Future of India's Marine Fisheries

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Kochi | Kerala | India

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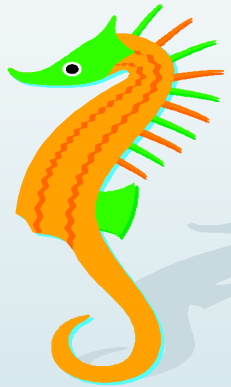
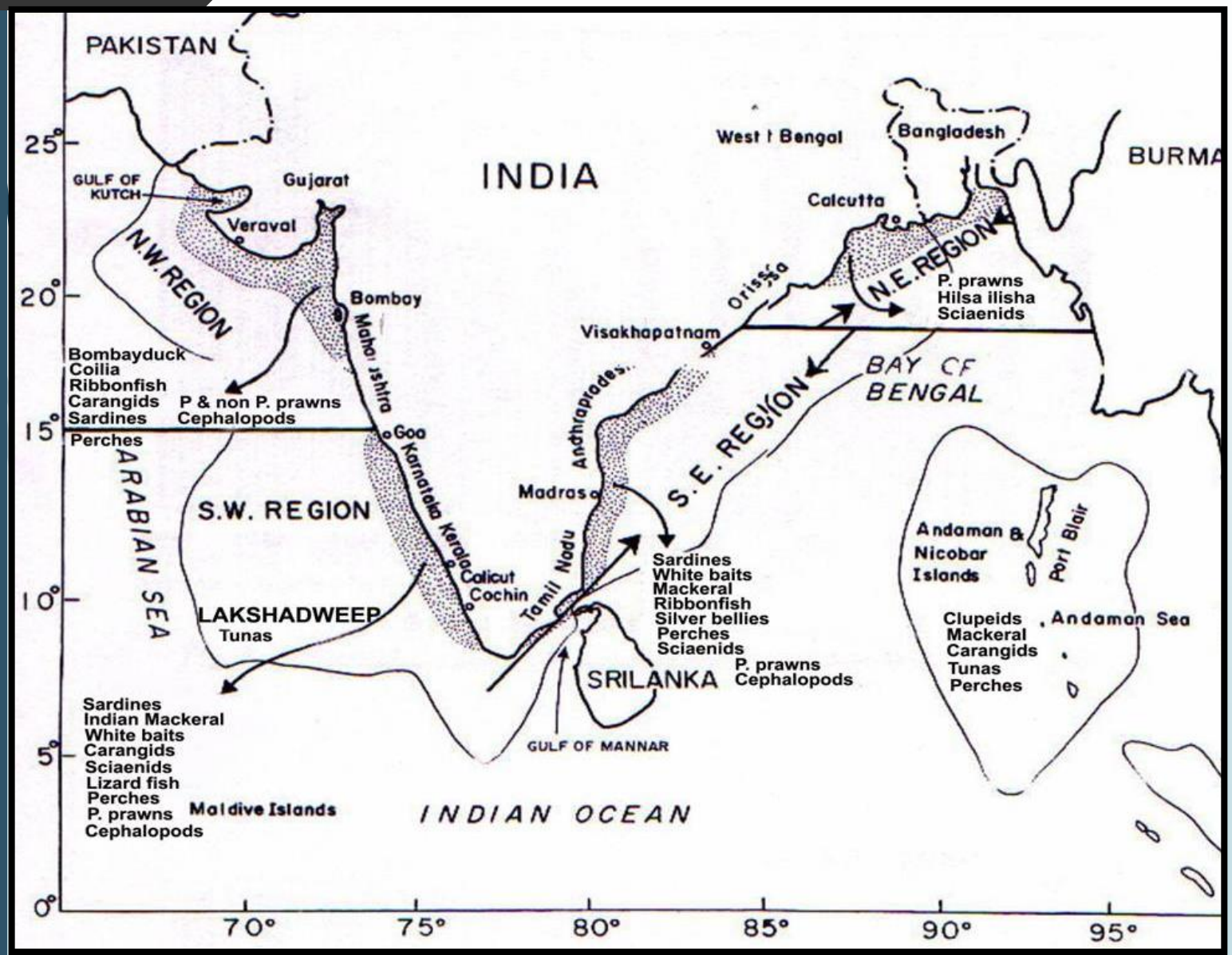
Profile of Indian Marine Fisheries

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	3202
Human Component	
Marine fishers population	3.5 million
Active fishers population	0.9 million
Infrastructure Component	
Landing centers	1332
Major fishing harbours	6
Minor fishing harbours	27
Mechanised vessels	58,911
Motorised vessels	75,591
Non-motorised vessels	104,270



