# Fisheries Management & Regulations

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# CURRENT STATUS OF THE MARINE FISHERIES RESOURCES IN GHANA

# Table of content

**Introduction**

**Overview of Fisheries**

**Current state of Ghana's fisheries**

**Management challenges**

**Management actions**

# GHANA'S COASTLINE

- Located in the **Western GoG**; Africa
  - 750 km north off the equator
  - Latitudes 4° to 12° N
  - Longitudes 3° W and 1° E.

- A coastline of **550 km** and a total continental shelf area of approximately **24,300 km²**.
  - relatively narrow continental shelf to a depth of around 75 –120 m. Trawlable area 16[redacted] km²

- Fishing industry is based on resources from both marine and inland (freshwater) waters including coastal lagoons and aquaculture.

# Ghana's Fisheries Sector

- The Fisheries sector accounts for about 5 % of the country's Agric. GDP.
- Fish contributes 60 % of annual protein intake of Ghanaians.

- In addition to food security, the marine fisheries sector is estimated to generate approximately US $1 billion in total revenue each year.

- The latest figures indicate that the sector represents about 2.6 % of Ghana's GDP (Fisheries and Aquaculture Development Plan 2011-2016 –

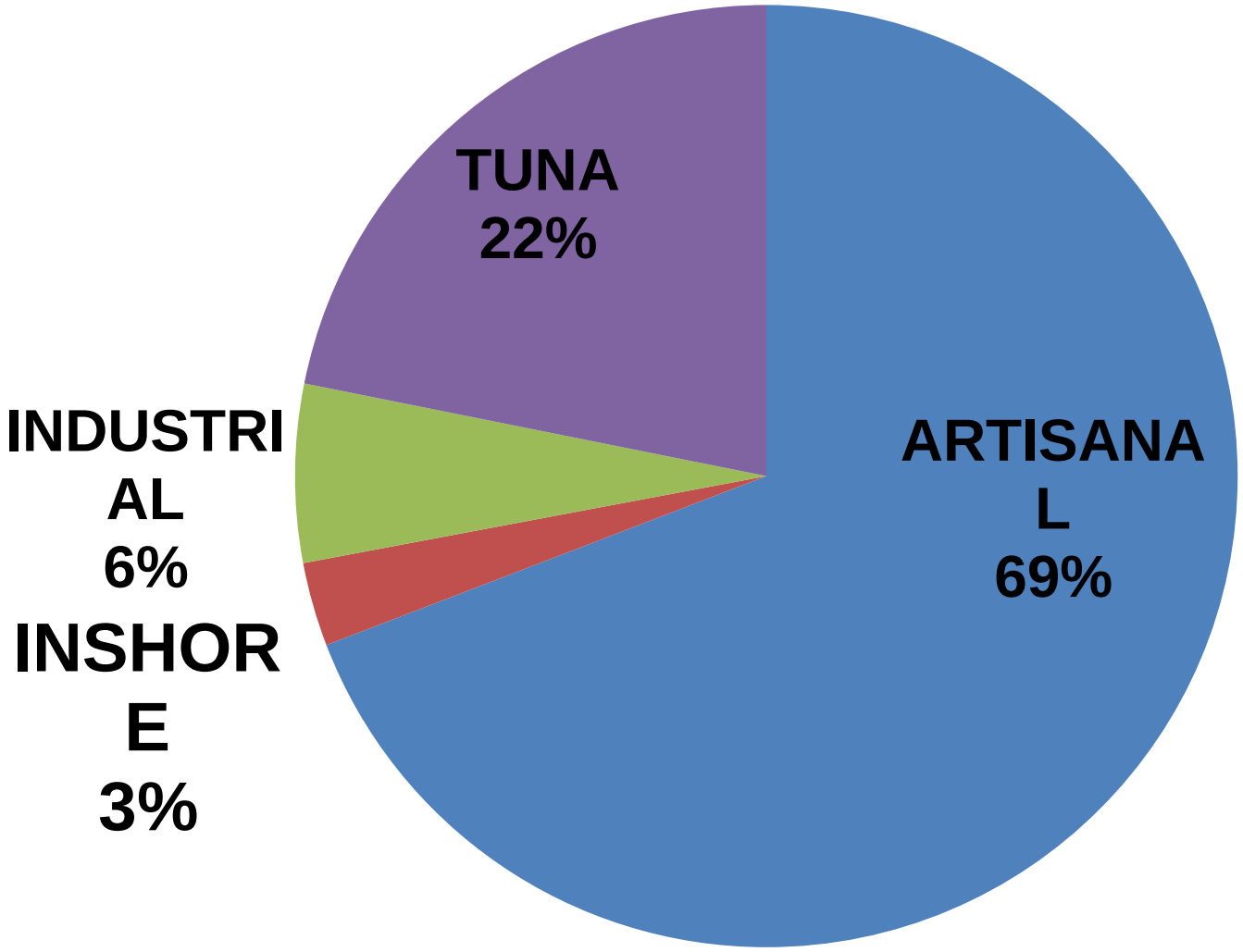
# The Marine Sector of Ghana's fishery

**Artisanal fishery - Canoe fishery using a variety of gears including the beach seine. Over 9,500 canoes (*2014 register)***

**Inshore fishery- operated from crafts with inboard engines with wooden hull (403 registered in 2014 *(2014 )***

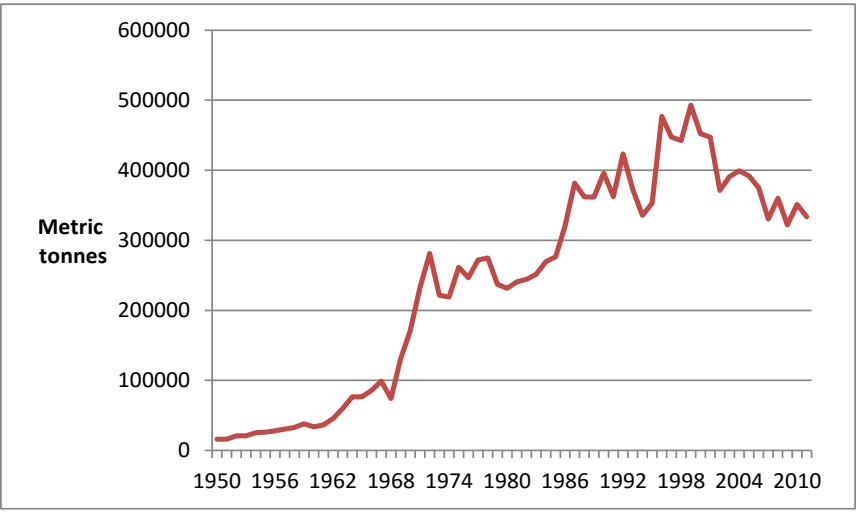
**Industrial comprising the 107 bottom trawlers 2 shrimpers and 37 tuna vessels *2014***

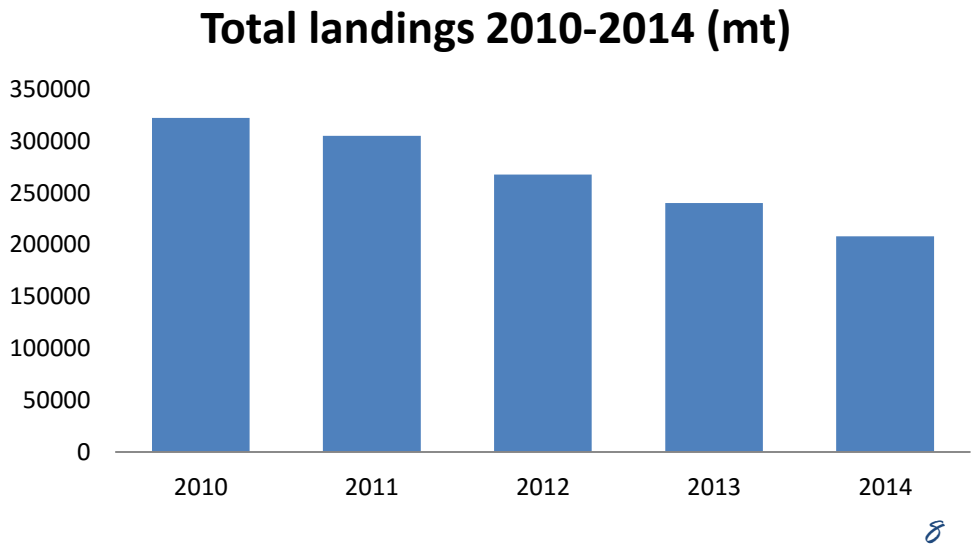
Percentage contribution of the various marine fisheries sectors



# Landings of fish resources from all fleet (marine and inland) 1950-2010 & 2010-2014

## TOTAL LANDINGS



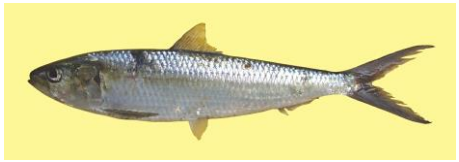
# ARTISANAL FISHERY –MAINLY CHARACTERISED BY THE SMALL PELAGIC SPECIES

- A variety of gears are used to exploit these fish species from dugout canoes.

- Sardinella forms at least 40 % of the artisanal catches and has been the 'backbone' of Ghana's fisheries for decades:


CHIMBORA
OBAMA

*Sardinella maderensis* (Lowe 1841)

