

## Diversity of trawl catch in India

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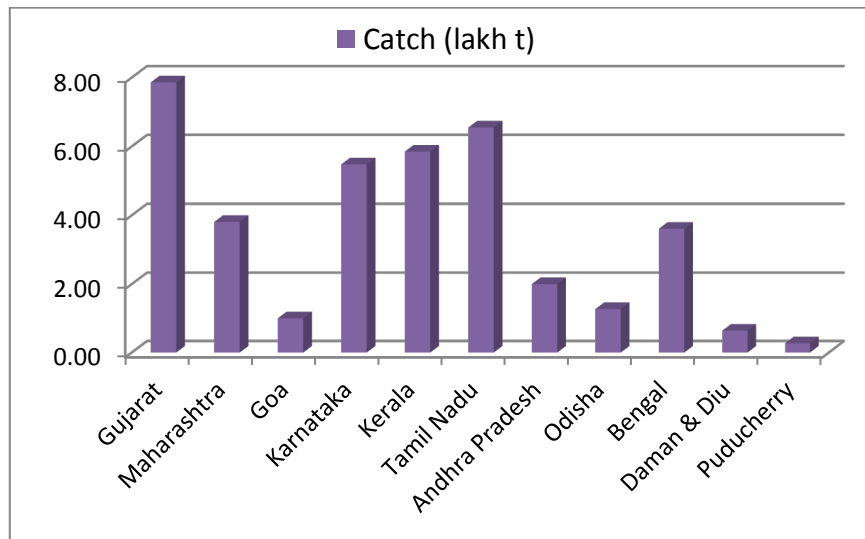
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### Introduction

The marine fish landing from the coast of the main land of India in 2017 was estimated as 3.83 million tonnes (t). The mechanised sector remained as the highest contributing sector with 3.17 million t (82.6%). In the mechanised sector 46.5% of the catch was by mechanised multi-day trawlers, 12.5% by mechanised single day trawlers, a total of 788 marine fish species were landed along the Indian coast (CMFRI, 2018).

The region-wise breakup of the landings indicated that southwest and northwest contributed almost equally to the landings spectrum with 12.33 lakh tonnes and 12.32 lakh tonnes respectively whereas the southeast contributed 8.82 lakh tonnes and 4.88 lakh tonnes by northeast during 2017. Gujarat continued to be in the top position for the fifth consecutive year with 7.86 lakh tonnes. Tamil Nadu stood behind Gujarat with 6.55 lakh tonnes. Kerala has overtaken Karnataka to emerge as the third largest producer in 2017 (Fig.1) (CMFRI, 2018).



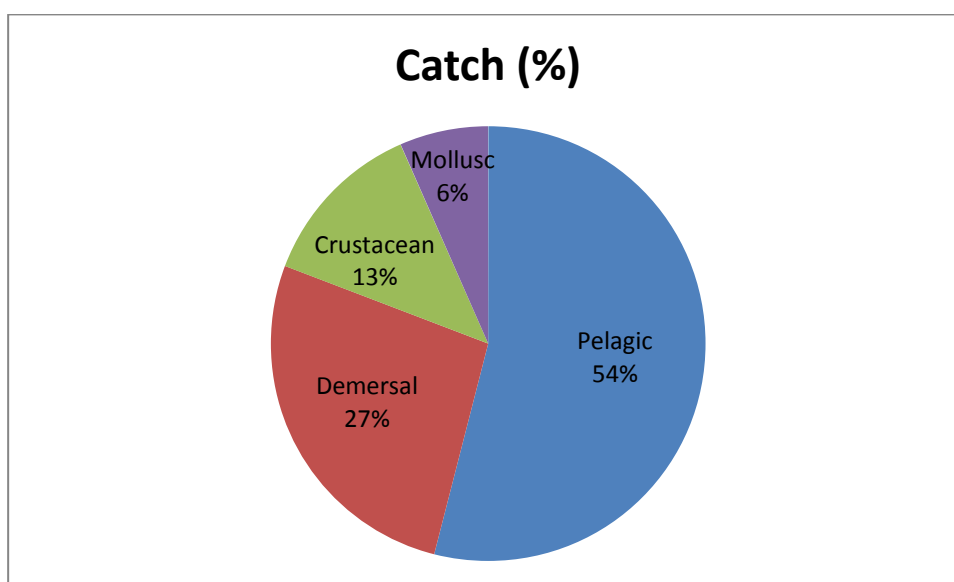
**Fig. 1. State-wise fish production (lakh t) all along Indian coast**