India – Coastal eco-regions

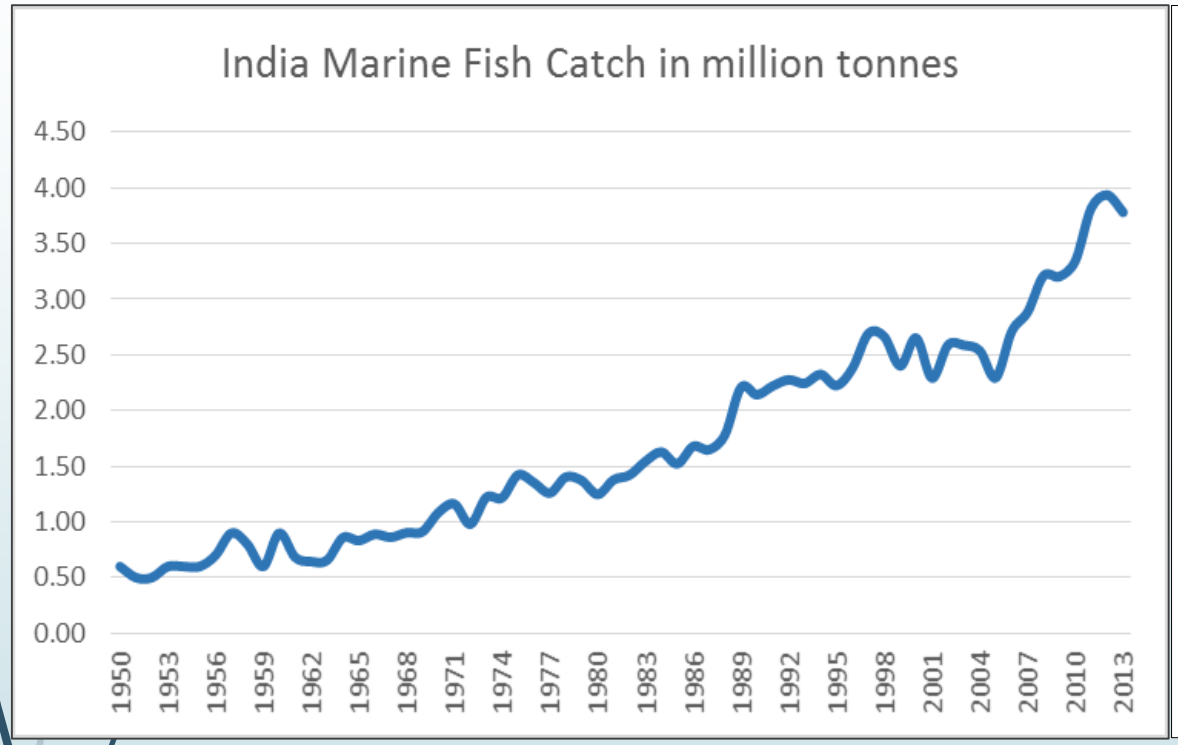


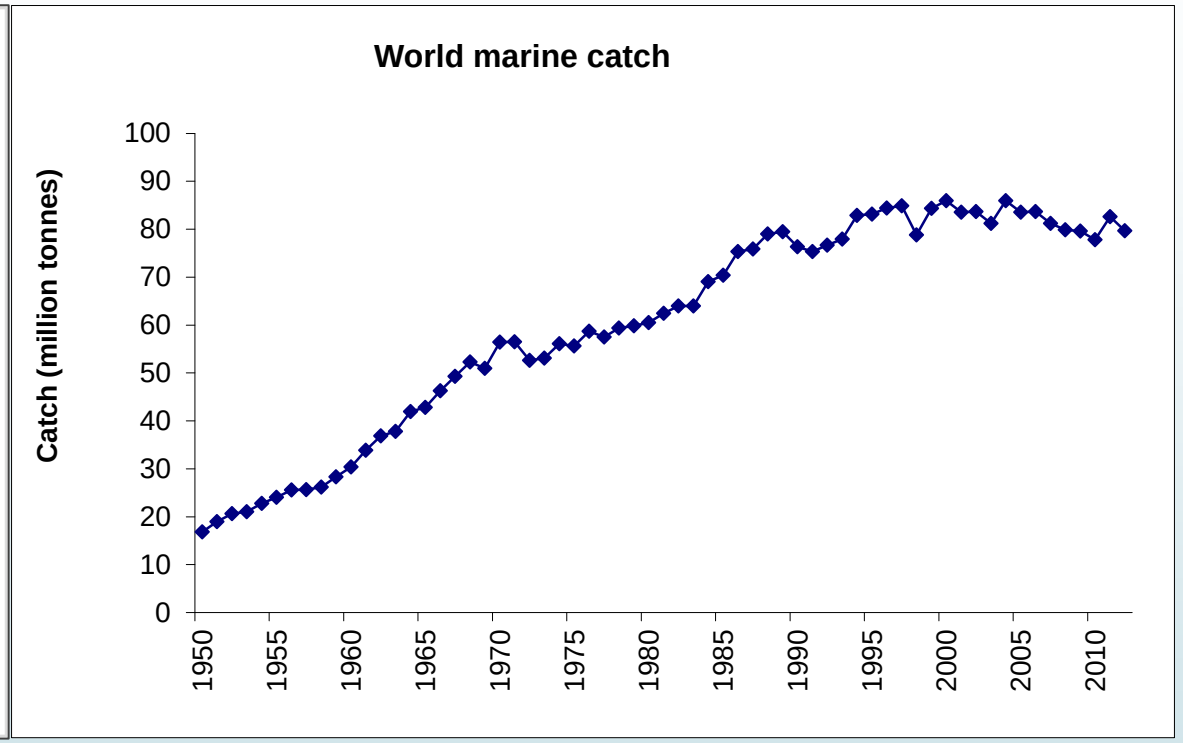
- 9 maritime states
- 2 island territories
- Arabian Sea
  - Gulf of Kutch
  - Gulf of Cambhatt
- Bay of Bengal
  - Gulf of Mannar
  - Palk Bay
  - Sunderbans

Indian Marine Fisheries - Percentages

Gross value	US$ 7.2 billion
Export Value	US$ 4.5 billion: ~65% marine capture
% in total exports	3%
Domestic markets	81% fresh; 5% frozen 6% dry; 5% fish meal
Per capita fish consumption	2.85 kg (range 39 – 0.3)
Share in GDP	~1%
Share in agricultural GDP	4.5%

India Vs World – Marine Catch Trends





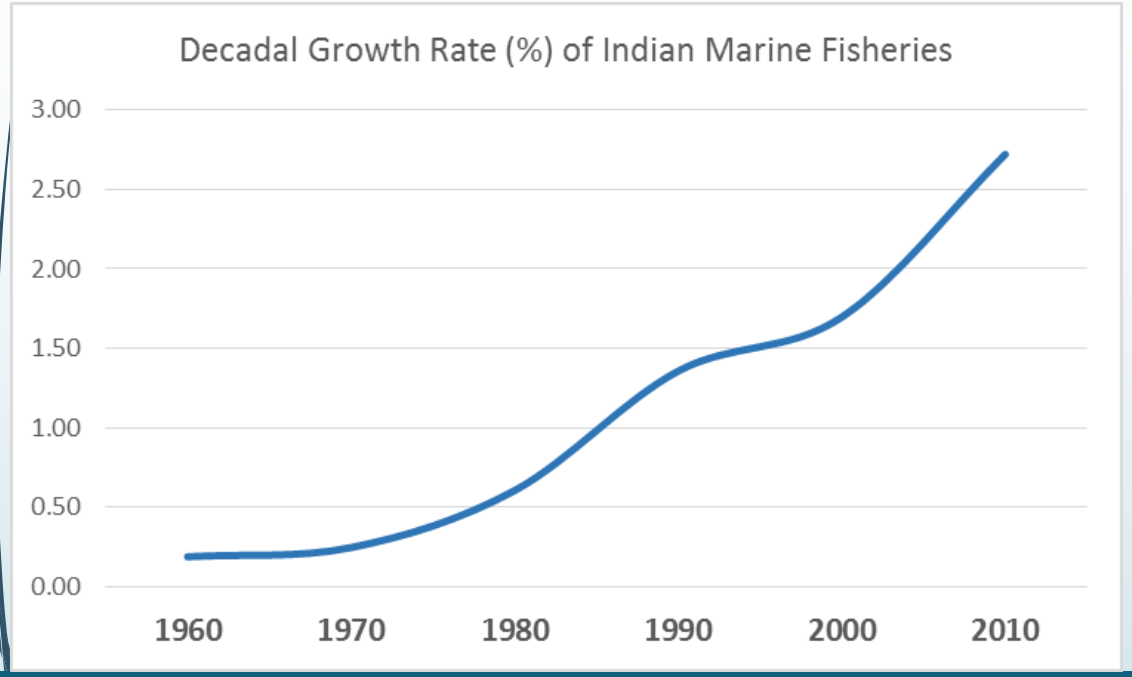
India **Global**

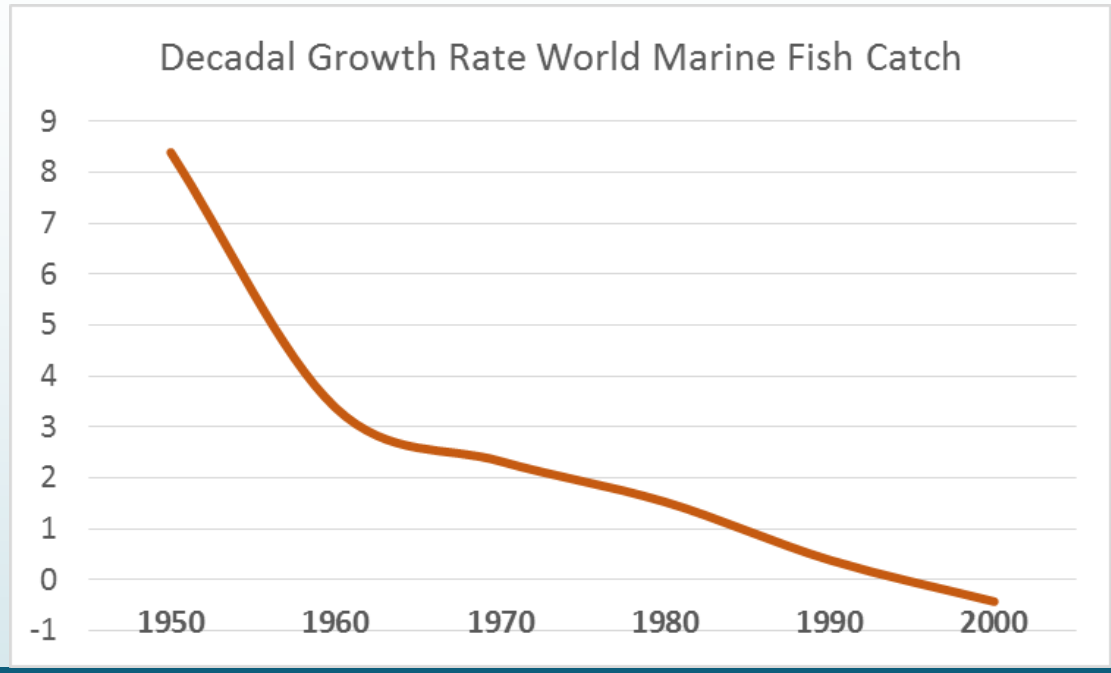
Continuing to grow & expand

Annual growth rate in marine fish production

India Vs Global

2-point moving average





India

- High fecundity (≈ 500 eggs per g body weight),
- Continuous spawning with extended spawning season with pulses
- Fast growth rate (K often exceeds 1.0),