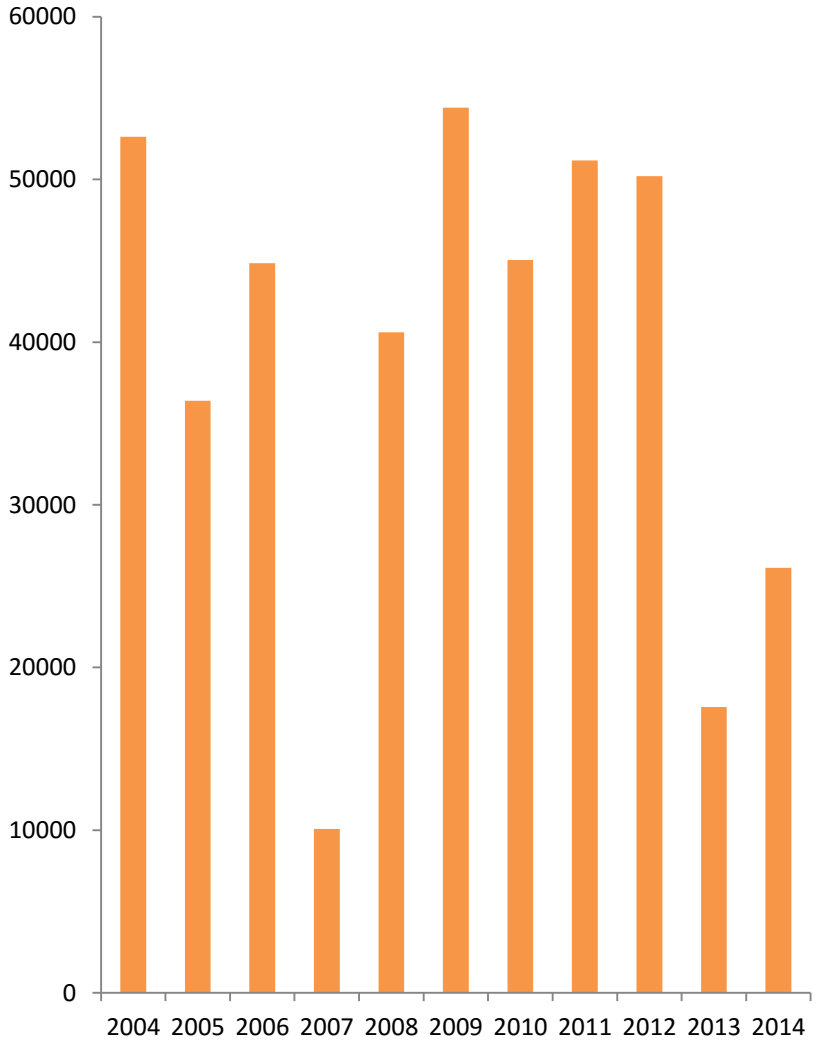


*Sardinella aurita* (Val. 1847

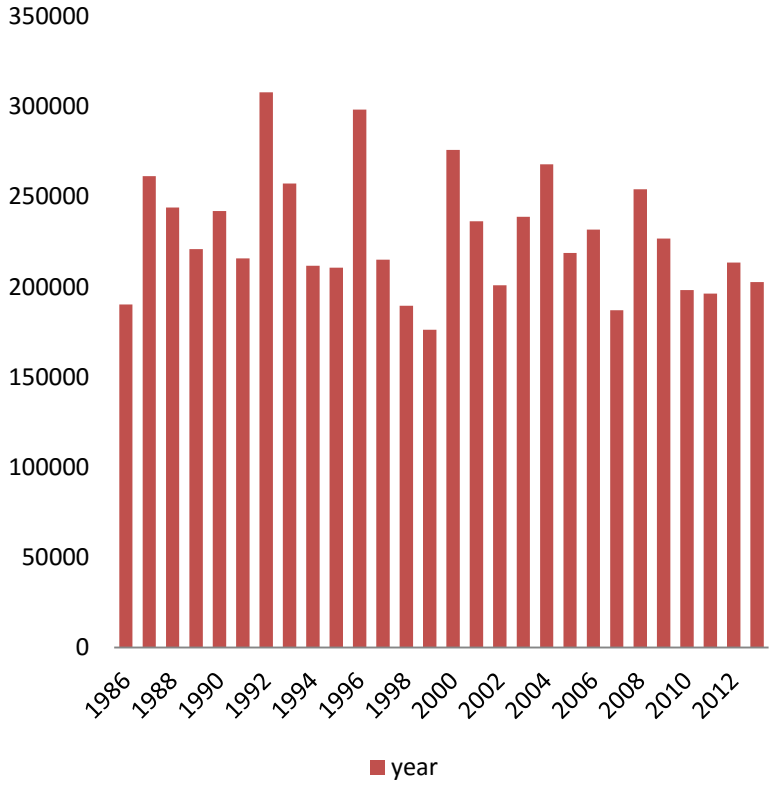


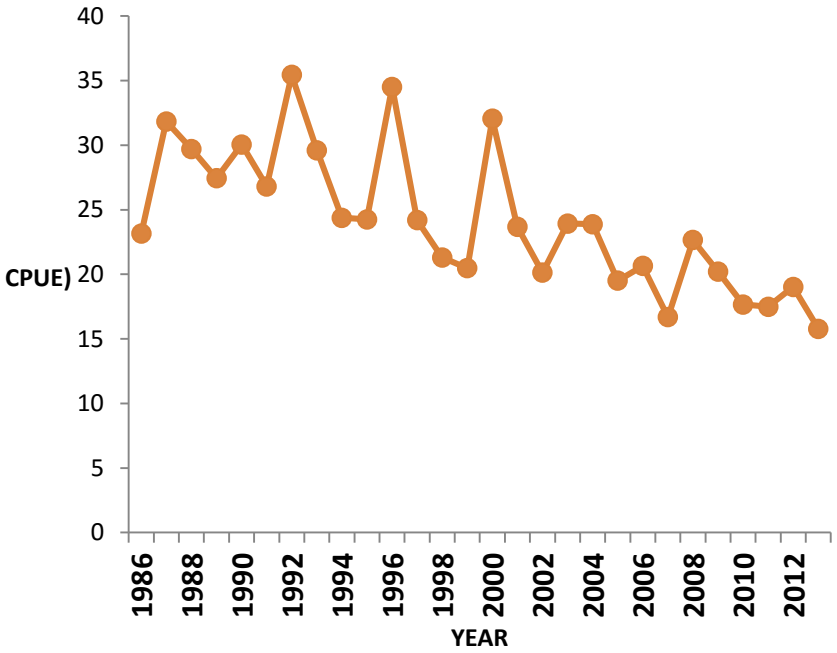

**The Sardinella fishery is seasonal with the *Sardinella aurita* more abundant between July and September than the *Sardinella maderensis***

# Anchovy



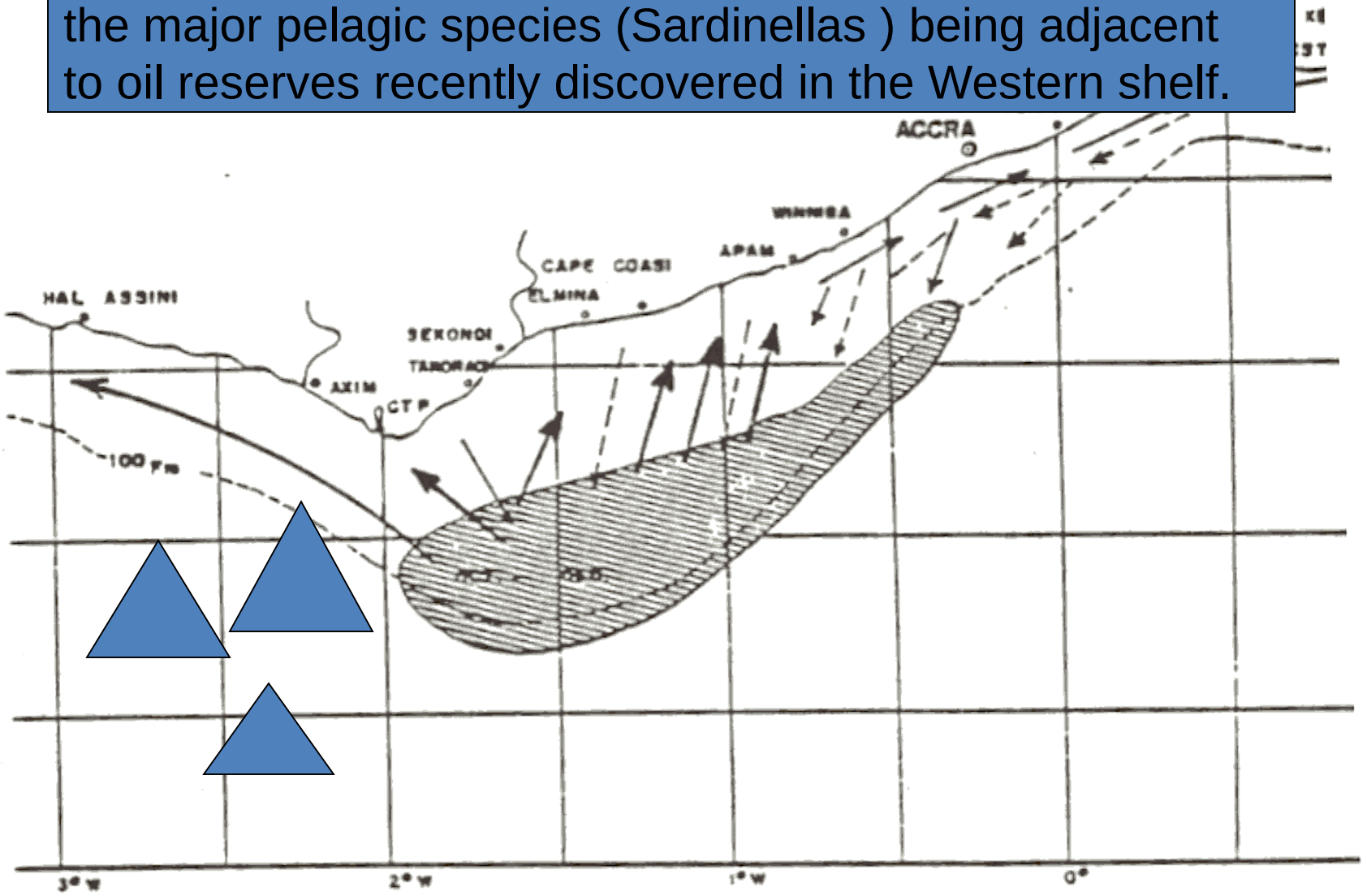
# Landings (mt) and CPUE (mt/canoe/trip) for the artisanal fleet



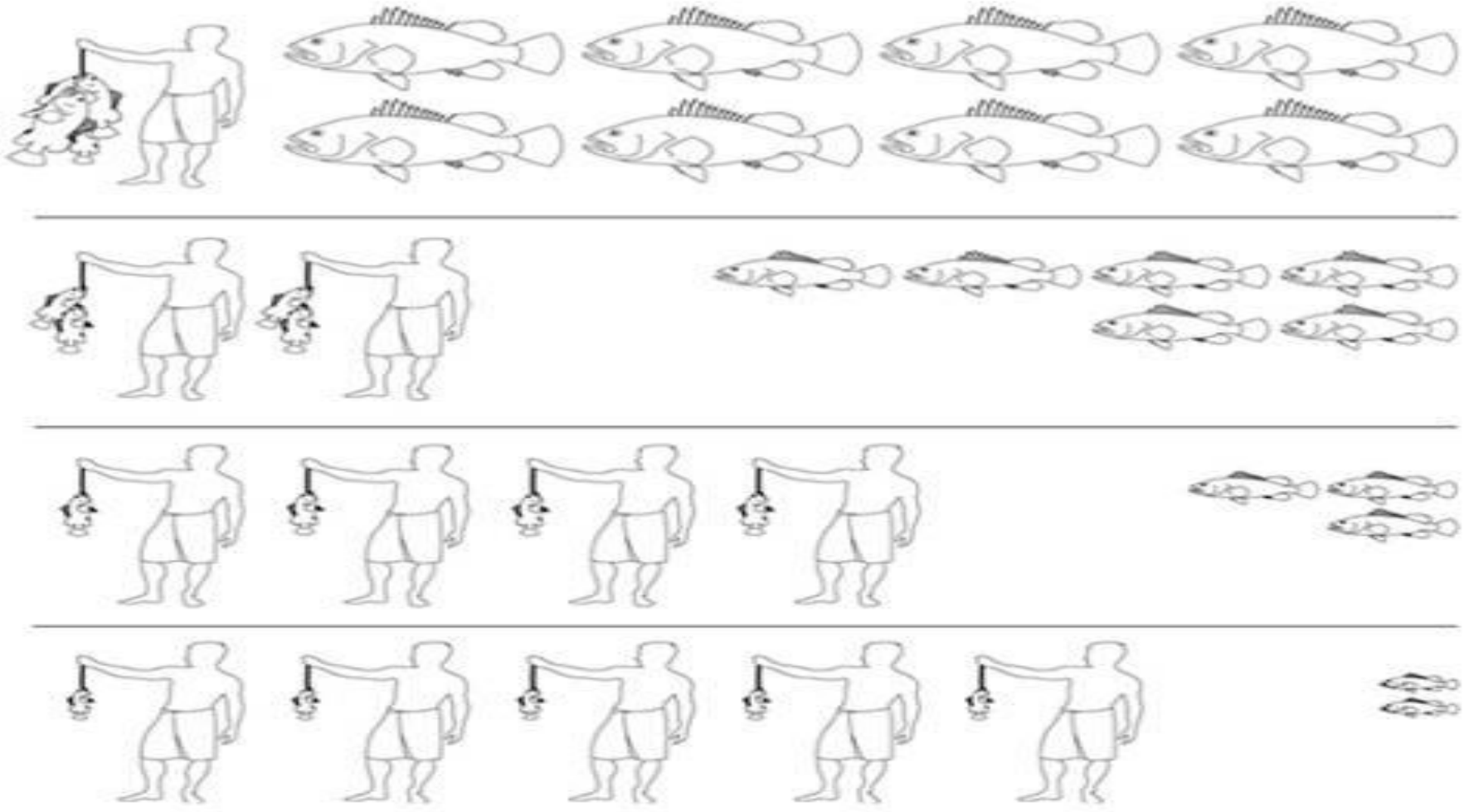

CPUE

Notably, and of concern of late is that resting grounds of the major pelagic species (Sardinellas ) being adjacent to oil reserves recently discovered in the Western shelf.



