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# OCEAN ENVIRONMENTAL MANAGEMENT

Fisheries and medical knowledge from the sea

HAI PHONG, 2020



# Fisheries vs aquaculture

## FISHERIES

- Fisheries are solely related to catching wild fish or raising and harvesting fish through aquaculture or fish farming.

## AQUACULTURE

- Aquaculture pertains to cultivating and harvesting fish, and involves the production and marketing of shrimps, oysters, and other animals.



# Fisheries vs aquaculture

## FISHERIES

- Fisheries are concerned with fish or shellfish.
- They mainly deal with catching, processing, and selling fish.

## AQUACULTURE

- Aquaculture is related to the cultivation of both aquatic animals and aquatic plants.
- It involves the natural or controlled cultivation of shellfish, fish, and seaweed in freshwater and marine environments.



# PEARLS – products of aquaculture or fisheries?







## Importance of fish for food security and nutrition



STRINGER / AFP/Getty Images

- Fish, either produced through fish farming/aquaculture activity or caught from wild marine or freshwater stocks, is a primary source of protein and essential nutrients.
- Fish is one of the most efficient converters of feed into high quality food.
- Fish and fish-related products provide income and livelihoods for numerous communities across the world.



# Fish as a critical food source

- Today capture fisheries and aquaculture provide 3.0 billion people with almost 20% of their average per capita intake of animal protein, and a further 1.3 billion people with about 15% of their per capita intake.
- Overall, 158 million tonnes of fish were produced in 2012 (91.3 million tonnes from inland and marine capture fisheries and 66.6 million tonnes from inland and marine aquaculture), of which 136 million tonnes were used for human consumption.



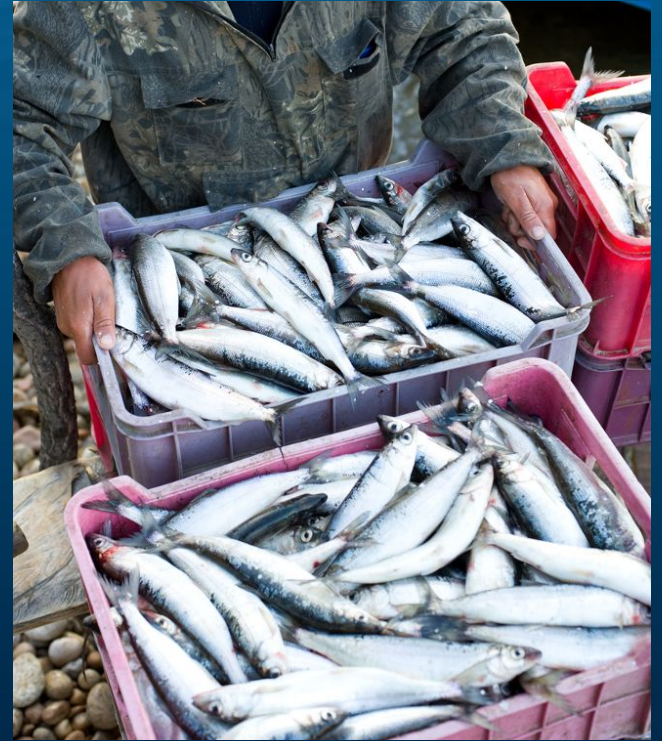
# Fish as a critical food source

- World population growth, but more importantly the combination of urbanization, increased levels of development, living standards and income are key drivers of the increase of fish and seafood demand and of fisheries development.
- Fish provides a wide range of nutrients, vitamins, amino acids, unsaturated fatty acids, with many potential beneficial effects for adult health and child development.



>> Fish is an important source of food for people. It also represents an important sector of the economy: the estimated annual landed value of fish globally is around USD 90 billion.

>> However, in many of the world's maritime regions, perpetual overfishing is putting stocks at risk.







# Risks and pressures affecting the world fisheries

- Fisheries resources are in crisis as a result of overfishing.
- Analyses of world marine stocks show an increase in the percentage of overexploited and depleted stocks over time, while the number of underexploited or moderately exploited stocks decreases.
- Fish caught can be dumped overboard—either due to accidental by-catch of non-targeted species or legally undersized fish, or due to low quality, partial damage or spoilage – making them not being commercially worth landing.
- The report published by FAO in 2005 has given an estimate of an 8% global discard rate of the world total capture fisheries.



