FOOD FORWARD NDCs

Reducing post-harvest food loss in fisheries supply chains

Overview

Fisheries and aquaculture sectors worldwide are essential for food security, nutrition and the economic **livelihoods of billions of people**. Rapid degradation of fish populations and significant post-harvest losses and waste in fisheries supply chains pose a major challenge to sustainable management of fisheries. Globally, estimates indicate that **about 35% of total harvest is lost or wasted annually**. Factors contributing to these losses include inadequate cold storage facilities, inefficient transportation, technological gaps and lack of training for fishery workers. These issues are compounded by fluctuating market demand and insufficient regulatory frameworks, affecting both developed and developing nations. Efforts to mitigate such losses are critical to ensure the sustainable use of aquatic resources and to secure the nutritional needs of the global population.

Concrete measures to implement

Reduction in post-harvest loss of fish presents a vast opportunity to reduce avoidable greenhouse gas (GHG) emissions, improve global food security and help reduce pressure on depleting fish populations. Several measures can be implemented by governments to significantly reduce the incidence of fish losses:

- Improved practices on fishing vessels:
    - Impose strict landing regulations: Introduce binding obligations for fishers to ensure all catches of species (subject to minimum sizes or

quotas) are kept on board the vessel, landed and counted against quotas, except when used for live bait (depending on the national context). It is crucial to include adequate Monitoring, Control, and Surveillance measures.

- Regulate discard levels: Use **International Guidelines on Bycatch Management and Reduction of Discards**, designed to assist state and regional fisheries management organizations in formulating and implementing appropriate measures to manage and reduce discards.
- Improve the storage capacity of smaller vessels through innovative systems (e.g., compartmentalisation, or plastification of wooden boats' outer hull to prevent seawater seepage).
- Encourage using ice on board vessels: The use of ice for preserving fish and fishery products is a highly effective handling method on board fishing vessels. Many larger vessels – including artisanal fishing vessels, such as larger dugout canoes, outboard-motor-powered launches and larger inboard-engine-powered vessels up to 20 m long – will benefit from the use of some form of on-board preservation (e.g., ice or chilled seawater).

- **Improved processing practices**:
  - Improve cold-chain infrastructure: Enhancing the capacities of all food handling and distribution practices to maintain the fish product at a suitable temperature throughout the entire supply chain.
  - Improve drying techniques: Raised drying racks enable fish to be dried off the ground faster and in a cleaner environment, reducing loss and improving quality and price. Perforated plastic containers can be useful to handle small pelagic fish on board and during transportation.
  - Improve hygiene and quality standards/practices to reduce spoilage and waste, and also to safeguard health of fishers. Establish Sanitary **Standard Operating Procedures (SSOPs)** and/or local management committees with a mandate and funding from the government.
  - Make use of by-products/waste, such as fish frames (i.e., bones and attached flesh that remain after slicing off fish fillets parallel to the spine), fish guts or fish offal (i.e., scraps other than fillets).

- Improved public infrastructure:

- Take into account context-specificity and equity for infrastructure improvements to prevent inefficiencies and ineffective interventions (e.g., cooling facilities are fuel dependent but fuel costs are prohibitively high; large modern facilities displace and marginalise women traders who traditionally make informal sales to vulnerable populations; or digital solutions do not match digital literacy of the population.)
- Invest in innovative post-harvest, preservation and digital solutions.
- Invest in renewable energy-based off-grid solutions; for example, for cold-chain and processing at the community level (e.g., ice-making, cold storage and dryers).
- Strengthen provision, funding, management and maintenance of **infrastructure, logistics, technologies and services** in alignment with national priorities, by public sector or public-private partnerships. Such activities should focus on benefitting areas with widespread multidimensional poverty:
    - Crucial infrastructure includes modern and well-designed fish landing centres, harbours, processing establishments and marketing facilities that are easily accessible by roads and have reliable energy supply.
    - Crucial services include portable water, electricity, ice, fish inspection and extension services, as well as other public services (e.g., environmental health inspections and market management).
    - Improved roads and transportation services.
    - Best management practices.