# The Basic Problem of Overfishing

**Too many fishermen chasing too few fish**



# Causes of overfishing

- Poor catches
- High quantities of fish discards
- Low catch rates i.e. low CPUE
- Fishing down the food web (e.g. small sizes of landed fish)
- Changes in life history traits
- Extinction of some fish species
- High cost of fishing inputs

# The Threat of Global Climate Change

**Potential impacts on physical features of oceans:**

- Sea surface temperatures
- Sea level rise
- Changes in Ocean circulation patterns
- Salinity fluctuations
- pH

**Potential impacts on marine fish:**

- Migration patterns
- Changes in reproductive patterns
- Food web effects

# Poor catch – full of algae & litter

# Plastic pollution


# Poor fish catch / Squid eggs

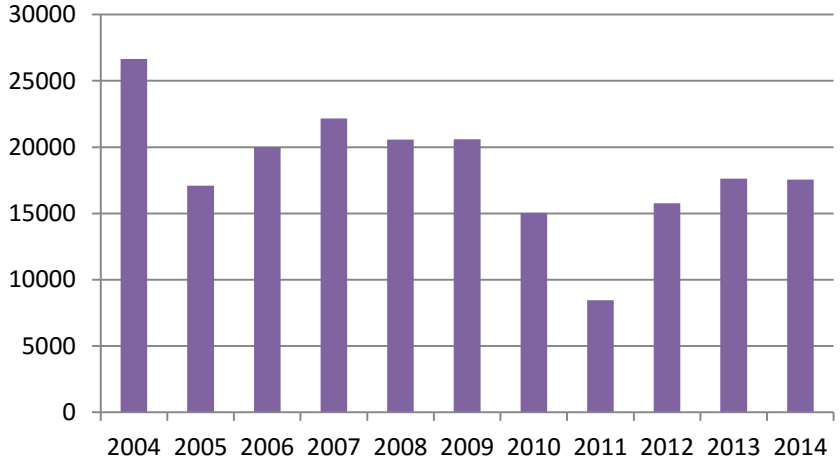
# Fishing Industry On Sick Bed

# Semi-industrial (inshore )fishery

- **Crafts with inboard engines often pursing during the major season and trawling off the season**


# Common species exploited by the semi-industrial operators within the Inshore Exclusive Zone (IEZ)

GRUNTS

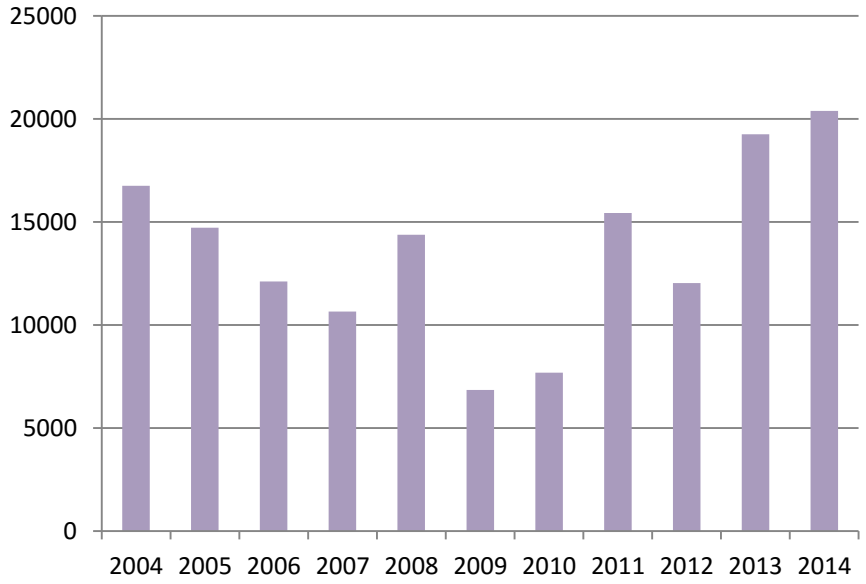


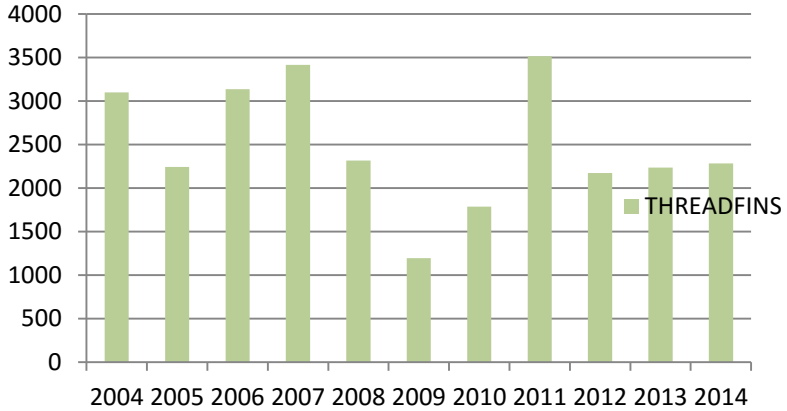

The burrito is one of the most abundant marine fish species caught in marine waters off the Gulf

MACKERELS

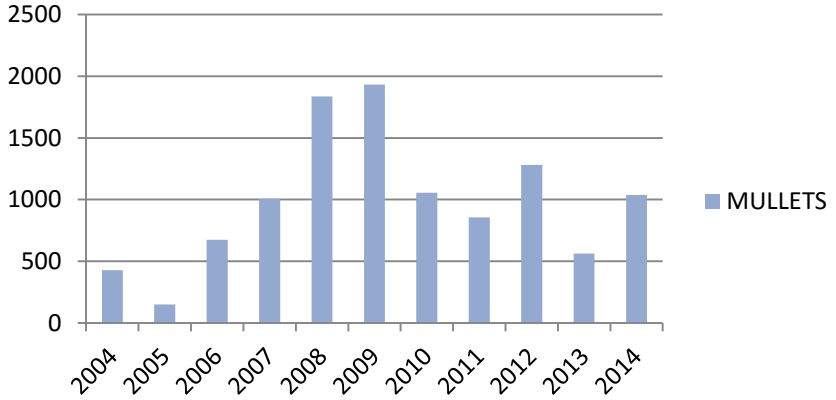
Scad mackerel

Horse mackerel



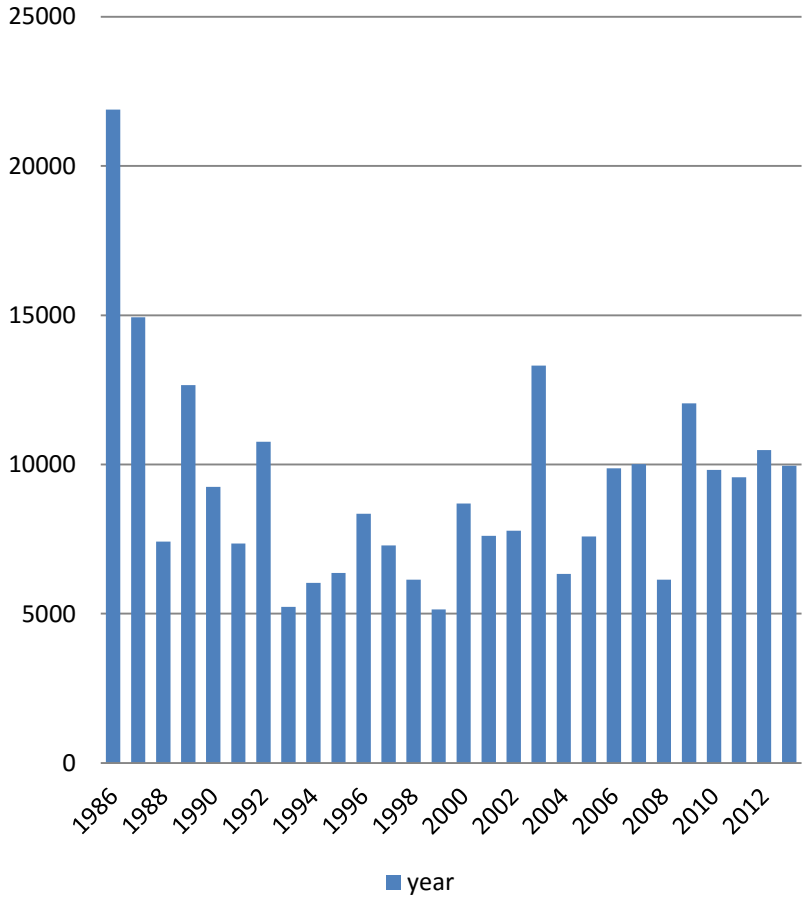


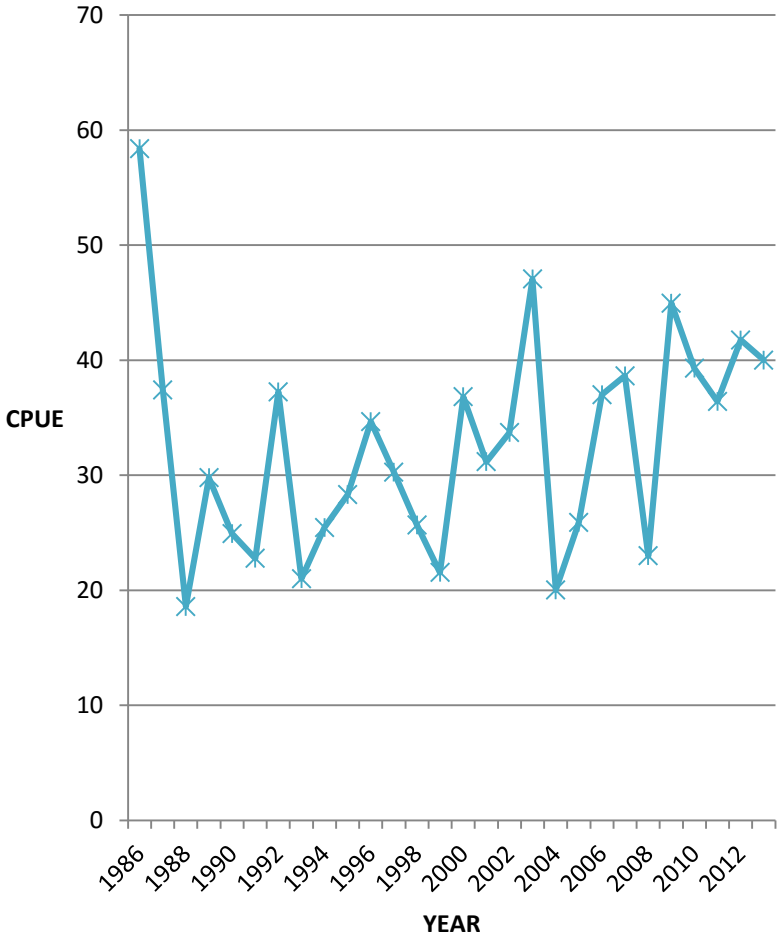

**Threadfins with mean landings of 2000mt**




**Mullets which are low in landings but highly preferred**

## Landings (mt) and CPUE (mt/inshore/trip) for the inshore fleet




Catch per unit effort show a fluctuating trend over the decades

# Where are we now with the Inshore fishery?

- The inshore fishery since the 2010's have been 'erratic' (ie ups and down) due to:

- Changing environmental and climatic regimes affecting the availability of fish species;

- The use of old obsolete engines;