# Risks and pressures affecting the world fisheries

- Environment, production ecosystems: are degraded or overexploited.
- Oil drilling, energy installations, coastal development and construction of ports and other coastal infrastructures, dams and water flow management, etc. have tremendous impacts on aquatic productivity, on habitats that sustain resources (e.g. erosion and pollution), or on the livelihoods of fishing communities.
- Climate change impacts are already visible, with modifications of the geographic distribution of species and warmer water species moving towards the poles
- Climate change impacts on fish-dependent populations will depend on the evolution of fishing opportunities and the evolution of prices. Sea level rise might lead to the relocation of communities.



## Exploitation on a massive scale

>> With an annual growth of around 7%, aquaculture is one of the most rapidly expanding food industry sectors.

>> Aquaculture already provides more than 40% of the global consumption of fish and shellfish.



A vertical photograph on the left side of the slide shows a person standing in a small, narrow boat on a body of water. The person is silhouetted against a bright sunset sky, which transitions from orange near the horizon to a deep blue at the top. The water is calm, reflecting the colors of the sky. The person appears to be using a long pole to navigate the boat.

# Decline of spawning stock

- “Fully exploited”: a fishery is operating at or close to an optimal yield level, with no expected room for further expansion.
- “Overexploited”: exploited above a level that is believed to be sustainable in the long term, evident from the steady decline of the stock.
- “Depleted”: catches are well below historical levels, irrespective of the amount of fishing effort exerted.
- “Recovering”: catches are again increasing after having been depleted.



A vertical photograph on the left side of the slide shows a person standing in a small, narrow boat on a body of water. The person is silhouetted against a bright sunset sky with orange and yellow hues. The water is dark blue with some ripples. The person appears to be using a long pole or oar.

# Decline of spawning stock

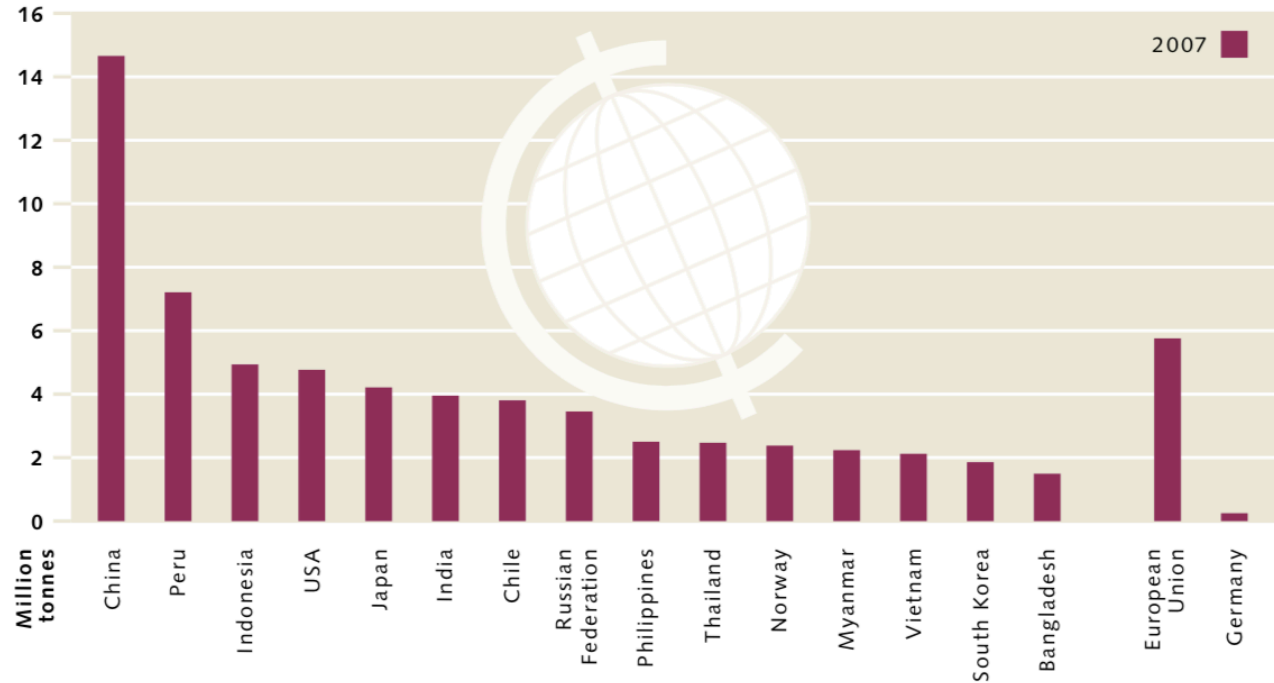
- According to FAO estimates, there has been a steady increase in the proportion of overexploited and depleted stocks since the 1970s.
- By contrast, there has been a decrease of around 50% in the proportion of underexploited stocks, which stood at an estimated 20% in 2006.
- This trend may be due to the development of increasingly efficient fishing technology, including technically improved means to locate shoals of fish and ever more powerful fishing vessels, enormous factory ships, fishing at greater depths.

