Marine Finfish Fisheries of India

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Finfish is a term used to describe the strictly classified biological group of fishes, sometimes called true fishes to distinguish them from other aquatic life whose common names also end in "fish", or any other aquatic organisms harvested in fisheries or aquaculture. The marine finfishes are classified into pelagic and demersal assemblages based on the realm in which they occupy in the ocean. The pelagic finfishes are those which generally occupy in the upper strata or columnar ocean waters of the oceans and ranges from small sized clupeoids to large sized tuna and bill fishes. They are one of the major components in the marine fish landings along the Indian coast. Demersal finfishes are grouped, based on their depth-wise distribution, as finfishes occupying the neritic areas in the continental shelf. In deep waters, they are found on or near the continental slope or along the continental rise. The finfish fisheries in India have exploited many major fish groups of different biological characteristics occupying a variety of ecological niche. Some of these groups, especially of large size, are targeted by the fishermen by using different craft and gear combinations. However, several other demersal finfishes are not targeted, but are landed as bycatch by shrimp trawlers (Vivekanandan, 2011). Large species are mainly caught by gillnets and hooks and lines. The shoals of small species are generally caught by trawls, seines and bag nets. Trawl catch consists of 76% demersal (finfish 38% and inveretebares-38%) remaining pelagic or column water fishes.

The exploitation of pelagic finfish groups has been predominant in India, especially in the southwest coast. They encompass an array of species residing in all realms of the pelagic region and include the small unicorn cod to the large billfishes, the planktivorous to the highly carnivorous fishes. Their vast distributional range makes them vulnerable to exploitation by different categories of gears such as seines, gillnets, lines and pelagic and mid-water trawls. However, the proper exploitation of the demersal finfishes in India has been initiated only three decades ago (Bensam, 1992). With the introduction of mechanized bottom trawling from the late fifties, the exploitation of demersal finfishes attained a threefold increase during late eighties. Demersal fish groups such as the sharks, groupers, snappers, threadfins, pomfrets and Indian halibut are commercially valuable and contribute substantially to the economy of Indian marine fisheries.

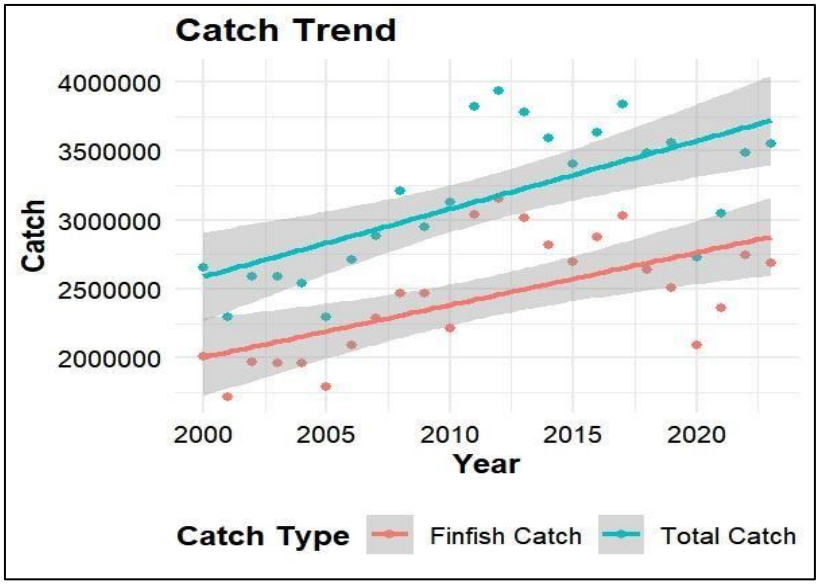

Fig. 1. Trend in marine fish landings of India and the contribution by finfish catch during 2000-2023

The marine fish landings in India during 2000-2023 period shows that the catch is increasing steadily over the years from a meagre of 2.6,53 million tonnes to nearly 3.549 million tonnes in 2023 with an average annual landing of 3.154 million tonnes (Fig. 1). The catch share of finfishes during the last 24 years indicates a similar trend with its contribution always higher than 70% of the total marine fish landings in India. The average annual landings of marine finfishes are estimated at 2.44 million tonnes during the period which was about 77% of the total marine fish landings of the country.

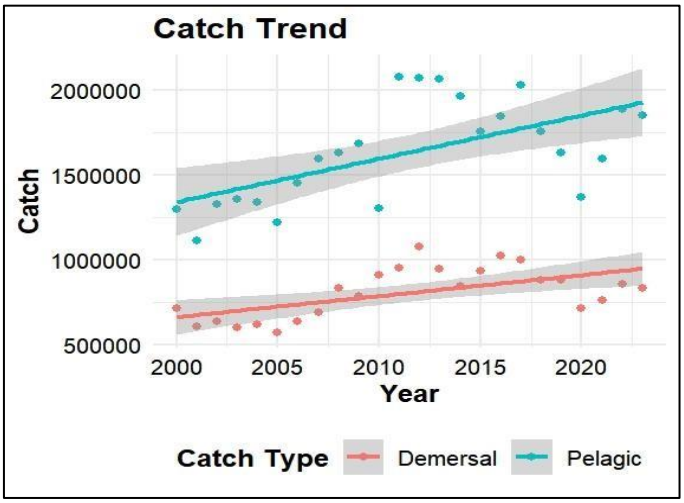

Fig. 2. Trend in the landings of pelagic and demersal finfish assemblages in India

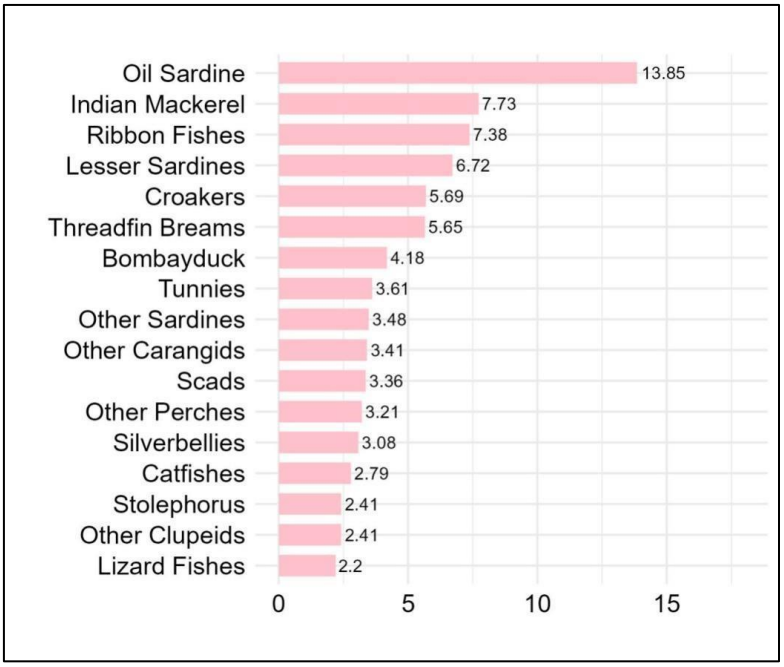

Fig. 3. Contribution of different groups to the marine finfish landings of India during 2000-2023

The group wise composition of finfish assemblages in Indian marine fish landings during 2000-2023 indicate that the major contributors are the cluepeids (27.7%) including the Indian oil sardine (13.3%), lesser sardines, shads etc., followed by perches (12.81%), composed of threadfin breams, rock cods, snappers etc. The other major contributors are carangids (10.73%), Indian mackerel, ribbonfishes, croakers, bombayduck, tunnies, silverbellies, lizardfishes etc. The species wise landings indicate that Indian mackerel is the second dominant (12.2%), followed by ribbonfishes and lesser sardines. The exploitation status of the important groups of finfishes along the coast of India are briefly given below.