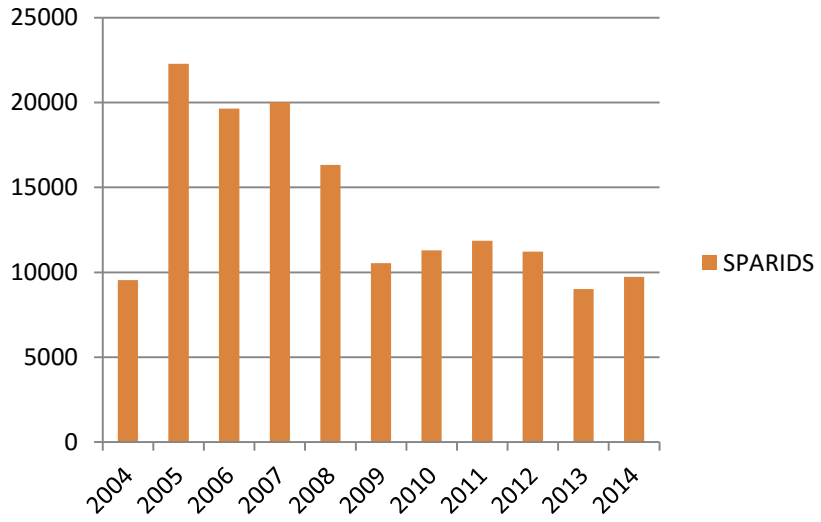
- Lack of spares and modern fishing equipment/ gears to target species;

**INDUSTRIAL FISHERY**

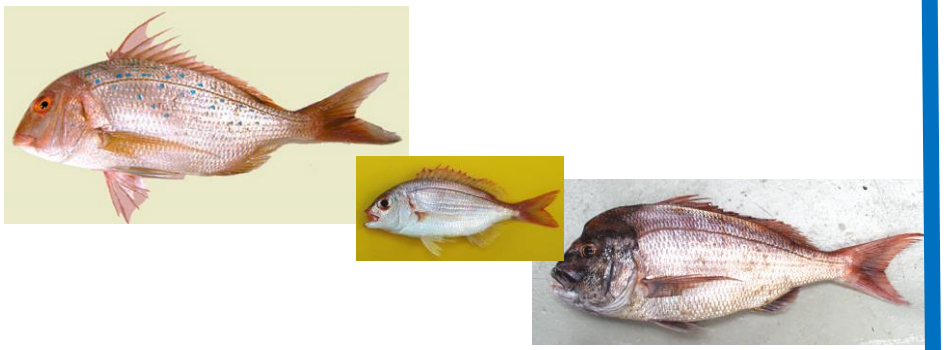
**MAINLY STEEL VESSELS TARGETS A VARIETY OF BOTTOM DWELLING (DEMERSAL) SPECIES TRAWLING MAINLY OFF THE CENTRAL AND WESTERN**

**SHELF OF THE COAST**

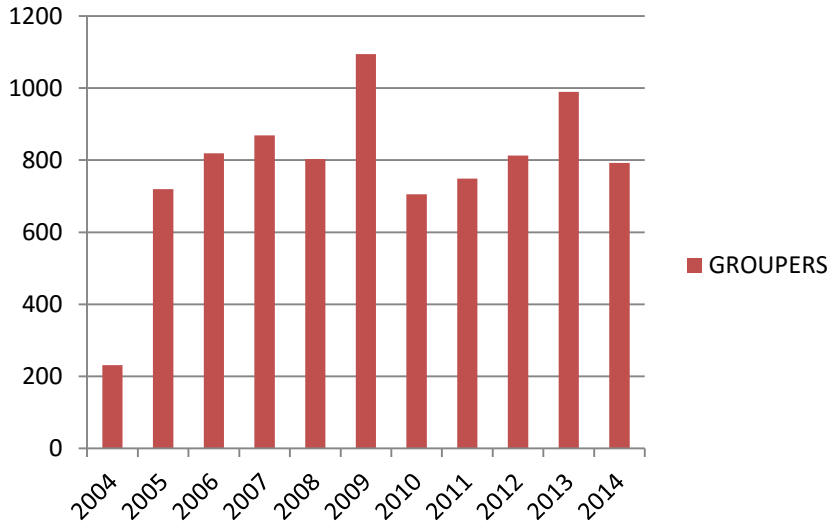
# Some demersals caught by the trawlers

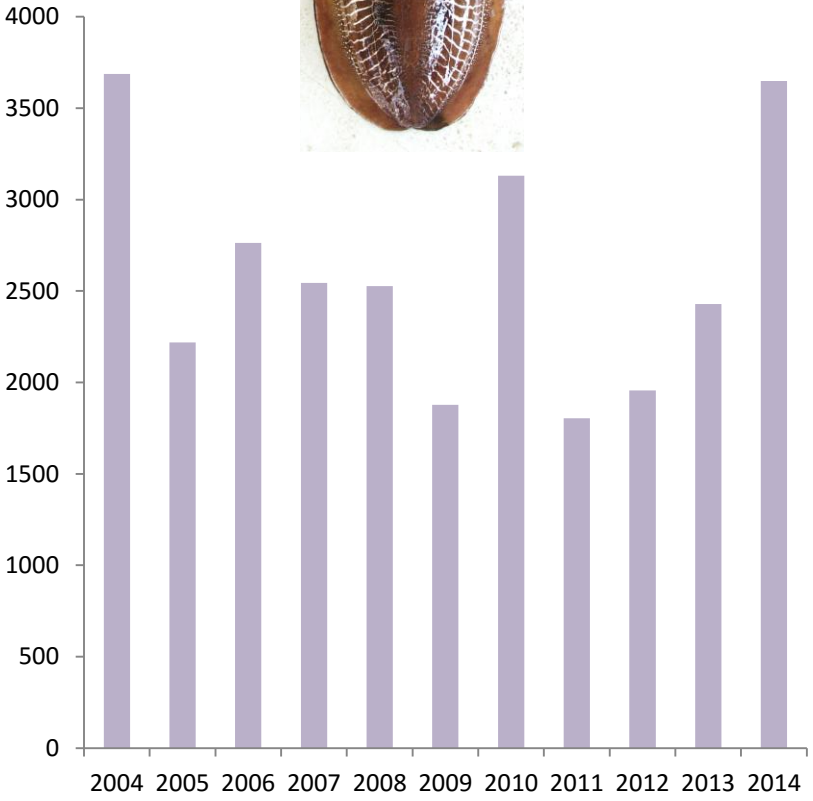



**Groupers are one of the most valuable fish preferred by many due to its taste, shape, size, colour, texture and value. Landings are also for the export market. Mean landings 800 mt (2004-2014)**