- **Improved market access** for producers, with a particular focus on benefitting areas with widespread multidimensional poverty:
    - Market Access and Quality Improvement Strategies.
    - Quality certification.
    - Inclusive value addition can improve product quality and convenience in use, significantly reducing food loss and waste (FLW) while providing more equitable benefits to all stakeholders.
    - Improved access to finance: Particular emphasis should be places on improving finance access for low-income and marginalised groups.

Supporting interventions can include:

- Government established loan facilities that require minimal collateral.
- Direct finance of fish processing businesses by microfinance institutions and banks with adjusted repayment options.
- Training on financial and business management.
- Village Savings and Loans Associations (VSLAs) schemes and banks that can particularly benefit women.

- Facilitated cross-border trade.
- Skills and knowledge related to handling, processing and marketing practices.
- Accessing and using technology or equipment; for example, the use of mobile phones and other information technology solutions to conduct transactions and make distribution and marketing more efficient.

Enabling governance measures

- Adoption of a **national strategy for reducing food loss and waste**:
    - The strategy should include action for preventing and reducing fish loss within national borders including programmes, policies, practices, incentives and/or related measures to influence the actions of fishing communities, companies and political bodies.
- Active engagement of governments, non-governmental organizations, private sector and the philanthropic community in investment platforms for cold-chain and improved infrastructure.
- Increase of technological research and development led by the private and public sectors and academia. Public food systems and fishery research, as well as other public investments in rural areas, should place emphasis on ensuring equitable outcomes.
- Enabling **regulatory environment**:
    - Laws, rules and regulations related to fish catching, farming, handling, processing, preparation, labelling and health and safety of workers in the sector.
    - Local practices and by-laws for effective implementation.
- Interventions targeted at supporting vulnerable groups in fisheries value chains, especially women, youth and the poor.

Tools and MRV systems to monitor progress

Food Loss & Waste Protocol

The Food Loss & Waste Protocol, developed by a multi-stakeholder partnership, offers standardised approaches to quantify and report on food loss and waste. The standard helps companies, countries or communities to quantify food loss and waste, develop reduction strategies and track progress towards reduction targets.

Link: https://www.flwprotocol.org/

2022 Progress Report on Sustainable Development Goal Target 12.3 on Food Loss and Waste

The 2022 Progress Report on Sustainable Development Goal Target 12.3 on Food Loss and Waste seeks to inform decision makers in government, business, academia and civil society about recent advances and available strategies to reach this global goal by 2030.

Link: https://champions123.org/publication/sdg-target-123-food-loss-and-waste-2022-progress-report

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Reducing post-harvest food loss at storage, transport, and processing levels

See guidance on *Reducing post-harvest food loss at storage, transport and processing levels.*

Link: https://foodforwardndcs.test/food-supply-chains/reducing-post-harvest-food-loss-at-storage-transport-and-processing-levels/

Reducing food waste in gastronomy sector, retail and at household level

See guidance on *Reducing food waste in gastronomy sector, retail and at household level.*

Link: https://foodforwardndcs.test/food-consumption/reducing-food-waste-in-gastronomy-sector-retail-and-at-household-level/

Mitigation benefits

- Climate-smart cold-chain technology directly reduces GHG emissions from energy consumption and refrigerant leakage associated with cold-chain infrastructure. See ***Reducing emissions from food storage, cold chains, transport, and processing***.
- Reducing fish loss improves the productivity of the value chain, lowering the fish production required to meet a given demand. Consequently, fewer energy resources are needed to deliver fish to end-consumers, reducing the carbon intensity of the entire supply chain. Reductions in waste, in turn, lower methane emissions associated with decaying, unsold or unconsumed produce.
- Recent research suggests that fish are an essential component of ocean carbon sinks. As fish loss is reduced, the need for overfishing to meet demand may decrease. This would positively impact the recovery of global or regional fish stocks, improving the carbon sequestration potential of oceans.

