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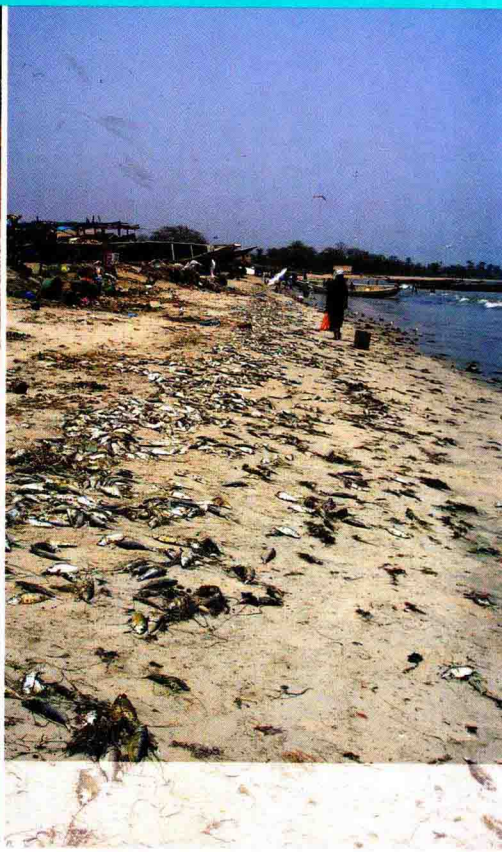
Post-harvest fish loss assessment in small-scale fisheries

A guide for the extension officer



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A guide for the extension officer

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Preparation of this manual

Post-harvest fish losses are a major concern and occur in most fish distribution chains throughout the world. Not only do losses constitute lost income to fishers, processors and traders but they also contribute to food insecurity – a loss of fish means less fish available for the consumer.

This manual has been developed as a tool to guide fisheries extension workers and other development practitioners on ways in which to assess post-harvest fish losses and help plan reduction interventions in small-scale fisheries (SSFs). It is a product of almost two decades of extensive fieldwork and unremitting collaboration among individuals and institutions, particularly FAO and the Natural Resources Institute (NRI) of the United Kingdom of Great Britain and Northern Ireland, which was concluded by the Post-harvest Fish Loss Assessment (PHFLA) Working Group organized and facilitated by FAO from 2006 to 2008 within the regional Africa PHFLA Programme.

The PHFLA Working Group brought together post-harvest fisheries experts from several countries, including Cameroon, Chad, Côte d'Ivoire, Gambia, Ghana, Kenya, Malawi, Mali, Nigeria, Senegal, Uganda and United Republic of Tanzania, together with other international experts. The group held three workshops. The first one was held in Accra, Ghana, in June 2006, where participants reviewed and internalized available PHFLA methods before mapping out a programme of fieldwork in selected countries. A second meeting was also held in Accra in June 2007, followed by a third in Jinja, Uganda, in March 2008. The last two meetings deliberated on the results of fieldwork to assess losses and validate the methods used in PHFLA.

The PHFLA Working Group recommended that the work should be consolidated into a manual for wider dissemination to promote post-harvest fish loss assessment and reduction.

Assessing losses and understanding them is key to addressing the post-harvest fish loss problem. The purpose of preparing this manual has been to provide extension officers and development practitioners with an effective fieldwork tool that is easy to read and understand and one that shows them how to carry out their own assessments. This manual is not designed as a definitive guide to fish loss assessment but rather as a resource that can encourage greater efforts to understand and reduce losses in SSFs. With this in mind, the authors look forward to receiving feedback from those who use this guide, which can then be used to enrich it further.

We are grateful to Gloria Loriente for the layout design.

Abstract

The field activities within the regional post-harvest loss assessment programme in small-scale fisheries in Africa (an FAO regular programme conducted from 2006 to 2008) tested and validated three key fish loss assessment methodologies that have been developed over the past two decades: the Informal Fish Loss Assessment Method (IFLAM), Load Tracking (LT) and the Questionnaire Loss Assessment Method (QLAM).

This manual describes these three methods in detail and provides practical guidelines on when they can be used and on how to use them to collect reliable data, be it for planning for an intervention to reduce losses in a particular area or at the country level or monitoring and assessing the effectiveness of a loss reduction intervention. While the IFLAM is used to generate qualitative and indicative quantitative post-harvest fish loss data that can be used to inform decision-making or to plan the use of LT and the QLAM, the latter are quantitative assessment methods. Load Tracking is used to quantify losses at stages along the distribution chain or losses related to specific activities, such as fishing, transport, processing and marketing. Key data related to the cause and effects of losses from an IFLAM study are validated using the QLAM before any suitable intervention is introduced. A combination of the IFLAM, LT and QLAM could then be used to monitor and evaluate the effects of an intervention. Illustrative examples and case studies are presented to facilitate the uptake and use of the methods in systematic fish loss assessment.

This fieldwork tool also enlightens the extension officer on how to communicate the data from the assessments and the design of loss reduction interventions to help policy-planners and decision-makers understand important issues facing fishing communities.

It is hoped that this manual will be of interest to all those involved in fisheries technology and development, field research, data analysis and reporting as well as participatory approaches to development.

