

## WHAT ARE POST HARVEST LOSSES?

Post-harvest losses (PHL) are defined as a reduction in quantity, or quality or monetary value of fish in the supply chain.

PHL of fish occur in all fisheries or value-chains, to varying extents. Losses typically result in lost income and a loss in the availability of fish as food hence they represent a major food security concern in Africa, where many people are food insecure.

There are two main types of fish loss that are of primary concern in terms of value-chain performance and ultimately to food security: reduced price loss and what is called, physical loss.

**Reduced price loss:** Producers such as fishermen and processors lose income when they have to sell their fish for a low price due to the affects of spoilage or damage.

**Physical loss:** In cases of severe spoilage or if processed fish is infested by insects, then fish may become un-saleable and the result is a physical loss where no income is generated but importantly there is no contribution to food security.

Globally fish losses are estimated to be ten to twelve million tons per year, accounting for around ten percent of the total production of capture fisheries and aquaculture.

Previous work in Africa showed a complex pattern of losses varying from 2 to more than 35 percent from both mono to multispecies fisheries.

The most common causes of losses are found in inadequate handling and processing methods, lack of knowledge and skills amongst producers, as well as poor access to infrastructure, equipment and services such as water, ice, electricity, roads and credit are all fundamental. Other underlying causes of loss are also lack of or poor market information, weak and unsupportive policy and socio-cultural factors. Whilst there are often estimates of loss in terms of percent or monetary value, these are often generalisations of complex and dynamic situations. Basing intervention decisions on these assumptions is a risk, so in order to reduce losses we first of all require a more detailed picture of the who, what, where, why, how and when of post-harvest fish losses. For example, losses are often seasonal, for example occurring during times of glut catches or the rainy season when traditional processing methods are less effective.

Losses are also associated with certain species of fish or types of fishing or processing method. They may also be occurring in particular types of location e.g. remote areas where services and infrastructure are poor. In addition, coping strategies to control losses may already exist and could form the basis of effective interventions.



Post harvest loss training in Tanzania © Davide Signa

# Reducing Post-harvest fish losses for improved Food security

Understanding these essentials is therefore key to prioritising and planning effective loss reduction interventions, where these should be targeted and the potential benefits that will accrue. Developing this understanding of losses is usually termed an “assessment”.

In pursuit of this, much work has been done in the past to develop practical field-based fish loss assessment methods for use by extension services and producers.

Ultimately we are interested in reducing losses and ensuring all fish is utilised and attains its optimum value, putting more money into the pockets of fishermen, processor and traders and giving consumers good quality, affordable and safe fish to eat.

SmartFish adopted a twin track approach on addressing the issue of post-harvest losses combining efforts on assessing losses in parallel with supporting specific actions on reducing losses in those areas where reduction has already been deemed feasible and sustainable.

## ASSESSING LOSSES

The assessment work was built on the FAO’s recently developed comprehensive Post-Harvest Loss Assessment (PHLA) methodology which identifies relevant loss patterns and baseline information. This has involved capacity development in post-harvest loss assessment methodologies for key institutions in the region.

A considerable amount of work has been done on modernizing the PHLA methodology by making it more user friendly, low cost and low technology oriented using mobile phones for data collection and transfer of data to a web-based dynamic mapping/profiling system.

The system has been piloted at major fish landing sites and markets in nine target countries: Burundi, Djibouti, Kenya, Madagascar, Rwanda, South Sudan, Sudan, Uganda, Tanzania.

These first phase of PHLA will be used as basis for the development of national post-harvest loss profiles, which will guide the identification of further loss reduction interventions in known “hot spots” in selected countries.

## REDUCING LOSSES

The loss reduction interventions implemented so far by SmartFish focus on working with key partner organizations to improve knowledge and skills as well as demonstrate the uptake and benefits from using appropriate improved handling and processing technology and solutions. Here are some examples of the main programme’s loss reduction initiatives:

- Education is an important part of the loss reduction process. SmartFish tackled the issue of lack of knowledge and understanding that many fishermen, processors and traders have of the causes of spoilage and fish losses using video. This is a powerful medium for transmitting important messages to people who have generally low literacy levels. In this line, the



Less loss means more money © Davide Signa



### Insect infestation as a cause of losses

One of the major causes of post-harvest fish losses in tropical environments is insect infestation of drying and dried fish products. Fresh fish that is traditionally sun dried is vulnerable to attack from blowflies, which lay their eggs on the fish. These eggs hatch into maggots (larvae) that feed on the fish flesh. A prolonged and slow drying process, which occurs when weather conditions are not conducive for drying (wet and humid), exacerbates the problem. However, once the moisture content falls to a certain level, blowfly infestation is not a problem. Such infestation levels can result in extremely high fly population densities, which may also have significant implications for human disease transmission. Additionally, dried and smoked fish are often infested by beetles and their larvae during transportation and storage. These insects can cause serious damage to stored products by not only consuming the dried flesh but also riddling the product with holes, which cause an unacceptable product appearance and making the product unsellable. Unfortunately processors and traders often resort to using potentially harmful agricultural pesticides to protect their products from infestation and losses. Most of the insecticides used to protect fish are unregistered and the use often results in high levels of residues

that may be unsafe to be consumed. The application of insecticides to drying fish may also have unacceptable environmental and health consequences not only for consumers, but also to those involved in handling, and application, and also the environment. The quest for safer alternatives has been ongoing for several decades and whilst food safe alternative insecticides exist, the answer lies in a holistic approach, which combines good hygienic practice, background insect population control and barrier protection for products.