A vertical photograph on the left side of the slide shows a person standing in a small, narrow boat on a body of water. The person is silhouetted against a bright sunset sky, which transitions from orange near the horizon to a deep blue at the top. The person is holding a long pole, possibly a fishing spear or a paddle. The water is calm, reflecting the colors of the sky.

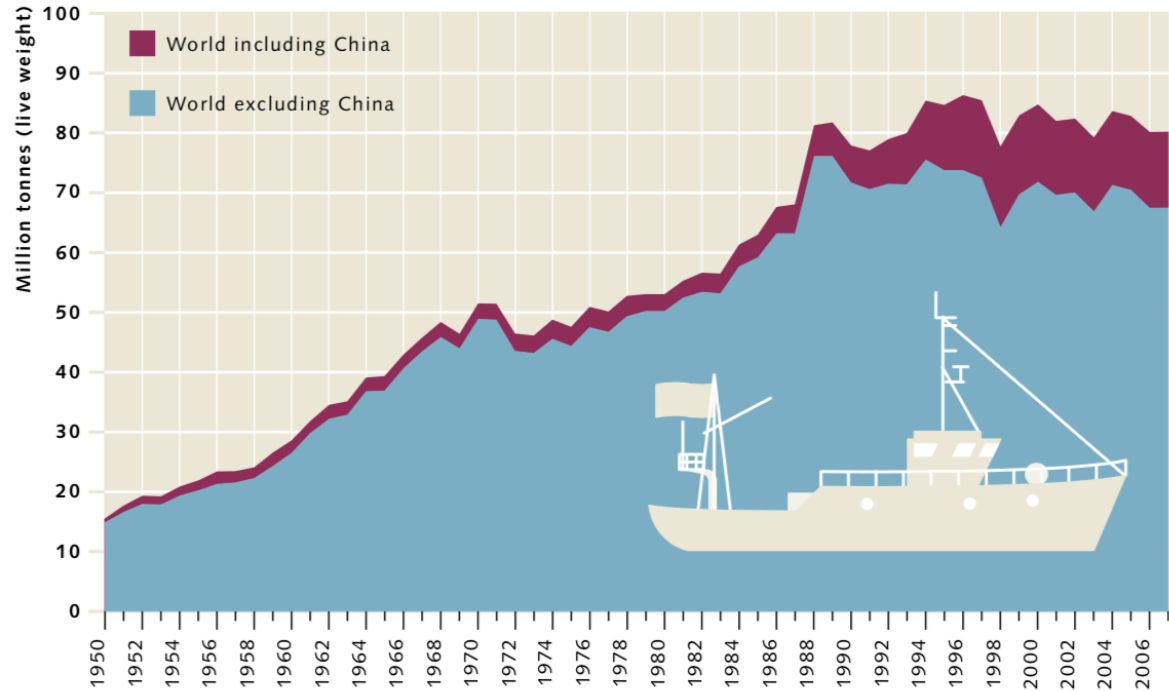
## Stock assessment – a difficult task

- As it is not possible to count fish individually, stock sizes are now estimated using mathematical models.
- Current catch figures from the fishing industry are an important source of data in this endeavor.
- The models also take account of the effort that must be employed in order to catch this quantity of fish, based, for example, on the number of fishing days or the fleet size – for the fewer the fish there are in the sea, the greater the effort needed to achieve a specific catch volume.