Indian Oil Sardine

The average annual landings of oil sardine (*Sardinella longiceps*) in India during 2000-2023 was 3,38,063 tonnes which is about 13.9% of the total finfish landings of the country. The catch trend indicates that the resource is declining over the years with a clear cyclical fluctuation in their annual landings. The dominant region is the southwest coast of India (71.2%), comprising Kerala, Karnataka and Goa, followed by southeast coast. The major gear which exploits oil sardine is the seine nets especially mechanised ring seins and outboard ring seins followed by mechanised trawls.

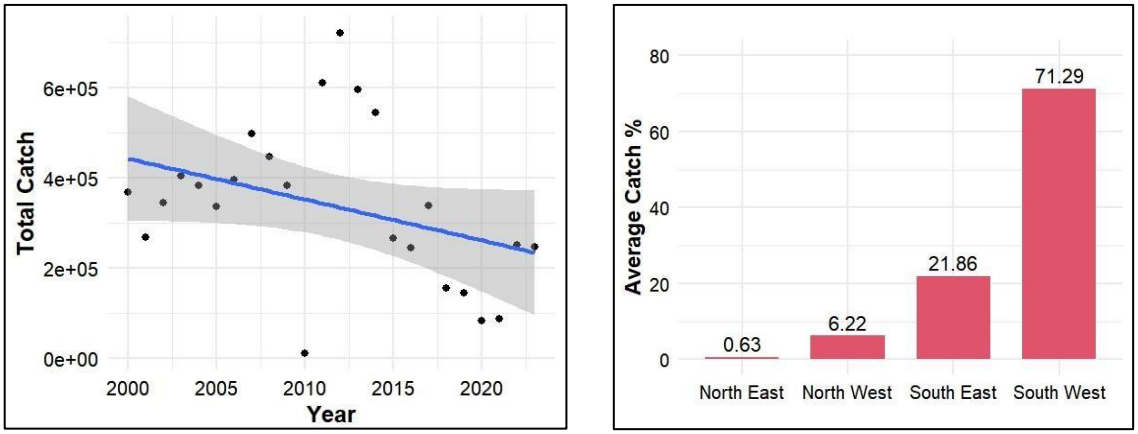

Fig. 4. Trend in landings of oil sardine in India and its region wise contribution during 2000-2023

Fig. 5. Oil sardine landings by ring seine units at Chettuva Fisheries Harbour, Kerala

Indian Mackerel

The annual landings of Indian mackerel *Rastralliger kanagurta* in India during 2000-2023 increased over the period with an annual average landing of 1,88,605 tonnes which formed about 7.7% of the total finfish landings of the country. The dominant region is the southwest coast of India, comprising Kerala, Karnataka and Goa, followed by southeast coast. The major gear which exploit oil sardine is the seine nets especially mechanised ring seins and outboard ring seines followed by mechanised trawls.

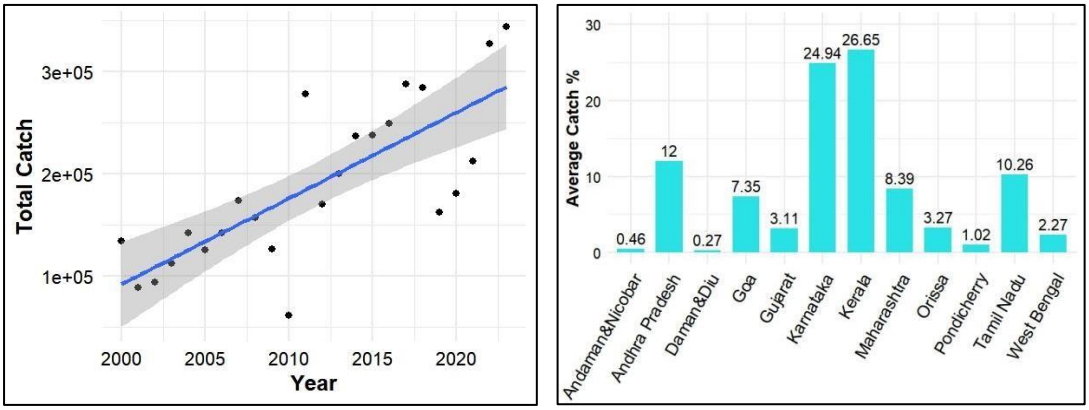

Fig. 6. Trend in landings of Indian mackerel in India and its state wise contribution during 2000-2023

Ribbonfishes

The average annual landings of ribbonfishes in India during 2000-2023 were 1,80,222 tonnes which formed 7.4% of the total finfish landings of the country. The catch trend indicates that the resource is gradually increasing over the period with major fluctuations in their annual landings. Northwest coast of India contributes bulk of the landings (>50%) of ribbonfishes with highest share by Gujarat (38.5%), followed by Maharashtra (11.1%). There are many species which support ribbonfish fishery, and the dominant was *Trichiurus lepturus* which are landed by both mechanised trawls as well as hook and lines.

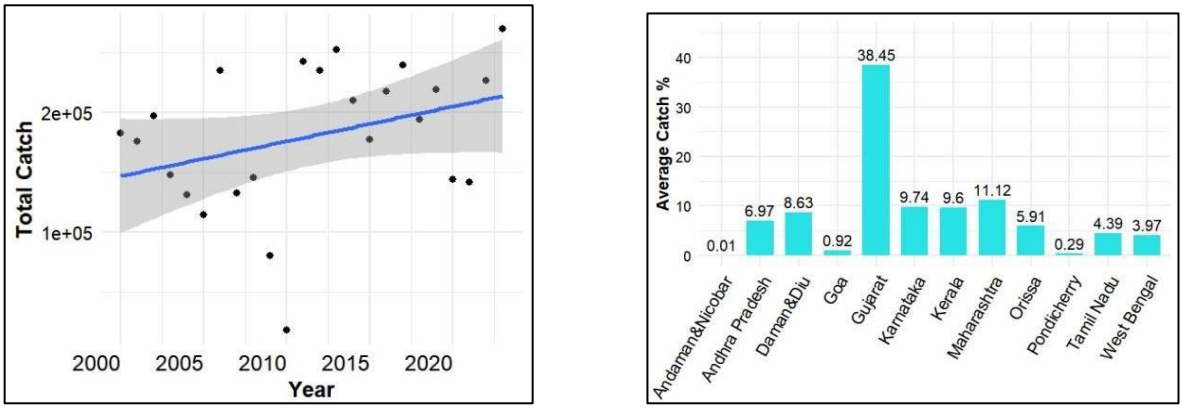

Fig. 7. Trend in landings of ribbonfishes in India and its state wise contribution during 2000-2023

Anchovies

The trend in annual landings anchovies in India during 2000-2023 indicate that the catch increases over the period with an annual average landing of 1,36,532 tonnes which formed about 5.6% of the total finfish landings of the country. The dominant state in the landings is Kerala with 30.6% of the landings being landed in the state, followed by Gujarat (15.6%), Tamil Nadu and West Bengal. Several species which support anchovy fishery and the dominant was *Stolephorus* sp. which are mainly by seine nets especially mechanised ring seins and outboard ring seins followed by mechanised trawls and outboard gillnets.

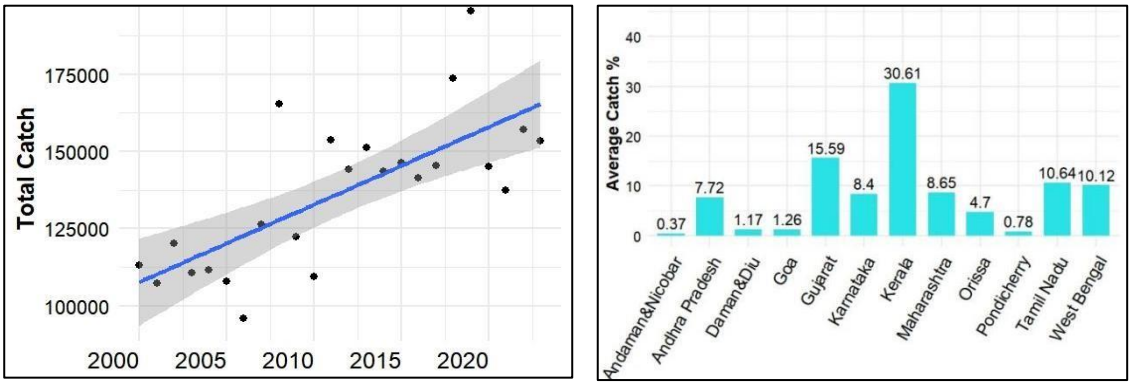

Fig. 8. Trend in landings of anchovies in India and its state wise contribution during 2000-2023

Carangids

Carangids are highly diverse group of fishes characterised by varying body shape and size. There about 60 species under 20 genera reported from Indian waters, some of which support commercial fishery along the coast of India. The average annual landings of carangids in India during 2000-2023 were 2,13,131 tonnes which formed 8.73% of the total finfish landings of the country.

