An Overview Of Marine Fisheries Of India

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An Overview Of Marine Fisheries Of India

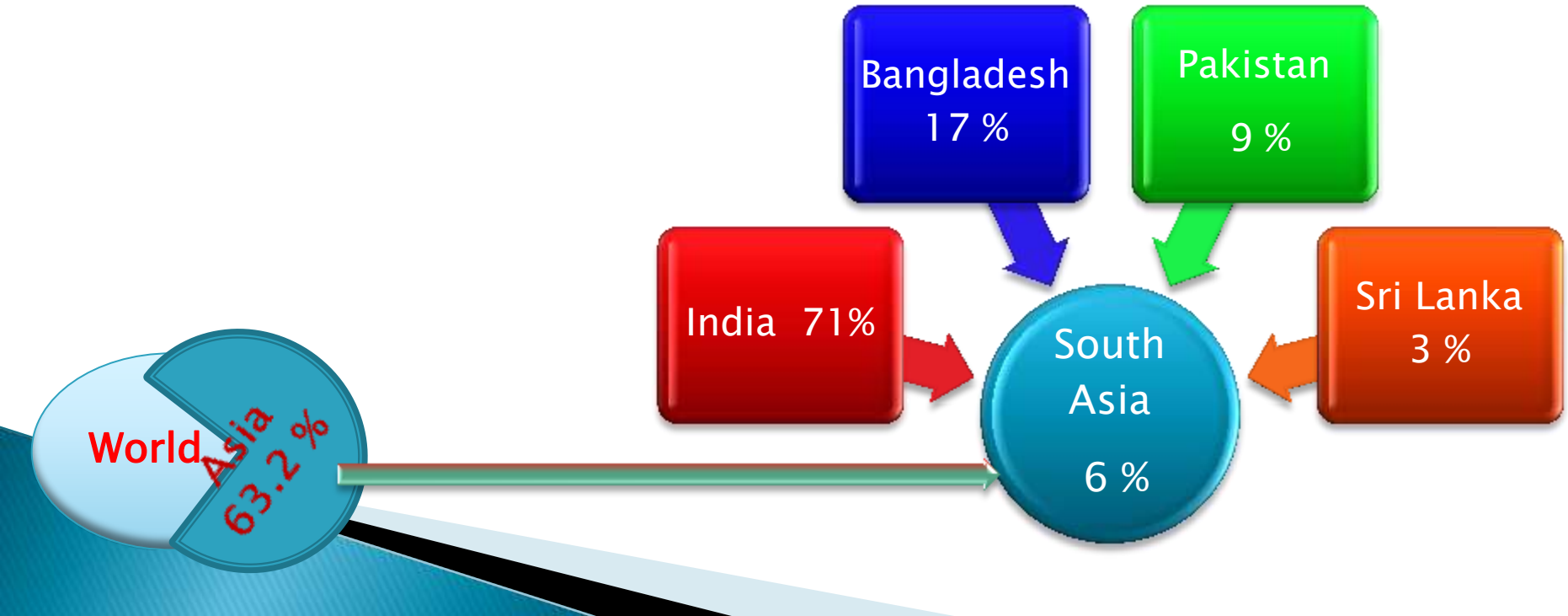
Dr. Rekha J. Nair & Dr. P.U Zacharia
Demersal Fisheries Division
CMFRI

Outline

- Present status of World fisheries
- Profile of Indian Marine Fisheries
- Present status of Indian fisheries
- Description of different fisheries
- Marine fisheries management in India
- Status of Mariculture
- Issues faced
- Future plans for development

Fisheries

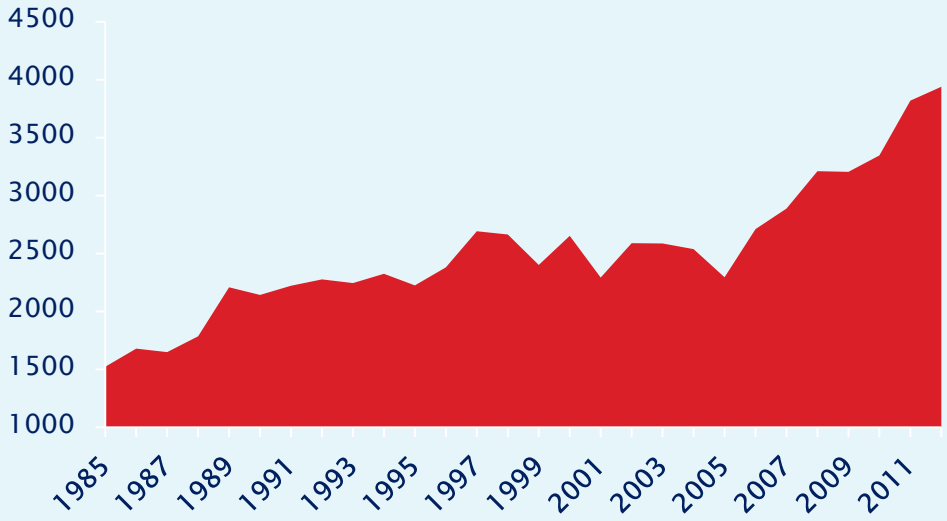
- World's fisheries provide more than 2.6 billion people with at least 20% of their average annual per capita protein intake.
- Fish
  - ✓ connoisseur's delight - preferred food for health conscious.
  - ✓ source of employment, livelihood and food security
  - ✓ food security to several millions of poor people in the developing world.

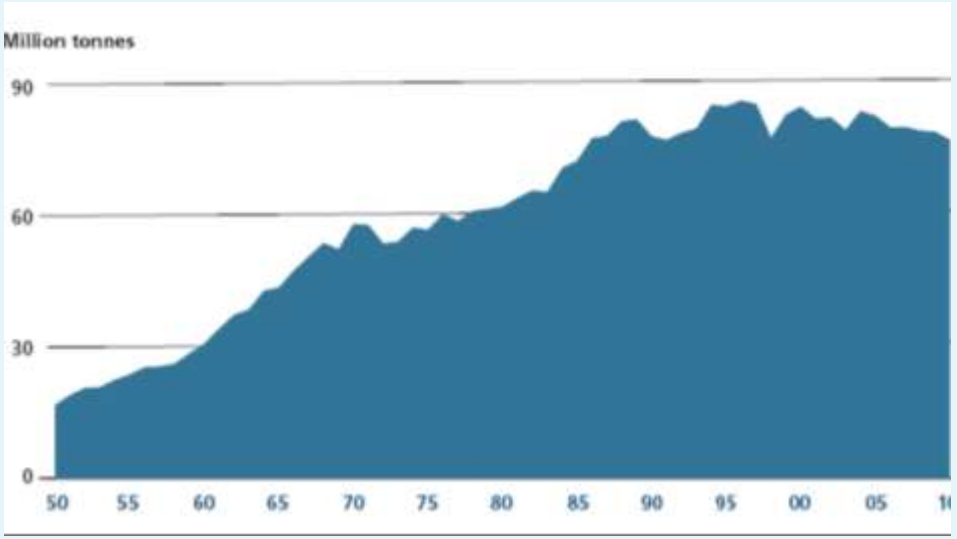


World fisheries and aquaculture production and utilization

	2006	2007	2008	2009	2010	2011
	(Million tonnes)					
PRODUCTION						
Capture						
Inland	9.8	10.0	10.2	10.4	11.2	11.5
Marine	80.2	80.4	79.5	79.2	77.4	78.9
Total capture	90.0	90.3	89.7	89.6	88.6	90.4
Aquaculture						
Inland	31.3	33.4	36.0	38.1	41.7	44.3
Marine	16.0	16.6	16.9	17.6	18.1	19.3
Total aquaculture	47.3	49.9	52.9	55.7	59.9	63.6
TOTAL WORLD FISHERIES	137.3	140.2	142.6	145.3	148.5	154.0
UTILIZATION						
Human consumption	114.3	117.3	119.7	123.6	128.3	130.8
Non-food uses	23.0	23.0	22.9	21.8	20.2	23.2
Population (*billions*)	6.6	6.7	6.7	6.8	6.9	7.0
Per capita food fish supply (*kg*)	17.4	17.6	17.8	18.1	18.6	18.8

India Vs World – Catch Trends





India **Global**

Profile of Indian Marine Fisheries

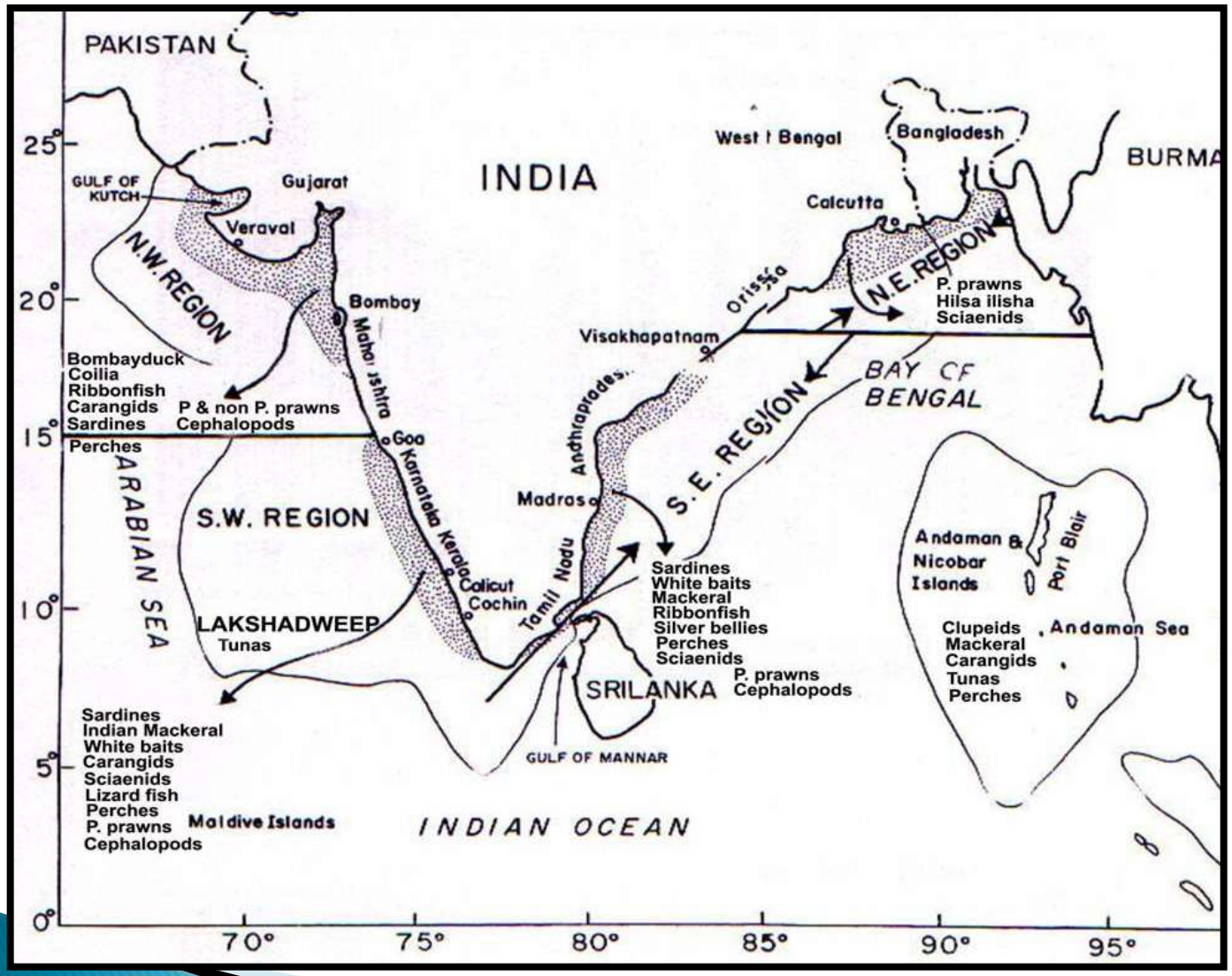
Component	Profile
Physical Component	
Length of coastline	8129 km
Exclusive economic zone	2.02 m km^2
Continental shelf	0.50 million km^2
Inshore area (< 50 m depth)	0.18 million km^2
Fishing villages	3288
Human Component	
Marine fishers population	4.0 million
Active fishers population	0.9 million
Infrastructure Component	
Landing centers	1511
Mechanised vessels	72569
Motorised vessels	71313
Non-motorised vessels	50618