SmartFish have linked with a commercial company that has developed innovative long lasting insecticide-incorporated barriers and storage bags for preventing insect infestation of agricultural products. The investigation will focus on evaluating how effective these products are to protect drying and dried fish during processing and mainly during storage. Pilot testing in Uganda will determine whether there is potential to rollout these tools for large scale uptake within fish value chains in the region. Insect related losses of dried pelagics, such as lake sardines from Lakes Victoria, Tanganyika and Kariba are assumed to be high, so any effective control could prevent significant quantities of fish from being wasted.

“Clean Fish Better Life” campaign has been formulated to raise awareness and educate communities and consumers about better handling, hygiene and processing practices using a participatory video approach which was disseminated among with other sensitization materials through a mobile cinema campaign (see Smart FICHE on the topic).

- In parallel to raise awareness, skills and knowledge development of all those involved in the value-chain is key to raising standards and encouraging the proper use of landing site facilities, cold chain management and meeting regional food safety requirements. A series of training videos has been developed by the programme on good handling and hygiene practices throughout the value chain. These self explanatory videos are used in the form of a short participatory training course. Key messages on better practices are conveyed using the appropriate local language and discussion of key issues is encouraged as part of the learning process. The theory is backed up with the provision of equipment to enable the participants to put into practice the techniques and ideas they have learnt about.
- In some fisheries such as the lake fisheries of east Africa, a significant proportion of the catch of certain species is smoked using a traditional process that uses large quantities of fire-wood and produces low quality products with high levels of chemicals called polycyclic aromatic hydrocarbons (PAH) which are known to be cancer causing agents. The programme is popularising the construction and management of improved “Thiaroye” fish smoking kilns to improve the quality and safety of smoked fish and uses much less fuel-wood. This smoking technology has been recently developed in West Africa under

the auspices of FAO and produce smoked fish which satisfy international standards for PAH levels.

- Strengthening the cold chain is one of the major opportunities for loss reduction in the region. Quality deterioration and spoilage of fresh fish are accelerated in hot ambient conditions. The use of ice is one of the most effective means to retard spoilage and maintain quality and hence prevent reduced price losses. The programme is popularising the uptake of insulated boxes for improved onboard handling of fresh fish and cold chain maintenance through the value-chain. Insulated boxes not only enable fish to be iced effectively and extend the shelf life of both ice and fish, but they also protect fish from physical damage and contamination. Ultimately, fish can be sold for a high price and sellers can keep the fish in good condition while waiting for the best price.



Loss may also occur during transformation © Davide Signa

# Reducing Post-harvest fish losses for improved Food security

- Sun-drying is widely used as processing method of small lake sardines in many African lakes such as Lakes Victoria, Kariba and Tanganyika. Improving the quality of dried fish is an important way of preventing reduced price losses. Consumers are normally willing to pay a higher price for products which have a good appearance and are free from contaminants such as sand, stones and dirt. Small-pelagics such as lake sardines are often associated with such contamination. SmartFish supports the construction and management of improved racks for sun-drying small-pelagics. These racks enable a good flow of air around the product, ease of handling, the use of polythene to protect the fish from rain and prevent contact with contaminants. Fish dried on raised racks are of much higher quality and they are often used in value-added products for regional trade, which is another intervention entry point for SmartFish.
- Deficiencies in value chain of crabs include the storage points at village level and transportation. Simple, low cost technical solutions and technology transfer for loss reduction, tailored to specific types of loss and product are promoted by the programme. For example, in Madagascar SmartFish achieved to reduce significantly the losses caused by the high mortality rate in the mud crab value chain. The interventions consisted of a combination of awareness raising activities and direct and on-the-job capacity building of the mud crab collectors and trade

operators through the design and promotion of improved, but simple, crab handling, storage and transport innovations. (See SmartFiche on the topic).

## THE WAY FORWARD

Building on the work already completed and on-going, SmartFish now aims to reduce post-harvest losses by at least 25% (volume and/or value) in at least four representative artisanal fisheries / value chains of low-value regionally consumed fish. This will produce gains in value throughout the value chain. Support will also be provided to support at least six selected countries to sustainably adopt and regularly implement post-harvest loss assessments as well as assist local national institutions and Regional Economic Communities (RECs) to develop short, medium and long-term action plans for losses/wastage reduction. At the community level SmartFish will assist a number of vulnerable groups to implement thorough post-harvest loss reduction interventions which have already been identified.

Loss reduction initiatives will be complemented by specific trade oriented actions, with the reduction of post-harvest losses having an obvious positive impact on local and regional trade flows. Improvements in trade will also contribute to better food security by increasing revenues, employment opportunities and foreign exchange generation.



Post harvest loss training in Madagascar © Davide Signa

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