over 65,000 t by 2012 and declined marginally after 2016. Spanish mackerels also exhibited a steady increase over the years to over 56,000 t by 2012. After maintaining the landing at higher level landing registered decline during the recent years.



Landing trend of neritic tunas in Indian waters over the years



Landing trend of Spanish mackerels in Indian waters over the years

The recent decline in their landings during the recent years can be attributed to disruption in fishing activities due to damage and loss of infrastructures following cyclones and loss of fishing days due to lockdowns following Covid pandemics.

Biological characteristics of the species

Size characteristics

Size characteristics of all major species contributing to fishery were collected and the consolidated details were provide in the Table. This shows fishing along the Indian coastal waters were in highly healthy manner during the year. Mean size of the species were well above their maturity size and optimum size for exploitation in the major gear.

Size characteristics neritic tunas and Spanish mackerels landed during 2020

Species	Size range (FL-cm)	Lc	Lopt.	Lmat	Lmean
<i>E.affinis</i>	15-95	32.7	38.1	37.7	52.4
<i>A.thazard</i>	20-75	29.1	30.4	29.7	50.4
<i>T. tonggol</i>	301-100	45.4	50.7	49.8	65.5
<i>S.commerson</i>	55-170	73.2	71.2	70.0	93.7
<i>S.guttatus</i>	20-70	30.6	38.8	37.4	38.7

The improved size characteristics of the fishery can be attributed to the strict enforcement of management measures in the fishery like seasonal fishing ban to protect spawners and

young ones of the fishery resources and implementation of minimum legal size (MLS) in the harvest.

Annual stock assessment (2020)

Stock assessment of the five major species were carried out following conventional methods using length frequency analysis for the year 2020. Their fishing rate, yield and biomass at current fishing level at MSY level were estimated and the results were depicted in the table below

Reference point	<i>E.affinis</i>	<i>A. thazard</i>	<i>T.tonggol</i>	<i>S.commerson</i>	<i>S.guttatus</i>
Yield	28310	5867	4093	23478	13419
MSY	39932	7189	6042	42612	13408
Spawning stock Biomass (SSB %):	47.4	48.2	46.5	48.4	41.7
B_{curr}	134133	32098	12357	200717	11349
B_{msy}	111790	30555	9478	186986	14071
F_{curr}	3.33	2.92	4.24	2.43	1.192
F_{msy}	5.994	3.504	6.8	4.374	1.073
B_{curr}/B_{msy}	1.20	1.050	1.304	1.073	0.807
F_{curr}/F_{msy}	0.56	0.833	0.624	0.556	1.111

The fishing rates and biomass were at safe levels for all species except for Indo-Pacific king mackerel. All other species offer considerable scope for enhancing their fishery. However, caution is needed in the case of the latter. As has been stated above regular fishery monitoring and harvest regulations are added significantly to the stock health of all resources.

Summary:

Disruption in the fishing activities during the last few years along the Indian coast following natural calamities like cyclones and lockdowns following Covid-pandemics lead to considerable decline in landings in the country. However, implementation and enforcement of fishery regulations improved the biological condition of the landings and stock status of the resources.