**Mean landings of the Seabreams (often termed the "Redfishes") from 2004-2014 have been around 13,700 mt**

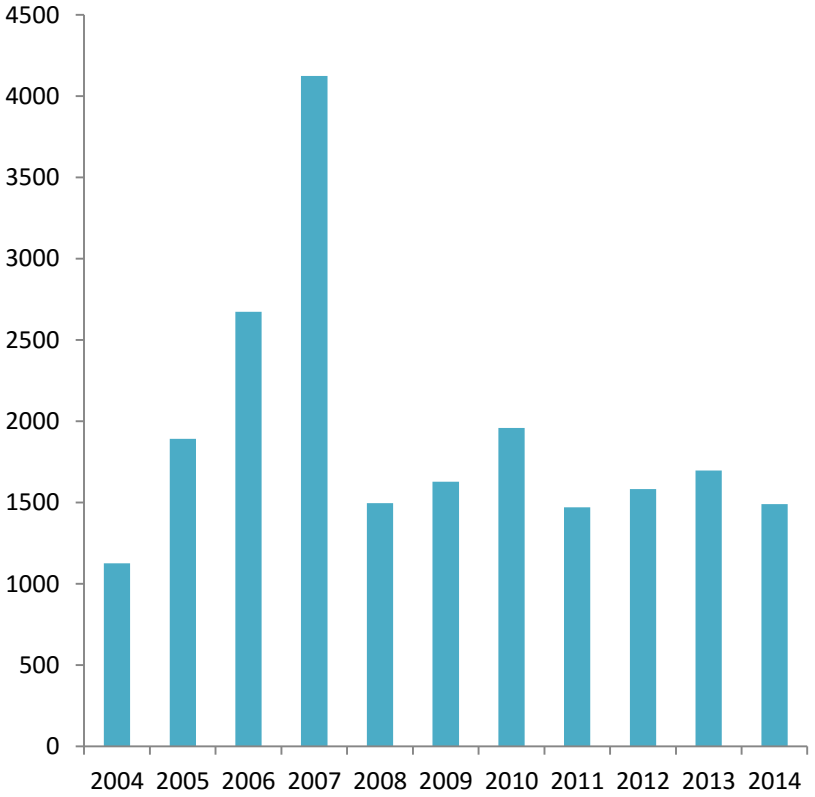





**Cuttlefishes are one of the most targeted marine species of late 1990's to date.**

**Reproductive potential seems to be high.**

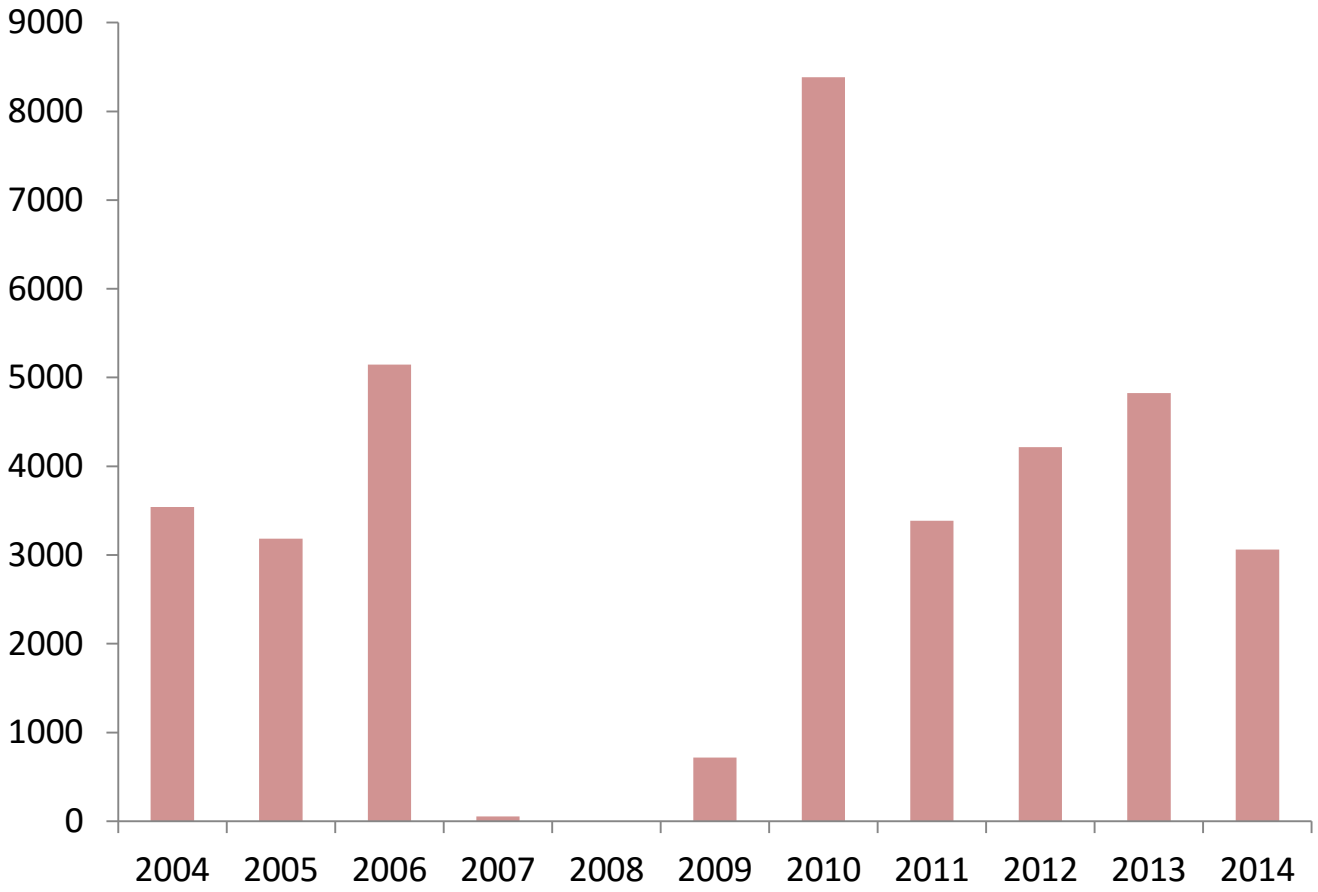
# Cassava fishes



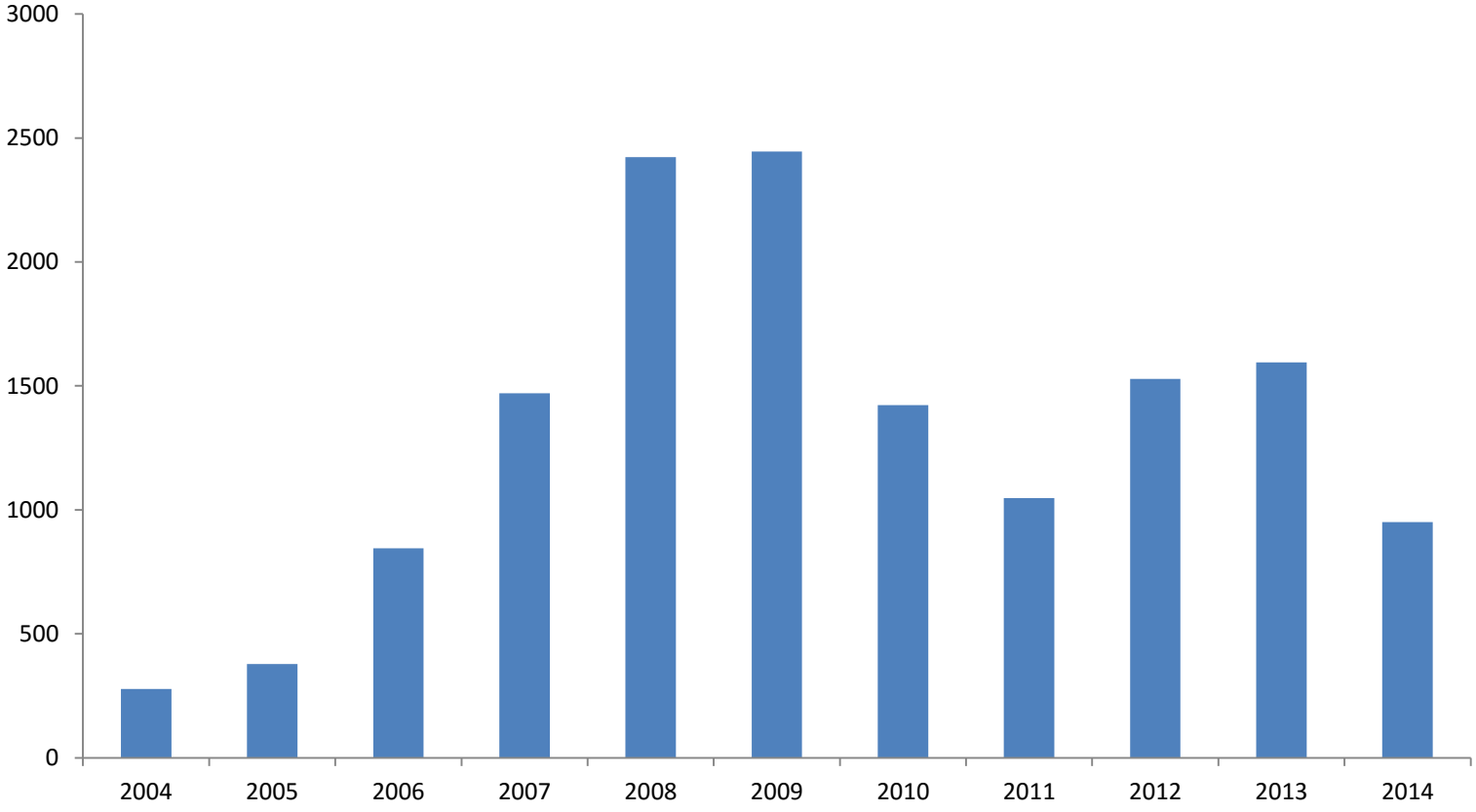

Found mainly off soft bottoms near estuaries

# Barracudas

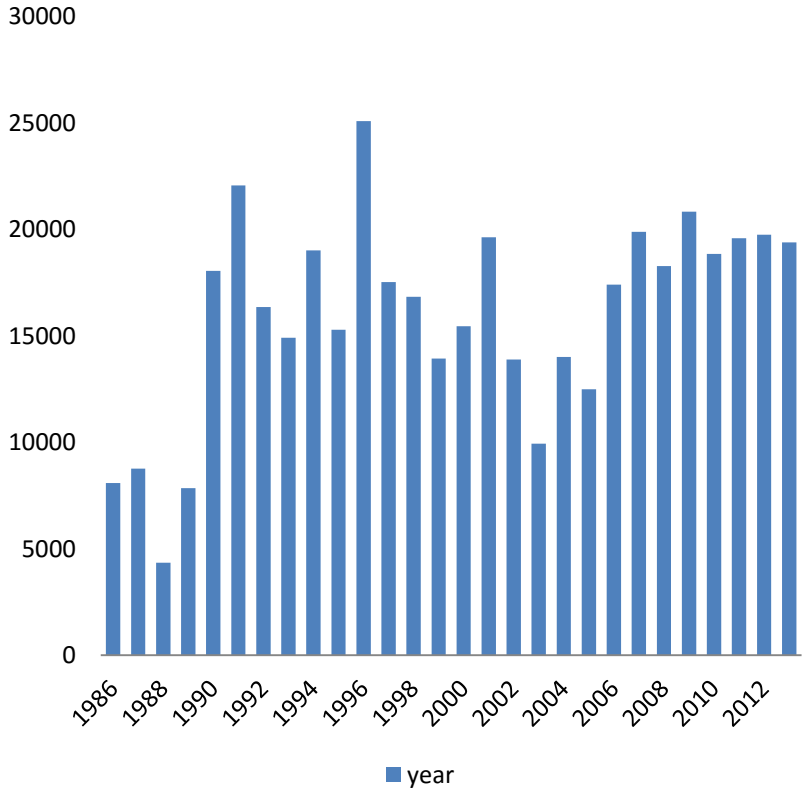
Species preferred though landings are erratic and distribution sparse

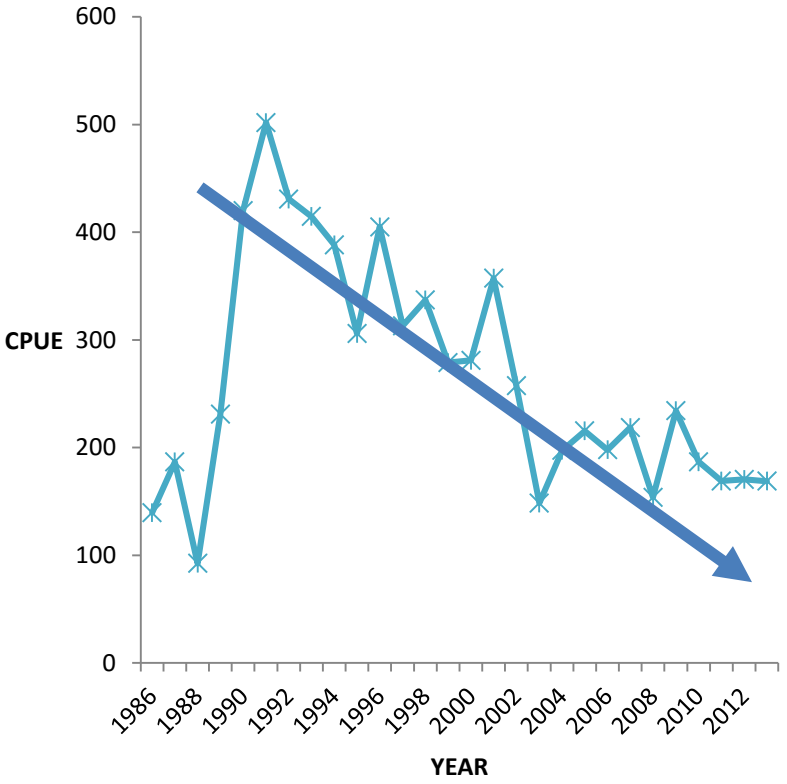


# Soles are also targeted by bottom trawlers and sometimes exported



# Landings (mt) and CPUE (mt/ves/yr) for the industrial fleet




General decline in Catch per unit effort showing declines from the 1990's

# Issues with the industrial fleet

- Too many trawl vessels fishing within a narrow area in the central and western shelf;
- Information on the biological characteristics of species low;
- Exploitation rates high indicative of downward trends in CPUE since the 1990's;
- Overfishing occurring due to small mean sizes of fish observed during observer programmes;

# The Basic Problem of Overfishing

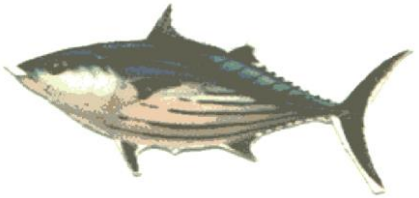
- **Bycatch and discards** e.g. Ghana's shrimp industry


TUNA
FISHERY

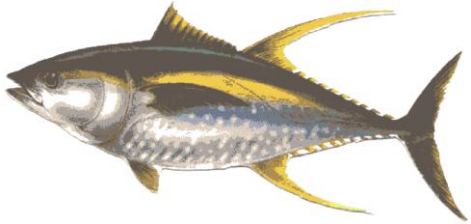
The large pelagics comprise mainly tuna species belonging to the family Thunnidae and other tuna-like species.

3 main tuna species occur as part of a large community in the Atlantic Ocean

- Skipjack (*Katsuwonus pelamis*)



- Yellowfin (*Thunnus albacares*)



- Bigeye (*Thunnus obesus*)

- There are currently 17 medium sized purse-seiners (50-65m) and 20 baitboats (40-50m registered from Tema,

- Baitboats have been dominant in the Ghanaian tuna fishery for the past 4 decades (1960-1990) whereas Purse-seiners were reintroduced in 1996.

- Purse-seiners usually stay at sea for up to 2-3 months whilst baitboats have a shorter duration of up to a month.

- Fish landed is either sold to the local market or canneries for processing to export market.

