

# **COLD CHAIN CHALLENGES IN SMALL-SCALE FISHERIES**

INTERNATIONAL CONFERENCE ON  
SUSTAINABLE COOLING, 28-30 NOVEMBER



**THE WORLD BANK**

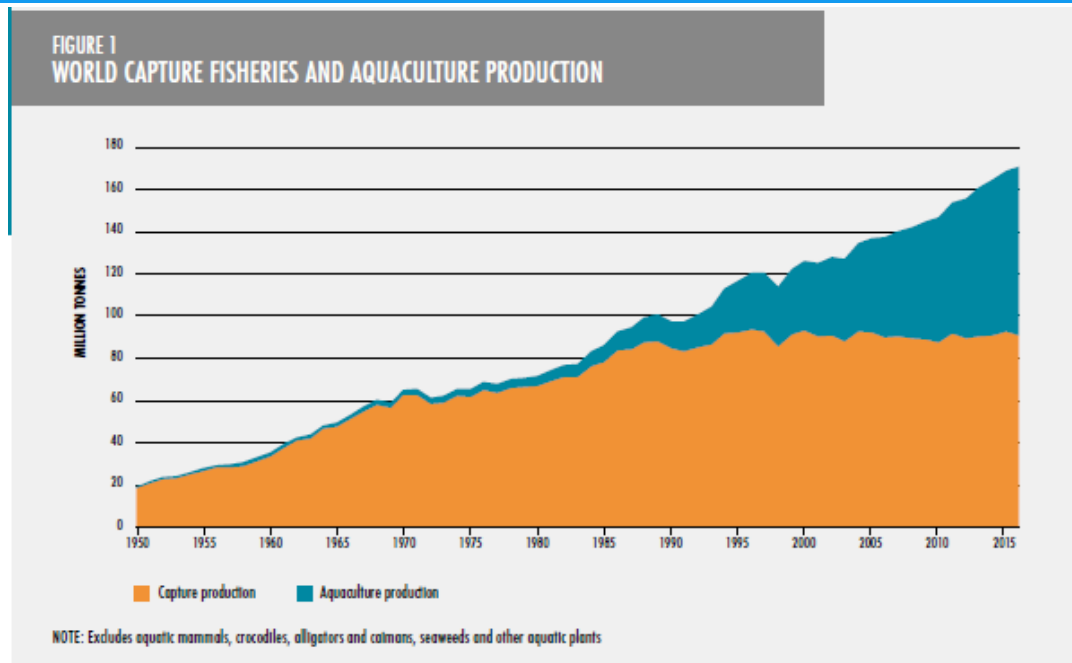
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Senior Fisheries Specialist*