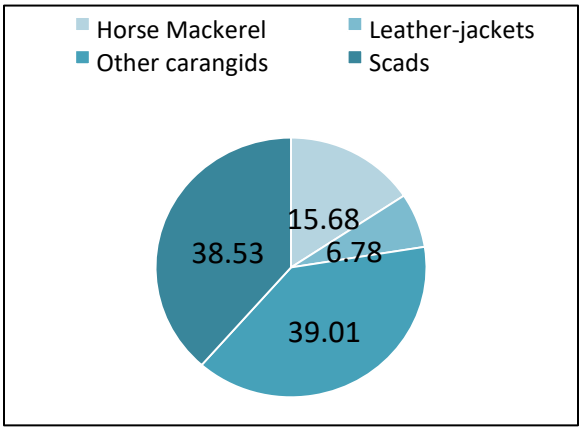

Fig. 9. Composition of carangids in the annual landings during 2000-2023

The dominant group among carangids are scads, mainly *Decapterus russelli,* which constituted 39% of the carangid landings of the country. The trends in landings of scads indicates that the resource is gradually

increasing over the period. southwest coast of India contributes bulk of the landings (>75%) of scads with highest share by Kerala (36.5%), followed by Karnataka (29.6%).

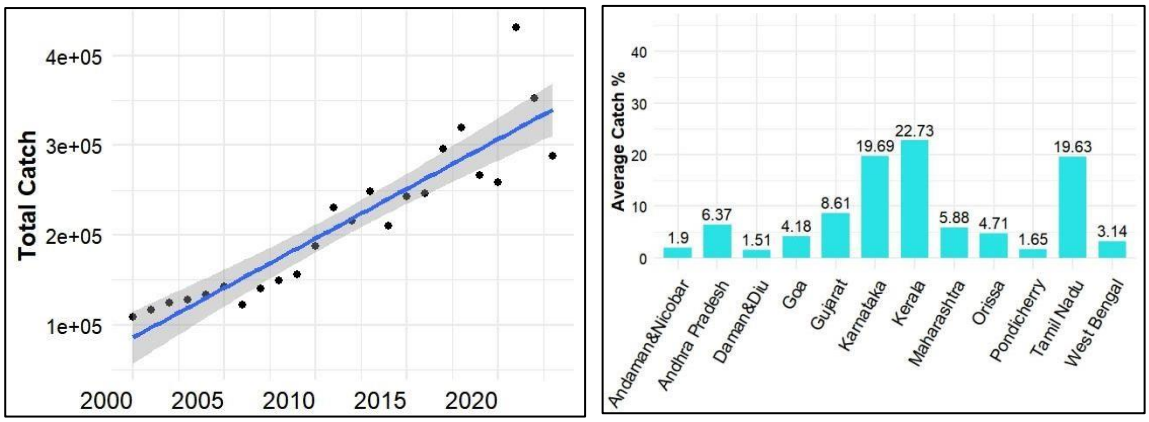

Fig. 10. Trend in landings of scads in India and its state wise contribution during 2000-2023

Tunnies

The average annual landings of tuna and allied species in India during 2000-2023 were 88,088 tonnes which formed 3.6% of the total finfish landings of the country. The dominant species among tunas are the mackerel tuna, which constituted 37.1% of the tunnies' landings of the country. The trends in landings of tunnies indicates that the resource is gradually increasing over the period. The west coast of India contributes bulk of the landings (>50%) of tuna and allied species with highest share by Kerala (20.5%), followed by Gujarat (16%). There are many species which support the tuna fishery and dominant one was *Euthynnus affinis* (37%), followed by *Auxis sp.* (16.1%) and *Katsuwonus pelamis* (14%).

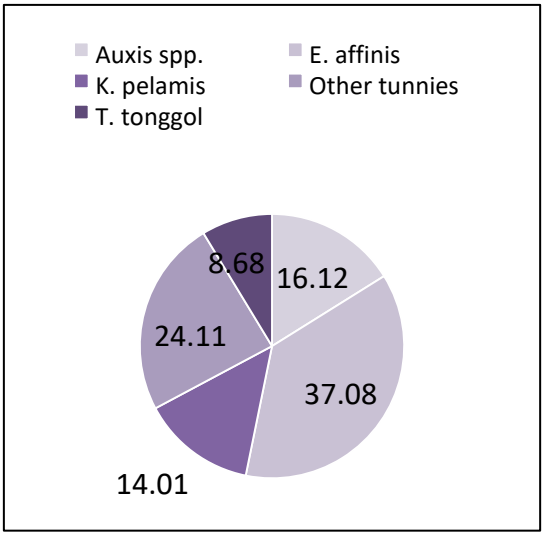

Fig. 11. Composition of tunnies in the annual landings during 2000-2023

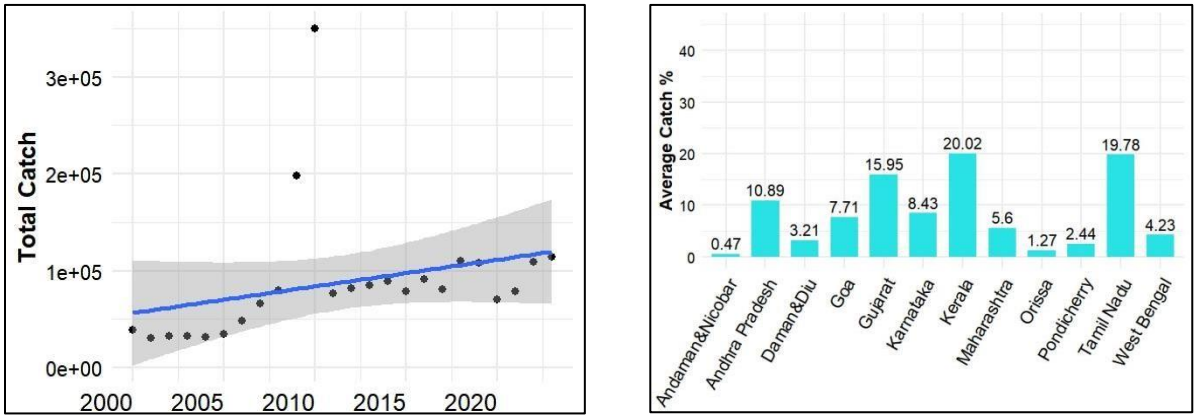

Fig. 12. Trend in landings of tunnies in India and their state wise contribution during 2000-2023

Elasmobranchs

In India, there are about 110 species of elasmobranchs, of which 66 species of sharks, 4 sawfishes, 8 guitarfishes and 32 species of rays are landed in the commercial catches. Among these, 34 species are commercially important. Some species of elasmobranchs are protected under the Wildlife Protection Act (10 species), Majority of the species of elasmobranchs in the Indian seas are viviparous, some are oviparous and few are ovo-viviparous with very low fecundity. All India landings of elasmobranchs during 2000-2023 was 49,259 tonnes, forms 2.0% of finfish catch. Trawl nets accounting for 48.8%, gillnets 35.6% and hook & line units 6% of the total elasmobranch landings of the country.