Other environmental benefits

- Less GHG emissions and improved air quality from a reduction in fossil fuel burning. By improving post-harvest handling, processing and distribution systems to reduce loss and waste, aquatic food systems can become more efficient. This efficiency translates to lower energy use and fewer emissions per unit of food consumed.

Adaptation benefits

Addressing post-harvest losses can contribute to climate change adaptation through:

- Improved nutritional and food security for coastal communities. Nutrients such as calcium, folate, iron and vitamin A are found in high quantities in fish. Nutrient deficiencies persist in high numbers across many developing countries. Improved technologies in fish supply chains, when coupled with equitable distribution of fish products, can help to **address the malnutrition experienced by women and children**.
- Climate-smart technologies can increase food safety and quality; for instance, different smoking technologies have varying impacts on the nutritional retention of smoked fish, and food management during processing can affect microbial safety of the fish.

Other sustainable development benefits

- SDG 1 (No poverty): Improved household incomes for fishing communities.
- SDG 2 (Zero hunger): Improved nutritional and food security for coastal communities, increased food quality and reduced food-borne pathogens.
- SDG 12 (Responsible consumption and production): Contribution to reducing food loss along production and supply chains.
- SDG 14 (Life below water): Decreased pressure on global fish populations and improved conservation of fishery and ocean resources.

Main implementation challenges and potential externalities and trade-offs

- Commercial (business model) risks associated with investments in climate-smart refrigeration, cold storage, ice-making and cold transportation operations.
- Technical operation of cold-chain technologies and lack of appropriate skills to maintain equipment.

Measures to minimize challenges and address potential externalities and trade-offs

- For improving bycatch use and preserving bycatch on vessels, buy-in is needed from crew and vessel owners who have incentives to align themselves with a specific processing industry that prioritizes a target species.
- For reducing cold-chain investment risks: In developing economies, investments in climate-smart (renewable energy-based/off-grid solutions)

cold-chain operations should be led by community members who are motivated to generate profit and can manage support contracts. In addition, these privately managed businesses should return profits to the community through use of community profit-sharing models.

- For reducing cold-chain maintenance costs: Innovative models need to be created with cold-chain technology companies to support the development of technical expertise on maintenance within communities. Communities could benefit from public or private sector financial support to create cold-chain economies that sustain on-going repair of cold-chain technology.
- For avoiding overfishing:
    - Adopt binding regulations to ban overfishing.
    - Regulate cold storage capacity on vessels.
    - Offer incentives for businesses that are willing to share data and be transparent in efforts to support sustainable fisheries and reduce overfishing.
- Incorporate behavioural insights into policy and programs.
- Climate-smart approach to development of cold-chain infrastructure. See *Reducing emissions from food storage, cold chains, transport, and processing*.

Implementation costs

- The costs and investment needs would vary based on the specific intervention and country. For solar driers across Africa, Asia and Europe, the **estimated investment costs** range from €10 for a small solar drier to €20,000 for an integrated community-scale solar drier and €100,000 for the Atmospheric Freeze Dryer (AFD), excluding the costs for the generation of solar electricity for less than €20,000.

Intervention in practice

- The Sri Lankan Ministry of Fisheries and FAO have launched an **initiative to introduce new designs of multi-day fishing vessels** to improve the quality of fish and reduce post-harvest loss in the fisheries sector. The first

vessel that was put in use in January 2023 was a modified multi-day vessel featuring a pilot coolant system in fish holds and storage, as well as a modified fish holding facility to minimise the physical damage to fish due to overload.

- KeepITCool ("KIC"), a company set up in 2020 which aims to address post-harvest fish losses in Kenya, has been testing a blended Containers as a Service (CaaS) and software service models with fishers to lower the cold-chain access barriers for small-scale fishers. KIC has partnered with a small-scale fishers' association along Lake Victoria to provide an integrated cold-chain solution, develop an online trading platform and deliver products. KIC delivers reports that provide insights on how access to off-grid cooling can increase financial outcomes and how to address cold storage needs of first-mile consumers. Some **39% of fishers using these services and products reported reduced wastage and 31% reported increased income.**

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