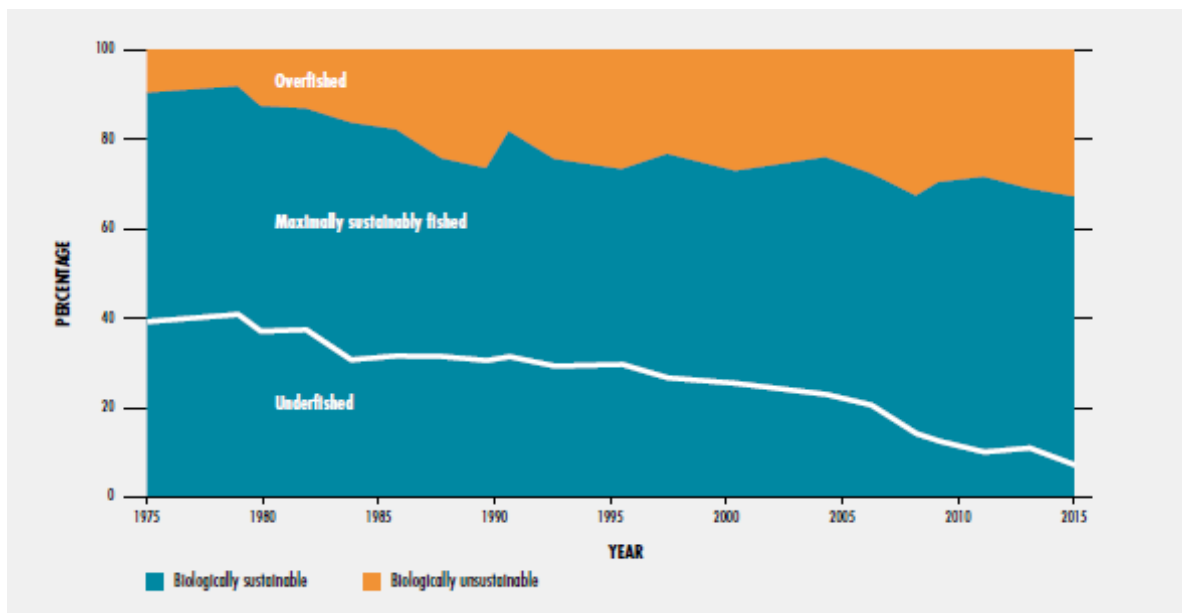
December 10, 2018

# GLOBAL PRODUCTION



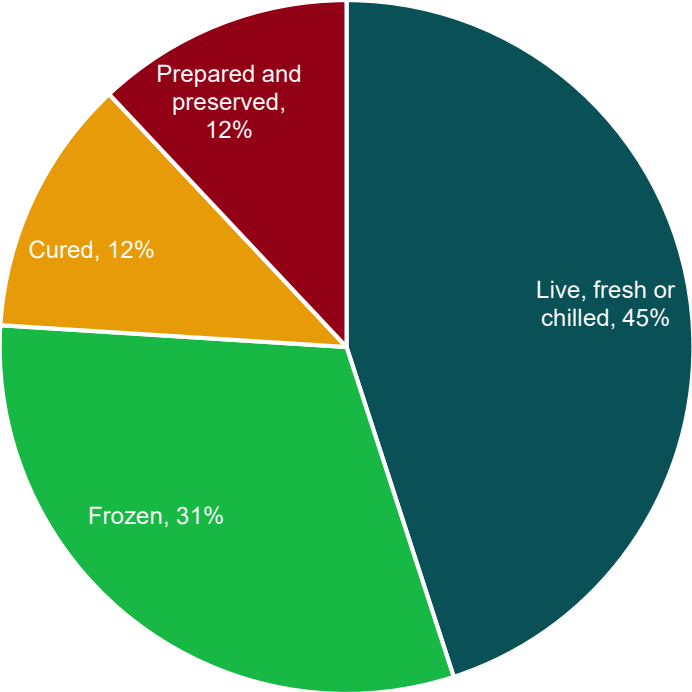
- Global production: 171 million tons (2016)
  - Fisheries 53%
  - Aquaculture 47%

# GLOBAL STOCK STATUS



- In 2015, maximally sustainably fished stocks accounted for 59.9%
- Underfished stocks for 7.0%
- Overfished stock for 33.1%

# GLOBAL CONSUMPTION

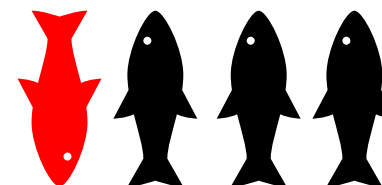


# FISH – A FRAGILE PRODUCTS

- Extremely perishable products
- Losses at all stage of the value chain
  - Physical loss
  - Quality loss
  - Market force loss
- Evidence of serious losses
  - 27% of fish catch estimated to be lost between landing and consumption (24.5 million tons) – when discards before landing are included, 35%.
  - In small-scale fisheries, losses up to 40% and on average 25%
  - In Africa, 20-25%, up to 50% losses where quality deterioration accounts for 70% of the losses