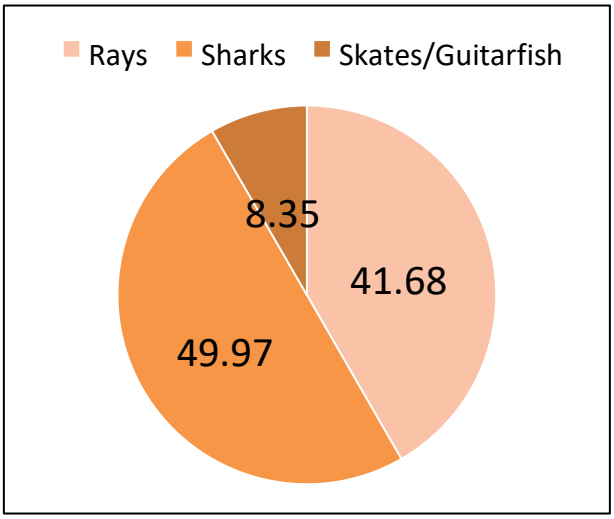

Fig. 13. Composition of elasmobranchs landed in India during 2000-2023

Sharks: Average annual shark landings in India during 2000-2023 was 24,614 tonnes, which formed 45% of the total elasmobranch landings of the country. The dominant species in the landings were *Carcharhinus falciformis* (37.25%), *Alopias superciliosus (11.85%), Sphyrna lewini (11.53%), Alopias pelagicus* (8.53%). Most of the catch was contributed by multiday trawl nets (34%) followed by mechanised gillnet units (27%).

Fig. 14. Landings of sharks at Cochin Fisheries Harbour, Kerala coast

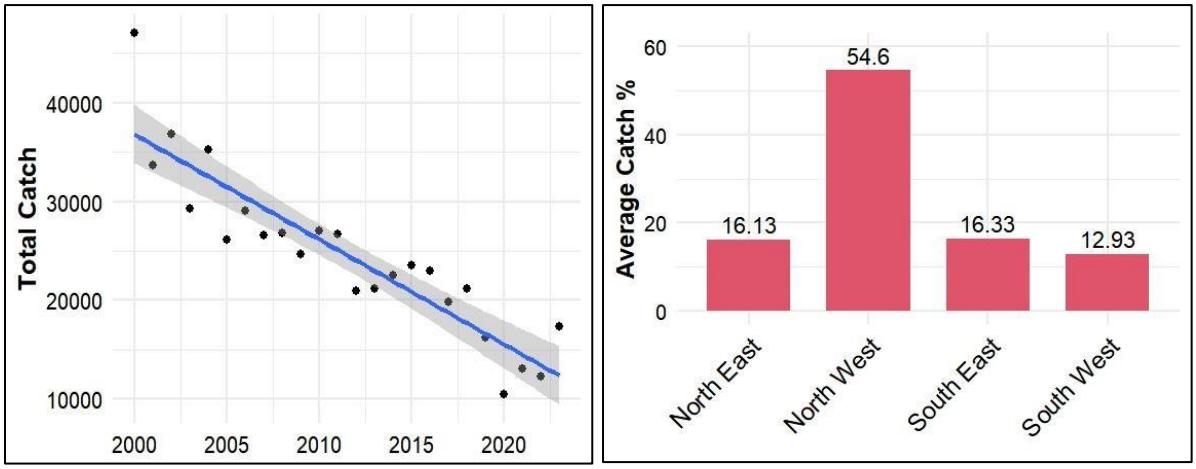

Fig. 15. Trend in landings of sharks in India and its region wise contribution during 2000-2023

Rays: The landing of rays in India during 2000-2023 was 20,533 tonnes, which formed 41.7% of the total elasmobranch landings of the country. The major families in the landings were Dasyatidae, Mobulidae, Myliobatidae, Gymnuridae and Rhinopteridae

Skates/guitar fishes: All India landings of guitarfishes were estimated at 4,112 tonnes, which constituted 8.3% of the total elasmobranch landings of the country. The major families of guitarfishes landed along the coast are Rhinidae and Rhinobatidae.

There are significant changes in the share of sharks and rays to total elasmobranch landings recent years. All India production of elasmobranchs during 1999-2010 shows that sharks were dominant in the catch with 49.7% share and that of the rays was 44.5%. However, the landings during 2013-17 indicate that the rays have emerged as the dominant group with 48% followed by sharks with 45% share.

Sharks are crucial to marine ecosystems. They maintain a balance in populations of prey species. They are in a global decline. Overfishing & life history parameters have reduced many shark populations. Life history traits are making sharks, a vulnerable group of fishes. Conservation and management measures for shark species are initiated in India. Already 10 elasmobranch species are protected in India under Wildlife Protection Act. There is a blanket ban on the export of shark fins from India. Unlike many other countries, the sharks are landed 'fin on' in India and there is a great demand for shark meat in the local markets in many parts of the country.

Perches

This group was abundant in the rocky grounds off Kerala and Tamil Nadu and was exploited by drift nets, hooks and lines and traps. All India annual average landings of *Perches* during 2000-2023 is 2.78 lakh tonnes and forms 11.4% of total finfish landings. Among the different groups of perches landed along the Indian coast, threadfin breams were the dominant group with 49.6% of the total perch landings, followed by other perches mainly composed of bull's eyes belonging to the family priacanthidae with 28.1% share, rock cods/groupers 12.4%, pigface breams 6.2% and snappers contributed 3.7%.

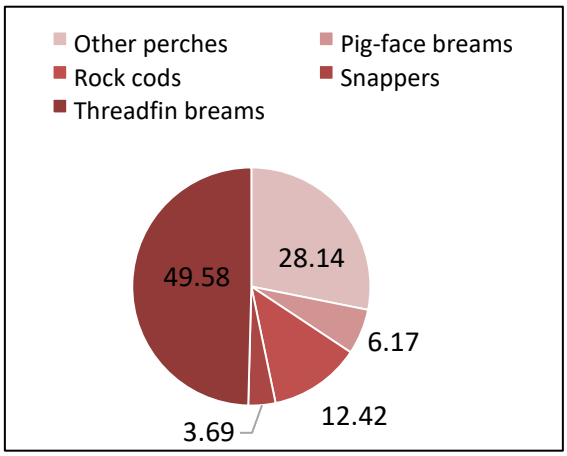

Fig. 16. Composition of different groups to the total perch landings in India

Threadfin breams

Six species of threadfin breams are known from the seas around India. *Nemipterus japonicus, N. randalli, N. bipunctatus, N. metopias, N. zysron, N. nematophorus, N. tolu.* Among these, *Nemipterus japonicus and N. randalli* are commercially important. Their abundance is influenced by upwelling and is known to move to inshore waters during monsoon period along the west coast. They are fractional spawners with protracted spawning periods. Spawning in *N. japonicus* takes place during October-April with a peak during October- December along Gujarat. In Kerala, *N. japonicus* and *N. randalli* spawn during monsoon and post monsoon periods with peaks during monsoon in the former and during post monsoon in the latter species. All India annual average landings of threadfin breams during 2000-2023 was 1,37,918 tonnes, forms 5.7% of the total finfish catch in India.