CMFRI Census, 2010

Indian Marine Fisheries - statistics

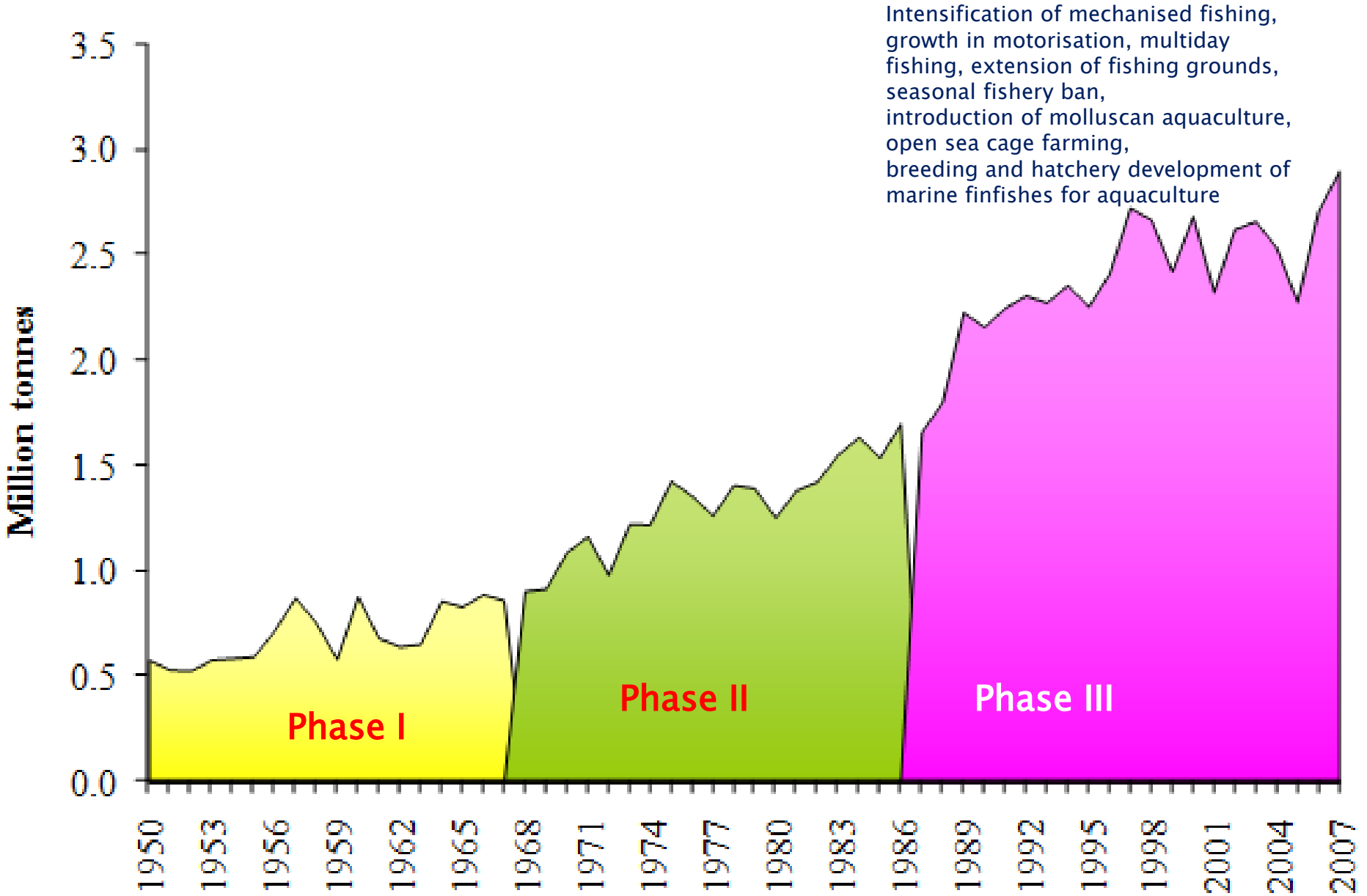
Gross value at land centre	19,753 crores
At retail point	28,511 crores
Export earnings	US$ 2.84 billion
% in total exports	3%
Domestic markets	81% fresh; 5% frozen 6% dry; 5% fish meal
Per capita fish consumption	2.58 kg (range 39 – 0.3)
Share in GDP	1.1%
Share in agricultural GDP	5.4%

India – Coastal Eco-regions/ EEZ



- 9 maritime states
- 2 island territories
- Arabian Sea
- Bay of Bengal
- Gulf of Kutch
- Gulf of Mannar
- Palk Bay
- Sunderbans

Phases of development of Indian marine fisheries



Indian Fisheries –an outlook

- Indian marine waters - 1707 species of fish - 200 species are commercially significant
- Estimated landings from the marine capture fisheries - 3.94 mmt (CMFRI, 2012).
- Growth rate of 4.62 percent
- Gross value of the marine fish landings
  - at the landing centre level - Rs.19753 crores
  - at the retail level - Rs.28 511 crores (Narayankumar 2011)

✓Kerala has emerged as the leading producer of marine fish in the country during 2012 (8.4 lakh t), followed by Gujarat, Maharashtra and Tamil Nadu .

Indian Fisheries –an outlook

- Regionwise --
  - southwest -13.9 lakh tonnes (35.1%)
  - northwest - 11.5 lakh tonnes (29.2%)
  - southeast - 10.1 lakh tonnes (25.5%)
  - northeast - 4 lakh tonnes (10.2%).
- Sectorwise –
  - Mechanised - 30.8 lakh tonnes
  - Motorised - 7.8 lakh tonnes
  - Non motorised -0.8 lakh tonnes

Features

Western coast (Arabian Sea)

- broad continental shelf, short, swift-flowing rivers, with little delta formations, heavy river runoff, upwelling, and therefore high productivity - maximum fishing effort.

Eastern coast (Bay of Bengal)

- narrow continental shelf, are long, slow-moving rivers, extensive delta formations.

3/4 of the total marine capture fish production is estimated to come from coastal waters.

Classification of Fisheries

Realm-wise	Broad resource group-wise	Major species-wise (exceeding 100,000 tonnes)	Vessel-wise	Gear-wise
Pelagic fisheries [54]	Finfish	Oil sardine [18.2]	Non-mechanized [2.03]	Trawl [44.0]
		Perches [8.6]		
Demersal fisheries [28]	Shell fish	Croakers [5.5]	Motorized [19.8]	Seining [19.2]
Crustacean [13]		Bombay duck [4.1]	Mechanized [78]	Gillnets [18.4]
Molluscan [5]		Threadfin breams [3.9]		Hooks and lines [2.0]
		Carangids [7.5]		Bag nets [11.0]
		Ribbonfish [6.0]		Artisanal [4.8]
		Mackerel [5.5]		
		Penaeid shrimp [6.4]		
		Non-penaeid shrimp [5.4]		
		Cephalopods [4.4]		

What do we exploit - MULTISPECIES

Country	Number of species		
	Finfishes	Penaeids	Cephalopods
India	1400 (263)	36 (15)	34 (8)

Commercial species in brackets

How the Exploitation is Carried Out

- 5 major Gears
  - Trawl –
  - Bagnets
  - Gillnets
  - Seines
  - Hook & Line
- Major Crafts
  - Mechanized – 58,911
  - Motorized – 75,591
  - Non-motorised – 104,270
- More than 25 craft gear combinations

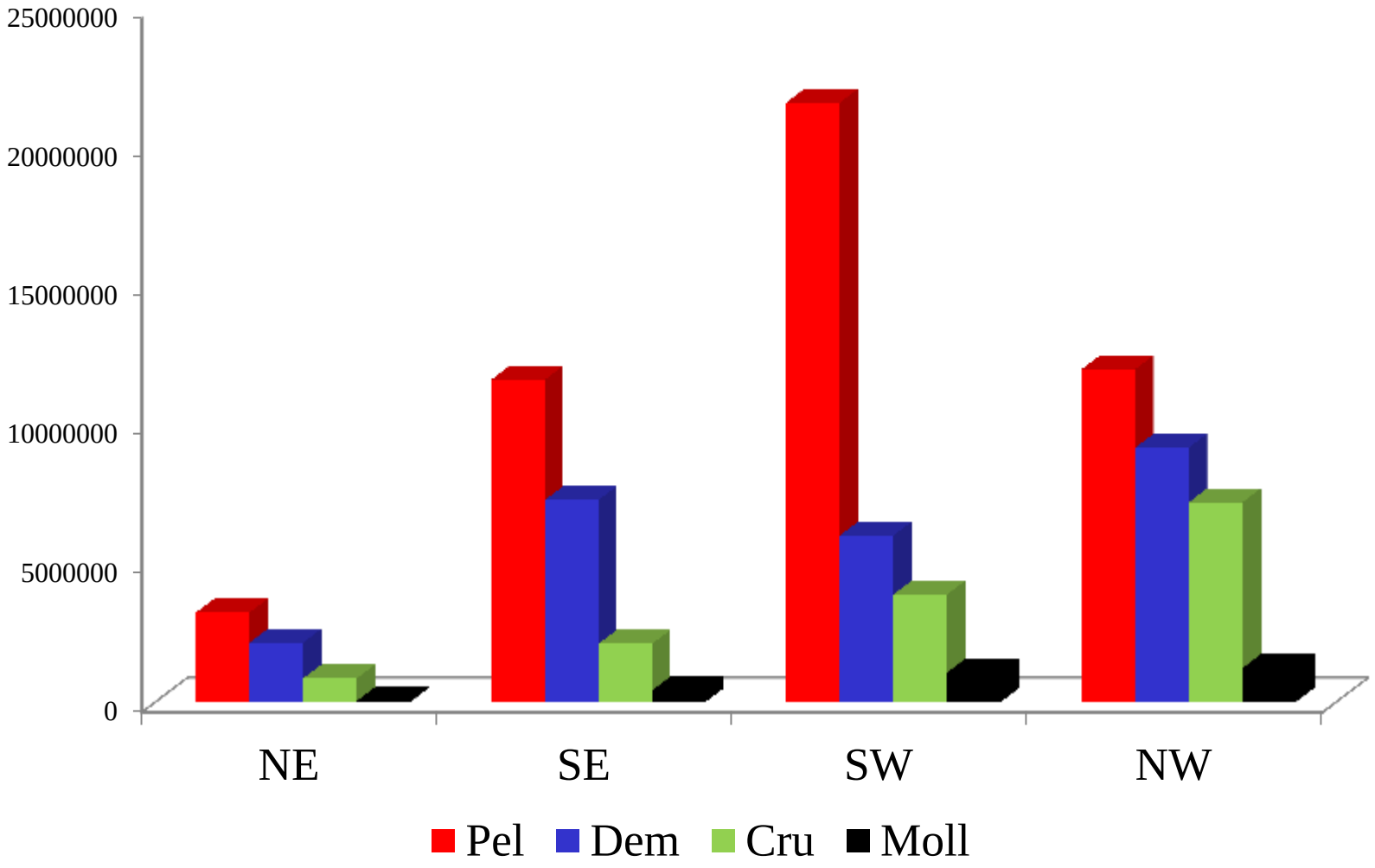
Scale of Marine Fisheries in India

Craft	Length (m)	Engine power (hp)
Mechanised		
Trawlers	9-20	150 - 400
Gillnetters	7-14	80-100
Purseseiners	11-15	100-120
Dolnetters	10-15	80-100
Ringseiners	10-20	85-120
Pole & liners	10-12	100
Motorised (with > one outboard motors)		
Plank-built canoes	8-22	35-120
Plywood boats	10-17	40-65
Motorised (with one outboard motor)		
Catamaran	5-7	2-5
Dugout canoes	5-7	2-10
Plank-built canoes	5-12	2-25
Plank-built boats	7-9	8-15
Plank transom canoes	7-9	8-15
Plywood boats	9-12	8-15
Non-motorised		
Catamaran	5-7	-
Dugout canoes	5-7	-
Plank-bulit canoes	5-12	-

Percentage contribution of different gears in Kerala during 1985 - 2008

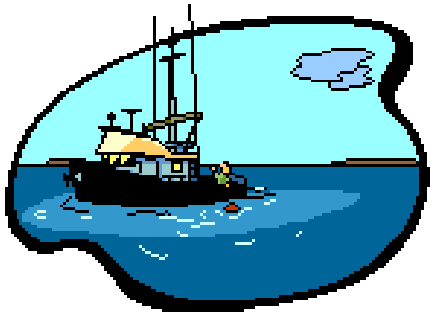
Gear	1985 – 89	1990 – 94	1995 – 99	2000 – 04	2005 – 08
Mechanised					
Trawlnet	35.33	44.35	42.57	36	29.09
Purse seine	1.11	0.95	0.96	0.57	0.15
Driftnet/gill net	2.02	0.35	0.32	0.44	0.42
Hooks and lines	0.12	0.14	0.42	0.63	0.16
Rings seines	0	0	0	4.41	19.58
Others	0.02	0	0.01	0.29	1.81
Motorised					
Driftnet/gill net	7.93	7.29	9.28	9.39	9.86
Rings seines	19.12	33.95	34.36	36.73	29.1
Boat seines	18.72	3.85	2.63	1.4	3.45
Hooks and lines	2.77	1.93	3.62	2.76	3.35
Trawl net	0.14	1.42	2.28	2.76	1.12
Others	0.96	0.01	0.05	0.25	0.02
Non - motorised	11.76	5.76	3.5	4.37	1.89

Regionwise – groupwise landing for the period 1961 - 2010



MAJOR FISHERIES

Trawl fisheries



- **Major gear - 44% of landngs**

- Number of trawlers increased twice, the estimated efficiency (engine horsepower) increased by nearly 4 times, from 951,200 hp (1980) to 3,448, 570 hp (1998).

- From 1999, employed for deep sea fishing upto 400 m depth

- The medium trawlers undertaking multi-day voyages carry nearly a dozen different trawl nets each rigged differently and having different cod-end mesh sizes (15 to 35 mm) to target commercially highly valued resources.

• Penaeid shrimps are the main stay of the trawl fishery.

• High opening trawls reduce the dependance on shrimp; instead squid, cuttle fish and fishes became important.

• Finfishes exploited by trawls belong to 21 major fish groups.

• Each region is characterized by dominance of specific finfish groups.

• NE coast - sciaenids, catfish and pomfrets (together contributing 74.0% to the demersal landings).

• SE coast - silverbellies and pigface breams

• SW coast - threadfin breams and other perches

• NW coast - sciaenids, catfish and threadfin breams

Seine Fisheries

- Ring Seine (mini purse seine) – most popular seining method for the pelagics along Kerala coast
- 1000 purse seiners – Karnataka (>50%), Goa and Maharashtra ; Ring seines – Kerala (>70%) and Tamil Nadu.
- Main species – small pelagics such as oil sardine, lesser sardines, anchovies and mackerel

Gillnet Fisheries

- The gillnet catches which ranged from 1.0 lakh to 1.35 lakh t during the 1980s and 1990s, increased by more than 4 times in recent years (5.8 lakh t in 2008).
- Share of mechanized gillnetters (MGN) is increasing as compared to outboard gillnetters (OBGN) (last 5 years).
- Exploits only few species; upto 60 species recorded.
- Small meshed gillnets (Clupeids and croakers)
- Large meshed gill nets (Sharks, seerfish, mackerels, catfishes, pomfrets, tunas and carangids)
- Average productivity of this gear - estimated at 13.7 kg/h maximum in SW coast followed by NE.

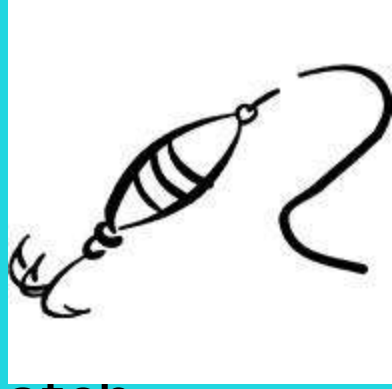
Bag net Fisheries

- ✓ Major gear used by artisanal fishers along NW and NE coasts.
- ✓ Gujarat and Maharashtra, the fixed variety of bag nets – Dolnets. Operate upto 40 m (8862 no.s)
- ✓ 80% of the bag net fisheries come from the mechanized dolnetters
- ✓ Catches - non-penaeid shrimps (Kiddi shrimp *Acetes indicus*), the mid-water carnivore Bombay duck (*Harpadon nehereus*), golden anchovy (*Coilia dussumeiri*) as well as penaeid shrimps and ribbonfishes.