Global

- Abundant spawning stock biomass (more than 50% of standing stock biomass),
- Quick turnover of generations (1 to 2 years) and
- Short life span (≈ 3 years)

Complexity of Tropical Fisheries - An Example

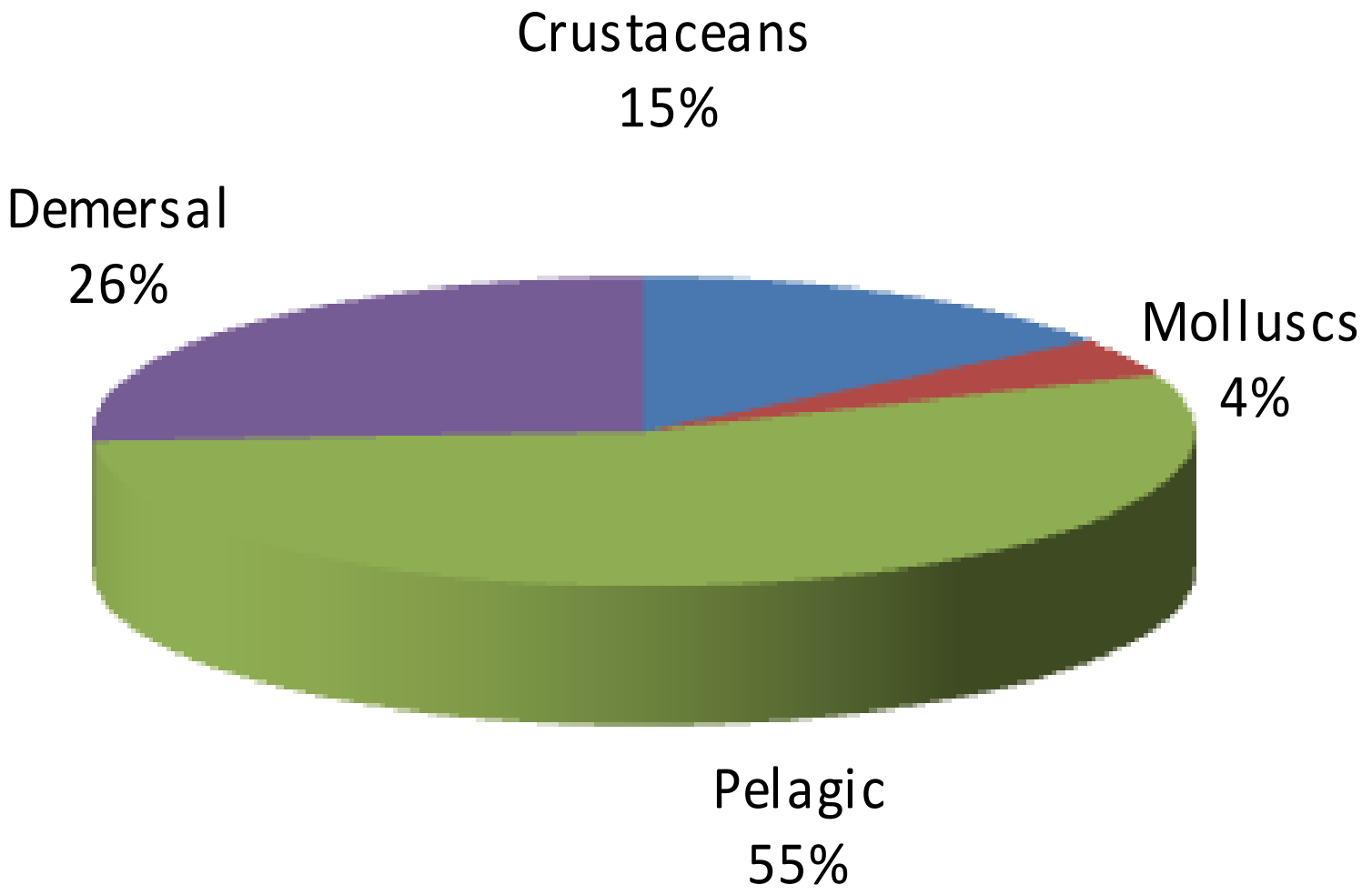
- Fish stocks in each ecosystem are in different stages of exploitation
- Of the 60 species of finfishes, crustaceans & cephalopods landed in one coastal trawl haul at the Chennai Fisheries Harbour
  - 6 were in overexploited category
  - 40 were in optimally exploited category
  - and 4 were in underexploited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

Complexity of Tropical Fisheries …..

- 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)
- More people are dependant on fisheries as a livelihood

How the Exploitation is Carried Out

- 5 major Gears
  - Trawl
  - Bagnets
  - Gillnets
  - Seines
  - Hook & Line
- Major Crafts
  - Mechanized
  - Motorized
  - Non-mechanized
- More than 30 craft gear combinations



Major Components of Marine Fish Landings in India

High number of species exploited in different gears

EXAMPLE

Sl. No.	Name of gear	Kerala	Karnataka
1	Mechanised trawlnet	610	335
2	Mechanised multi-day trawlnet	418	158
3	Mechanised gillnet	292	200
4	Mechanised multi-day gillnet	283	64
5	Mechanised driftnet	282	185
6	Mechanised hooks & lines	221	30
7	Mechanised multi-day hooks & lines	55	0
8	Mechanised purse seine	105	215
9	Mechanised ring seine	67	0
10	Outboard gears	480	221
11	Non-mechanised gears	496	283
	Total	818	524

Open Access Fishing is Governed by

- 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

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 (only for trawls)
- Minimum legal size at capture
- Use of Turtle Excluder Device (TED) in trawls in Orissa

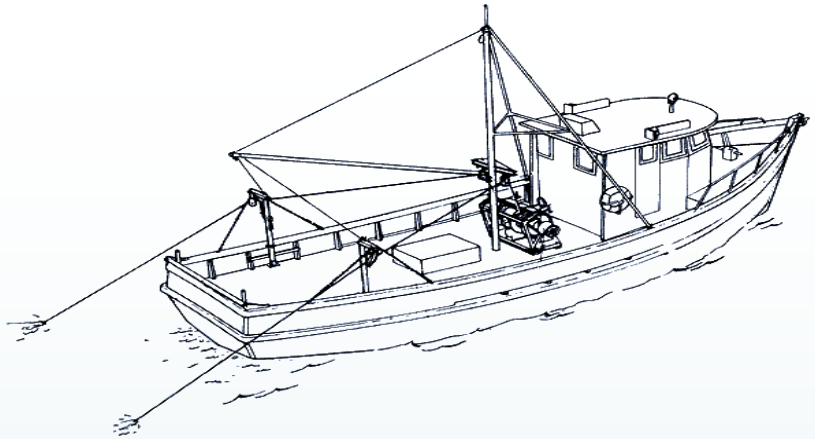
Issues in the system

- Potential vs Current
- Governance – new regulations
  - RFMO – shared stocks
  - HCR – Harvest Control Rules
  - VMS – Vessel Monitoring System
- Conservation
  - ETP species
- Environment - Climate
- New resources – deep sea
- Sustainability
  - Certification | Choose wisely
- Labour | Skill