Fig. 17. Landings of threadfin breams along southwest coast of India

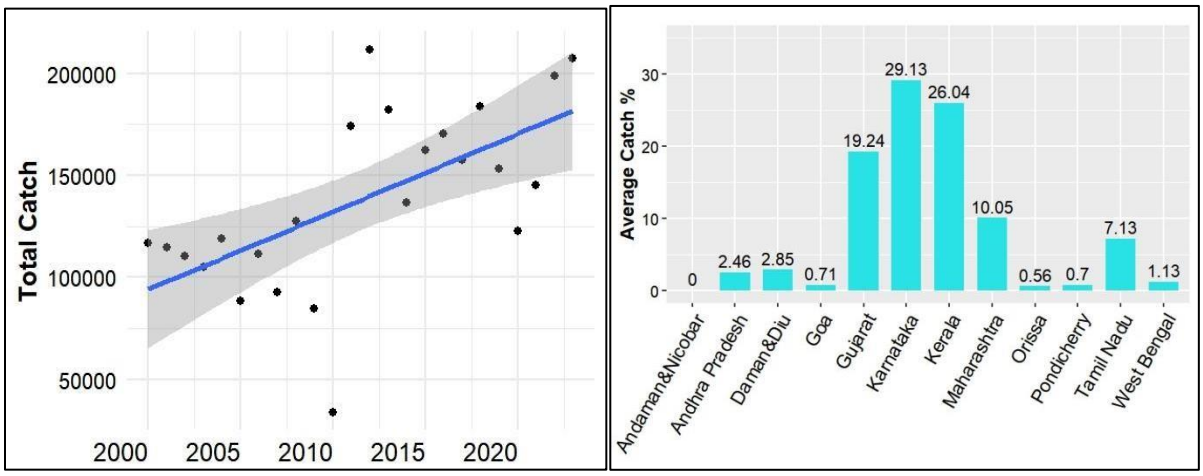

Fig. 18. Trend in landings of threadfin breams in India and its state wise contribution during 2000-2023

Groupers/rock cods

Rock cods or groupers are protogynous hermaphrodites, initially maturing as females then reverting to males as they grow in age and size. The major species observed in the landings are *Epinephelus chlorostigma, E. diacanthus, E. areolatus, E. tauvina, E. morrhua, E. bleekeri, E. longispinnis, Cephalopholis argus, Aetheloperca rogaa, Variola louti*. The annual landings of groupers during 2000-2023 in India was 34,540 tonnes, which formed 1.4% of the finfish landings of India. North-west coast comprising Gujarat and Maharashtra dominate in the catch with 68% of the total grouper landings of the country.

Fig. 19. Landings of Groupers and Snappers at Cochin Fisheries Harbour, Kerala

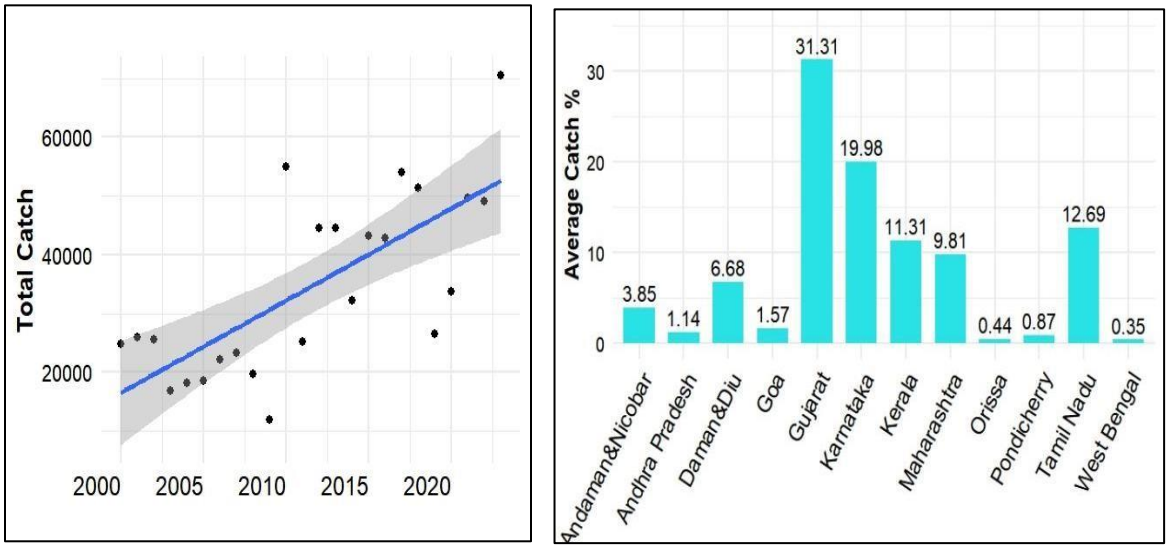

Fig. 20. Trend in landings of rock cods in India and its state wise contribution during 2000-2023

Snappers

The major species observed in all India landings of snappers were *Pristipomoides typus, Lutjanus argentimaculatus, L. gibbus, L. rivulatus, L. bohar*, and *L. lutjanus*. The annual catch of snappers during 2000-2023 in India was 10,260 tonnes. Southeast coast of India contributed the majority of landings of snappers in India with 63% followed by northwest coast of India.

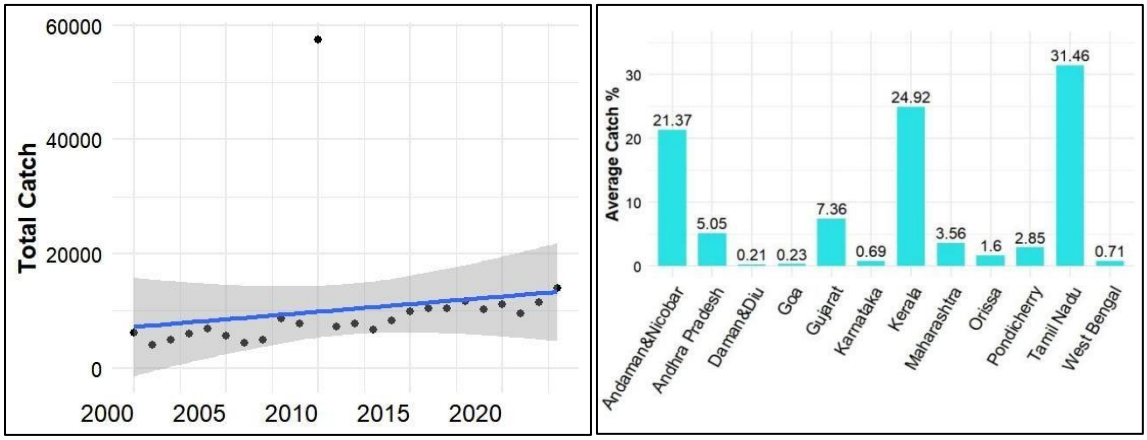

Fig. 21. Trend in landings of snappers in India and its state wise contribution during 2000-2023

Pigface breams

The major species observed in the landings of pigface breams/ emperor breams in India are *Lethrinus mahsena, L. lentjan, L. conchyliatus, L. nebulosus, L. ramak, L. elongatus* and *Lethrinus miniatus*. The landings of Pigface breams in India during 2000-2023 was 17,166 tonnes, which formed about 0.7% of the total finfish landings of the country. South east coast of India contributed the major share of landings of pigface breams in India.

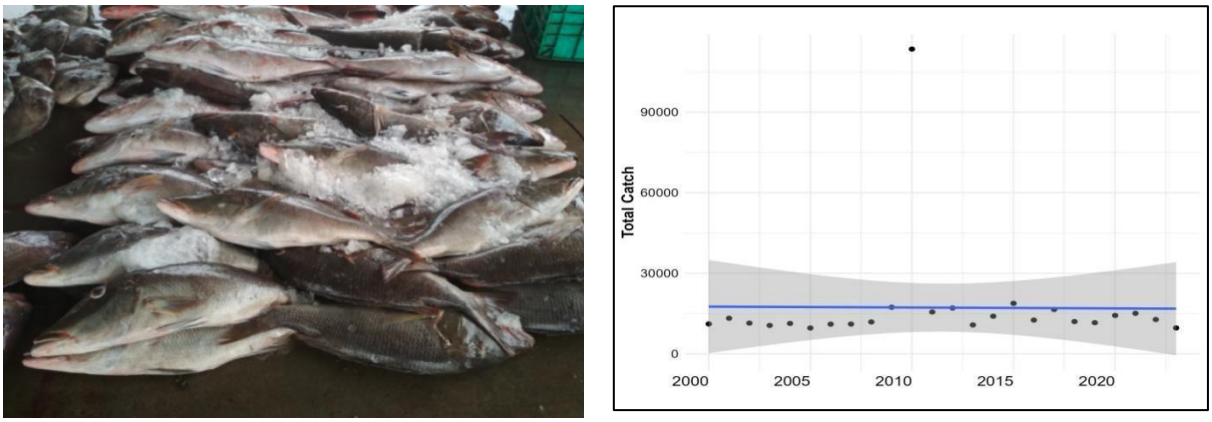

Fig. 22. Catch of the Emperor bream/ pigface bream landings along the Kerala coast and Trend in landings of pigface breams in India during 2000-2023

Catfishes

Catfishes are one of the important demersal finfish resources which have wide distributional range in the Indo-Pacific region. Marine catfishes belong to the family Ariidae, of which 11 species appear in the commercial fisheries. Average annual

landings of catfishes during 2000-2023 were 68,171 tonnes which formed 2.8% of finfish landings of the country. West coast of India landed 70% of the total catfish catch and the east coast 30%, northwest coast landed 90% of the west coast catch. All species of catfishes exhibit parental care - the male carrying the brood (25-120 eggs) in the oro-buccal cavity for 1 to 2 months' time until the juveniles (4-7 cm) are released. After spawning the brooding males segregate into shoals and move along the surface and prefer shallow water. The newly released juveniles of all species of tachysurids live in the shallow muddy grounds feeding on the bottom epi-and in-fauna – become easy target in fishing.