Issues

- ✓exploits the resources indiscriminately
- ✓small mesh sizes - results in growth over-fishing of one of the main species, Bombay duck;
- ✓juveniles form 45 – 65 % of catch.
- ✓*A. indicus* -constitute the principal by-catch

Hooks and Line Fisheries



- Contributes - 2% of the all India marine fish catch
- Targets the large pelagic fishes such as sharks, tunas and barracudas.
- Regional modification and craft mechanisation
- Development schemes of the government has targeted promotion of H&L fisheries particularly the modern version of long line fishing for tunas.
- Many large shrimp trawlers in NE converted to longliners.

Artisanal Fisheries

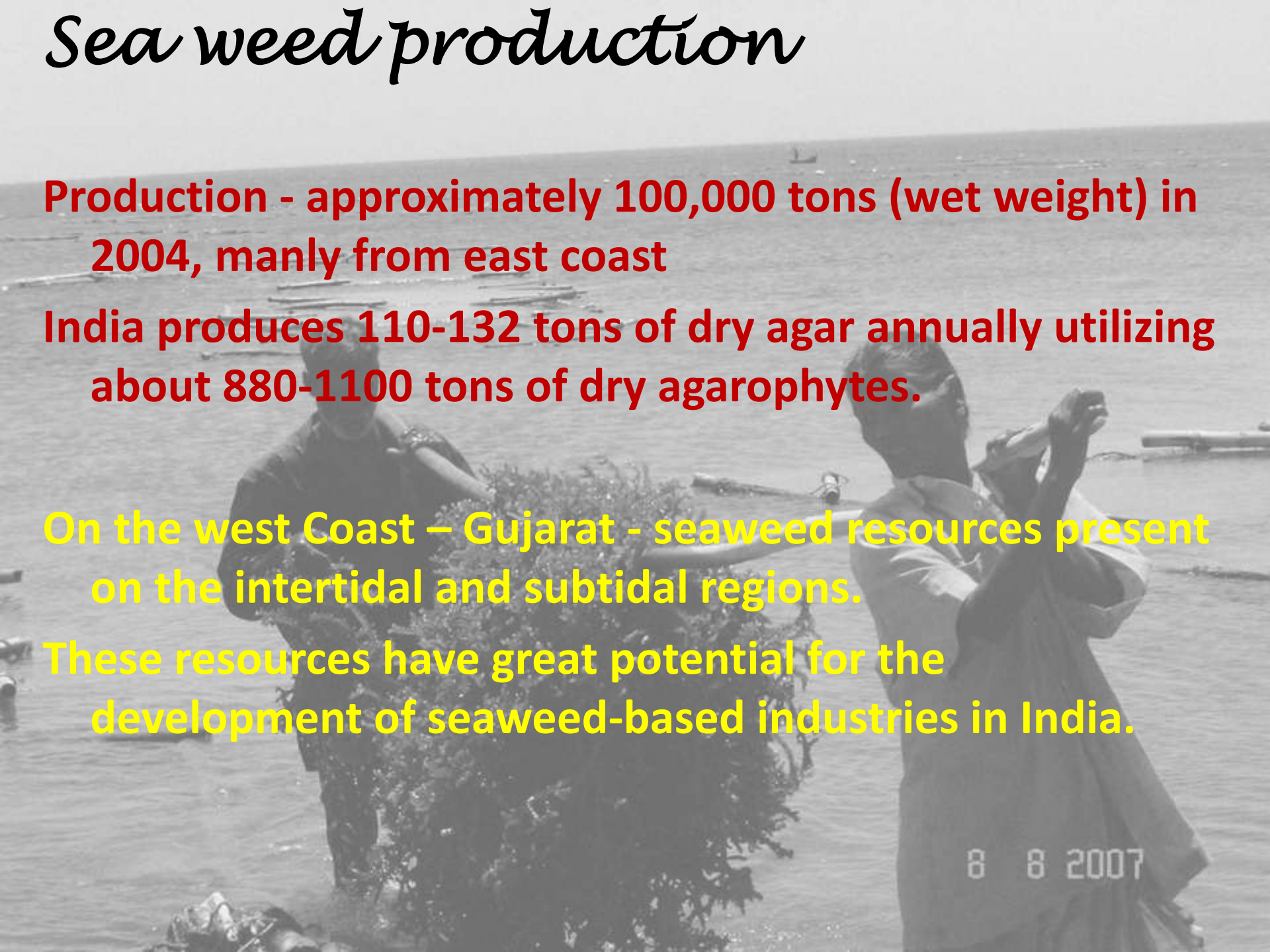
- Sector has dwindled with the advent of mechanization from 88 % in 1960 to 2 % recently

- Innovative - with fishing gears, and to withstand competition from the mechanized sector, motorized their crafts, initially with outboard engines and lately with inboard engines as well.
- Catamaran and plank built boats have been motorised

Bivalve fishery

- Clams and mussels mainly in inland waters and bays; hand picking and by dredge.
- Meat is also sold both in internal markets as well as to export processing plants
- Kerala leads India in the production of clams with estimated annual landings of about 66,000 tons (t) in 2008-09
- Estimated fishery from bivalves is approximately 1 lakh t.

Sea weed production



Production - approximately 100,000 tons (wet weight) in 2004, manly from east coast

India produces 110-132 tons of dry agar annually utilizing about 880-1100 tons of dry agarophytes.

On the west Coast – Gujarat - seaweed resources present on the intertidal and subtidal regions.

These resources have great potential for the development of seaweed-based industries in India.

Important species groups (all-India average 2006-12) in lakh tonnes

Name of fish	Avg landings	Percentage
Oil sardine	4.48	**14.60**
Penaeid prawns	2.16	**7.05**
Indian mackerel	1.87	6.09
Croakers	1.71	5.57
Ribbon fishes	1.64	5.35
Non-penaeid prawns	1.58	5.14
Threadfin breams	1.18	3.86
Bombay duck	1.11	3.62
Other sardines	0.98	3.21
Catfish	0.81	2.64

State-wise detail of fishing vessels in India

State/Union Territory	Mechanized Vessels	Motorized Vessels	Non Motorized Vessels	Total
West Bengal	6829	1776	10041	**18646**
Odisha	3577	4719	15444	**23740**
Andhra Pradesh	2541	14112	24386	**41039**
Tamil Nadu	7711	22478	24231	**54420**
Puduchery	627	2306	1524	**4457**
Kerala	5504	14151	9522	**29177**
Karnataka	4373	3705	7577	**15655**
Goa	1087	932	532	**2551**
Maharashtra	13053	3382	7073	**23508**
Gujarat	13047	7367	3729	**24152**
Daman & Diu	562	654	211	**1427**
Andaman & Nicobar	165	781	1837	**2783**
Lakshadweep	667	376	1341	**2384**
India	59743	76748	107448	**243939**

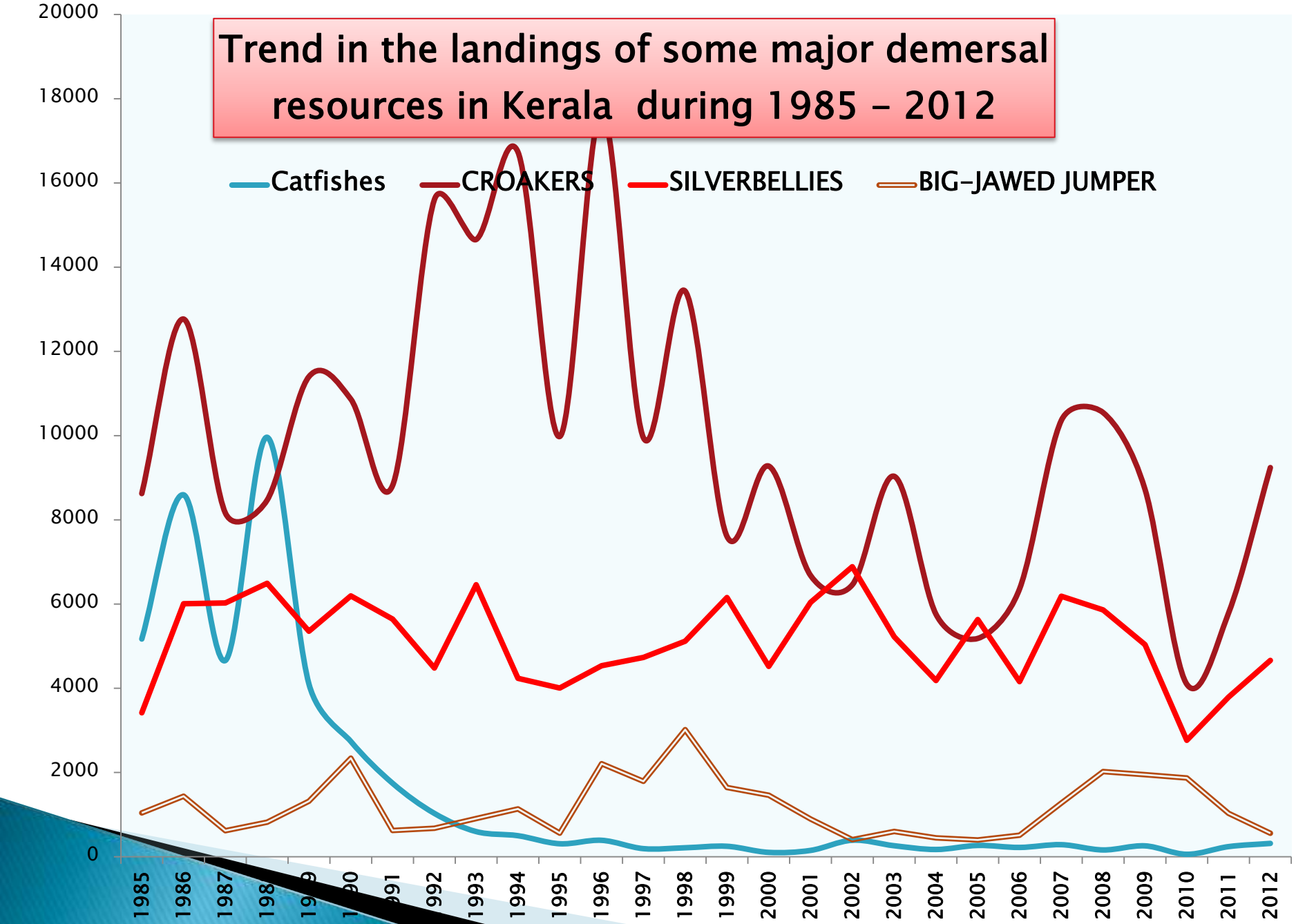
Kerala

- 222 marine fishing villages
- 187 marine fish landing centres; Thiruvananthapuram district (42); Kannur district (11).
- 1,18,937 fishermen families -population of 6,10,165- 98% belonged to traditional fishermen
- 1,45,396 active fishermen of whom 1,30,922 were fulltime fishermen, 10,582 part-time and the rest engaged in fish seed collection
- 21,781 crafts in the fishery 4,722 mechanized, 11,175 motorized and non-motorized formed the rest.
- Trawlers (78%), ringseiners (10%) and gillnetters (10%) - main crafts in the mechanized sector.

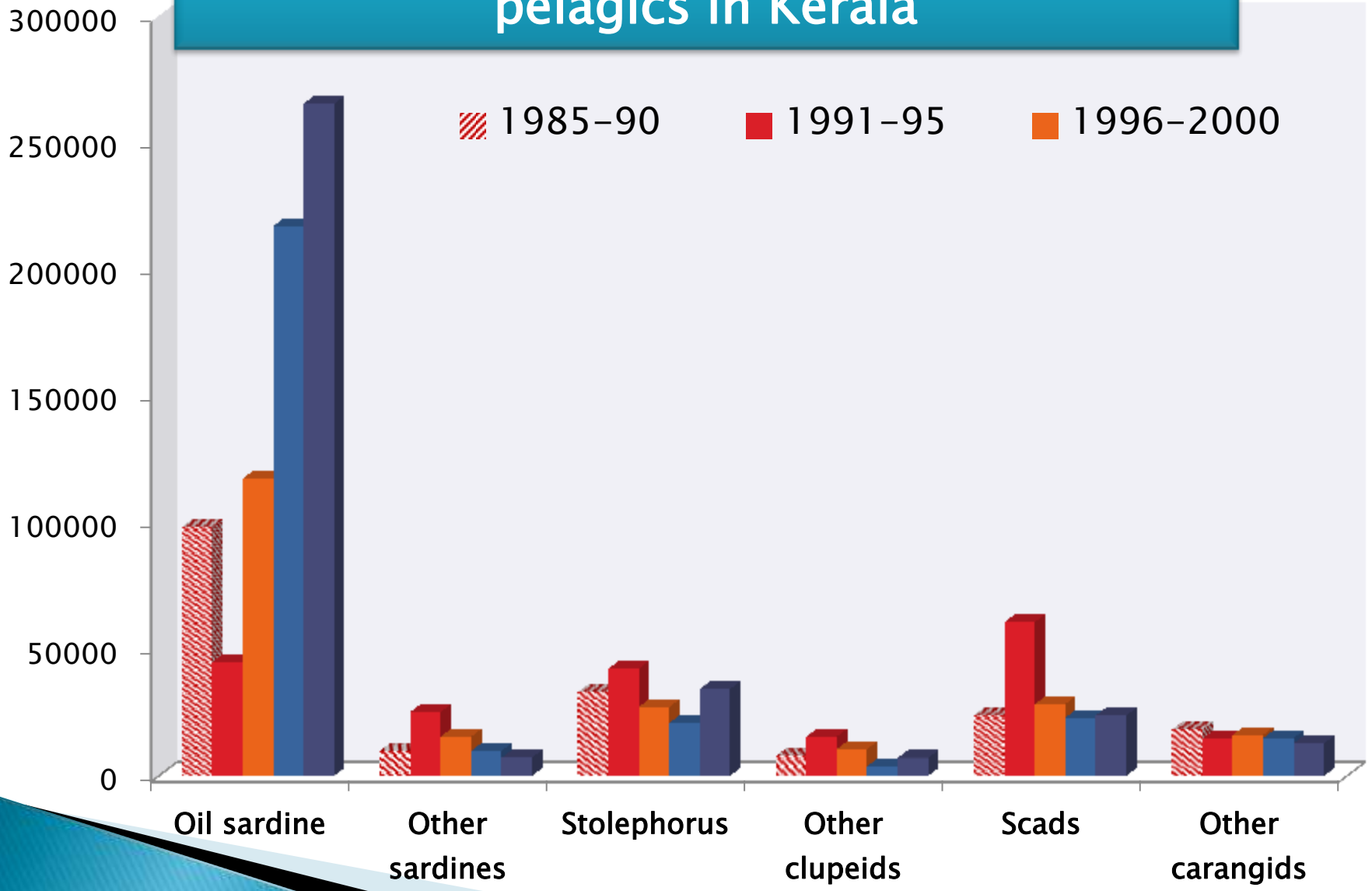
Craft	Fishing gear
Mechanised fleet	
1. Mechanised Trawlers Small (8.5-9.7 m LOA; 90 hp) Medium (9.7-16.7 m LOA; 100 -158 hp) Large (16.7-21 m LOA; 177 hp)	Shrimp trawls – 5 types Fish trawls – 3 types Cephalopod trawl – 1 type Gastropod trawl – 1 type
2. Mechanised Gill-netter-liner (9.7 – 21 m LOA; 110-140 hp)	Gillnets; longlines; handlines
3. Mechanised Purse seiner (15.2 – 16.7 m LOA; 110-156 hp)	Large mesh (45 mm) purse seines for tuna, seerfish, mackerel and carangids