A TYPICAL BAITBOAT OPERATION

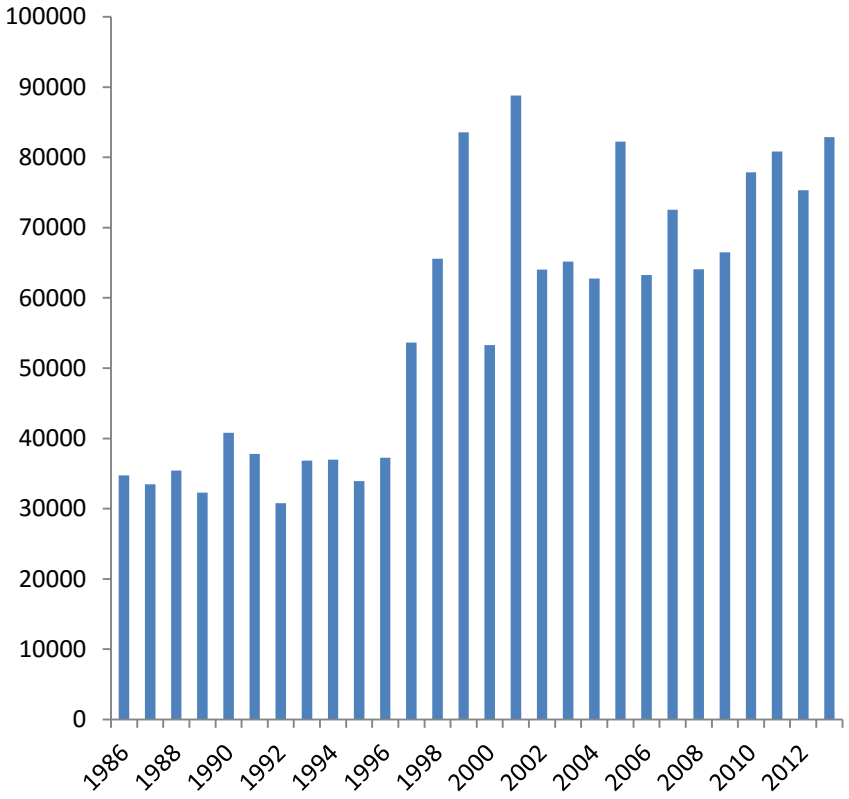
# By-catch from tuna fishery

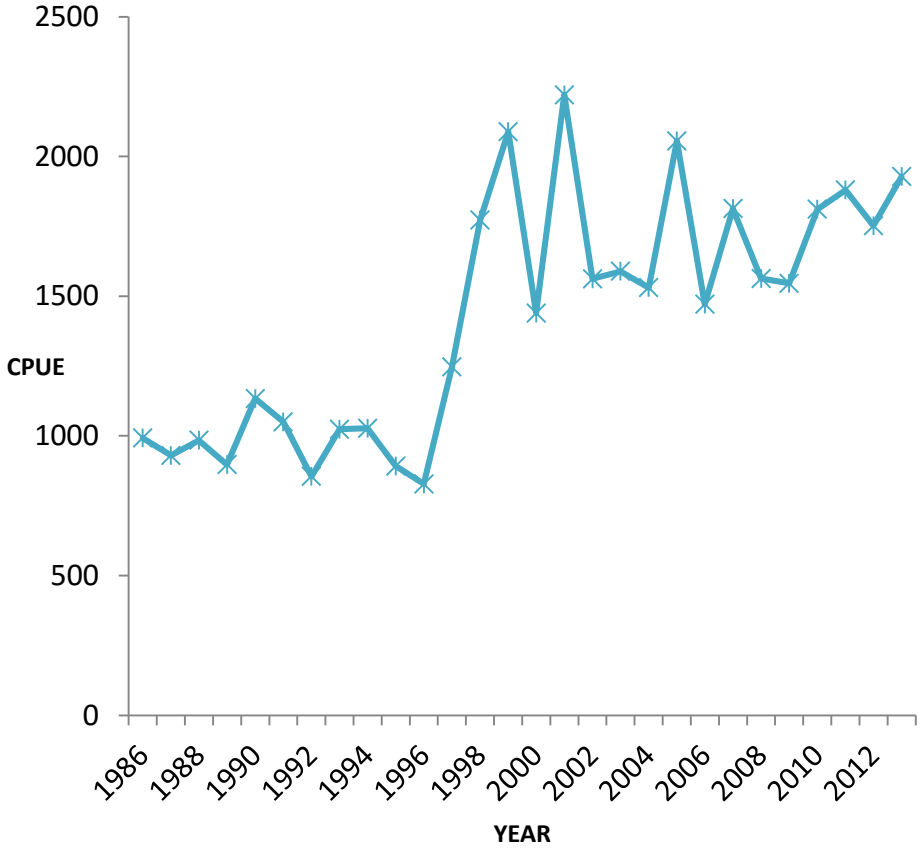
- Sharks and rays are seldomnly caught as by-catch in the Tuna purse seine fisheries

- Those caught alive are thrown back and those caught dead are utilized as food.

- However some rays species and sharks are often incidental catches from trawl gears

# Landings (mt) and CPUE (mt/vessel./trip) for the tuna fleet

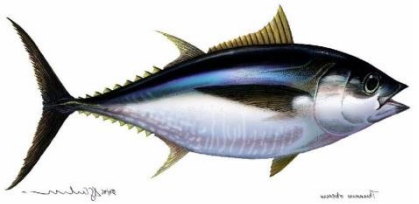



Catch per unit Effort rising from the 1990'S . Resource from ICCAT analysis show healthy stocks of the skipjack

# Management of the large pelagics-tuna /tuna-like species

- This is done by ICCAT of which Ghana is a member.



- Estimates of the Biomass of the Bigeye species in the East Atlantic show a low stock status and probably threatened

- A lot of recommendations such as Area closures and Quotas have be recommended, adopted and implemented to conserve the species.

# In summary the key issues are:

- Excessive fishing effort exerted in all fisheries;
- Inadequate information on Biology (spawning, maturity distribution) of fish stocks;
- Low enforcement of Fisheries Regulations;
- Low levels of protection of marine

# Dwindling stocks and catches with sizes of fish caught becoming smaller and smaller

# What is causing  low catches?

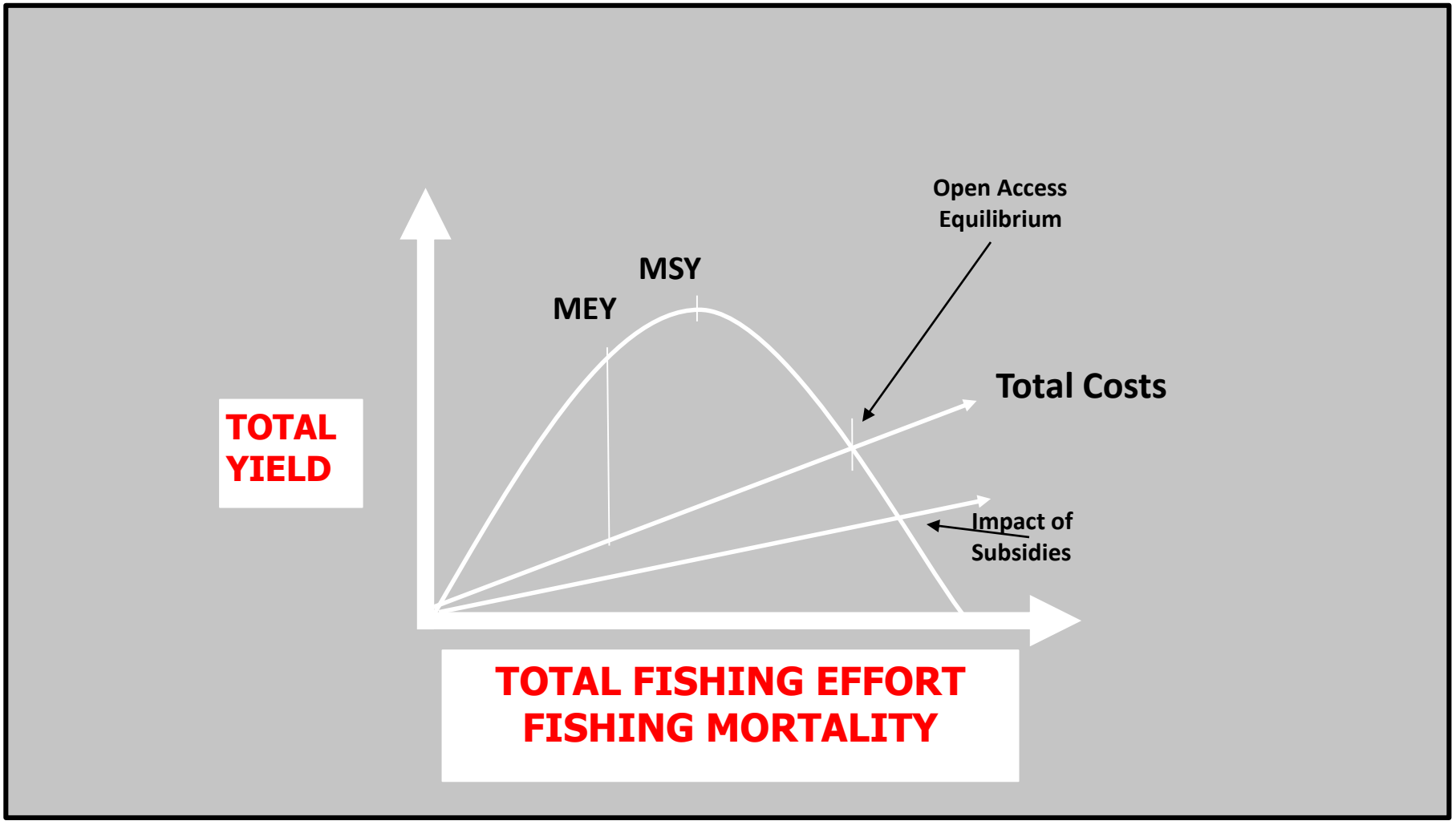
- Limited natural resource
- Generally open access nature
- Poor fisheries governance
- Observed depletion of fish resources worldwide due to **Over-fishing**
  - Increasing human population / overcapacity
  - Improved fishing technology
  - Bycatch
- Climate change

# What can be taken out of our waters and with what capacity of fleets?

- From catch assessment surveys conducted by the Fisheries Commission, *(1986-2013)*

the Maximum sustainable yield (MSY) was computed using a production model Shaeffer 1954.

# Basic Concepts:
## The Bio-Economic Model of a Fishery



# SUMMARY OF SUSTAINABLE LEVELS IN RELATION TO CURRENT FLEET NUMBERS

| | No of units in 2014 | MSY mt | Units required to sustain fishery |
|---|---|---|---|
| Artisanal | 9951 | 239,913 | 9,095 |
| Inshore | 403 | 13,713 | 272 |
| Industrial | 107 | 30,637 | 48 |

# FISHERIES MANAGEMENT

# Fisheries Management

- Manage = to be in control of something

**AIM / GOAL**

- Sustainable management – wise use of resource in order to meet the needs of present and future generations

- Equitable use of resource by all interested groups.

# Requirements for Management

Quality Information / Data about the fishery

- The fishery – its operation & constraints
- Participants – social aspects
- Species e.g. stock assessment, catch assessment
- Environment – physico-chemical e.g. monitor Temperature, Salinity, Dissolved O2 of water

# Specific Management Objectives

Single or combination of a number of objectives:

- For sustainable exploitation
- To increase yield
- To increase value and profitability in fisheries
- To increase employment
- To increase income (local & hard cash)

# Specific Management Objectives

Single or combination of a number of objectives:

- To protect critical species
- To protect critical habitats
- To reduce IUU
- To improve on policy
- To strengthen governance, etc. etc.

