Marine capture fisheries-Pelagic resources and their management

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Pelagic resources contribute around 50% of the total marine fish landings in India and the major contributors include the single species group comprising oil sardine (*Sardinella longiceps*), Indian mackerel (*Rastrelliger kanagurta*), Bombay duck (*Harpadon nehereus*) and the Hilsa shad (*Tenualosa ilisha*). The lesser sardines (*Sardinella* spp.), Ribbonfish (*Trichiurus lepturus, Lepturacanthus savala*), anchovies (*Stolephorus* spp. *Thryssa* spp.,), carangids (comprising scads, trevallies, pomfrets etc), seerfishes (*Scomberomorus* spp.) and tunas (coastal and oceanic) are the other major resources (Figs. 1 & 2). Different maritime states of India show different trends in landings of pelagic resources (Table 1)

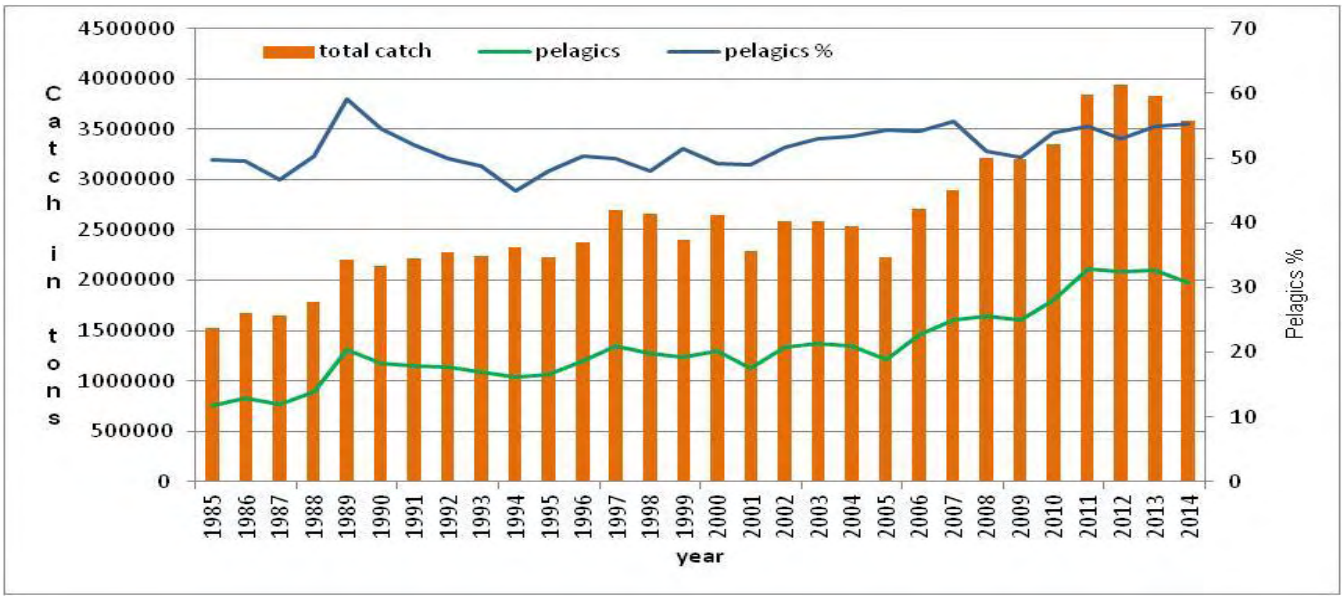


Fig. 1. Trend of annual all India marine fish landings and the contribution by pelagic fishery resources (1985 – 2014)