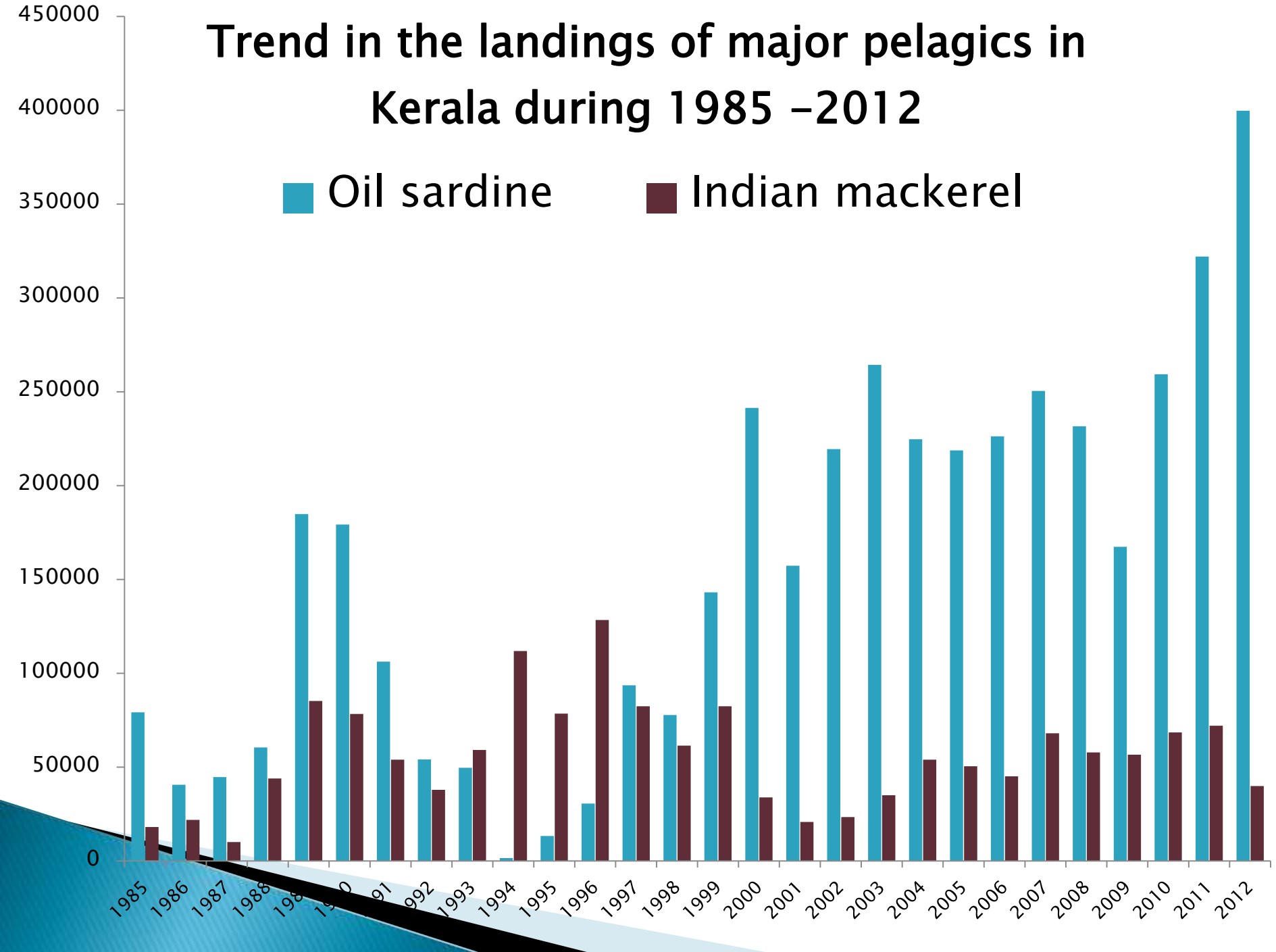
Motorised (IBM or OBM) Traditional fleet	
4. Crafts with inboard engine (steel or wood hull; 18.3-25.8 m LOA; 90-140 hp)	Ring seines (18 mm mesh) for sardines and mackerel
5. Crafts with OBM (wood, steel, fibreglass hull); 12.2 to 21.3 m; 22+22 hp, 40+22 hp, 40+22+22 hp, 40+40+22 hp or 40+40+40 hp)	Ring seines (18 mm mesh size) for sardines, mackerel, carangids and prawns
6. Crafts with OBM (wood and fibreglass hull; 9.9-22 hp)	Ring seines (8-12 mm) for anchovies; Mini trawls; Gillnets; Hooks and lines; Encircling nets; Boat seines; Shore seines
Non-motorised traditional fleet	
7. Catamaran Plank canoe Dugout canoe FRP canoes	Encircling nets; Boat seines; Shore seines; Gillnets; Hooks and lines; Cast nets

Trend in the landings of some major demersal resources in Kerala during 1985 – 2012



Trend in the changes in the fishery for major pelagics in Kerala




Trend in the landings of major pelagics in Kerala during 1985 -2012
Oil sardine
Indian mackerel
450000
400000
350000
300000
250000
200000
150000
100000
50000
0
1985
1986
1987
1988
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
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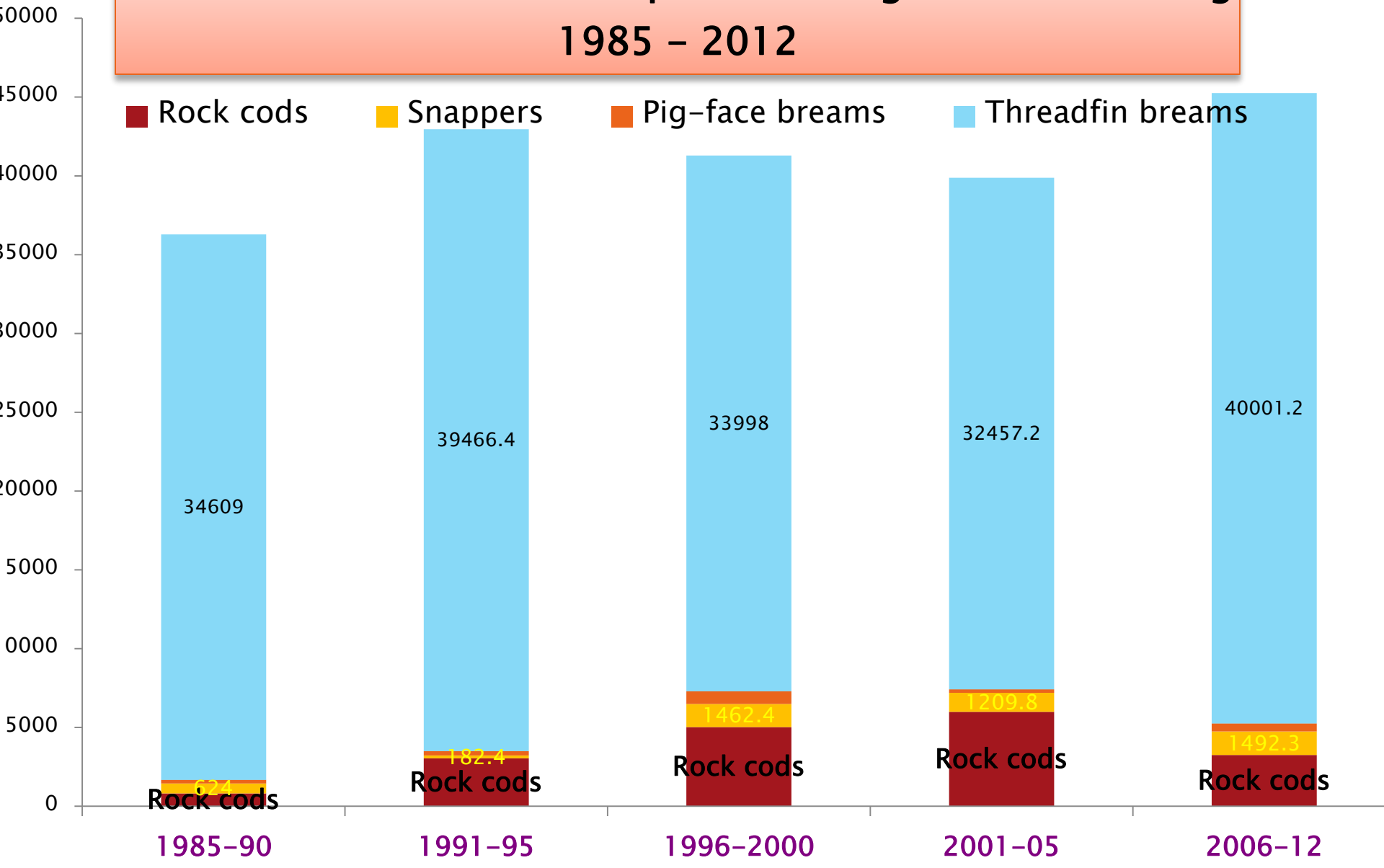
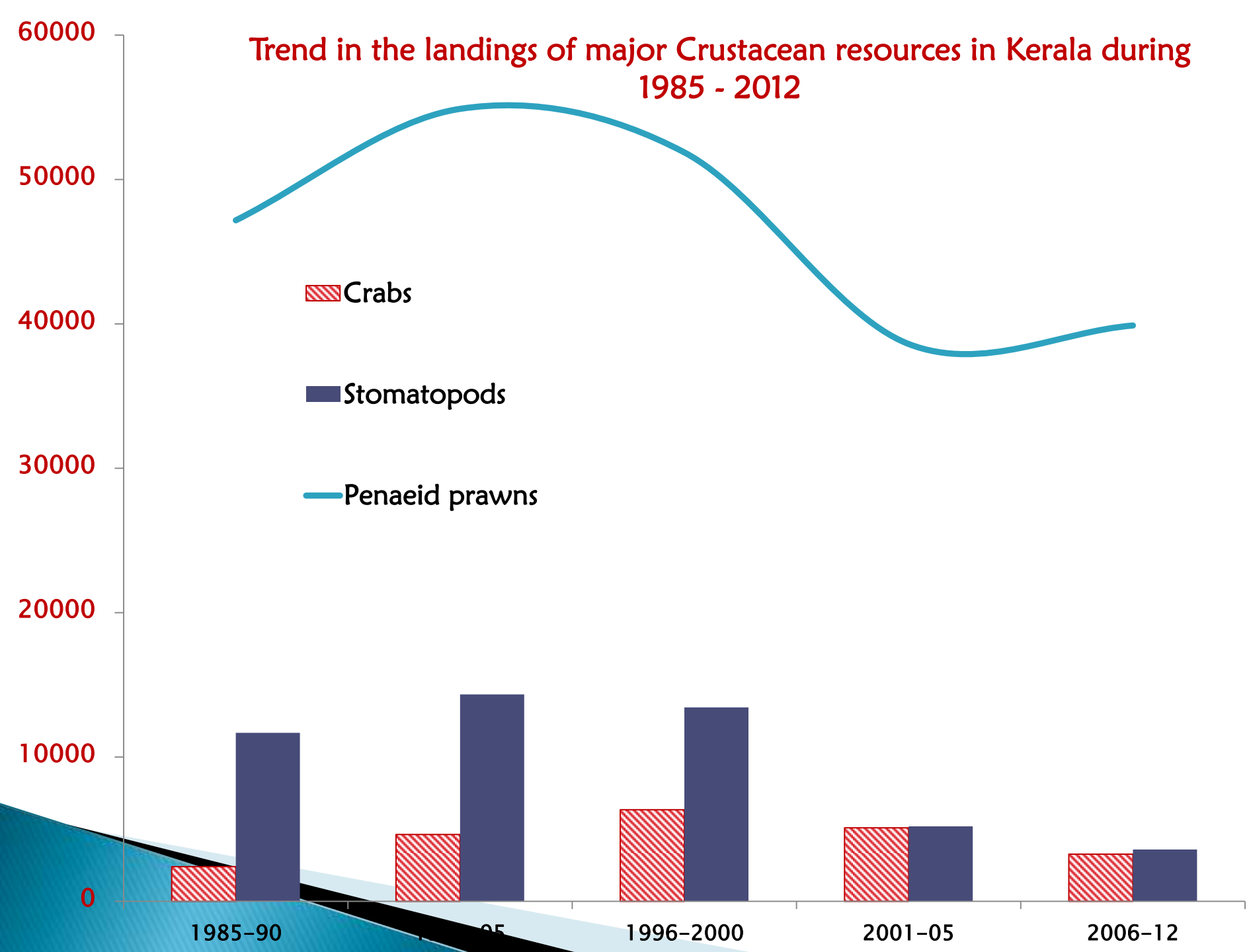
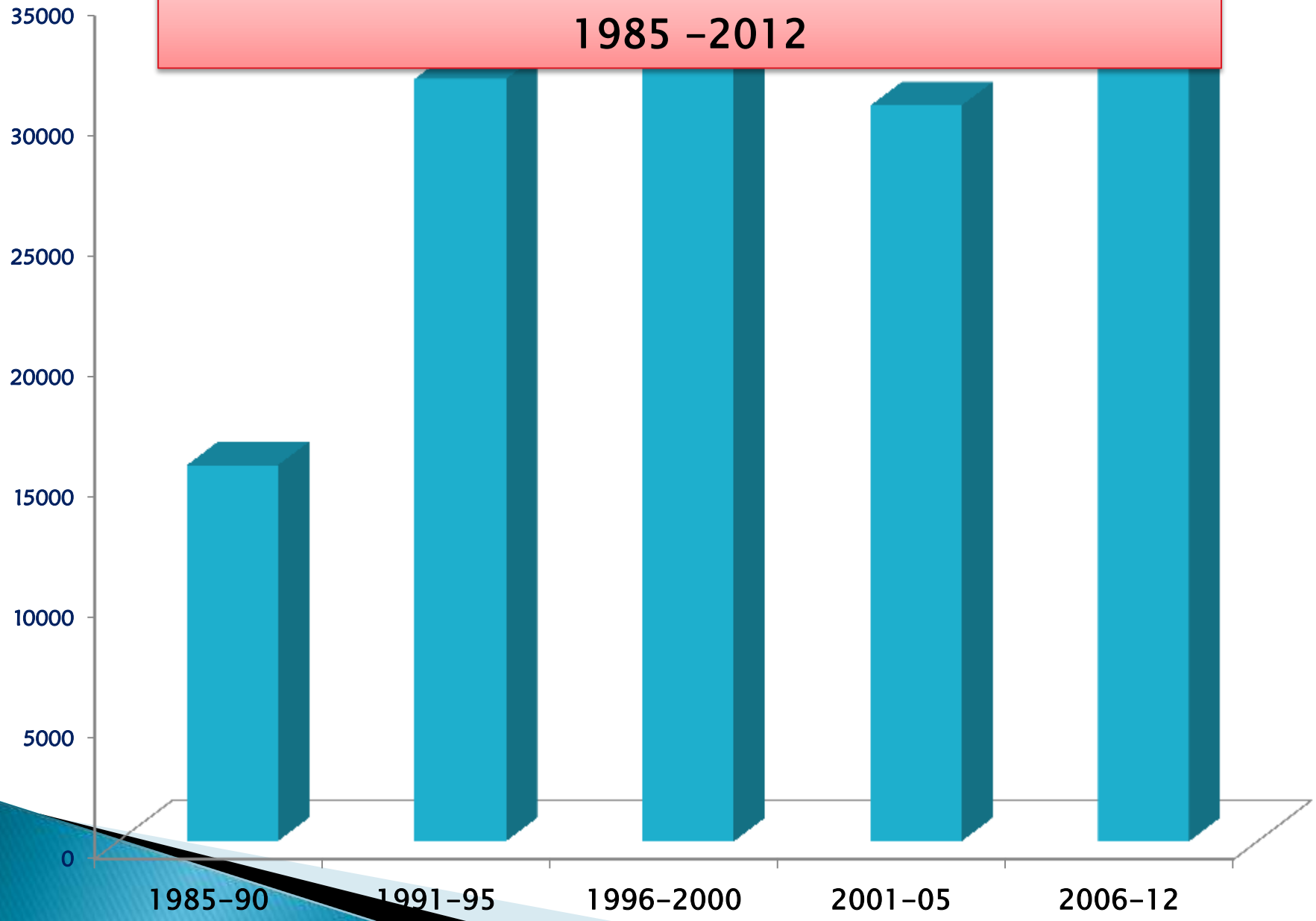
2006
2007
2008
2009
2010
2011
2012