### Marine Fisheries

Pelagic finfishes dominated the marine fish landings during 2017 by contributing 54% of the landings. Indian oilsardine, mackerel, ribbon fish, lesser sardines and Bombay duck contributed almost 60% of the pelagic fish landings. Of this, oilsardine alone accounted for 16.3%.

Demersal finfishes contributed 26.8% to total landings. The major demersal resources landed were threadfin breams, croakers, silver bellies, bullseyes (*Priacanthus* spp.), and catfishes. Crustaceans comprised high value resources like shrimps, crabs and lobsters and the contribution from this group was 12.6%. Molluscs comprising squids, cuttlefish, clams and oysters accounted for the remaining 6.6% (CMFRI, 2018).

The mechanised sector remained the highest contributing sector with 3.17 million t (82.6%) being caught by this sector. The catch rates in terms of per boat catch was high (1568 kg/trip) for the mechanised sector. In terms of hours of operation also the catch rates were high for mechanised sector (50 kg<sup>h</sup><sup>-1</sup>). In the mechanised sector, 46.5% of the catch was by mechanised multi-day trawlers, 12.5% by Mechanised single day trawlers (CMFRI, 2018).



**Fig. 2. Marine fishery resources landings (%) along Indian coast**

**Table 1. Estimated marine fish landings (tonnes) in India 2017**

| <b>Pelagic finfish</b> |        | <b>Demersal finfish</b> |        |
|------------------------|--------|-------------------------|--------|
| <b>CLUPEOIDS</b>       |        | <b>ELASMOBRANCHS</b>    |        |
| Wolf herring           | 18566  | Sharks                  | 19777  |
| Oilsardine             | 337390 | Skates/Guitarfish       | 2628   |
| Other sardines         | 226970 | Rays                    | 17766  |
| Hilsa shad             | 63437  | Eels                    | 13174  |
| Other shads            | 6967   | Catfishes               | 88177  |
| <b>ANCHOVIES</b>       |        | Lizard Fishes           | 57803  |
| Coilia                 | 33574  | <b>PERCHES</b>          |        |
| Setipinna              | 8777   | Rock cods               | 53924  |
| Stolephorus            | 64859  | Snappers                | 10518  |
| Thryssa                | 38003  | Pig-face breams         | 16483  |
| Other clupeids         | 67607  | Threadfin breams        | 157773 |
| Bombayduck             | 145115 | Bullseyes               | 143451 |