Potential versus Current

- Potential 4.45 million tonne
- Current 3.9 million t
- Not much scope
- PY likely to be revised – new deep sea resources
- Develop indigenous deep sea fishing capability
- Main focus – maintain present yields with marginal increase

Poor Governance…..
MFRAs of Maritime States



- Cod-end mesh size of trawl nets should be 35 mm (40 mm square mesh in the case of Gujarat)
- Compliance to such regulatory measures are very poor.
- Multi-day trawl fishermen throughout the country carry more than half a dozen nets with mesh sizes varying from 10 to 40 mm.
- A recent study on compliance to CCRF of FAO and MFRAs and MCS measures by Indian maritime states indicates poor observance

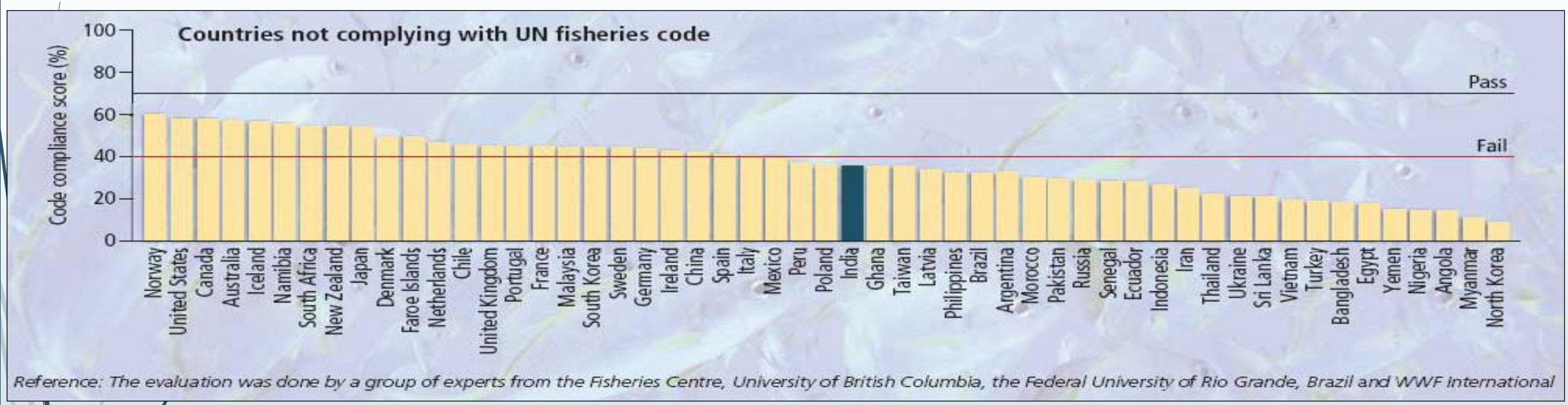
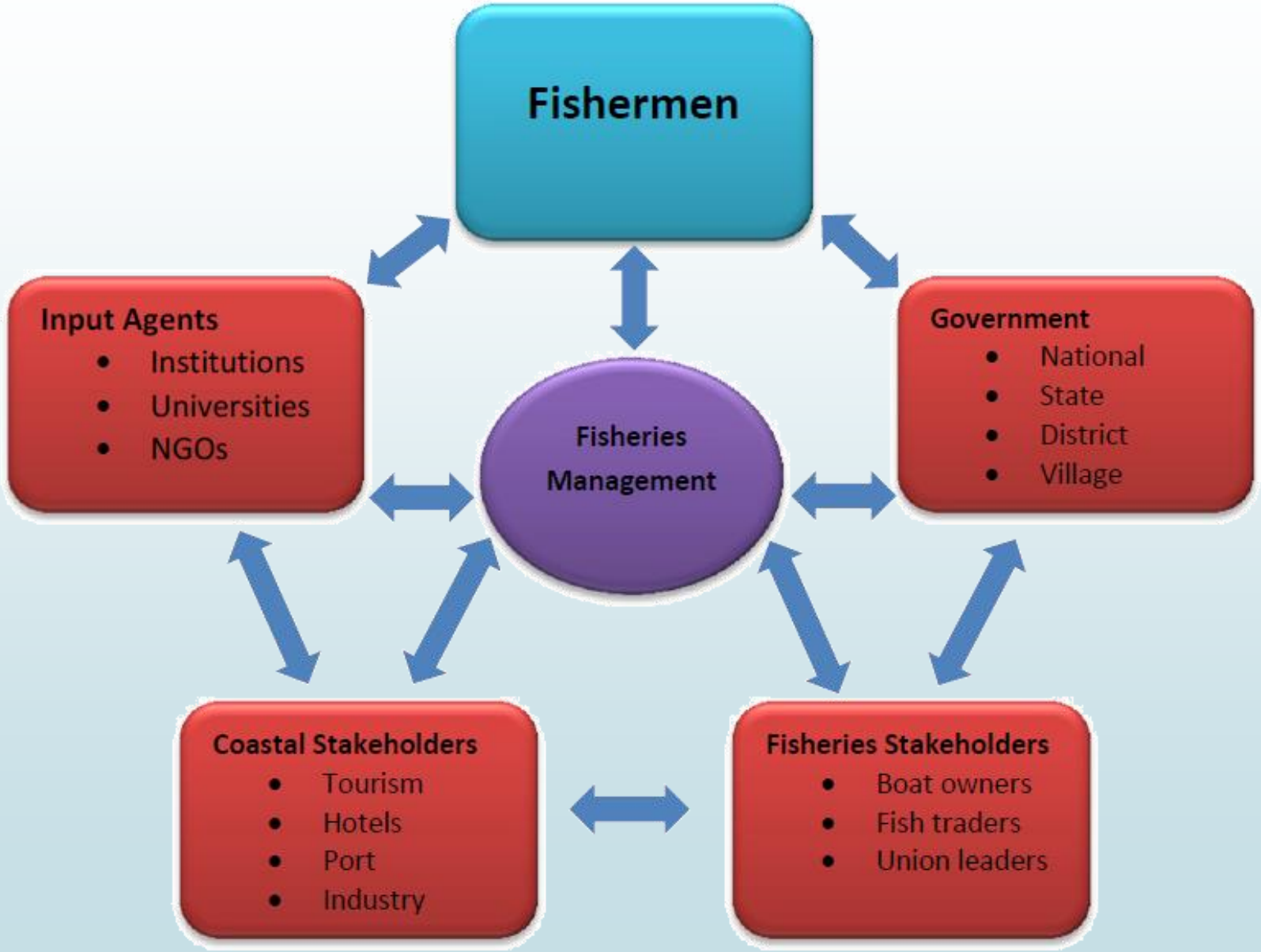


Chart of compliance of different countries to FAO's CCRF. India's position is shown in dark blue and it fails to pass the minimum score

