COLD CHAIN CHALLENGES IN SMALL-SCALE FISHERIES
INTERNATIONAL CONFERENCE ON SUSTAINABLE COOLING, 28-30 NOVEMBER
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

- Live, fresh or chilled: 45%
- Frozen: 31%
- Cured: 12%
- Prepared and preserved: 12%
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