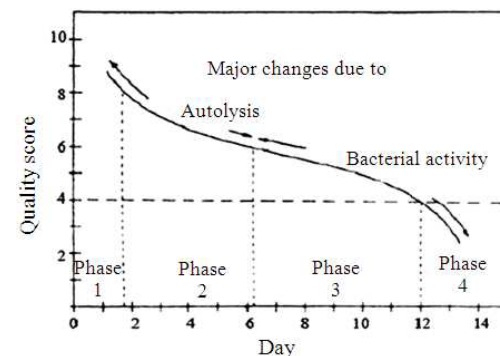
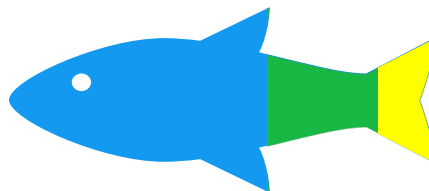
*Important waste of nutritious food and valuable source of protein  
Contribution to unsustainable exploitation of the stocks*



- Lack of hygienic landing sites, electric power supply, water, roads, **ice plants, cold storage, refrigerated transport**, appropriate processing and storage facilities

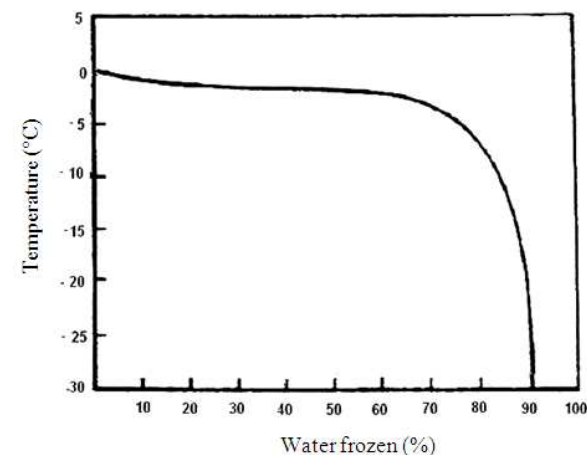
# FISH – A FRAGILE PRODUCT

- Fish contains
  - 60-80% water (freezing point -1 to -2).
  - 15-20% protein
  - 0.5-20% fat.
- Fish start degrading rapidly after it is caught: enzymes, lipases, microbes and surface bacteria
  - Breakdown of proteins and lipids
  - Change in odor, flavor and texture
  - Can lead to histamine poisoning (scombroid poisoning)
- Fish degradation rate is highly dependent on temperatures
  - Higher degradation under tropical conditions
  - **Principal preservative measure, besides good hygienic conditions, cooling the fish as soon as possible after catching and keeping it cool**
- But... old fish is rarely a health risk!



# FISH PRESERVATION TECHNIQUES

- Low temperature storage
  - retard the growth of microorganisms (cooling -1 to +4) or freezing (-18 to -30)... but freezing rate affects quality
- Ice
  - maintain uniform low temperature
  - reduce autolysis and bacterial degradation
  - provide a gentle washing/cleaning effect during melting
- Controlling water activity
  - drying, salting, smoking
- Controlling autolytic enzymatic spoilage
  - gutting the fish after catch



# COLD CHAIN CHALLENGES

**Maintain the cold chain through the whole value chain is difficult in many developing country for Small-scale fisheries**

- Onboard fishing vessels
  - Lack of space and access to ice
  - Low level of equipment and low skills
- At landing sites
  - Lack of cooling infrastructure (cold storage and ice)
  - Lack of refrigerated transport and roads
- SSF in developing tropical countries
  - High temperatures
  - Often remote location of landing sites and communities
  - Lack of access, bad quality or high cost of energy
  - Lack of skills (operation and maintenance of infrastructure)
  - Lack of ownership of communities
  - Lack involvement of private sector (needs derisking)
  - Lack of proper management systems
  - Often high running cost if not done properly





# NEEDS

## Innovation in developing sustainable cooling infrastructures

- Very important investments for SSF: waste reduction, sustainable utilization of natural resources, health and improved economic benefits
- Rationalize investments and development of infrastructures
  - Infrastructures (ice, cold storage, isotherm cooler) and adequate transportation
  - Need for associated business plans for operational and financial sustainability
  - Need for capacity building to operate and maintain
  - Improve ownership and accountability
  - Improve investment climate for private sector
- Use of greener infrastructure
  - Renewable energy for less dependency to grid
  - Transition from HCFC-22/HFC to HFO and natural refrigerants
- Alternative processing/preservation methods not dependent on cooling
  - Dried, salted and smoked
  - Prepared and preserved