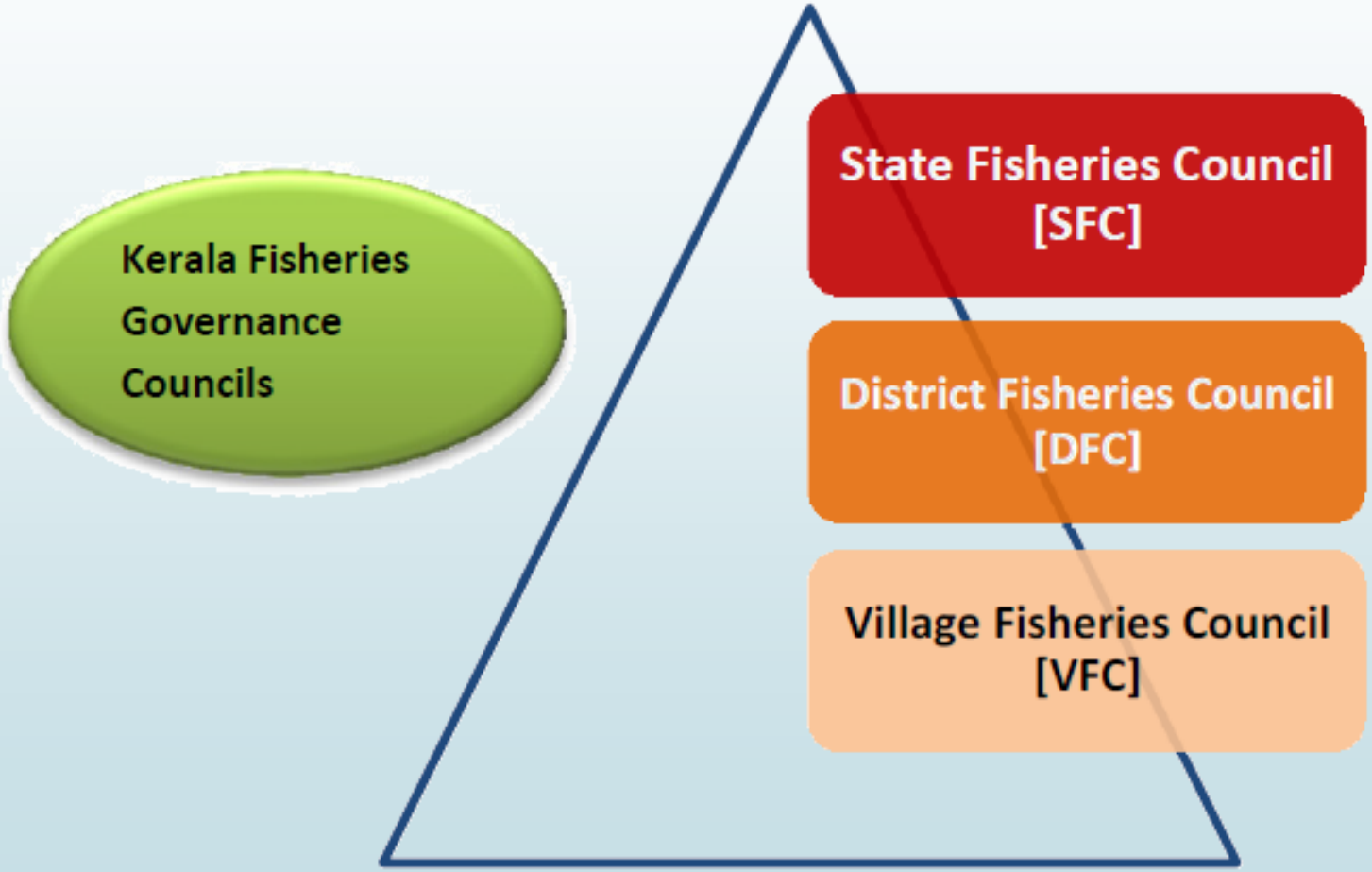
Governance of the resources and fishers

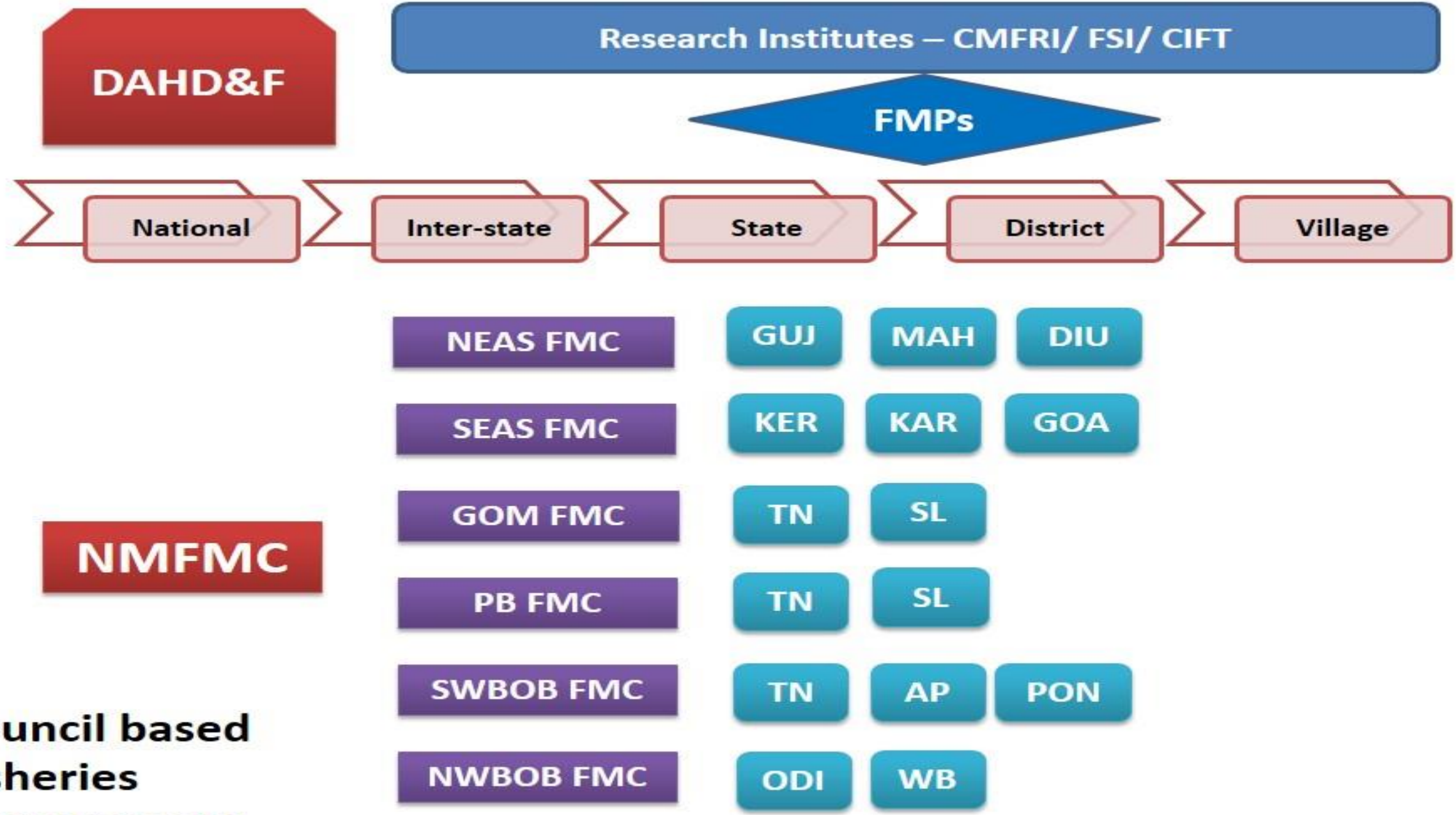
- Poor
- A clear example of this omission is the **absence of any regulations for area between 12 and 200 nmi of the EEZ** which is supposed to be administered by the central government.
- This renders a substantial proportion of the catches from this area (~70% of trawl catches) as IUU.
- The lack of strict implementation of input and output controls within the existing, but outdated MFRAs, is also a shortcoming
- Considering this, the CMFRI has embarked on a major exercise to develop a Marine Fisheries Management Code (**NMFMC**) on how the FAO CCRF can be implemented in the country

Partnership in Fisheries Management



Council Management System





Council based Fisheries Management System

Harvest Control Rules

- MFRAs outdated
- No specific objectives
- No specific FMPs (being developed)
  - Fishery based
  - Maritime state based
- Poor enforcement
  - Reward and punishment
  - No VMS

Shared Stocks – RFMOs | Conflicts

- IOTC, BOBP-IGO, CCMLR
- Conflicts – Sri Lanka/ Bangladesh/ Pakistan/ Maldives
- No RFMO for Arabian Sea or South Asian Seas
- No means of conflict resolution – only bilateral

Conservation of resources & MPAs

- Marine Protected Areas (MPAs) are a passive form of fisheries management tool highly successful in many parts of the world.
- In recent years it has evolved to what is called as Fish Refugia, enabling an undisturbed unfished area within a heavily fished zone for spawning and nursery of all marine organisms.
- Although, most Indian fisher organizations are against this concept, this would become essential in future years to conserve and protect spawning stocks of our commercial fish stocks.
- Already many Southeast Asian countries have set up fish refugias to protect their spawning stocks

MPAs in India….