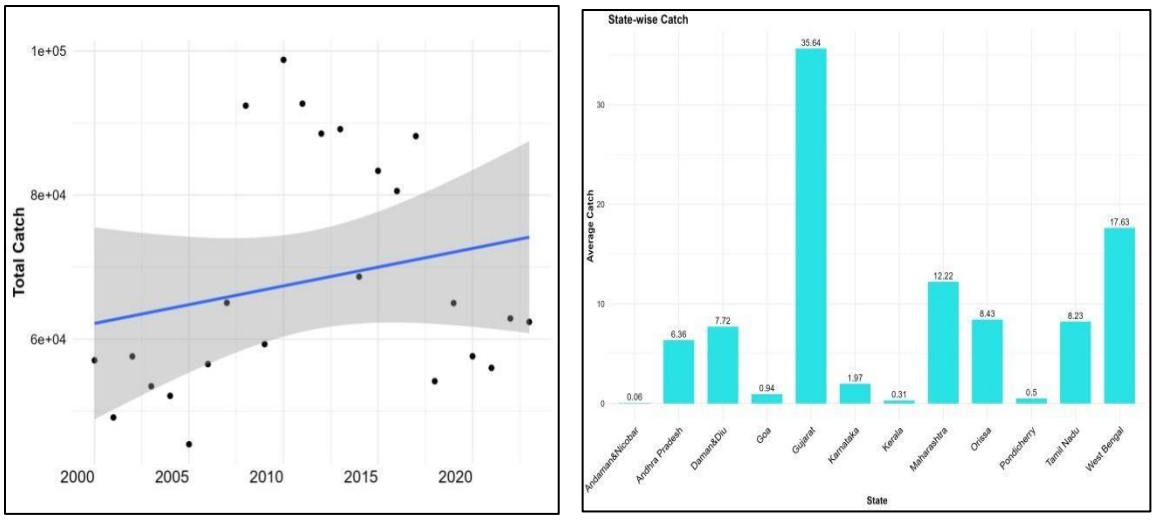

Fig. 23. Trend in landings of catfishes in India and its state wise contribution during 2000-2023

Lizardfishes All India landings of lizardfishes is 53,674 tonnes, forms 2.2% of finfish catch in the country. The species of lizardfishes landed along the west coast of India are *Saurida tumbil, S. undosquamis, Trachinocephalus myops*, *Synodus englemani* and that of east coast are *S. undosquamis, S. longimanus* and *S. micropectoralis, S.tumbil, T. myops*, *S. englemani*. Spawning in *S. tumbil* occurs during September to March off Veraval and Bombay along Northwest coast; August to November off Cochin.

Fig. 24. Lizardfish landings along the west coast of India

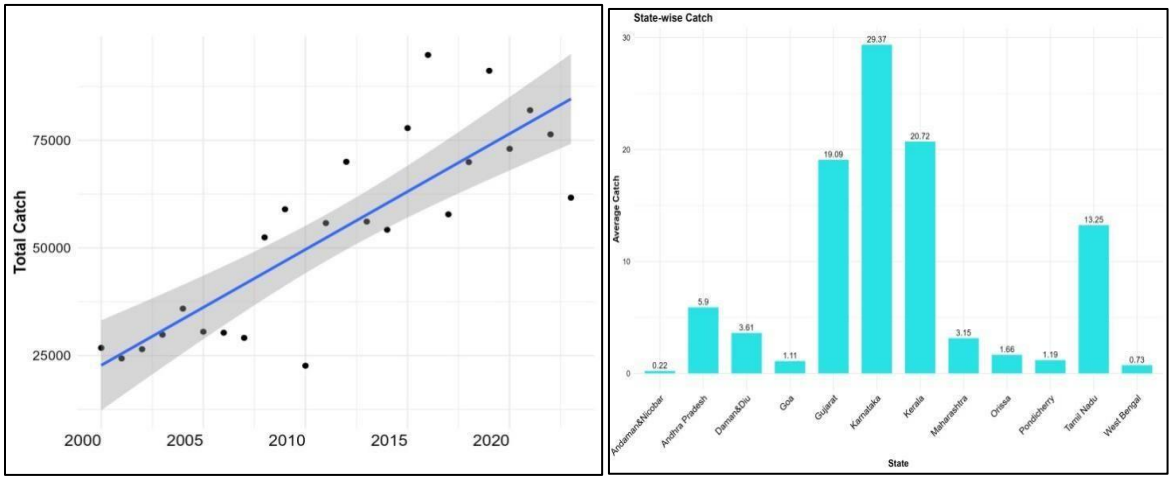

Fig. 25. Trend in landings of lizardfishes in India and its state wise contribution during 2000-2023

Flatfishes

These were abundant in muddy and/or sandy bottom up to about 80 m depth belonging to genera such as *Cynoglossus, Psettodes, Pseudorhombus, Bothus, Paraplagusia,* etc. and exploited by trawl nets, gill nets and other artisanal gears. The Commercial exploitation of flatfishes along the Indian coast varies widely with *Cynoglossus macrostomus* dominating in the west coast and *Cynoglossus macrolepidotus* along the east coast. The Fishery of *Psettodes erumei* showed a decline in recent years. The all India landings of flatfishes during 2000-2023 was 46,340 tonnes, which formed 1.9% of finfish catch of India. Bulk of the landings of soles are contributed by northwest coast followed by southwest coast.

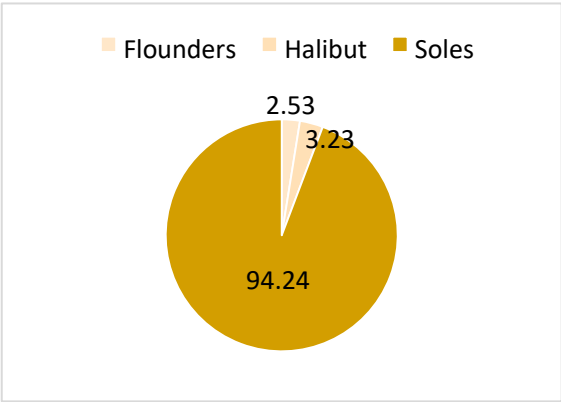

Fig. 26. Composition of flatfishes in the annual landings during 2000-2023

Whitefish/Big jawed Jumper

This resource is also called butterfish and known to be depleted/overexploited by the mechanised trawl operations along the near-shore waters of west coast of India. Although distributed all along the coastline, it has been supporting notable fisheries along the southwest and southeast regions. All India landings of whitefish is 7939

tonnes, forms 0.32% of finfish catch. *Lactarius lactarius* is the only species available in this family. Whitefish production in India shows wide fluctuation.