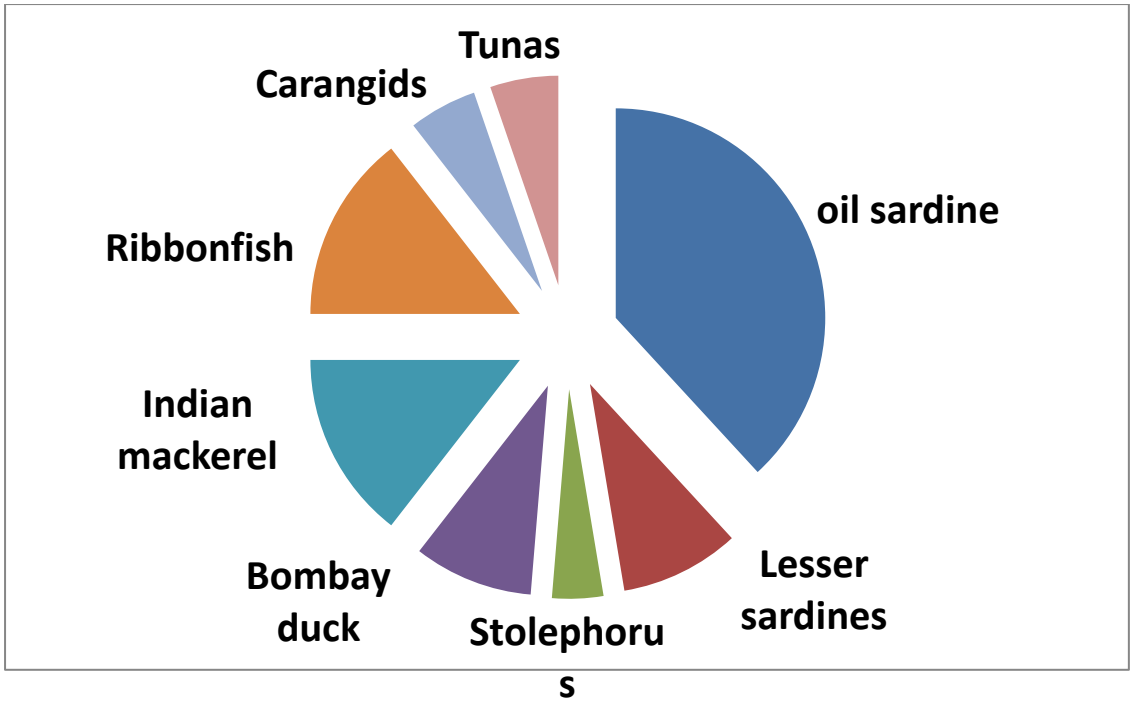


Fig.2. Resource wise contribution by major pelagic fishery resources to the total pelagic fish catch (Avg. 2005 -2014 period)

Table 1. State-wise status of marine fisheries 2016

State	Total Marine Fish Landings 2016 (lakh t)	Pelagics (lakh t) & % contribution	Major Resources	Gears
Gujarat	7.74	2.9 (39%)	Ribbonfish, clupeids, seerfish, tunnies	Dol net, trawls
Maharashtra	2.92	1.1 (41 %)	Bombay duck, Golden anchovy, Ribbonfish, Oil sardine	Seines, dol nets
Goa	0.6	0.55 (90 %)	Oil sardine, mackerel	Purse seines
Karnataka	5.3	2.8 (54 %)	Oil sardine, mackerel, ribbon fish, scads (Decapterus spp.)	Trawls and seines
Kerala	5.22	3.2 (61%)	Oil sardine, carangids, mackerel, anchovies	Ring seines

Tamil Nadu & Puducherry	6.6 0.7	3.1 (46%)	Oil sardine, Silverbellies*, mackerel, ribbonfish, tunas, seerfishes	Trawl nets, gill nets, ringseines
Andhra Pradesh	3.4	2.1 (63%)	Lesser sardines, mackerel, tunas & billfishes, ribbonfishes	Trawls, seines & gillnets
West Bengal	0.77	0.33 (43%)	Hilsa shad, clupeids, Bombay duck, Ribbonfish	Trawls, gillnets and dol nets
Odisha	1.39	0.77 (55%)	Lesser sardines, Mackerel, ribbonfish	Trawls

Indian Oil sardine *Sardinella longiceps*: It is a small lived, fast growing shoaling fish and shows high fluctuations in annual catches. Its maximum life span is less than 2 years and reaches a maximum size of 23 cm within this period. Fishes become mature at around 6 months of age when they attain sizes of about 14 cm. They are plankton feeders (phytoplankton and copepods) and their fishery is mainly confined to coastal water of less than 50 m depths. It is a highly favoured table fish in states like Kerala while it is less preferred in other coastal states of India. The oil content of the fish is very high and its highly valued for fish oil extraction and also for fish meal production. The Climate Change experienced with increasing sea surface temperature is reported to have caused fishes to migrate to cooler waters and establish themselves in deeper waters as well as the further north latitudes of the Indian coast.

Indian Mackerel *Rastrelliger kanagurta*: A short lived species, maximum 2-2.5 years life span, it reaches about 210 mm in Total Length by the age of 1 year. Its peak spawning period is during May to June on the west coast with another minor spawning peak during October - November. It feeds on copepods, phytoplankton and detritus. Catches also show strong inter-annual variations. Environmental conditions play an important role in creating favorable spawning and the first feeding for larvae required to ensure successful recruitment each year.