Trend in the increase in the perch landings in Kerala during 1985 – 2012




Trend in the landings of major Crustacean resources in Kerala during 1985 - 2012
60000
50000
40000
30000
20000
10000
0
Crabs
Stomatopods
Penaeid prawns
1985-90
1996-2000
2001-05
2006-12

Trend in the landings of Cephalopods in Kerala during 1985 -2012



Trawl ban – implications and post analysis

There has been a **positive impact** on fishery yields (without oil sardine) in Kerala State due to the introduction of the trawl ban from 1988. However, the positive impact on fishery yields was present only up to 1997 (9 years), and thereafter, the fishery yields are declining, the net decline being more than one lakh tonnes after 2000. This indicates that the benefit in terms of yield was not sustained.

This brief analysis indicated that the total value of Kerala's marine fisheries has on an average increased by 17.3-times during the 25 year post ban period based on nominal prices.

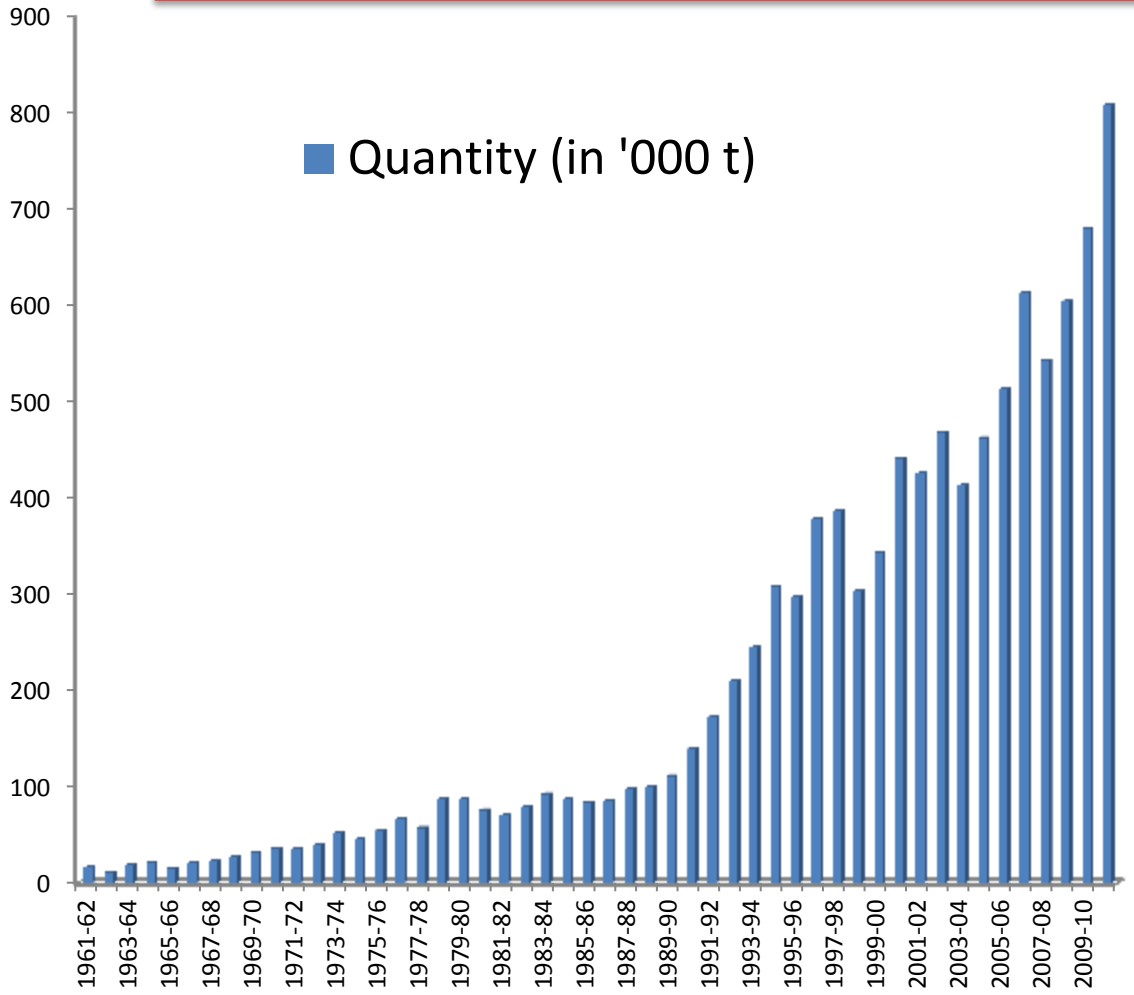
Excerpts from Trawl Ban Commt Report 2013

Issues & Steps

- High speed Chinese engines
- FAD Based Cuttlefish Fishery –Vizhinjam –
- Intense trawling in the Wadge Bank area west of the region –fished biodiversity affected
- Karikkadi fishery
- Poaching by foreign vessels

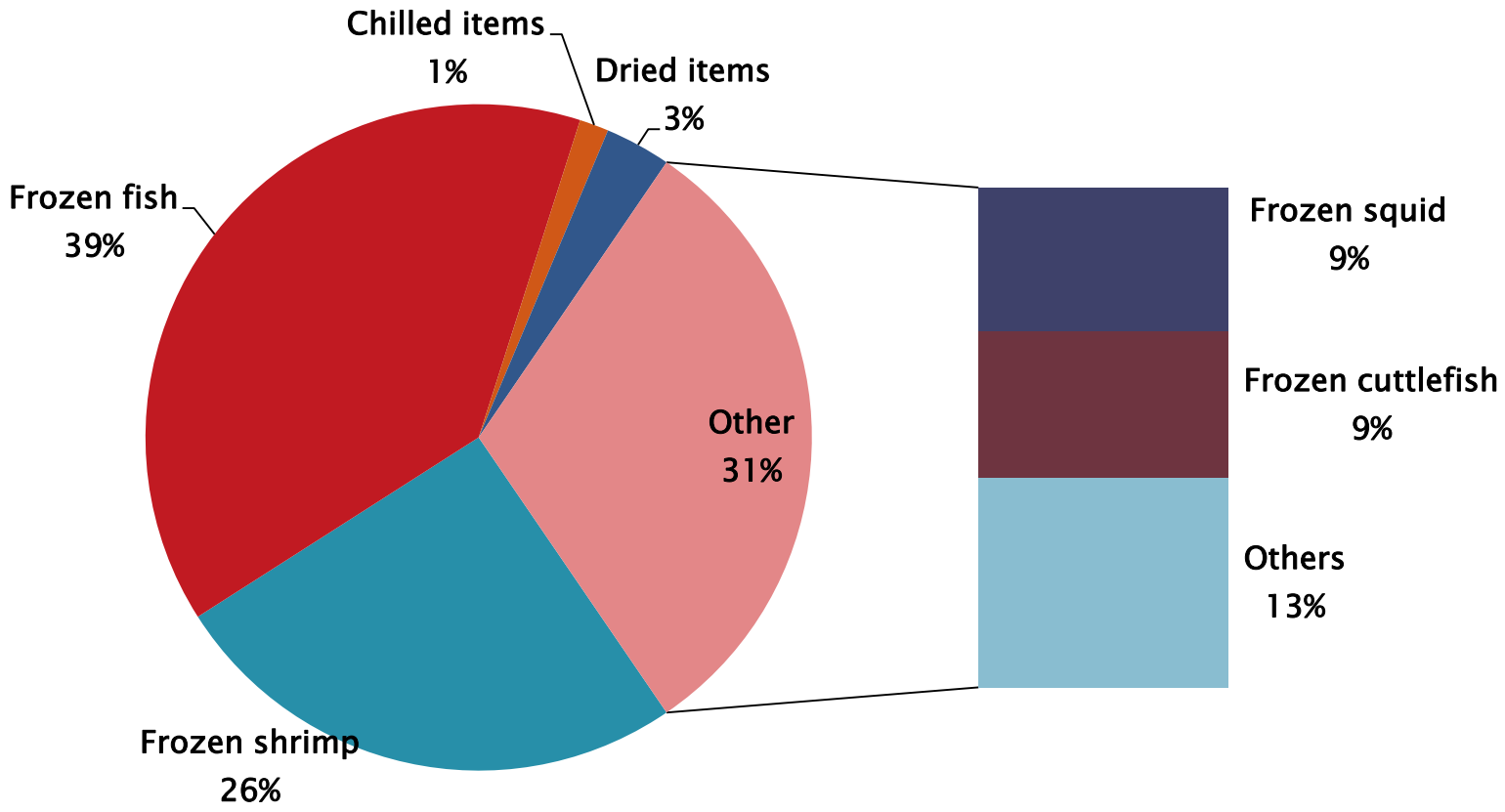
- ✓ Strict implementation of the legal cod-end mesh sizes in trawls
- ✓ MPA
- ✓ Length-power combinations of fishing vessels
- ✓ Prohibition of Destructive Gears/Nets
- ✓ Fishing Ban
- ✓ Alternatives to be explored –cage culture, artificial reefs, sea ranching, CBA