|                                 |        |                    |                |
|---------------------------------|--------|--------------------|----------------|
| Half Beaks&Full Beaks           | 7883   | Other perches      | 53807          |
| Flying Fishes                   | 1345   | Goatfishes         | 20306          |
| Ribbon Fishes                   | 239355 | Threadfins         | 10764          |
| <b>CARANGIDS</b>                |        | Croakers           | 150241         |
| Horse Mackerel                  | 51964  | Silverbellies      | 89901          |
| Scads                           | 108010 | Whitefish          | 3807           |
| Leather-jackets                 | 16237  | <b>POMFRETS</b>    |                |
| Other carangids                 | 120019 | Black pomfret      | 12622          |
| <b>MACKERELS</b>                |        | Silver pomfret     | 28789          |
| Indian mackerel                 | 287880 | Chinese pomfret    | 5466           |
| Other mackerels                 | 636    | <b>FLAT FISHES</b> |                |
| <b>SEER FISHES</b>              |        | Halibut            | 2069           |
| <i>Scomberomorus commerson</i>  | 30170  | Flounders          | 90             |
| <i>Scomberomorus guttatus</i>   | 18163  | Soles              | 43173          |
| <i>Scomberomorus lineolatus</i> | 74     | <b>Shellfish</b>   |                |
| <i>Acanthocybium solandri</i>   | 268    | <b>CRUSTACEANS</b> |                |
| <b>TUNNIES</b>                  |        | Penaeid shrimp     | 209513         |
| <i>Euthynnus affinis</i>        | 27680  | Non-penaeid shrimp | 202748         |
| <i>Auxis</i> spp.               | 16640  | Lobsters           | 2863           |
| <i>Katsuwonus pelamis</i>       | 10559  | Crabs              | 53476          |
| <i>Thunnus tonggol</i>          | 7350   | Stomatopods        | 14784          |
| <i>Thunnus albacares</i>        | 13505  | <b>Cephalopods</b> |                |
| Other tunnies                   | 4656   | <b>MOLLUSCS</b>    |                |
| Bill Fishes                     | 11328  | Squids             | 131774         |
| Barracudas                      | 33337  | Cuttlefish         | 109089         |
| Mulletts                        | 7939   | Octopus            | 10816          |
| Unicorn Cod                     | 325    | Miscellaneous      | 2135           |
| Miscellaneous                   | 68279  | <b>TOTAL</b>       | <b>3834574</b> |

(Source CMFRI, 2018)

### Trawl fisheries

Trawling is the major gear used to exploit marine resources along Indian coast. Penaeid shrimps are the main stay of the trawl fishery. Out of 35,228 trawlers in the fishery, Gujarat accounted for the maximum (32.9%) followed by Tamil Nadu (16.4%), Maharashtra (15.9%) and Kerala (10.4%) (CMFRI, 2012)

Single day trawlers leave the fishing port early morning and return by afternoon. The multiday trawlers operate for more than one night extending up to 9 to 13 days. Though trawl is a non-selective gear there is a targeted fishery in each season. Major targets are shrimps, cephalopods and high valued demersal fishes. High opening bottom trawls, and midwater trawls are operated which target demersal, semipelagic and pelagic fishes. In the early years of trawling the depth of operation was limited to 30 to 50 m with the voyage time of 5 to 8 hours. The entire catch was brought to the shore and similar scenario is continuing in single day operating vessels

in many landing centres. In the case of multi-day operating vessels generally entire catch was not brought to shore if the catch is more than the fish hold capacity. It was observed that the comparative economic viability of bringing the fish in preserved form or in non-preserved form depends on the demand for the species in the landing centre (Dineshababu, 2014).

Average all India trawl landing for the period 2008-2011 was 17, 21,000 t with a maximum of 20,27, 000 t in 2011 which formed 51 % of the total marine fish landing in the country . The west coast of India contributed 51 % of the catch. Gujarat State accounted for 20% of the trawl landing of the country of which 42% is landed at Veraval fisheries harbor. Likewise, Karnataka account for 11% of the country's trawl landing of which 54% landed in Mangalore fisheries harbor. On the east coast of India, Andhra Pradesh accounted for 9% of Indian trawl landing of which Visakhapatnam fisheries harbor accounted for 51%. It was observed that even though the total landing by trawlers showed a steady increase during 2008-2011, similar increase was not reflected in the edible portion of the landing, which was fluctuating around 3 lakh t. The nonedible portion of the landing steadily increased from 50,000 t in 2008 to one lakh t in 2011. The LVB at different centres increased from 16% of the total catch in 2008 to 27% in 2011 (Dineshababu, 2014).

### **Trawl catch**

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. The finfishes exploited by trawls belong to 21 major fish groups, out of which, sciaenids contributed maximum (18.4%) to the demersal landings along the Indian coast, followed by threadfin breams (17.3%). Each region is characterised by dominance of specific finfish groups. The NE coast is characterised by the dominance of sciaenids, catfish and pomfrets (together contributing 74% to the demersal landings), the SE coast is characterised by the dominance of silverbellies and pigface breams, the SW coast by the threadfin breams and other perches, and the NW coast by the sciaenids, catfish and threadfin breams (Zacharia, 2012).