# Top producer countries, based on catch

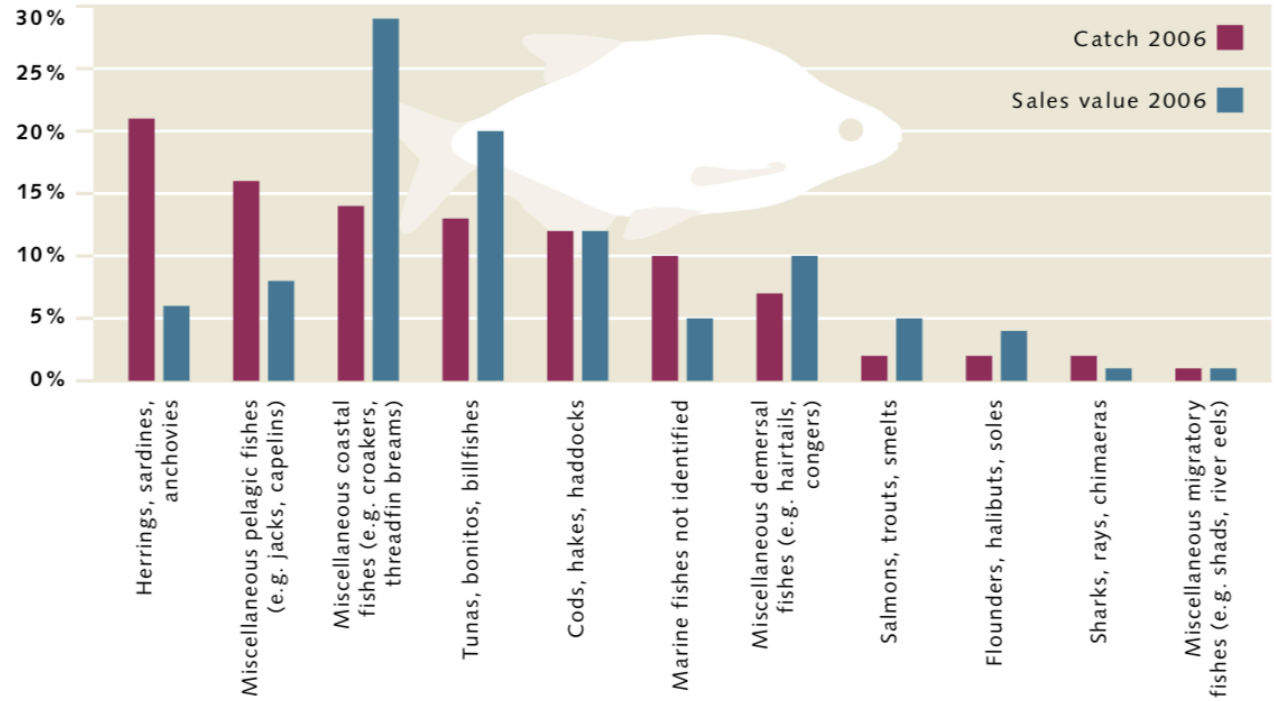


# World marine capture fisheries production since 1950

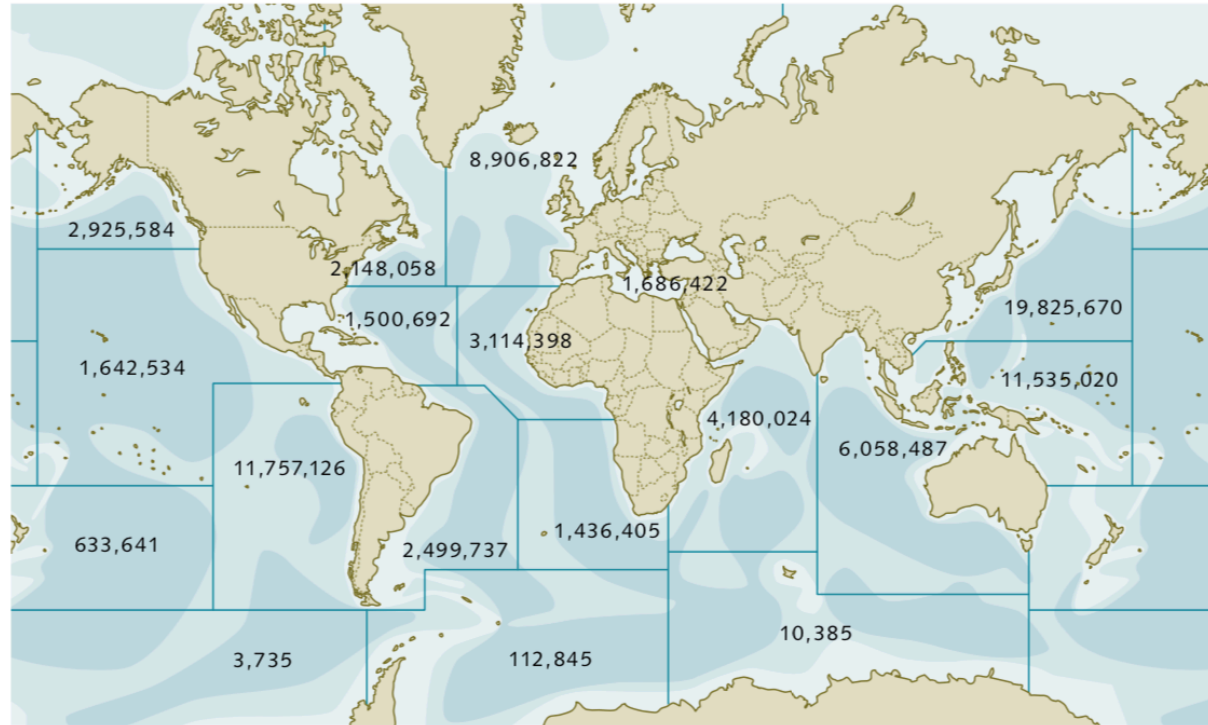




# Catches and landing values by groups of species

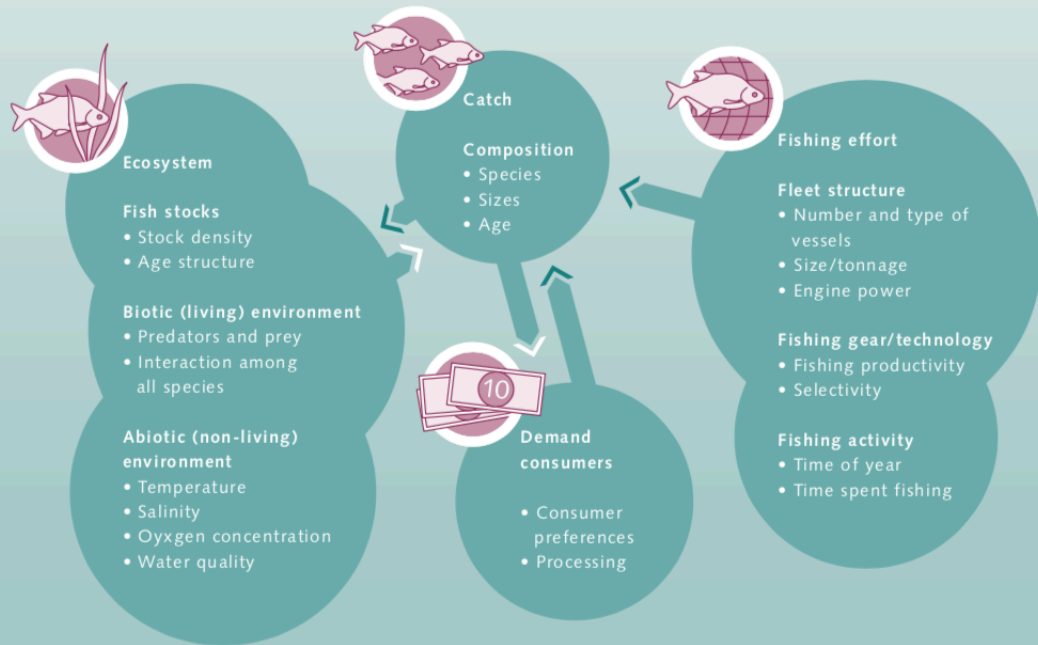


## Catches by region in tonnes (live weight) (2007)



# The causes of overfishing ???





- Schematic overview of a marine fishery.
  - The white arrows show the route taken by the fish from the sea to the consumer.
  - The dark-green arrows show the impacts of consumer demand and fishing effort on catch volumes and the marine ecosystem.