# How is it done?

- **Use management plans**
  - For single species or group of species?
    - Specify objectives
    - Identify and implement strategies
      - Time bound
    - Monitor & evaluate gains
    - Feedback mechanism
    - Involve relevant stakeholders to ensure compliance

# Management Tools

**Strategies**

- De-centralization
- Ecosystem-based management
- Input and output controls
- Technical measures
- Indirect controls
- Co-management

**What works in developed country industrial fisheries may not apply in small-scale tropical fisheries**

# Management Tools (cont'd)

**INPUT CONTROLS** – Directly limit or control the amount of fishing effort.

Examples include:

- Limits on number of fishers
- Limits on number of boats
- Limits on the types of fishing gear
- Minimum & Maximum size limits

# Management Tools (cont'd)

**OUTPUT CONTROLS** – Directly limit or control the amount of fish coming out of the fishery.

- Catch quotas (e.g. TAC, ITQ)
- Minimum landing sizes
- Trip and bag limits

# Management Tools (cont'd)

**TECHNICAL MEASURES**

- Area closures (MPAs, Marine reserves)
- Closed seasons
- Gear/method restrictions – e.g. FADs use, gear selectivity (size of fish caught)
- Discarding restrictions – prevent high grading and may reduce catch per trip
- Reduce sex specific harvesting
- Size restrictions

# Management Tools (cont'd)

**INDIRECT CONTROLS** –

- Taxes
- Increasing costs of inputs
- Alternative source of livelihood

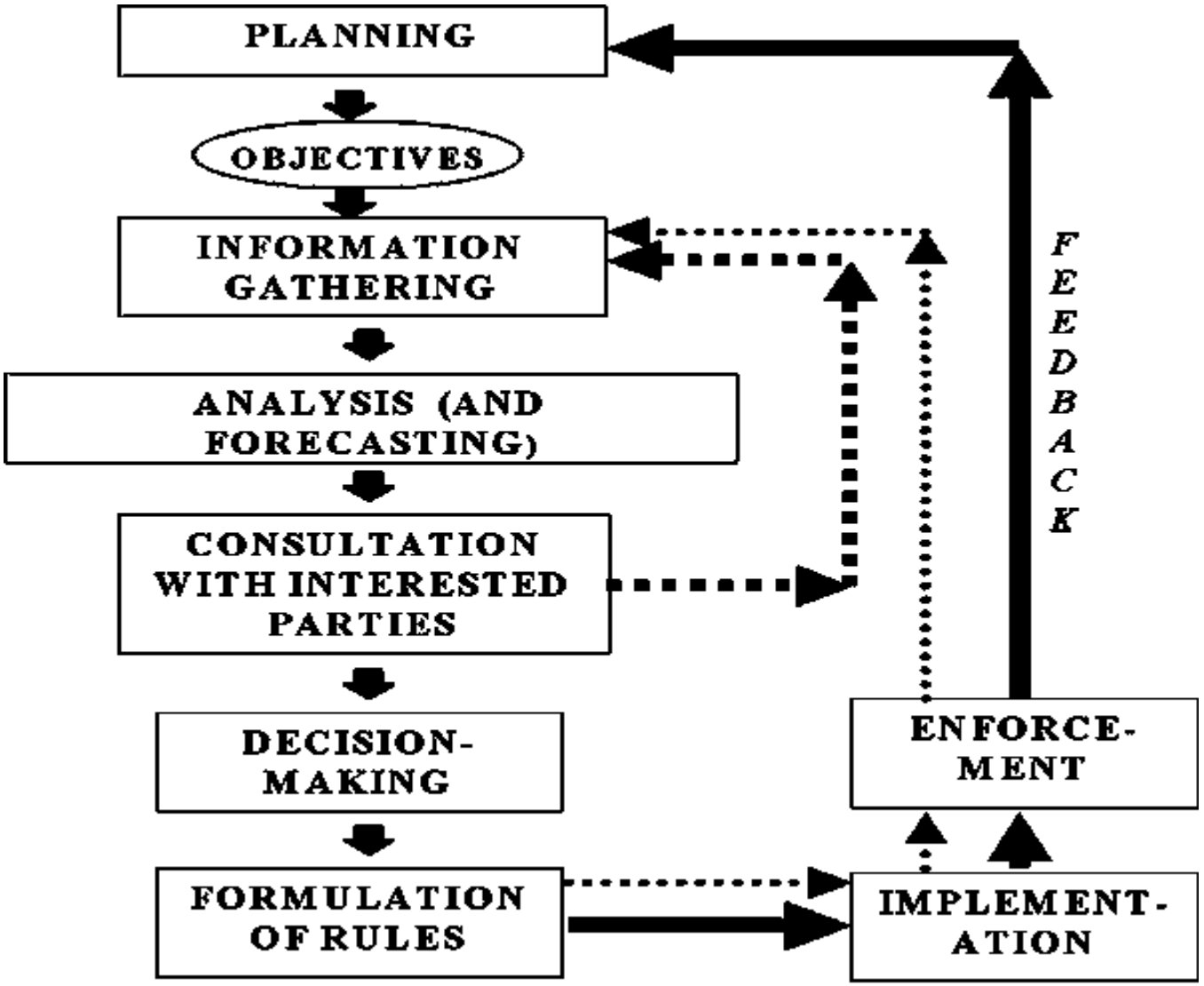
# Management Tools (cont'd)

**Co-management / Traditional Management** – vary among communities; sometimes linked with cultural practices

- No fishing days
- Closed areas / Closed seasons
- Festivals
- Taboos e.g. ladies forbidden, no sex at beaches
- Other local bye-laws

Enforced by Chiefs, Traditional Council, Chief Fisherman, Gear leaders, Traditional Priests e.g. Wulomo

# STEPS IN FISHERIES MANAGEMENT



# International Institutional Framework

- **FAO** of the United Nations

- **Committees** – (Regional & sub-regional) e.g.
  - Committee for the Eastern Central Atlantic (CECAF)
  - Committee on Fisheries (COFI)

# International Institutional Framework

- **Commissions** e.g.
  - International Commission for the Conservation of Atlantic Tunas (ICCAT)
  - Committee on Fisheries

- Specialised Working groups e.g. standing groups for research etc. under Commissions/ Committees

# International Legal Framework

- **UNCLOS** – United Nations Convention on the Law of the Sea (1982)
- **FAO** Code of Conduct for Responsible Fisheries (CCRF, 1995)
- **CBD** - Convention on Biological Diversity
- **CITES** – Convention on International Trade in Endangered Species
- **IPOAs** – International Plan of Actions

# National Institutional Framework

- Minister of State (Min. of Fisheries and Aquaculture Development)
  - Fisheries Commission
    - Fisheries Directorate
      - MFMD, IFMD, FSSD, MCSD, F&AD
        - » Regional Fisheries Directorates
        - » District Fisheries Officers
        - (Community Based Fisheries Management Committees)
        - » Fisheries Technical Assistant / Enumerator

# National Legal Framework

- National Fisheries & Aquaculture Policy (2008?)
- Fisheries Law, Act 625 of 2002
  - E.g. No foreign ownership of fishing vessels
- Fisheries Regulations L.I. 1968 of 2010
- Local Bye Laws (by communities)

# Summary - How and what do we do to contribute to a sustainable fisheries for posterity?

- Monitoring the environment?
- Stock Assessment?
- MCS operations ?
- Education?
- Reduction of Effort – where and how amidst of socioeconomic considerations ?

# Summary - How and what do we do to contribute to a sustainable fishery for posterity?

- Training in Alternatives? E.g. Aquaculture production
- Enacting sanctions to defaulters of Law & regulations?
- Application of multiple approaches, User rights, Conservation techniques e.g. MPAs,
- Ecosystem based concepts, Enhanced CBFMC's etc. Wealth creation in fisheries

# EAF/EAFM/EBFM

- There has been a lot of interest in recent years in moving from fisheries management focused essentially on single-species or single fisheries, to management with an ecosystem orientation.

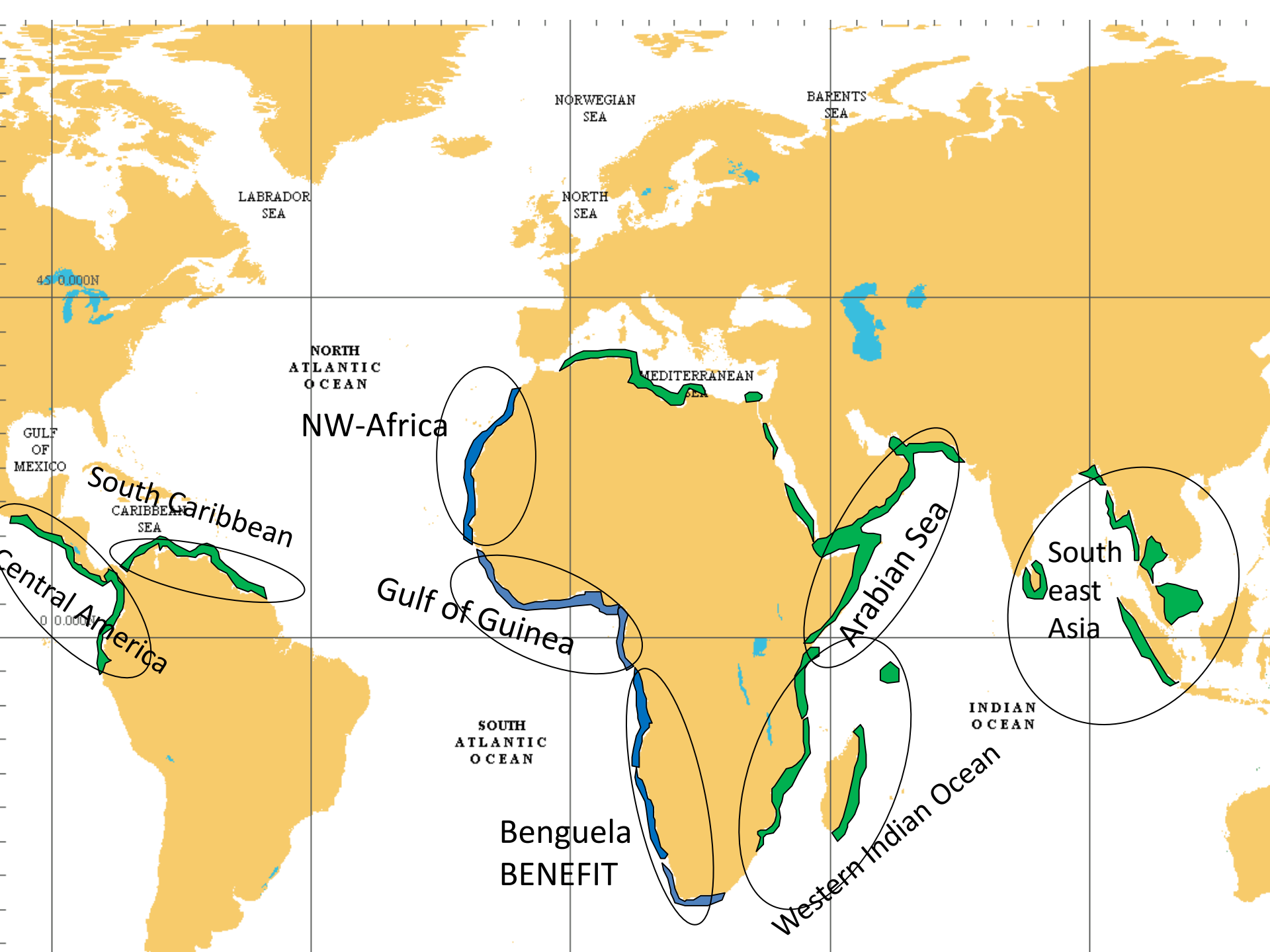
- This expanded approach has been termed ecosystem-based fisheries management (EBFM) .

# THE EAF-NANSEN PROJECT

*Assisting Developing Countries to implement an ecosystem approach to fisheries*

# The Genesis

- In 1974 *R/V Dr Fridtjof Nansen* was commissioned, with UN-flag; Norwegian crew and core scientific team
- Placed in a programme involving Norway, FAO and UNDP
- Surveys carried out in tropical and sub-tropical regions in Africa, Central America and Asia in collaboration with local fisheries agencies and research institutions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BARENTS SEA
LABRADOR SEA
NORTH SEA
NORTH ATLANTIC OCEAN
MEDITERRANEAN
GULF OF MEXICO
CARIBBEAN SEA
NW-Africa
South Caribbean
Central America
Gulf of Guinea
Arabian Sea
South east Asia
SOUTH ATLANTIC OCEAN
INDIAN OCEAN
Benguela
BENEFIT
Western Indian Ocean

- The goals and activities of the programme evolved over time in response to changing needs in the developing world
  - exploratory surveying
  - integrated resources management
  - implementation of the ecosystem approach to Fisheries (EAF).
- The vessel has been a key tool at all times.

