



FACT SHEET

Reduction in food loss and waste through fish value chain, market and food system innovation



Overview

Fish provides 60% of the animal source protein consumed in Myanmar and Cambodia, and per capita fish consumption is similar in each country at between 30 and 75 kg. However, consumption varies strongly by income, with the poorest consuming only 10 kg per capita, often fish of the lowest quality as it is cheaper. Poor post-harvest quality and safety control lead to an estimated 25% of all fish produced being lost before they are consumed in Cambodia and Myanmar (10% lower than global value). Consumers in the region are very sensitive to perceived product quality. Purchasing and processing habits are also a source of further losses and waste.

Fish waste is a major part of food loss in the region. This can include “discards” (unwanted or undersized fish) that have a low or no market value and fish damaged in transport and considered inedible due to physical damage or bacterial contamination (rotten fish). Those parts of fish that are not routinely consumed, like head, skin, fins and viscera, are also referred to as fish waste. This type of waste can be as much as 50% of the bodyweight, although in some wholesale markets much of this waste is recycled as animal feed and therefore indirect human consumption. In the fish industry, only 40% of the fish is used for direct human consumption. The rest, comprising the heads, skin, fins, viscera and trimmings, is unwanted.¹ A large proportion of capture fisheries and aquaculture production is either lost or wasted—accounting for 35% of the global harvest.²

Context of fish value chains in Southeast Asia, mainly in Thailand, Myanmar and Cambodia

In Southeast Asia, dried fish contributes between 25% and 30% of all fish consumption, which includes salted, dried, fermented, smoked and pickled fish. Hilsa fish is caught in both fresh and marine waters in Myanmar. Myanmar exports fish globally, including Thailand. As with dried fish, waste and loss in the value chain are high due to poor post-harvest quality control. Cuttlefish and squid from the Moken archipelago are caught by Moken ethnic minority women from marine protected areas, under management plans currently being developed, and marketed via middlemen to nearby Thailand. The value chain needs to be better understood, especially the fate of the by-catch and food loss involved. Freshwater fish value chains look at a range of species produced by poor households in Myanmar, Cambodia and other countries in the region.

What is known so far

Food and nutrition loss in fish value chains in Southeast Asia is around 25%. In Myanmar and Cambodia, food loss is a result of many factors, including poor fish and shellfish handling, poor storage facilities, absence of ice/refrigeration, few primary processing facilities, poor transportation, inadequate market facilities and poor packaging. Consumer preferences also play an important factor as consumers traditionally prefer to purchase live fish at wet markets. The delivery of live fish to markets works well in small quantities over relatively short distances. However, fish value chains often involve fish being transported over 1000 km by bus with little ice at ambient temperatures of around 30°C. Fish are typically transported “in the round” (head on and intestines in), so bacterial damage causes fish to rot faster than filleted or preserved fish. In the case of dried fish (including pickled and fermented products), the processing is carried out in the open with exposure to bird feces, flies and other contaminants. Once dried, the fish are often transported in sacks and then stored in bulk without packaging under tarpaulins in open markets where the fish and fish products are subject to damage by rats and insects. To prevent pest infestations, these products are often sprayed with pesticides, which are harmful to human health.

What do we need to know more

Different studies have concluded that fish and its waste products can be used for the formation of fishmeal, fish oil, fish silage, pet food and fertilizer. The value of fish by-products can be increased by feed formation from these unwanted products.³ In addition, fish waste has a high concentration of biodegradable organics that could be recycled as an attractive co-substrate for waste-activated sludge to improve methane production during anaerobic co-digestion.⁴

The following are two research areas that warrant more investigation:

- (1) What is the level of food loss in terms of economic and nutritional value reduction associated with inadequate quality control in post-harvest processes?
- (2) What are the major food safety issues associated with poor aquatic food post-harvest handling and processing? There is a need to work with stakeholders along the value chains to assess what interventions (knowledge, tools and technologies) are currently being successfully used to reduce food loss in each country.

Anticipated interventions

For each of the selected fish and shellfish value chains in the Southeast Asia region, research should focus on the following steps to reduce food and nutritional value loss:

- Identify all the stakeholders in the selected supply chains and provide awareness training and capacity development to reduce food and nutrition loss.
- Emphasize the participation of women at each of the value addition steps to ensure that at least 35% of those interviewed and trained are women.
- In general terms, establish the probable causes of food and nutrition loss by a series of interviews (focus group discussions, surveys, etc.) with those who catch or produce the aquatic food and then market the products. Provide feedback in terms of reasons for the losses from those interviewed and document their responses.
- Based on the stakeholder food and nutrition loss interviews, further define the root causes for the losses described using the Hazard Analysis and Critical Control Point management system to establish, in participation with the stakeholders, exactly which critical control points can realistically and cost-effectively be controlled and by what means.

- Use scientific evidence gathered through interviews to establish cost-effective remedial actions, and calculate the possible increase in product price to cover the improvement costs as a trade-off between increased quantity and quality of aquatic food products.
- Carry out producer, wholesaler, retailer and consumer surveys to establish to what degree they are prepared to pay for improved quality (food safety) and, if negative, design awareness campaigns for those unwilling to pay more for an improved product.

Theory of change for the region

The theory of change that guides anticipated change could be stated as;



IF fish value chains—how fish are caught, produced and marketed—are assessed scientifically, findings of assessments are shared with stakeholders and their feedback is incorporated into the market system of the value chains...

THEN this will increase income, employment opportunities and nutritional value, decrease food loss and human health issues, and foster positive behaviors in the community, especially among women and youths in Southeast Asia.



Nutrition events are held in Taunggyi Township.

How knowledge will be transferred

WorldFish has been present in the region for more than a decade and has in-depth experience and knowledge of the fisheries sector through the implementation of a range of research and development projects. A recent notable intervention, designed to research aspects of adaptation to climate change by fish farmers in five Greater Mekong countries, worked closely with information and communication technology companies running virtual extension systems on smartphones. These applications are now in use by over half a million beneficiaries in Myanmar alone. The applications are linked to Facebook pages to promote interaction with fisheries sector stakeholders in each of the countries. Information sharing between countries has been coordinated by a range of virtual communication platforms that are now used extensively due to the COVID-19 pandemic. There are language complications with fishers and fish farmers even within countries because there are many regional languages spoken along with the national language. The designated focal persons for each of the countries will play a vital role to help disseminate and communicate through digital communication platforms in multiple languages. WorldFish will encourage collaborative research publications by involving research leaders in Southeast Asia. This will be good evidence of South-South collaboration because some of the countries, such as Thailand, are advanced in terms of fishery value chain quality control and research capability.

Notes

- ¹ Dekkers E, Raghavan S, Kristinsson HG and Marshall MR. 2011. Oxidative stability of mahi mahi red muscle dipped in tilapia protein hydrolysates. *Food Chemistry* 124:640–45.
- ² [FAO] Food and Agriculture Organization. 2020. The State of World Fisheries and Aquaculture 2020. Sustainability in action. Rome: FAO. <https://doi.org/10.4060/ca9229en>
- ³ Ferraro V, Cruz IB, Ferreira JR, Malcata FX, Pintado ME and Castro PML. 2010. Valorisation of natural extracts from marine source focused on marine byproducts: A review. *Food Research International* 43:2221–33.
- ⁴ Wu Y and Song K. 2021. Anaerobic co-digestion of waste activated sludge and fish waste: Methane production performance and mechanism analysis. *Journal of Cleaner Production* 279:123678.

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