The total production by trawlers along the northeast sector of India was 2.39 lakh t, during 2014 (CMFRI, 2018). Goat fishes (23.7%) and silverbellies (23.1%) were dominant in trawl catch, followed by clupeids (9.85%), ribbonfishes (8.33%) and nemipterids along Southeast coast of India during 2004-6 (Sreedhar, 2010).

In Gujarat, the annual marine fish landings during 2017 registered an all time high of 786495 t. Sector-wise, Gujarat showed the dominance of mechanised fishing vessels with a catch of 7.38 lakh t. Landings from mechanised sector were mainly contributed by multiday trawlers (MDTN), where highest catch was landed from MDTN (4.04 lakh t) with 46 kg h<sup>-1</sup> Catch per unit effort.

Estimated marine fish landings of Maharashtra during 2017 was 3.81 lakh t with 30% increase from the previous year (2.92 lakh t). Trawlers contributed 57% of catch.

Total estimated marine fish landings in Karnataka and Goa was 547784 t and 61219 t respectively. Mechanised sector comprising mainly trawlers and purseseiners was the major contributor to the catch in both the states. Pelagic resources continued to be the dominant group in both states followed by the demersal fishes, crustaceans and molluscs.

Total marine production in Tamil Nadu during 2017 was 6.55 lakh t. Single day mechanised trawlers contributed 56.5% of the total landings, followed by multiday trawlers (17.5%) and together formed 74% of the total landings. Total landing in Puducherry was 27040 t. MDTN contributed 74% of the total landings.

Trawl landings in Andhra Pradesh was 1.36 lakh t forming 51.8% of the total marine landings during 2013-14. Marine landings of Andhra Pradesh in 2017 were estimated at 1.99 lakh t. Trawl was the major gear contributing 46.78% with catch rates of 22.06 kg h<sup>-1</sup> for multiday trawlers and 8.34 kg h<sup>-1</sup> for motorised outboard trawlers.

### **Discarded bycatch**

In 2008, the estimated discard constituted 18% of the total trawl catch at Mangalore, which came down to 6% in 2011, whereas in Calicut the discarded catch which was 15% of the total trawl catch came down to 4% in 2011. At Veraval, in most of the season, the entire bycatch was landed by trawlers, as there was no restriction of the landing of trash in any form of deterioration. In Visakhapatnam the discarded catch was 22%. In Mumbai 15% of the bycatch was presumed to be discarded since there was restriction on trash fish landing in deteriorated form and the average trash landing was only 7% of the total trawl landing. In Chennai, reported discard was very nominal (1%) (Dineshababu, 2013).

### **Low value bycatch (LVB)**

At Veraval, it is a regular trend to land most of the fishes caught by trawlers and the LVB landing during 2008-11 showed a steady increase from 24% to 33%. At Veraval fisheries harbor, a very efficient market chain exists for the LVB which encourages trawl operators to bring as much trash as possible for landing. During the year 2011, 10.44% of the catch was discarded at Veraval during the monsoon and post monsoon months (August to December), when the demand for the trash fish is too low due to erratic weather conditions. The trash landing at Veraval was more than 50,000 t in 2011. In major landing centres of Mumbai, the percentage of LVB landed remained around 5%, and the trash fish landed were only those caught during the last day of the voyage.