- 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
- But, no fisheries MPA or refugia

State of the Marine Environment

- Seas under increasing threats from anthropogenic activities
  - Marine debris/ litter
  - Ghost fishing
- Inland water bodies severely affected
  - Eutrophication – most impacting on seas - HABs
- VMEs – habitats not identified
  - Being done by NCCZM/ ICMAM

Climate Change – Climate Proofing?

- Climate has always influenced fisheries
- Weather > Oceanography & Currents > Spawning & recruitment > fisheries
- Species distribution impacts – resilient stocks > pelagics / demersals
- High diversity > an advantage > some species affected > others favoured
- Acidification > Shellfish
- Sea Level Rise - fishermen

Protected Species - Indian Wildlife Protection Act 1972

- **All** marine mammals, corals, gorgonids, sea cucumber, sponges & sea horses
- 7 sharks
- 2 rays
- 1 skate
- 1 giant grouper
- 4 bivalves
- 1 cephalopod
- 19 gastropods

Minimum Legal Sizes

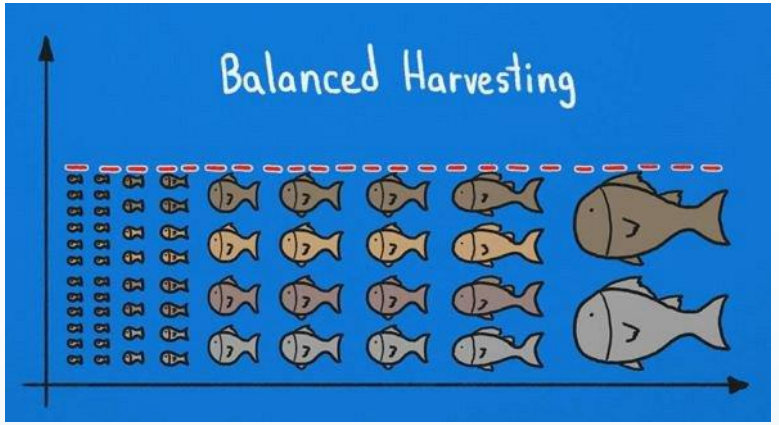
Species	Weight (g)/ Length (mm)
Panulirus polyphagus	300 g
P. homarus	200 g
P. ornatus	500 g
Thenus orientalis	150 g
Pampus argenteus	200 g
Loligo duvauceli	80 mm
Sepia pharaonis	115 mm
Octopus membranaceous	45 mm

MLS for 58 species recommended for the state of Kerala in 2014

Rights-based fisheries

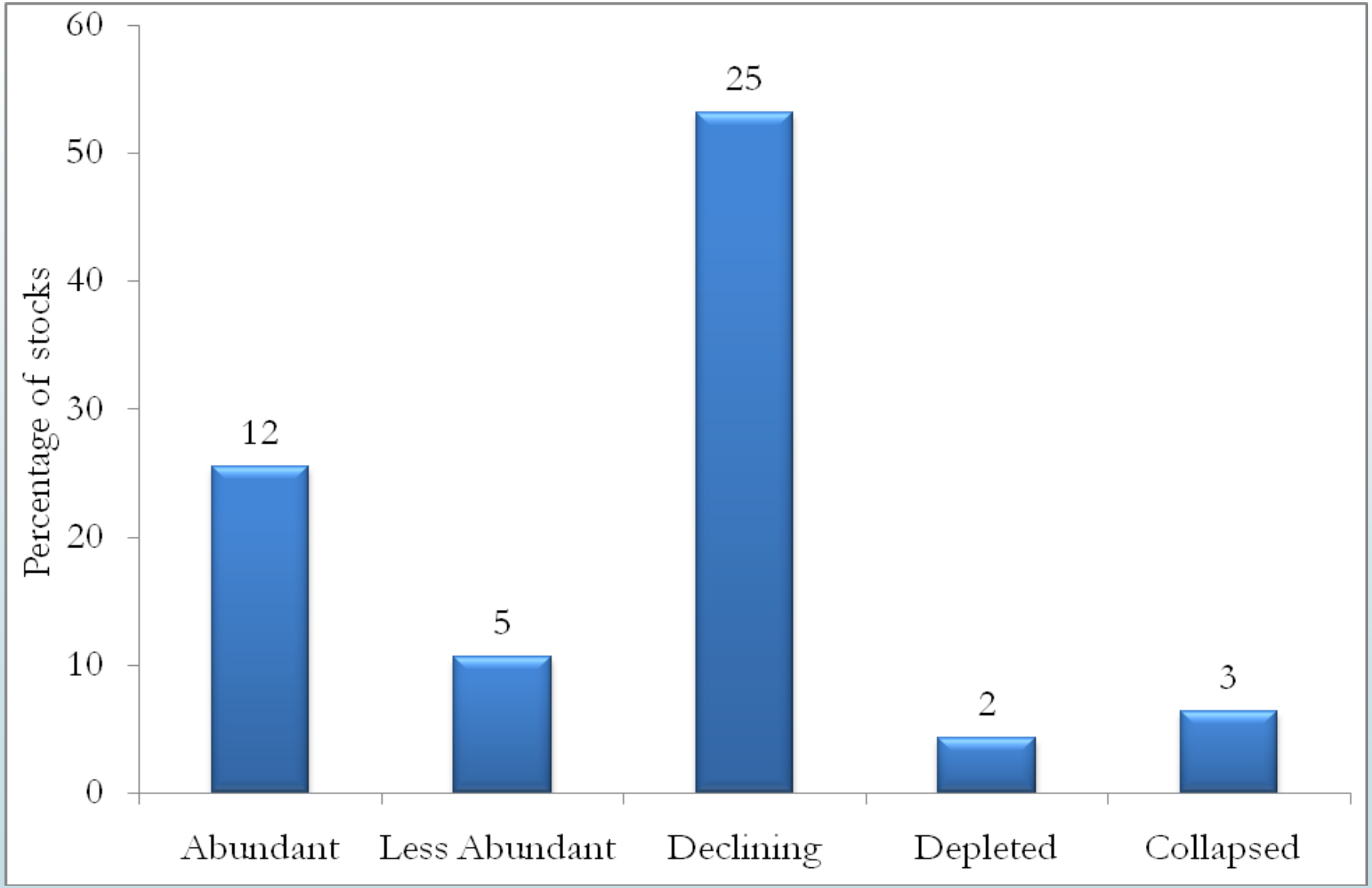
- Rights based fisheries management is a fisheries management tool that creates rules which define both the right to use and the allocation of fisheries resources.
- Thus, fishermen, fishing vessels, fishing communities and so forth can be awarded a license, quota or fishing right to stocks.
- There are a large number of different rights based approaches, such as
  - limited non-transferable licensing;
  - community catch quotas;
  - individual non-transferable or transferable effort quotas,
  - individual non-transferable or transferable catch quotas,
  - vessel catch limits or territorial use rights in fisheries

Sustainability..