Fig. 27. Flatfish and Whitefish landed along the Kerala coast

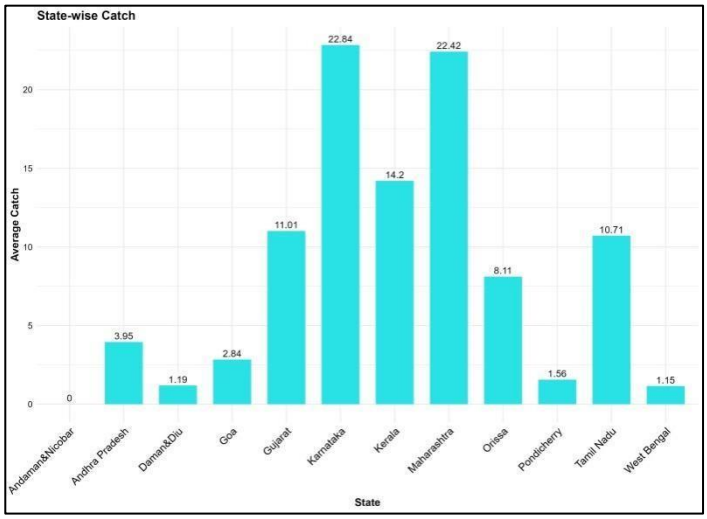

Fig. 28. Region wise distribution of soles along the Indian coast

Sciaenids/croakers

Sciaenids include high value demersal resources like croakers, which are landed mainly in Gujarat and Maharashtra. The important gears used are trawls and gill nets. These fishes are caught mainly during October - December and January - March. They mainly consist of the species like *Pseudosciaena diacanthus, Otolithes* spp. and *Johneiops* spp. *Protonibea diacanthus, Johniops macrorhynus, Otolithes cuvieri, J. dussumieri, J. glaucus,* and *O. ruber*. All India annual landings of Sciaenids during 2000-2023 is 1,38,947 tonnes, which formed 5.7% of finfish catch of the country. Northwest region is the

highest contributor followed by northeast region. They are mostly harvested by single day/multiday mechanised trawls.

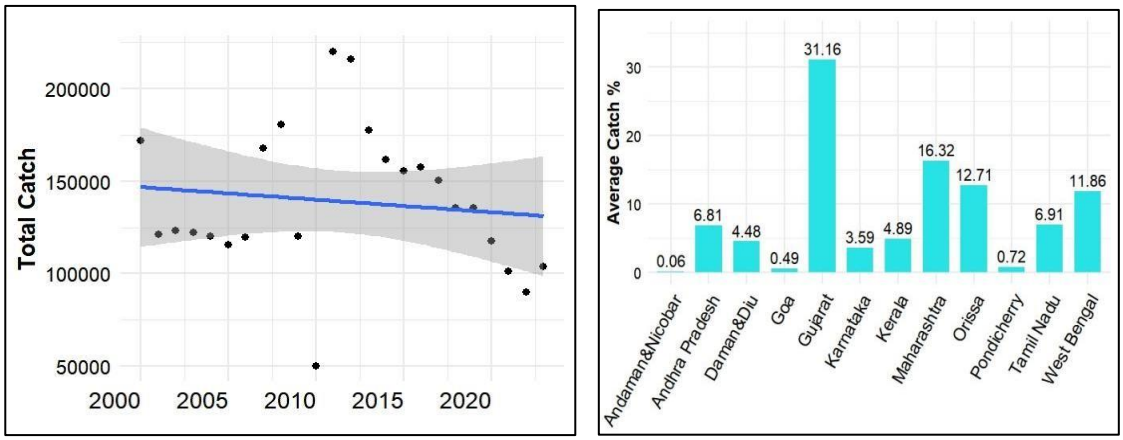

Fig. 29. Trend in landings of croakers in India and its state wise contribution during 2000-2023

Pomfrets

Pomfrets belong to two families, the black pomfret *Parastromateus niger* is coming under the family Carangidae and the silver pomfret *Pampus argenteus* belongs to the family Stromateidae. They are landed abundantly in Gujarat and Maharashtra. The black pomfret landings in India during 2000-2023 was 17,828 tonnes forming 0.7% of finfish catch, and that of silver pomfret was 25,644 tonnes, which formed 1.1% of finfish catch. Now the silver pomfret species identified are *Pampus candidus* dominating along the west coast and *P. griseus* along the east coast.

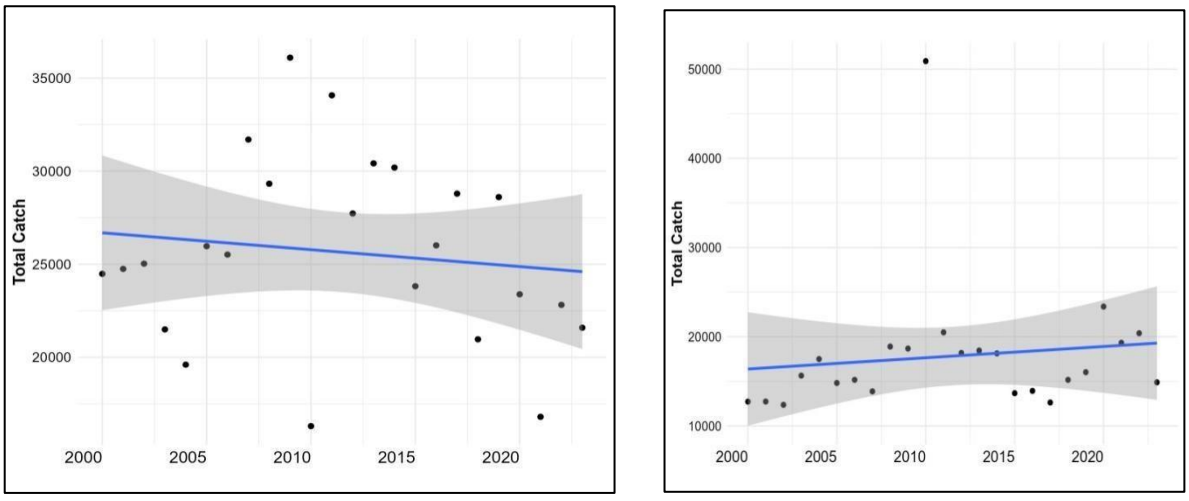

Fig. 30. Catch trends of silver pomfrets and black pomfrets along the Indian coast

Silverbellies

Silverbellies belonging to the family Leiognathidae. Exploited by trawl nets and artisanal gears, this group formed about 11% of demersal finfish production. The major species landed along the coast of India are *Leiognathus splendens, L. equlus, Gazza minuta, L. bindus, L. dussumieri, L. jonesi, Secutor insidiator*. All India annual landings of silverbellies was 75,103 tonnes, which formed 3.1% of finfish catch of India and most of the catch is contributed by southeast coast of India, especially by Tamil Nadu

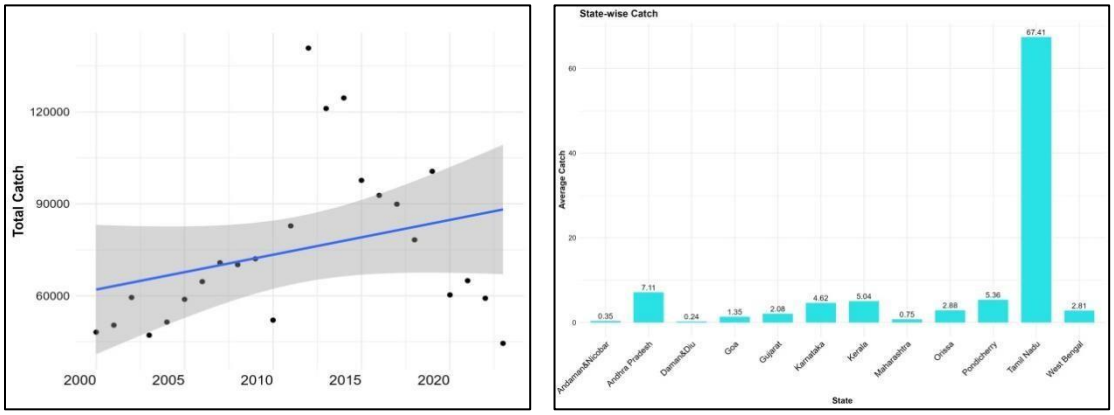

Fig. 31. Catch trends of silverbellies a along the Indian coast during 2000-2023

Regionwise Distribution of Finfish species

Finfishes exploited by trawls belong to 21 major fish groups. Each maritime region of India is characterized by dominance of specific finfish groups. Along the northeast (NE) coast , sciaenids, catfishes and pomfrets are dominant. The southeast coast is characterised by the abundant landings of silverbellies and pigface breams. Along the southwest coast of India, oil sardine, mackerel, threadfin breams and other perches are the major resources and the northwest coast is characterised by the dominance of sciaenids, catfish, pomfrets and threadfin breams.