# How can overfishing be avoided?

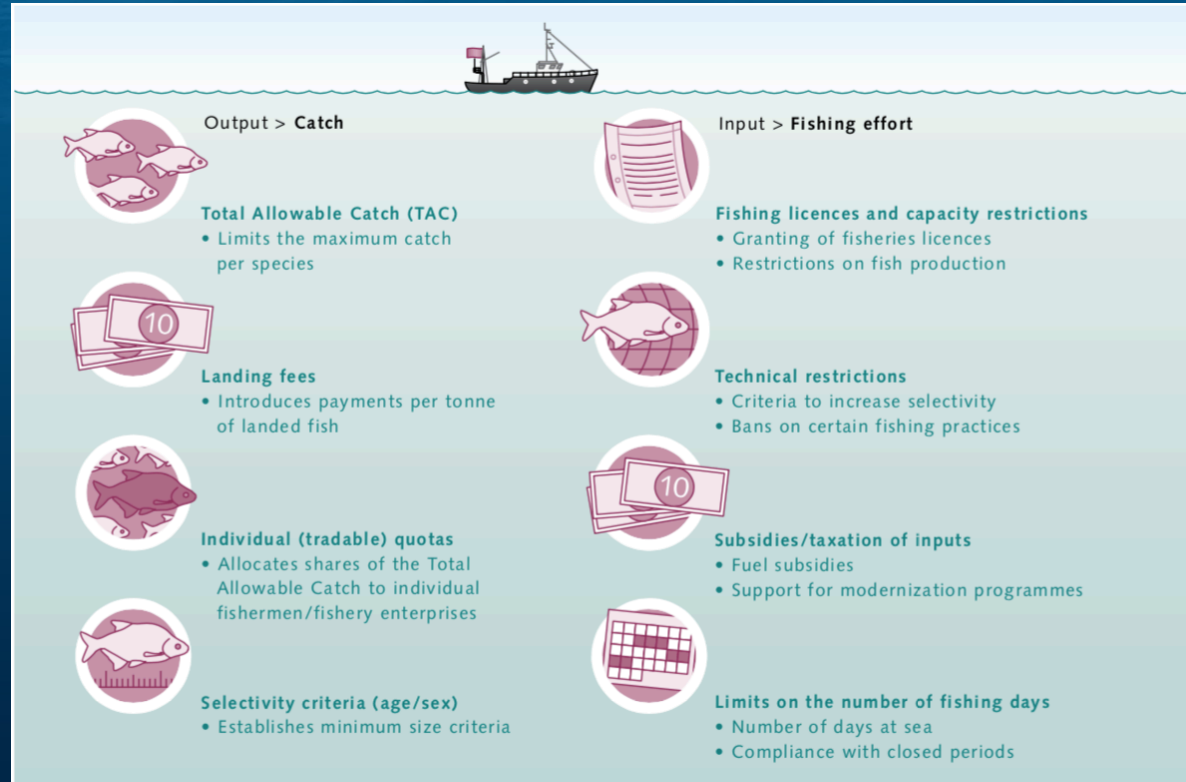


- Reducing catches
- Restricting fishing effort
- Allocating fishing rights



## Fisheries management

Classic approaches to fisheries management either focus directly on restricting catches or attempt to limit fishing effort. However, monitoring these regimes is often fraught with difficulty.





# MEDICAL KNOWLEDGE FROM THE SEA

In-class discussion and report-out

A vertical photograph on the left side of the slide shows a person standing on a surfboard, silhouetted against a bright sunset sky. The person is holding a surfboard and looking out at the ocean. The water is calm, reflecting the light from the sky. The sky transitions from a deep blue at the top to a bright orange and yellow near the horizon.

# GROUP-WORK

- Remain 5 groups as in the previous day
- Study and analyze a feature of the sea which can act as a medical treatment for people (15 minutes).
- Round-presentation (3 minutes for each round).
- Report-out by audience groups (3 minutes each).





Now you know... what i want to thank you

And THANK YOU