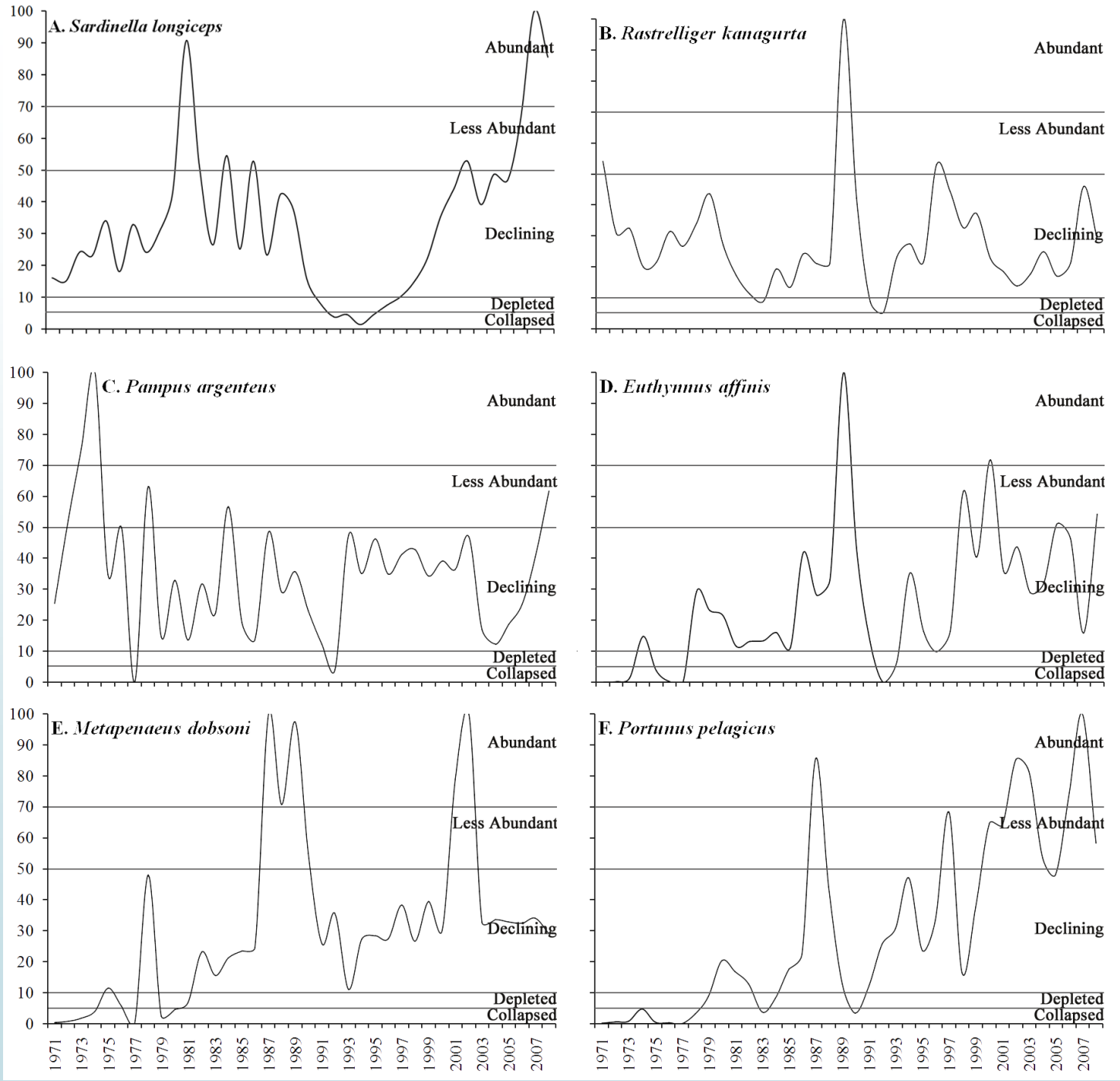


- Production trends are good on a macro scale
- However, on a micro-scale, several declines and some collapses
- Also revivals..
- Mostly small-scale fisheries, unknowingly following the now touted **balanced harvesting concept** – and hence mostly sustainable..
- In some cases reduced catches propped up by price increases
- Certification of small-scale high value fisheries a new goal

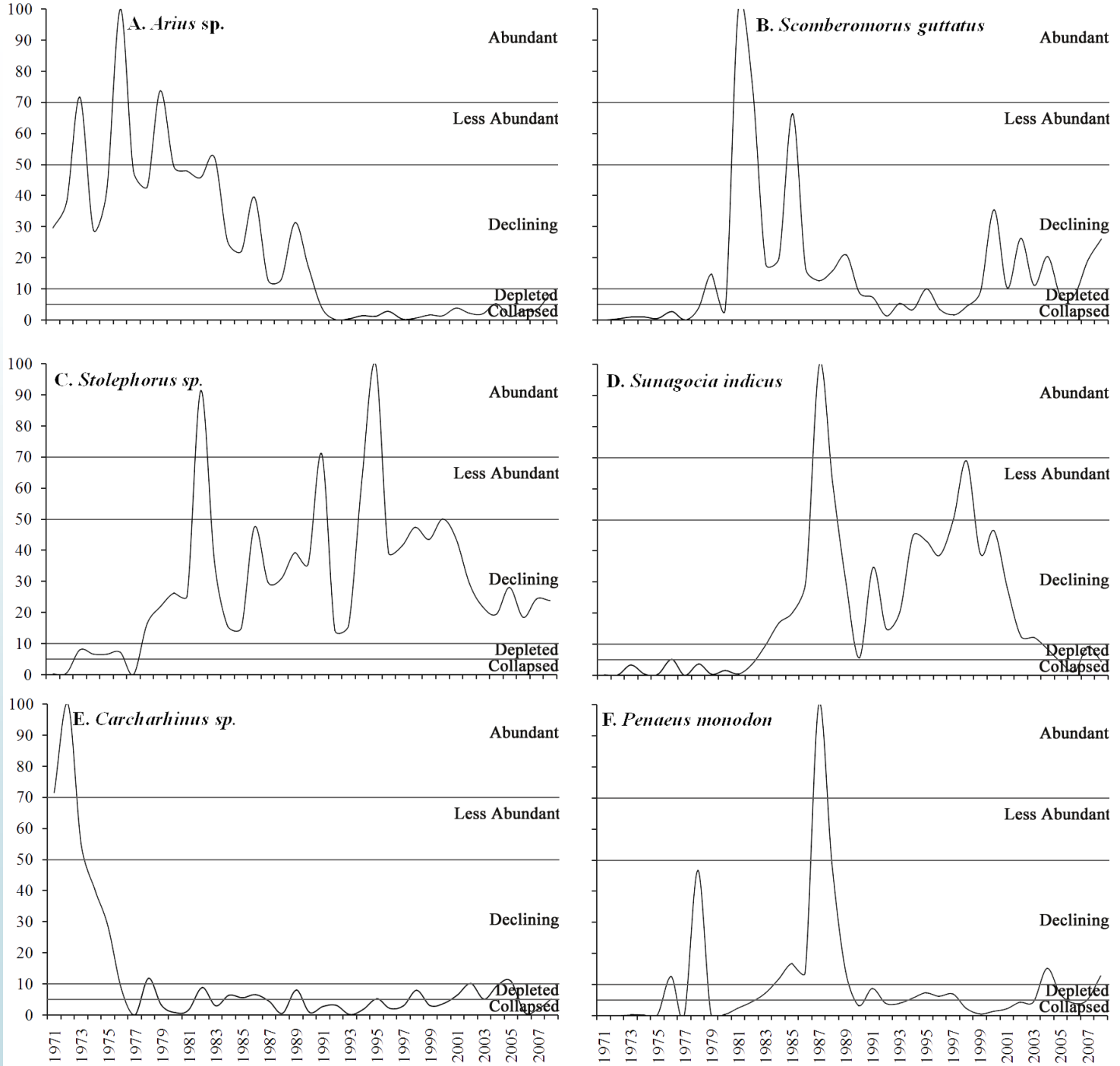
Percentage of marine fish stocks in Karnataka as per stock-status classification