Marine products export growth

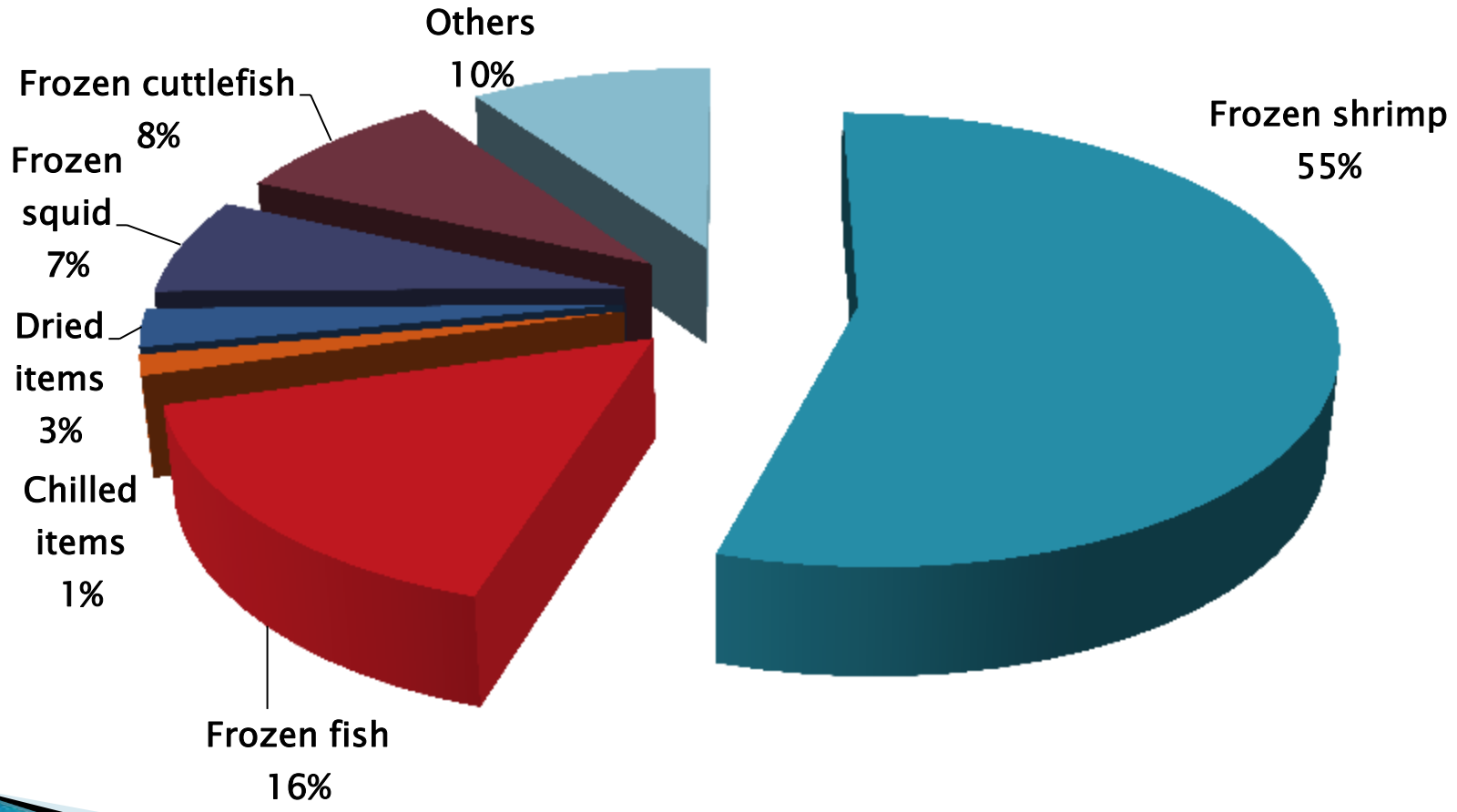


2.84 billion US $ (2010-11)

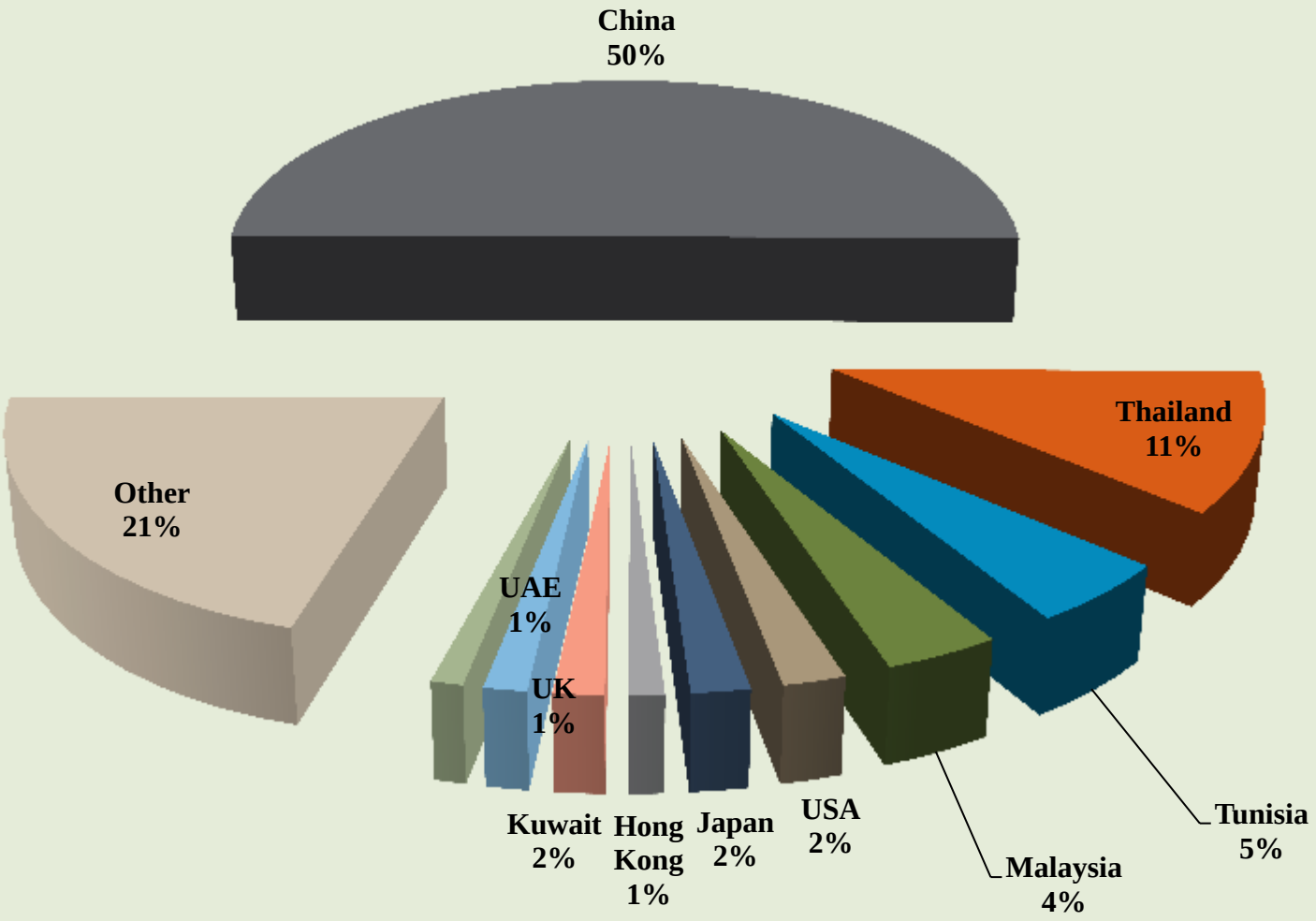
Item wise contribution to export quantity (%) of marine products form India during 2001-2012



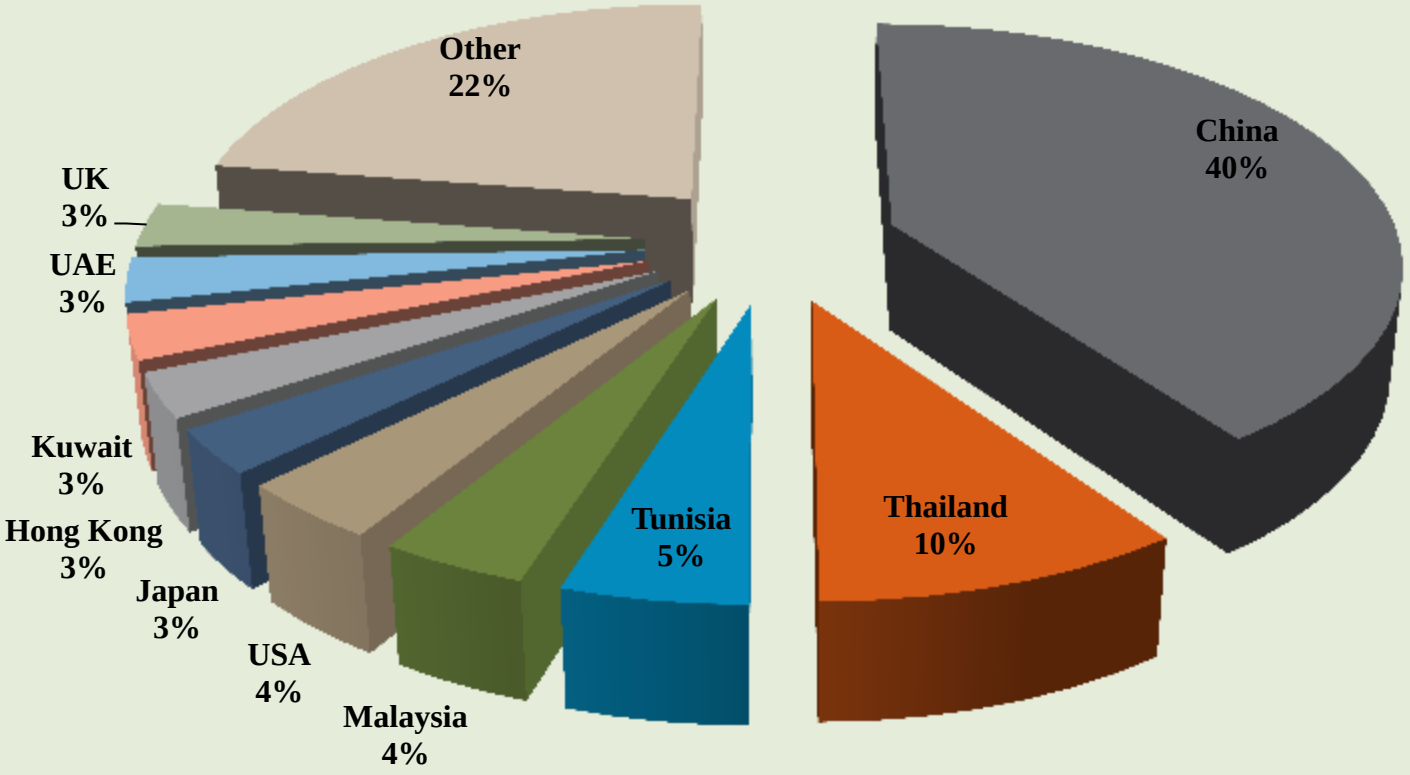
Item wise contribution to export value (%) of marine products from India during 2011-2012



Major markets for the finfish export from India by quantity

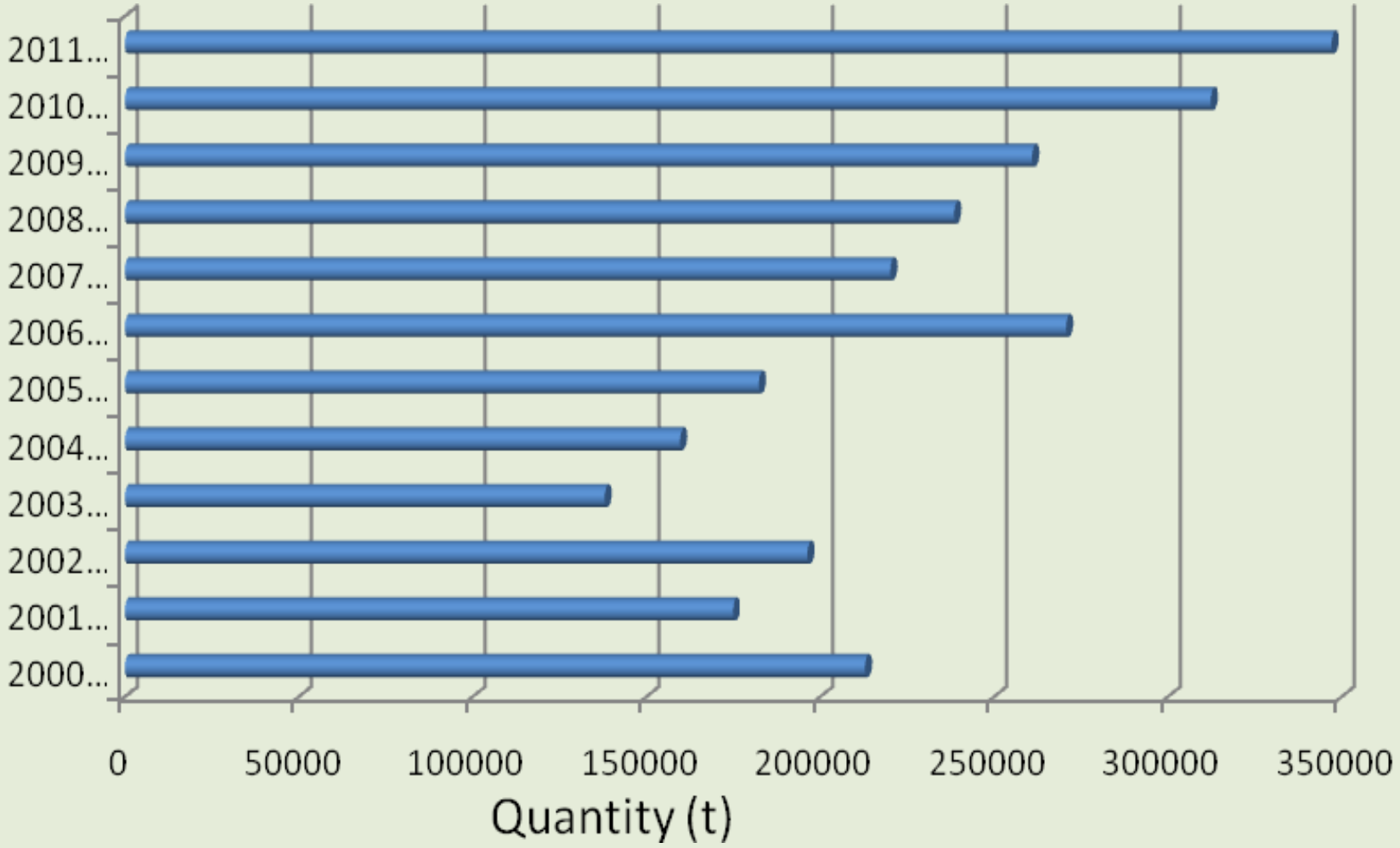


Major markets for the finfish export from India by value



Major fish importers (by value) from India

Export of frozen finfish (t) from India during the period 2001 – 2012

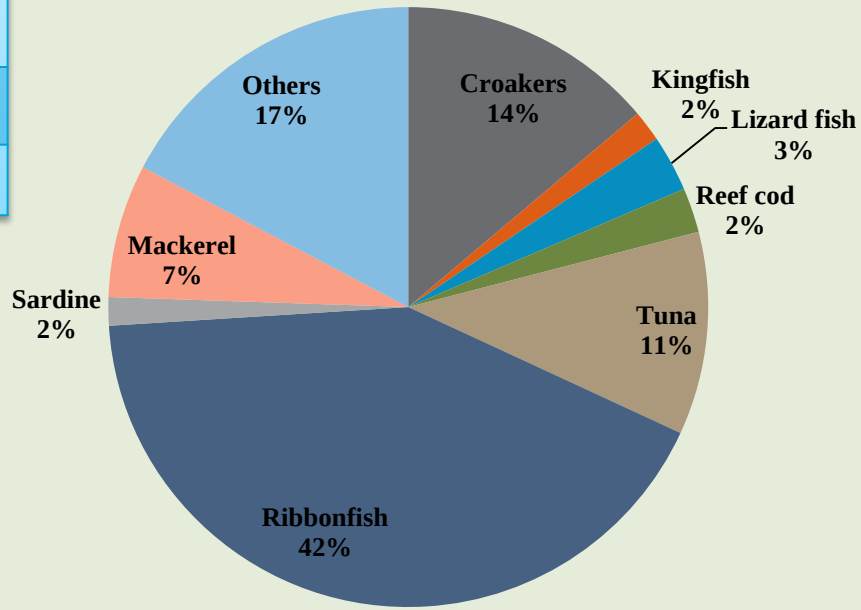


Contribution of finfish to the various marine products export categories from India