Bombay duck *Harpadon nehereus* : Its 'Discontinuous Distribution' pattern is characteristic and the fishery is confined to north west (Maharashtra & Gujarat) and north east coast (West Bengal, Odisha and northern Andhra Pradesh) of India. They are fished mainly by the fixed bag nets (*Dol* net) in the 15-50 m depth zone and also landed by trawlers. The fish has high water content and is easily perishable. Bulk of the catch is sundried and used for domestic consumption. Specially processed 'laminated Bombay duck' are in demand in foreign markets.

Hilsa shad *Tenualosa ilisha*: It belongs to the family clupeidae and is a shared stock among Bangladesh, India and Myanmar. An anadromous species, it forms schools in coastal waters and migrates upstream to breed. Although the resource is widely distributed all along the Indian coast, the states of West Bengal and Odisha on the north east coast of India contribute nearly 80% of the estimated hilsa landings from the marine habitat in India. Drift gill nets and seines are used in the fishery. During the monsoon season the hilsa shad is found in the estuarine/near shore areas where bulk of the catch is landed. Two well marked migrations of the marine hilsa shad into the Hoogly area during post-

monsoon (September/ October) and winter (January/February) was reported by Reuben et al., (1992). The fish is a highly esteemed table fish and commands prices over 1000 Rs per kg. Hence it is also subject to high fishing pressure and there was serious decline in the catch volumes in 2015. However in 2016, the fishery had bounced back with record estimated catch of 89,109 tonnes compared to a mere 16273 t in the previous year (CMFRI, 2016).

Lesser sardines (*Sardinella* spp.): This is a highly diverse group of sardines. The resources are mainly exploited along the south east coast (Tamil Nadu and Andhra Pradesh) using gill nets, seines and pelagic /bull trawling . Commonly recorded species are the *Sardinella gibbosa*, *S. fimbriata* and *S.sirm*. They are often landed in bulk quantities and sundried/ taken to fish meal plants depending on market conditions.

Anchovies: Five genera *Encrasicholina, Stolephorus, Thryssa, Setipinna* and *Coilia* are recognized and constitute seasonal fisheries mostly being fished in Andhra Pradesh, Tamil Nadu, Kerala, Karnataka and Maharashtra. The whitebaits are constituted by the *Encrasicholina and Stolephorus* genera only. They are highly favored as food fish in most of these states and some are used for dry fish trade and occasionally for fish meal. Along the southwest coast the whitebaits exhibit seasonal migration by the shoals moving southward in April- May and concentrating in the Gulf of Mannar and Palk Bay during the southwest monsoon. After this, the shoals again disperse and spread and occur from Quilon (Kerala) in the south to Ratnagiri (Maharashtra) in the north. All the fishes are short lived (< 2 years) with fast growth and hence considered as 'annual crops' that should be harvested optimally.

Ribbonfishes: This is a resource which has high demand in the export market. Among the various species available in Indian waters, *Trichiurus lepturus* is the most important component in terms of volume and value followed by *Lepturacanthus savala*. The resource is mainly exploited by trawls. These fishes grow upto 1m and are strongly carnivorous in their feeding habits with anchovies being a preferred food item.

Carangids: This is a highly diverse group comprising of several species. Groups like the scads are smaller and abundant in coastal waters which are caught using seines and trawls. Several other species grow to large sizes and occur in hooks and line/ drift gill net fisheries. Abdussamad et al., (2007) based on body shape, scale and lateral line scute counts, gill rakers, head shape, fin characters, body colour and mouth characterstics identified 49 species of carangids belonging to 20 genera (Table 2).