In Mangalore, as in other centres, single-day trawlers brought all the catch to shore and the trash consisted of 30 to 40% of total catch. On the other hand, multiday trawlers brought the trash in semi-preserved form suitable for fish meal and fertilizer producers. In Mangalore also a strong market chain exist for the LVB and the business is becoming a very prominent economic activity in fisheries of Karnataka. In Mangalore fisheries harbour the increase in trash landing was phenomenal, the trash landing which formed only 3 % (3,000 t) of the trawl landing in 2008 increased to 26% of the total fish landed (12,000t) in 2011, the percentage of LVB was 3, 14, 21, 26 in 2008, 2009, 2010 and 2011 respectively. This increase in LVB landing was the result of increased demand from an array of fish meal plants operating all along the Karnataka coast. In Karwar the LVB landed by single day operating trawls was about 42 % (2,310 t) in 2011.

In Calicut also there was high demand for the LVB by fishmeal plants and in this centre, LVB landing in 2011 was 12,000 t forming 26% of the landed catch. In Kochi, at Munambam, the total estimated LVB landed in 2011 was 1,992 t forming 7.2% of total trawl landings and in

Sakthikulangara fisheries harbour the estimated LVB in 2011 was 11% of the total landing. In Chennai, the estimated LVB landing was 13% (3,000 t) of the total landing in 2008 which increased to 17% in 2011 (5,800 t). In Visakahapatnam, estimated LVB landed show a steady increase from 2% (705 t) of the landing in 2008 to 21% (19,000 t) in 2011 (Dineshababu, 2014).

### **Bycatch from single day trawlers**

It is estimated that during the fishing year (2007-08) single day operating trawlers from Mangalore Fisheries harbour landed 1,601 t of fishes out of which 583t (36.44%) were of non edible, low valued fauna which is landed as trash. The highest trash landing was during December (47.2%). Stomatopods were the most dominant group among the bycatch, followed by finfishes, whereas, non-edible crabs, invertebrates, cephalopods and other molluscs were present in lesser quantities. the bycatch from single day trawlers consisted of 35 species of finfishes, 20 species of crustaceans, 20 species of gastropods, 3 species of echinoderms 2 species of coelenterates and one sea snake (Dineshababu, 2014).

### **Bycatch and discards from multi-day trawlers**

In the multi-day trawlers total landing was estimated at 65,589 t. out of which 2,418 t (3.69%) were landed as trash, which formed part of the bycatch caught during the last two days of the fishing. The low valued bycatch caught earlier to the last two days were discarded, 14% of the catch was discarded during the process which amounts to be 9,199t. (Dineshababu, 2014).

## **Issues**

### **Excessive fishing effort**

Excessive fishing pressure has resulted in stagnation and decline in the landings; decreased catch rates, incomes and intense competition and conflict among fishers.

### **Inappropriate exploitation pattern**

The use of trawls with small-meshed cod-ends is a cause for concern from the point of view of growth overfishing, biodiversity loss and economic loss. Strict implementation of the legal cod-end mesh sizes in trawls would particularly help in preventing growth overfishing and restoration of stocks

### **Habitat degradation**

Sea floor gets disturbed and damaging the corals, sea-grass and other biota due to continuous dragging of bottom trawls.

### **Non selective fishing**

Trawls landing huge quantity of juveniles, discards and Low value bycatch which are not fetching good returns. Catching of juvenile leads to growth overfishing.

## Conclusion

1. Out of 35,228 trawlers in the fishery, Gujarat accounted for the maximum (32.9%) followed by Tamil Nadu (16.4%), Maharashtra (15.9%) and Kerala (10.4%).
2. The finfishes exploited by trawls belong to 21 major fish groups, out of which, sciaenids contributed maximum (18.4%) to the demersal landings along the Indian coast, followed by threadfin breams (17.3%).
3. The west coast of India contributed 51 % of the catch. Gujarat State accounted for 20% of the trawl landing of the country.
4. The nonedible portion of the landing steadily increased from 50,000 t in 2008 to one lakh t in 2011. The LVB at different centres increased from 16% of the total catch in 2008 to 27% in 2011.
5. single day operating trawlers from Mangalore Fisheries harbour landed 1,601 t of fishes out of which 583t (36.44%) were of non edible, low valued fauna which is landed as trash.
6. Out of the total, 14% of the catch was discarded from multiday trawlers at Mangalore coast

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