Items	Total export (t)	Finfish export (t)	Share of finfish (%)
Frozen	443666	209764	**47**
Chilled	7631	5227	**68**
Dried	17178	14220	**83**
Others	69751	11274	**16**
Total	538226	240485	

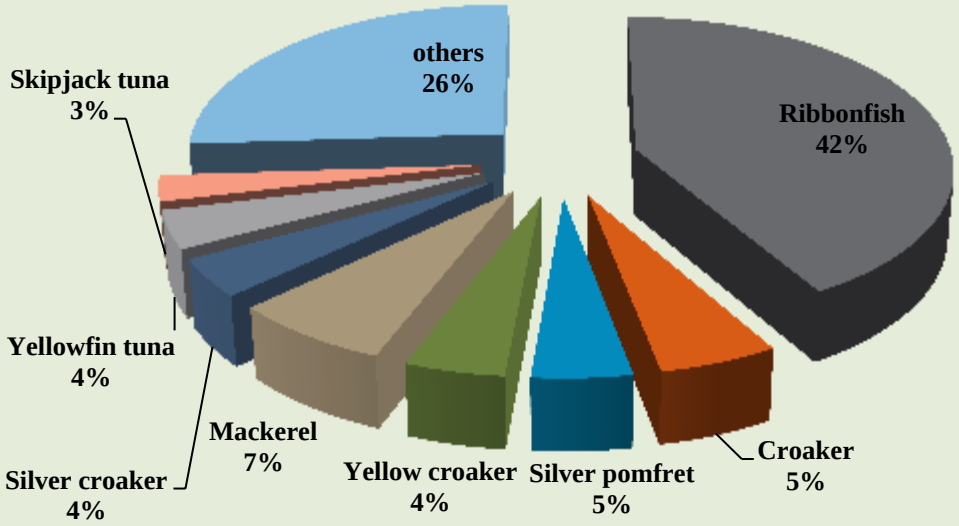
Contribution of different resources to the total marine finfish exports from India

Fishery Resource	Quantity (t)	%
Ribbonfish	83507	35
Croakers	27546	11
Tuna	18797	8
Mackerel	14010	6
Pomfrets	11976	5
Total	143860	

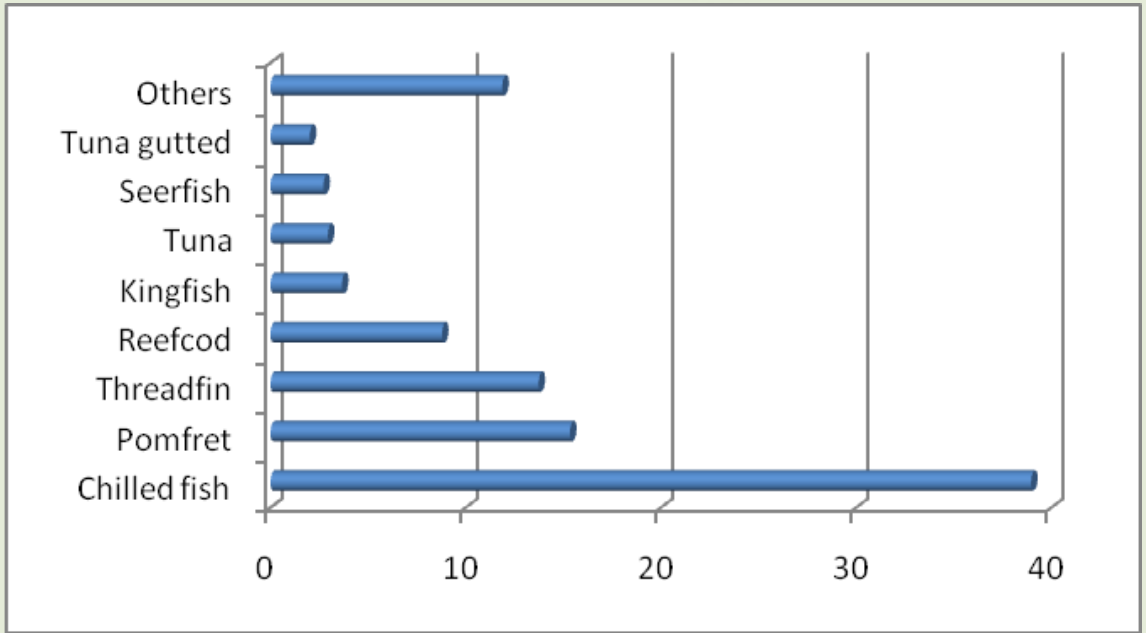


Contribution by different fish groups to the total frozen fish exports

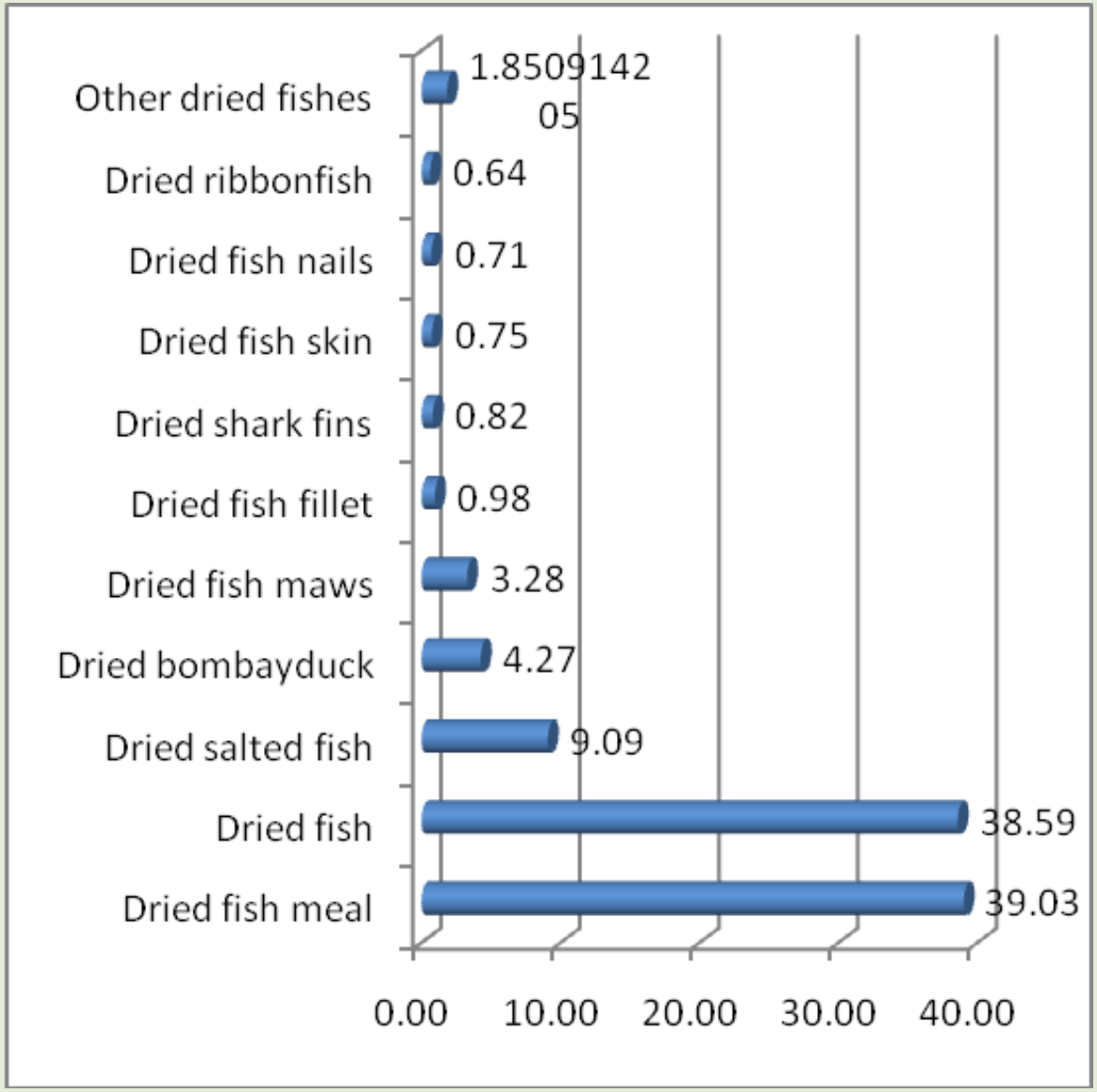
Item wise export of frozen marine finfishes in India



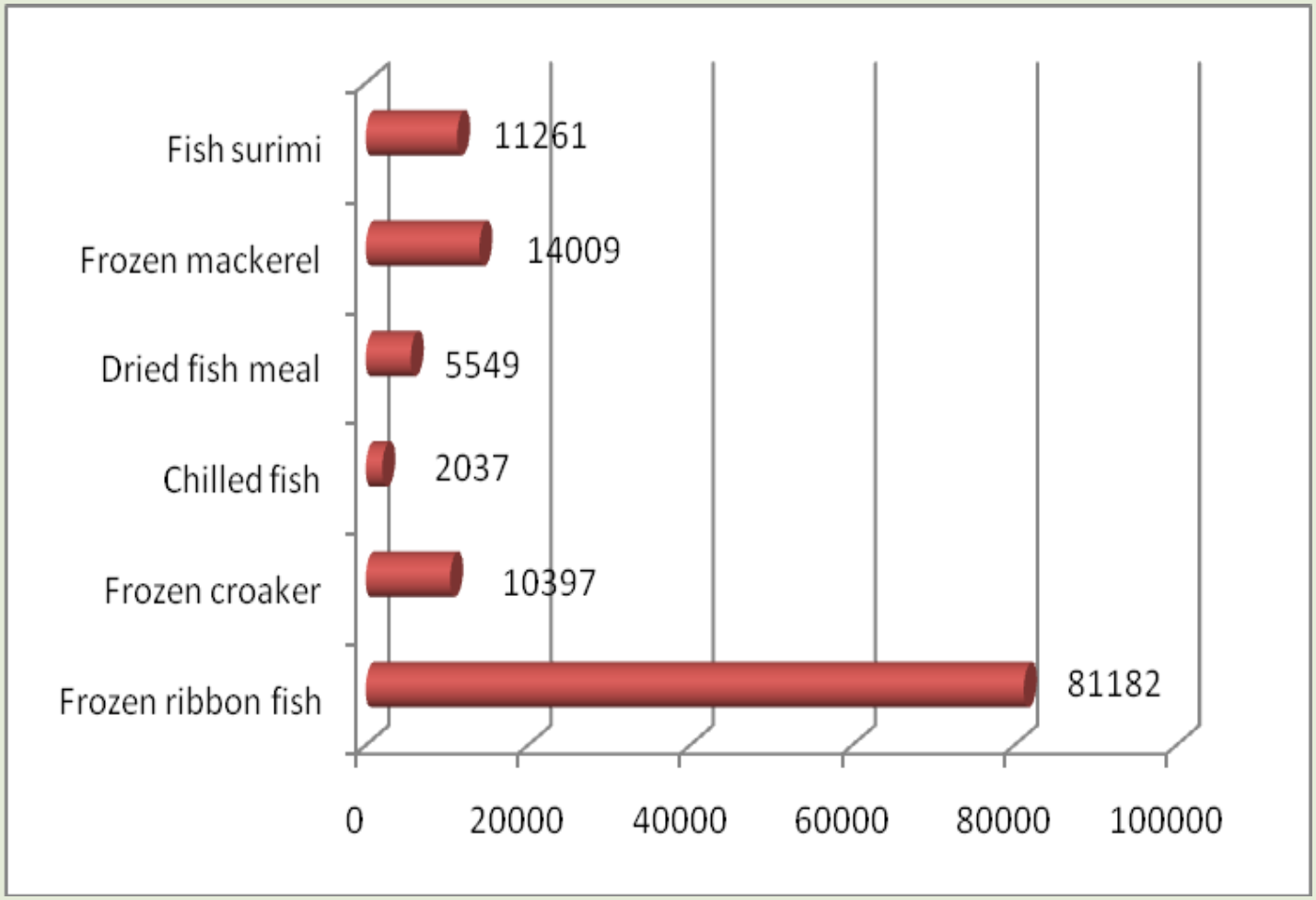
Contribution (%) of various finfish groups to the export of chilled items in India