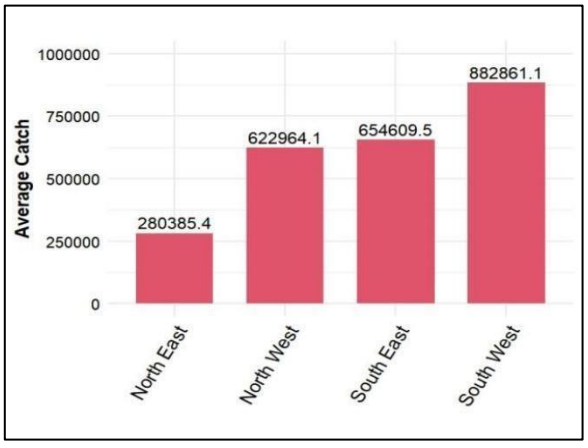

Fig. 32. Region -wise landings of finfishes during 2000-2023

Status of Finfish Fisheries in Maharashtra

The overall catch trend of finfishes along the coast of Maharashtra indicates that the catch is decling over the period 2000-2023 with an average annual landing of 1.955 lakh tonnes, which formed about 66.2% of the total marine fish landings of the state. The highest landed resource was croakers with a catch of 23,120 tonnes which formed 11.82% of finfish landings of the state followed by ribbonfishes 20,793t (10.63%), bombayduck 18,339 t (9.38%), Indian mackerel 15905 t (8.13%) and threadfin breams 14045 t (7.18%). The major share of the landings was by mechanised trawl nets (38.9%) followed by mechanised dolnets (29.5%), mechanised purse seines (17.3%) and mechanised gillnets (9.3%).

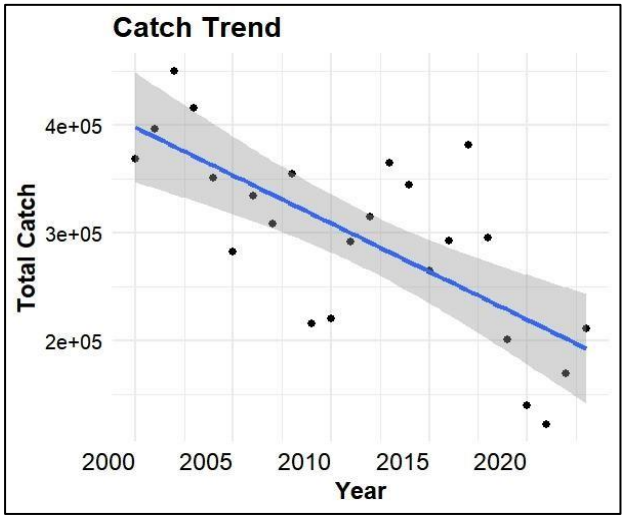

Fig. 33. Trends in landings along Maharashtra coast during 2000-2023

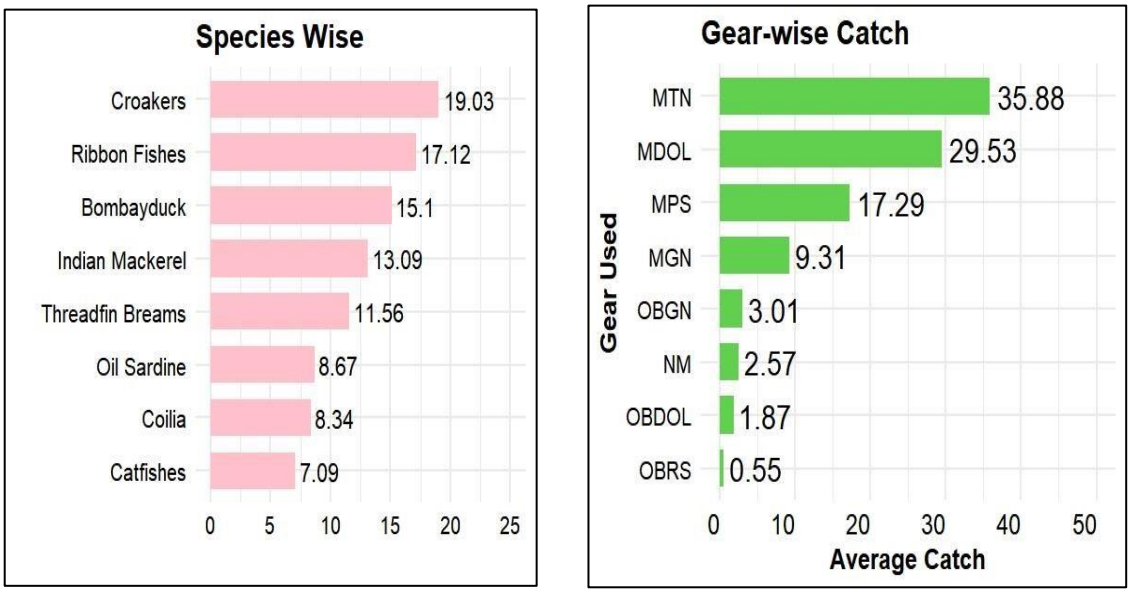

Fig. 34. Species-wise and Gear-wise catch along Maharashtra coast during 2000-2023

Status of marine finfish stocks of India

The health of marine fish stocks has declined globally, with only 65.8% of assessed stocks being fished within biologically sustainable levels in 2017; a drop from 90% in 1974 (FAO, 2020). However, it was also seen that effectively managed fisheries have shown increases in biomass while those which have under-developed management systems are still in poor shape (FAO, 2020). Stock status information is generally scarce and available only for a few coastal stocks in certain areas. Most of the stocks monitored by FAO are assessed based on catch trends and other ancillary information rather than analytical stock assessments or fishery-independent data. Therefore, the state of stocks in the region is considered highly uncertain and should be treated with caution (FAO, 2022). Most of the marine fish stocks of India are assessed as healthy (CMFRI, 2023). In a recent study which assessed 49 marine finfish stocks in India, 90.7% were healthy, indicating that the current management measures are adequate in the prevailing scenario (CMFRI, 2023). For this purpose, stock assessments were carried out using length-based micro-analytical models, for commercially significant species which include the stocks of 49 finfishes. However, the marine realm is always under threat from several factors including climate change, pollution, unplanned coastal development, etc. which could change things dramatically. To be ready for any potential upheavals in the future, we need to use innovative methods that are holistic and use a more integrated approach incorporating spatial, temporal, environmental and technological dimensions for better management of fish resources and marine ecosystems.

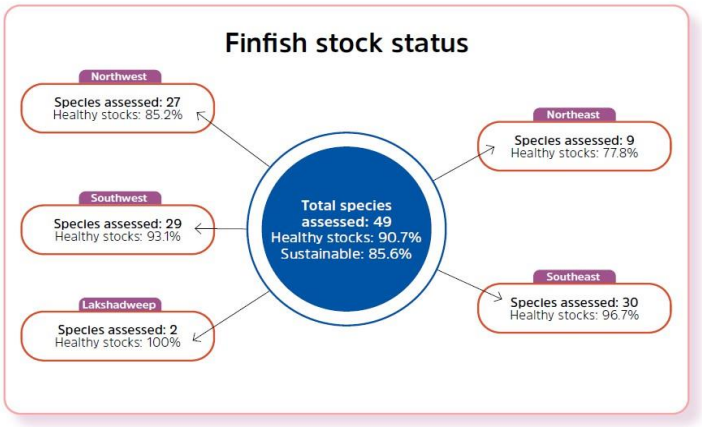

Fig. 35. Marine finfish stock status of India along four maritime regions in 2022

(source: CMFRI. 2023. Marine Fish Stock Status of India, 2022. CMFRI Booklet Series No. 32/2023)