Table 2. Various carangid groups and genera recorded in Indian seas

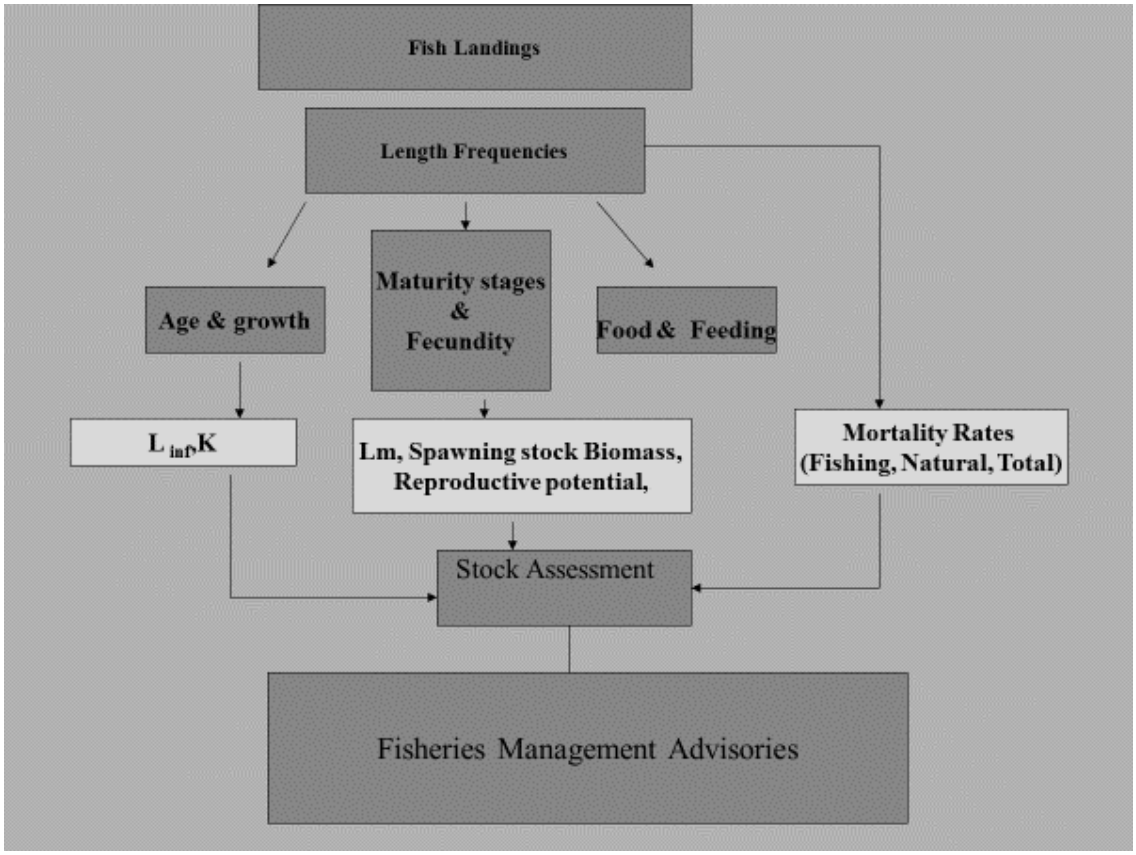
Group	**Genera**
Scads	*Alepes, Atule, Selar, Selaroides, Decapterus, Megalaspis*
Runners	*Elegatis*
Trevallies	*Atropus, Carangoides, Caranx, Ulua, Seriolina, Seriola,*
Pilotfishes	*Gnathanodon*
Jacks	*Naucrates, Uraspis*
Black Pomfret	*Parastromateus*
Queen fishes	*Scomberoides*
Pompanos	*Alectis, Trachinotus*

Seerfishes: These are high unit value fishes (*Scomberomorus commerson, S.lineolatus, S.guttatus* and wahoo *Acanthocybium solandri*). They are mostly exploited by drift gill nets operating in deeper waters (>80 m depths). Juveniles (<70 cm) occur as by-catch in trawls. They can grow upto 1.5 m and have a longer life span of 8-10 years and hence exhibit slower growth. Hence fishing regulations are required so that every year there are adequate numbers of juvenile fishes surviving to grow to bigger size, reproduce and produce new recruits to the fishery.

Bill fishes: These fishes are oceanic, highly migratory and often are straddling stocks. They have high demand in international markets and are exploited intensively in the Indian Ocean region using hooks and line, drift gill nets and troll lines. Marlins (*Makaira* spp.,) , sword fish (*Xiphias gladius*) and sailfish (*Istiophorus platypterus*) are mainly exploited.

Tunas : This group comprises coastal (*Euthynnus affinis, Auxis thazard, Auxis rochei*), neretic (*Thunnus tonggol, Sarda orientalis*) and oceanic (Skipjack *Katsuwonus pelamis* , yellowfin *Thunnus albacares*, Big eye *Thunnus obesus* and dogtooth tuna *Gymnosarda orientalis*). Skipjack is favored for *Masmin* production (a smoke dried tuna product from Lakshadweep) while the highly fresh yellowfin tuna is preferred for processing into premium export quality *Sashimi* tuna. Hooks and lines, troll lines, purse seines and drift gill nets land the tuna catches on the Indian mainland. Lakshadweep has a specialised pole and line fishery for skipjack tuna. Coastal tunas contain higher amount of red meat and are mainly preferredd for domestic consumption or producing canned tuna .

Resources are routinely monitored based on a sampling scheme from the commercial fishing vessels and length frequencies of the various commercially important species and their biology are recorded for making an assessment of the fisheries and the stock status (Fig.3).



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