Contribution of dried finfish items to the total dried finfish exports

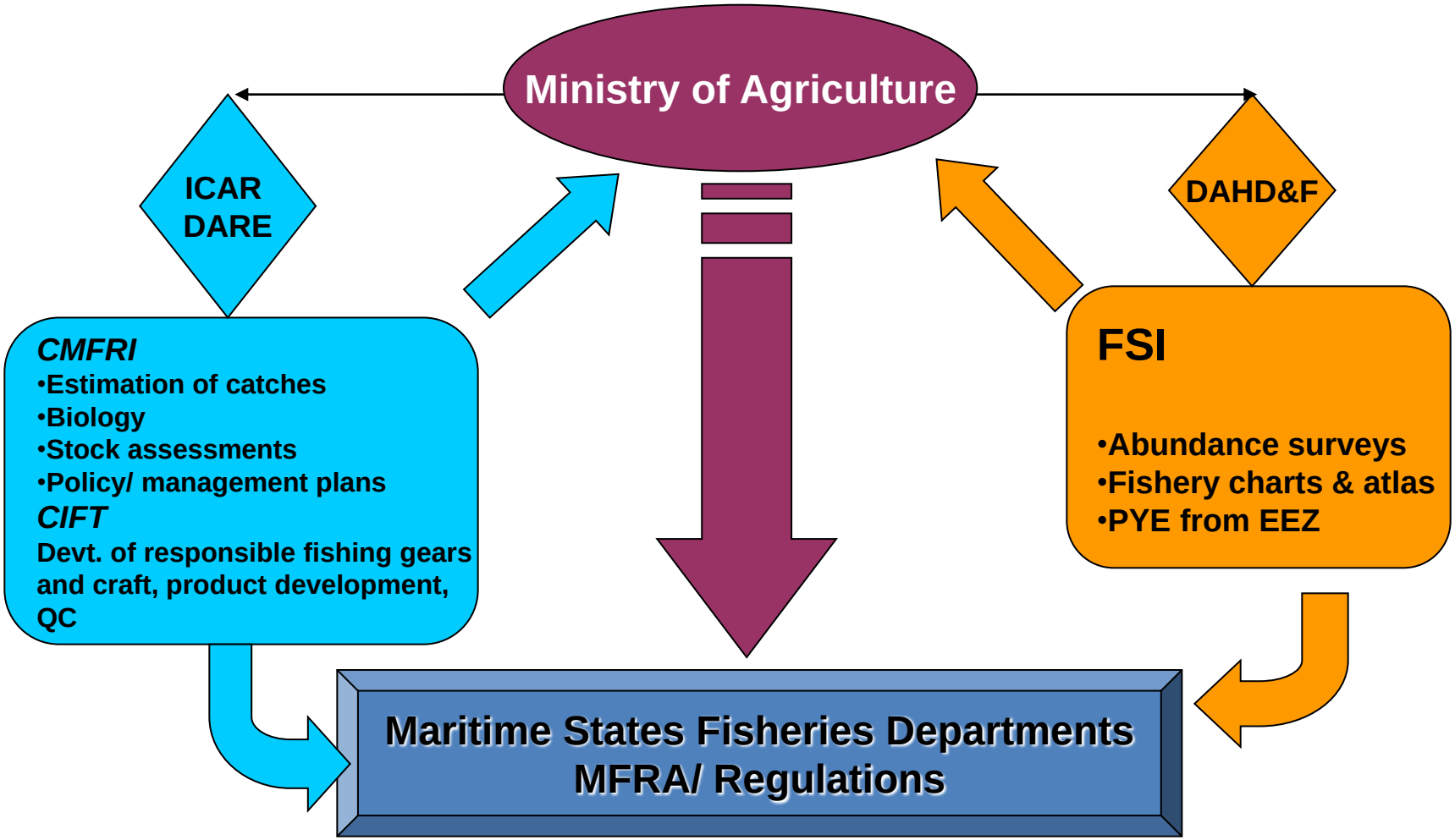


Major items (quantity t) in the export of marine finfish from India



Marine Fisheries Management in India

Management Structure



Open Access Fishing is Governed by

Primary aim is to prevent and minimize disputes among different sectors

- Indian Fisheries Act, 1897
- The Wild Life (Protection) Act, 1972
- MFR (regulation) Bill, 1978 formulated after the EEZ declaration
- MFRA of maritime states enacted from 1980 in all maritime states
- Maritime Zones of India Act, 1981
- Environment (Protection) Act, 1986

Drawback

no entry restrictions, retire old fishing fleets, no legal action against violators

Regulatory Measures Include

- Closed season
- Closed fishing areas
- Marine Protected Areas (MPAs)
- Protected Species
- Ban on certain destructive fishing gears and methods
- Minimum mesh size regulation
- Minimum legal size at capture
- Use of Turtle Excluder Device (TED) in trawls in Orissa

Closed Season for Mechanized Sector

State	Months	Days
Gujarat	June - August	45
Maharashtra	June - August	45
Goa	June - August	45
Karnataka	June - August	45
Kerala	June - August	45
Tamil Nadu	April - May	45
Andhra Pradesh	April - May	45
Orissa	April - May	45
West Bengal	April - May	45

Spatial Closures

State	Reserved for traditional vessels	Available to mechanized vessels
Goa	Up to 5 km	Beyond 5 km
Kerala	Up to 10 km	<25 GRT: 10-22 km; >25 GRT: beyond 23 km
Karnataka	Up to 6 km	<15m LOA: 6-20 km; >15m LOA: beyond 20 km
Maharashtra	Up to 5-10 fathom	Beyond 10 fathom depth
Tamil Nadu	Up to 3.4 nautical miles	Beyond to 3.4 nautical miles
Andhra Pradesh	Up to 10 km	<20m LOA: 10-23 km; >20m LOA: beyond 23 km
Orissa	Up to 5 km	<15m LOA: 5-10km; >15m LOA: beyond 20 km

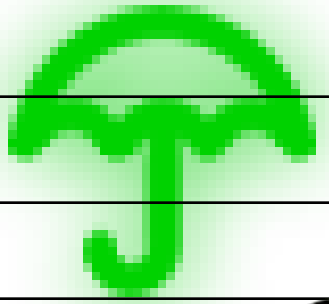
MARINE PROTECTED AREAS (MPAs)

- Currently, there are 31 MPAs (majority in A&N)
- The current area under MPAs is 6.16 per cent of the area in the coastal biogeographic, which is proposed to be expanded to 7.12 per cent
- Oil wells in Bombay High and Godavari Basin also function as MPAs

31 Marine Protected Areas In India

Protected Species
(under Indian Wildlife (Protection) Act, 1972

Species/ Group	**Number**
Molluscs	24 species
Elasmobranchs	10 species
Grouper fish	1 species
Sea horses	All species
Sea Cucumber	All species
Sponges and seafans	All species
Corals	All species
Turtles	All 5 species
Whales, dolphins, sea cow	All species



Minimum Legal Sizes

Species	Weight (g)/ Length (mm)
Panulirus polyphagus	300 g
P. homarus	200 g
P. ornatus	500 g
Thenus orientalis	150 g
Pampus argenteus	200 g
Loligo duvauceli	80 mm
Sepia pharaonis	115 mm
Octopus membranaceous	45 mm

Ban on Destructive Fishing Methods

- Dynamite fishing
- Cyanide poisoning
- Pair trawling in GoM and Palk Bay
- *Thalluvalai* (minitrawl) in GoM and Palk Bay

Mariculture in India

Bivalve mariculture

Rack and bottom culture –20 t (1971) – 18432 t (2010)

Edible *Oyster* farming

Rack and ren, rack and tray

Technology developed in 1970s , yet to take off

Sea-weed farming

•PepsiCo Food has introduced farming of *Eucheuma cottoni* and *Hypnea musciformis* in 100 ha through contract farming system.

- *Kappaphycus alwarezi* farming was initiated at Palk Bay in 2003.
- Production reached 865 t dry weight in 2009.

Cage farming

CMFRI has been successful in demonstrating open sea cage farming of lobster, and Asian Sea bass at different parts of Indian coast with the support of NICRA and fishermen societies and is targeting to harvest one lakh tonne of fish through open sea cage farming

Success stories

Lobsters harvested from cage

Success stories

- Pond culture of **Pompano** in brackishwater farm – 3,400 numbers of fingerlings (30.59 ± 0.24 mm mean length and 2.00 ± 0.04 grams mean weight) were stocked – a one acre pond having salinity of 8 ppt –salinity gradually raised to 24 ppt – after 240 days of culture about 1305 kgs of fishes were harvested and the survival rate was 91.32%. FCR was 1:1.83

Hatchery production of finfish seed

CMFRI has been able to successfully breed Cobia - *Rachycentron canadum and greasy grouper E. tauvina* in captivity

Hatchery production technology of Asian sea bass (*Lates calcarifer*) has been standardised by CIBA

Hatchery production of marine ornamentals

Broodstock development, breeding and larval rearing of marine ornamental fishes –

Clown fishes – *Amphiprion chrysogaster, A. percula*, *A. frenatus, A. ocellaris*;

Damsels – *Chrysiptera unimaculata*, *Dascyllus aruanus* and *D. trimaculatus* successful

Issues in marine fisheries

- *Declining catches and overfishing in coastal waters (open access, c/e of demersals reduced , FDMFW SE coast etc*
- *Post-harvest losses (discard, spoilage, reduced quality*
- *Habitat degradation (industrial waste, domestic sewage, pestcdes etc*
- *Climate change*
- *Illegal, unreported and unregulated landings*
- *Poor implementation of regulations (eg; mesh size)*

Also to look into -

Habitat degradation

- water contamination
- enforcement of standards for water discharge
- maintaining the quality of river runoff
- reducing greenhouse gas emissions
- ? -----

Complexity of Tropical Fisheries – An Example

- Fish stocks in each ecosystem are in different stages of exploitation
- Of the 60 species of finfishes, crustaceans & cephalopods landed in one coastal trawl haul at the Chennai Fisheries Harbour
  - 6 were in overexploited category
  - 40 were in optimally exploited category
  - and 4 were in underexploited category

- One fishing village for every 2 km of coastline
- Active fisher population in India 0.9 million
- Active fisher population at Iceland + New Zealand is 12,000
- These 2 countries together produce 2.6 million tonnes annually (216 t/fisher)
- So with more fishers we produce less (2.9 t/fisher)
- Because more people are dependant on fisheries as a livelihood

Future Plans

Fisheries sustainability

Unlike other resources invisible, diverse, migratory, seasonal, its own dynamics as well as anthropogenic and climatic impacts

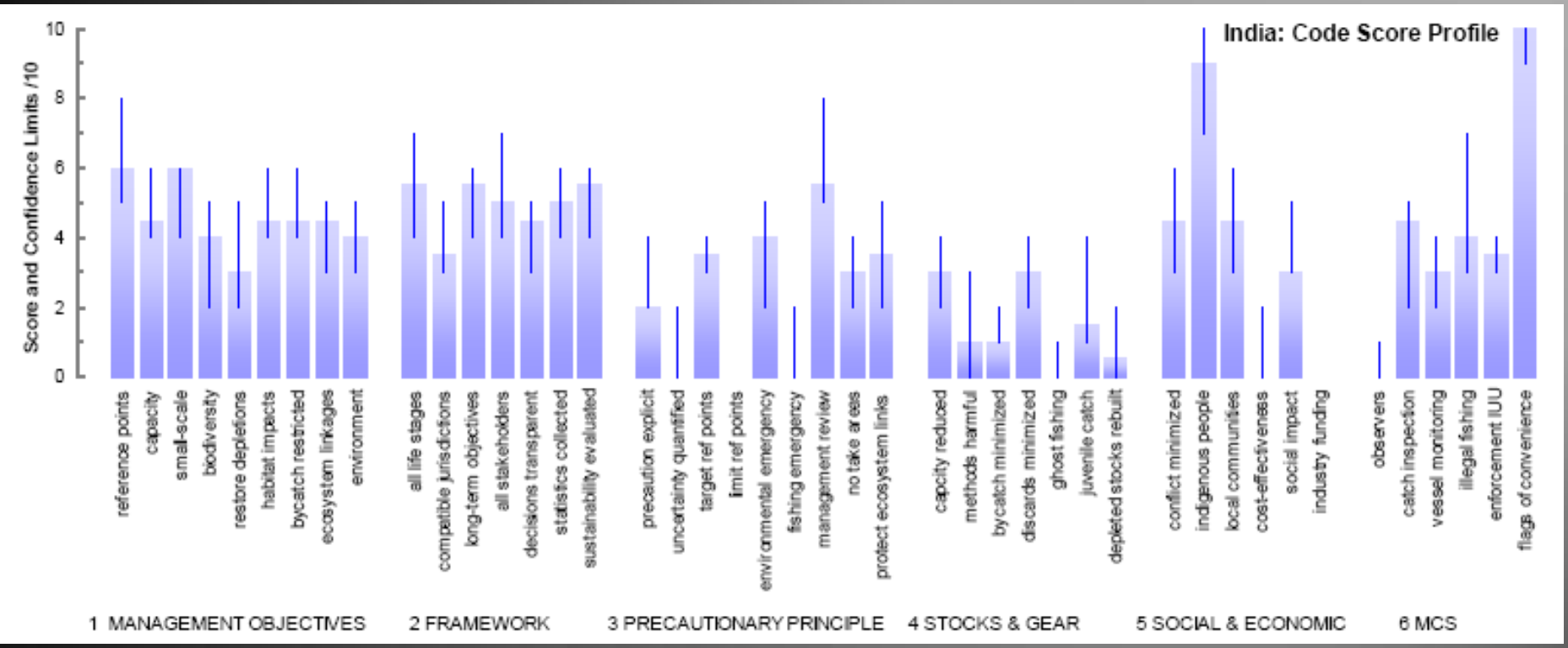
Management and conservation of the resources

- ***Ecosystem-based fisheries management (EBFM)*** ***better than single species mgmt, ecosystem evaluation and modeling, can predict changes***
- ***Bycatch reduction-*** ***BRDs and sem pelagic trawling***
- ***Capacity reduction-*** ***limit entry, buyback***
- ***Understanding climate variability and fisheries-****improved information on climate and effects made available*
- ***Implementation of CCRF -*****overexploitaton of stocks, damage to ecosystems, trade issues: ecolabeling**
- ***Natural hazards – disaster management plans***
- ***Mariculture-*** ***potential mariculture site identification***

- ***Development of Infrastructure-*** ***post harvest loss [illegible], public investment, VMS, better domestic marketing***
- ***Diversification of vessels and deep sea fishing-*** ***1.3 lakh t of deep sea resources- tuna longliners and squid jiggers***
- ***Diversification of products -value added products***
- ***Utilisation of fish waste to useful products***
- ***Marine Protected Areas (MPAs)-area to expand to 7.12%***

Compliance to FAO CCRF

India's Score



High scores for reference points, conflict minimization, protection of indigenous fishers etc,

Poor scores for quantifying uncertainties in estimates, lack of limit reference points, lack of initiatives for rebuilding stocks and prevent juvenile fishing

The Sunken Billions: The Economic Justification for fisheries Reform- World Bank report, 2008

- This study concludes that marine capture fisheries are an underperforming global asset.
- The difference between the potential and actual net economic benefits from marine fisheries is in the order of $50 billion per year.
- India can very well capture $2 billion per year from marine fisheries by way of fisheries reforms and improved governance