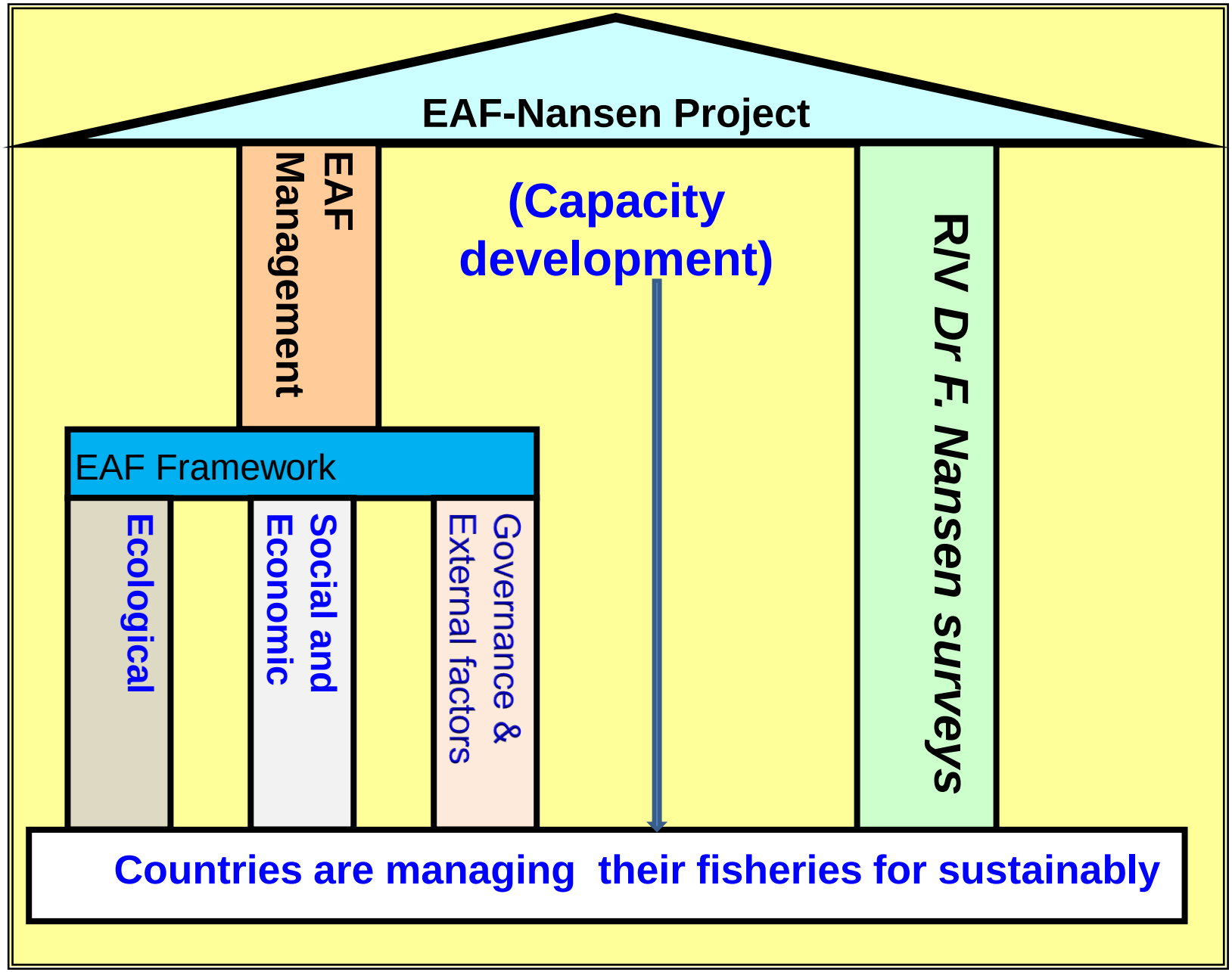
# THE EAF-NANSEN PROJECT

Strengthen the knowledge base to adopt and implement an Ecosystem Approach to Fisheries

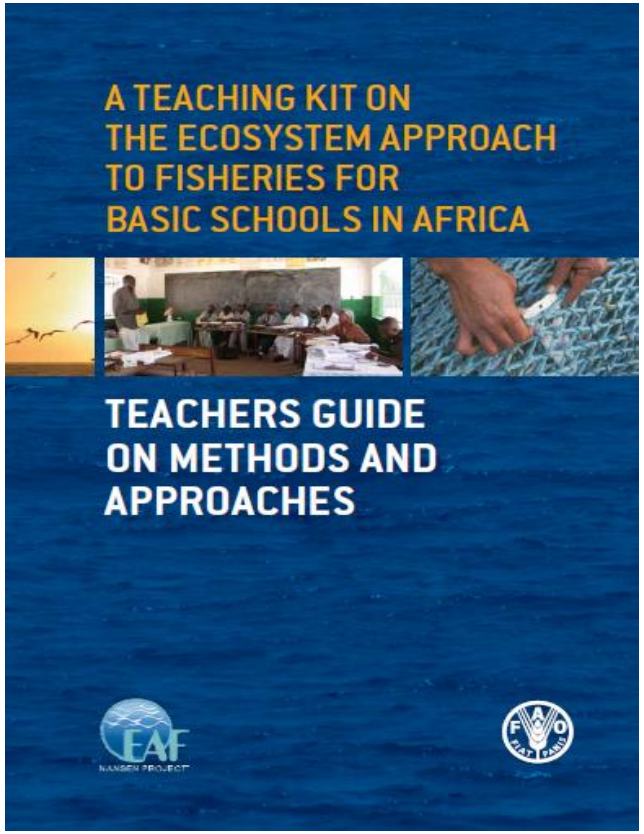
**Immediate objective:** Staff of the fisheries research institutions and management administrations in the participating countries provided with additional knowledge on their ecosystems and on EAF principles for their use in planning and monitoring.

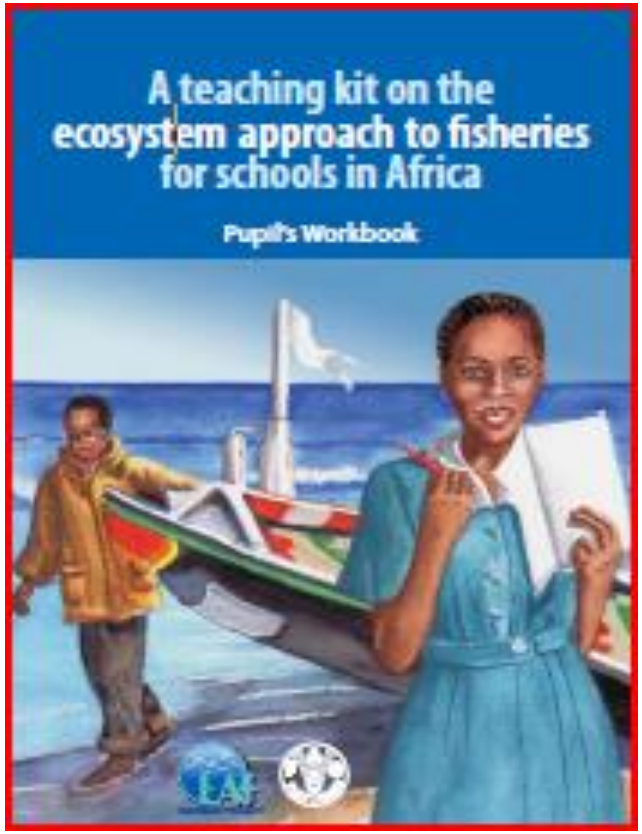
# *Project Components*

- Support for fisheries policy formulation and review
- Support for EAF management planning
- Ecosystem assessments and monitoring
- Capacity development
- Support to national/regional research vessels for ecosystem surveys
- Project planning, management and dissemination of lessons learnt

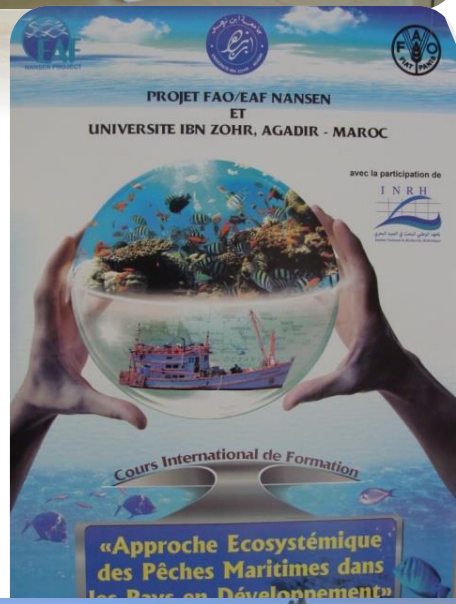

EAF-Nansen Project
EAF Management
(Capacity development)
R/V Dr F. Nansen surveys
EAF Framework
Ecological
Social and Economic
Governance & External factors
Countries are managing their fisheries for sustainably

# Increased capacity at scientific and management levels








THE REPUBLIC OF GHANA

MINISTRY OF FISHERIES AND AQUACULTURE DEVELOPMENT


# A MANAGEMENT PLAN FOR THE BEACH SEINE FISHERY IN GHANA

**July, 2013**


R/V DR FRIDTJOF NANSEN III


# Please visit us on:

- Website: www.fao.org/in-action/eaf-nansen/
- Flickr: https://www.flickr.com/photos/67578091@N08/
- YouTube: https://www.youtube.com/user/eafnansen

- To address the general fluctuations and declines in the marine fisheries with the exception of the tuna sector coupled with man-made activities,

- the Government has enshrined in the Fisheries Act 625 - section 42: A management plan 2015-2019 to reverse and improve issues threatening

- food security, livelihoods and also to meet international obligations

# Some options in the Fisheries Management Plan:

- Enact closed seasons;
- Cancellation of licences for violators of Ghana's fisheries laws and regulations
- Facilitation of co-management systems in communities with other institutions
- Develop research plans and undertake assessments of key commercial fish stocks;
- Collaborate effectively with regional bodies on MCS strategies to combat IUU fishing;

(*ALL THE ABOVE ARE IN THE PROCESS*)

# RESEARCH?

- The ECOWAS Coastal and Marine Resources Centre through the Monitoring for Environment and Security in Africa (MESA) Program,
- funded by the EU under the 10$^{th}$ EDF Rule, is providing earth observation (EO) applications to enhance effective policy formulation for sustainable fisheries management.

# Research (cont'd)

- The Centre is providing marine services to support fisheries with science-based decision making through:

- Production of Potential Fish Zone (PFZ) overlaid with fishing vessel traffic

- Early warning system to ensure safety for artisanal fishers by forecasting ocean conditions and disseminating them via SMS, etc.

# RESEARCH (Cont'd)

- Installation of MESA stations in all countries to ensure reliable access to continuous data stream

- Building of collaboration and synergies in the region to avoid duplication, and maximise resources

- Institutionalisation to ensure sustainability at the regional and national levels, and with National Centres of Excellence and

# Conclusion

- More knowledge on our stocks through research is needed to understand the dynamics of our ever-changing fisheries;
- More training and education on responsible fishing practices is needed to sustain our fisheries;
- We all have a part to play to manage our resources for posterity.

# FURTHER READING


- Cochrane, K.L., Neil, L. Andrew and Ana, M. P. (2011). Primary Fisheries Management: A Minimum Requirement for Provision of Sustainable Human Benefits in small-scale fisheries. *Fish and Fisheries* **12**: 275 – 288.
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- Berkes, F. (2009a). Social Aspects of Fisheries Management. In: A Fishery Manager's Guidebook (Cochrane, K.L and Garcia, S. M. Eds). FAO, Rome and Blackwell Publishing, Oxford. Pp 52-74
- FAO (1995). Code of Conduct for Responsible

# THANK YOU