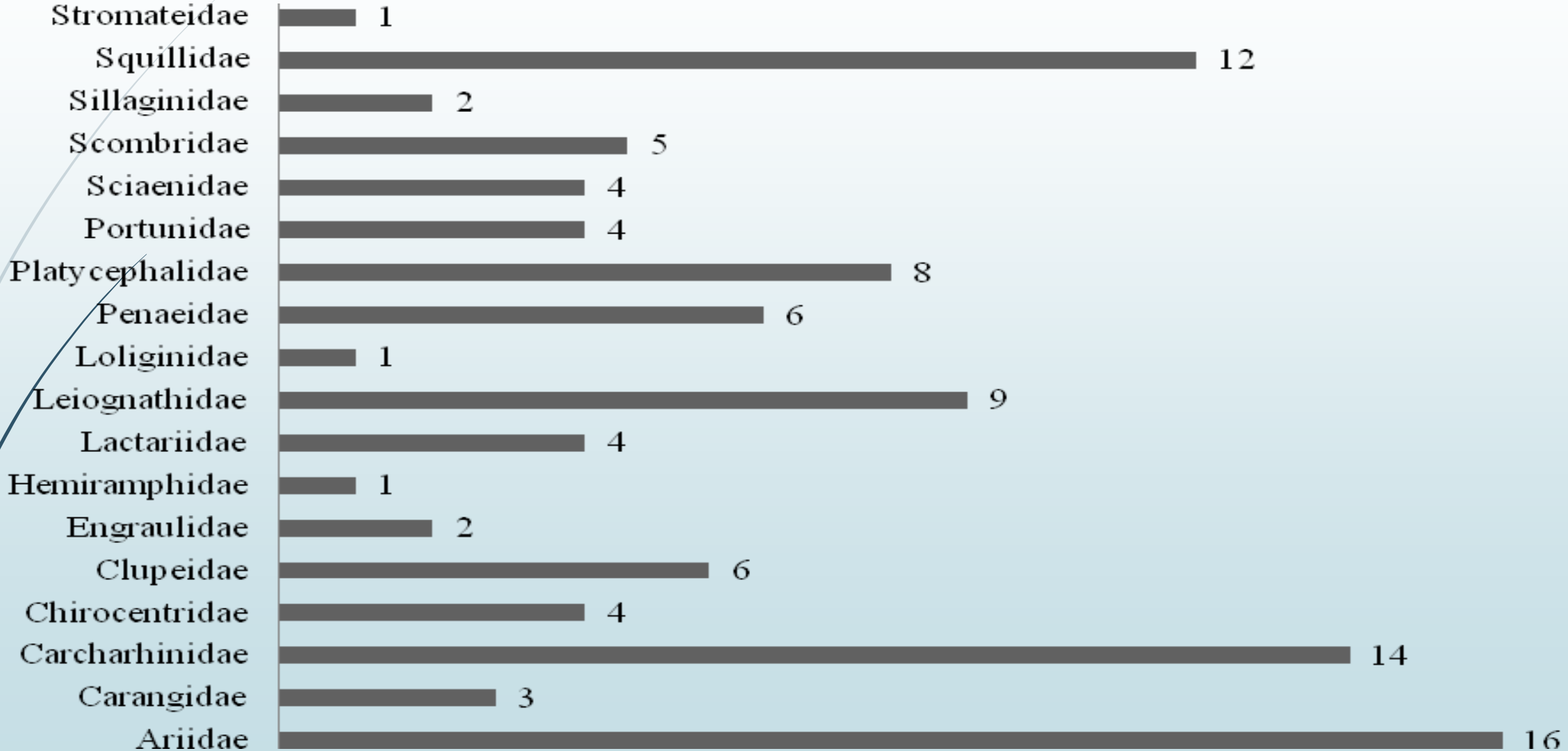
Maximum number of stocks are fluctuating



15/57 (>25%) are dwindling stocks



Recoveries possible- Mean number of years for recovery of stocks

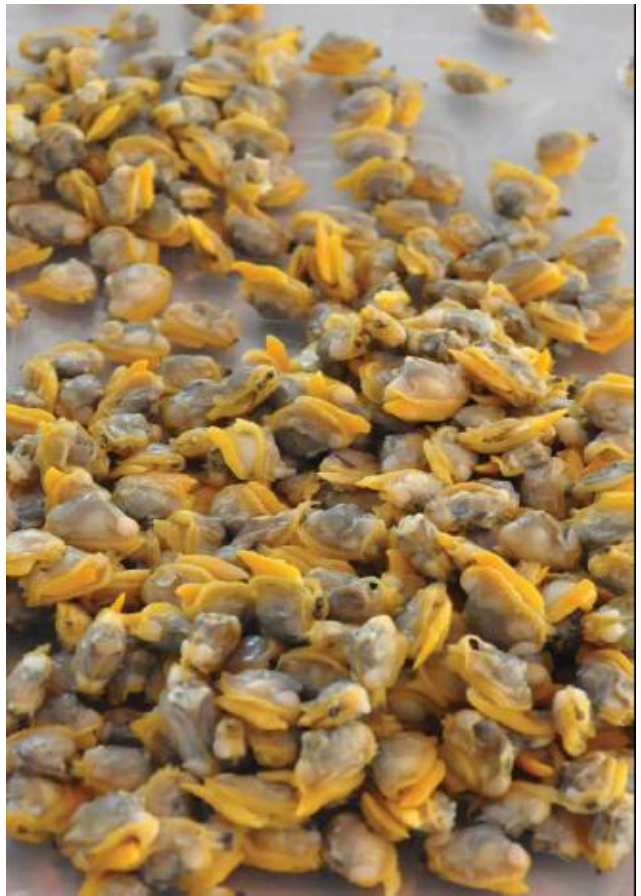


Success story in Management

Paphia malabarica

- Although, they do not form a high unit value resource, yellow-foot clams are exported to niche markets such as Japan fetching high value.

- Almost 90% of this export is sourced from the Ashtamudi Lake, and in 2009, India exported 542 tonnes of clam meat in various forms valued at US$ 0.99 million



Clam Fishery History

- From 1981 – rapid increase in exploitation due to demand from exporters
- 1990s – decline in catches to below 5000 tonnes
- 1993 – based on CMFRI advice – the beginning of scientific management …
  - Closed season for 3 months during the breeding period (Dec to Feb)
  - Mesh size of clam dredge nets fixed at 35mm
  - Exporters will not take more than 1400 count clam meat
- CMFRI conducts clam biomass surveys – 1996, 2011, 2013 – now annually…

Highlights of the 2011 Ashtamudi Lake CFMP

- Creation of Clam Sanctuary (no-clam-fishing Zone) for protection of spawning biomass
- Instead of meat count restriction – minimum Legal size for capture (APM 20 mm)
- No transplantation between habitats and no mechanical harvesting
- Move towards a quota management system based on TAC set by CMFRI
- Introduce council management system (participatory management)
- Setting Clam Management Area
- Encourage depuration of clams for better hygienic quality

Has led to ecolabelling…

- The current management practices for the clam fishery resulted in WWF identifying this fishery for ecolabelling under the MSC certification scheme
- Passed pre-assessment in 2012
- Completed full assessment by independent certifying body (Moody Marine) – **Granted certificate in Nov 2014**

Deep Sea Resources

- The PY has been estimated as about 0.6 million tonnes in area beyond 100m depth
- A good portion is already exploited by coastal vessels which are now venturing to deeper areas
- GOI has to encourage such vessels by offering financial and technical assistance
- The current letter of permit (LOP) system favoring Indian owned foreign vessels does not seem to have worked – neither improving Indian capability nor increasing production.

Fishery business & migrant labour

- New generation of fishermen – educated, but not interested in fishing – leaving out of fisheries
- Industry now hiring migrant labour – who lack skills
- Fishermen turning into fishery business managers
- Only skilled will survive
- Decrease in effort

In the next 10 years…

- Decrease in effort
- More participatory control and management
- Yields at around 5 million tonnes – addition from deep sea
- More conservation efforts
- More value for fisheries – productivity losses negated through price gains
- Increase in fish consumption – domestic markets – more important

Thank You