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Abbreviations and acronyms

FD	flow diagram
IFLAM	Informal Fish Loss Assessment Method
IUU	illegal, unreported and unregulated (fishing)
kg	kilogram
KII	key-informant interview
LT	load tracking
NGO	non-governmental organization
PH	Post-harvest
PHFL	post-harvest fish loss
PHFLA	post-harvest fish loss assessment
PRA	participatory rural appraisal
QLAM	Questionnaire Loss Assessment Method
SSF	small-scale fishery
SSI	semi-structured interview

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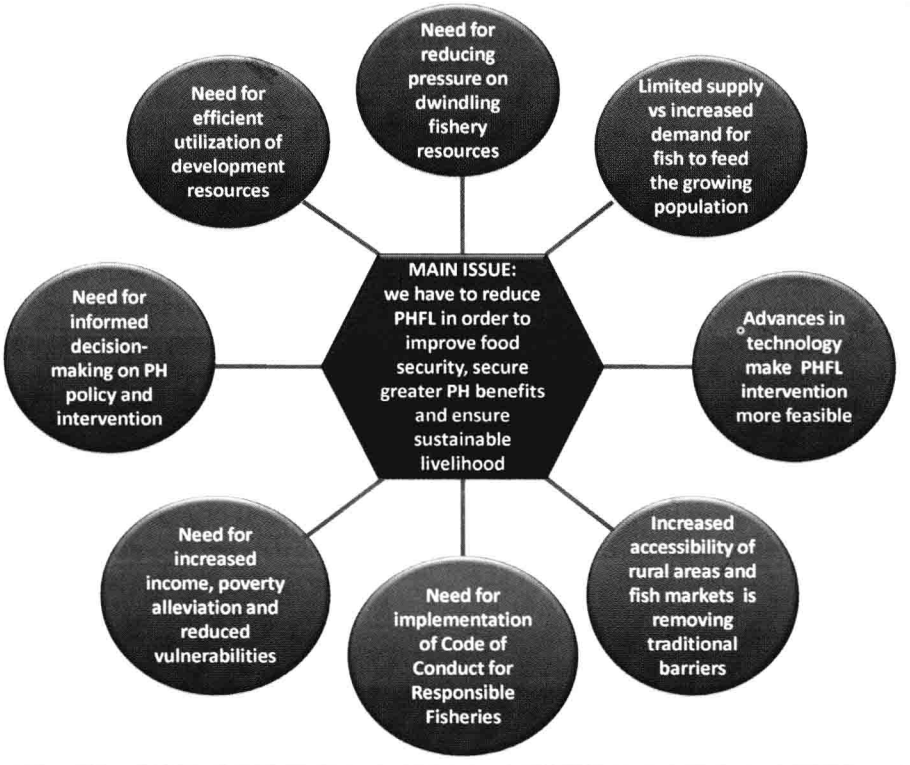
1. Introduction

Small-scale fisheries (SSFs) account for more than half of total fish production in the world. The sector is a major source of food fish, income and employment to many millions of people, especially in developing countries. Despite their importance in terms of poverty alleviation and food security, SSFs are facing a host of challenges, including: overfishing, illegal unreported and unregulated (IUU) fishing, conflicts with industrial fisheries, and high levels of post-harvest fisheries losses (PHFLs).

Post-harvest fisheries losses are of great concern because they equate to a loss of valuable animal protein for consumers and lost income for fishers, processors and traders. Reducing losses is therefore an important development goal in the fisheries sector. Figure 1 summarizes the PHFL problem.

FIGURE 1
Key issues associated with post-harvest fish losses



However, reducing PHFLs in SSFs is not straightforward owing to the multiplicity of species, fishing gear and methods, as well as numerous dispersed and inaccessible landing sites. The complexity is compounded by a diversity of products, long or fragmented fish distribution systems and the involvement of many different types of stakeholder socio-economic factors related to poverty, skills and knowledge, access to services, culture and traditions.

This manual describes three fish loss assessment methods: the Informal Fish Loss Assessment Method (IFLAM), Load Tracking (LT) and the Questionnaire Loss Assessment Method (QLAM). These methods have been developed through fieldwork over the past two decades. They have been used in the Gambia, Ghana, Kenya, Malawi, Mali, Nigeria, Senegal, Uganda and United Republic of Tanzania in Africa as well as in several Asian countries. These methods are seen as practical ways of investigating, understanding and measuring fish loss. They help identify significant losses affecting SSF operators and set the scene for interventions to reduce these. This manual is an output of the FAO Regional Programme in Post-harvest Loss Assessment in Africa. Annex 1 contains a list of those involved in the programme.

This manual provides practical guidelines on how loss assessment can be conducted to better understand and address the PHFL problem. The assessment methods will help identify different types of PHFLs, the causes of the losses, the magnitude of key losses and who is affected, where and how. The information from the assessments can help policy-planners and decision-makers understand important issues facing fishing communities and how these can be addressed.

The manual consists of chapters focused on:

- understanding fish losses;
- planning an assessment;
- using the IFLAM;
- using LT;
- using the QLAM;
- report writing and communication;
- intervention.

The manual will be of interest to anyone involved in fisheries technology and development, field research, data analysis and reporting as well as participatory approaches to development. Sources of further information on fish losses and fish loss assessment are provided at the end of the main text.

2. What are post-harvest fish losses?

WHAT DOES "POST-HARVEST FISH LOSS" MEAN?

This chapter introduces the main types of PHFLs encountered in SSFs and the main causes of these losses. Generally speaking, PHFL refers to fish that is either discarded or sold at a relatively low price because of quality deterioration or owing to market dynamics. This means that fish operators (fishers, processors, traders, and other stakeholders involved in ancillary operations) lose potential income. It also means that less fish is available to consumers, or that consumers are supplied with low-quality fish and fish products (Figure 2). There are also important negative implications for food security.

Post-harvest fish losses are often caused by biochemical and microbiological spoilage changes that occur in fish after death. A live fish has natural defence mechanisms that help to prevent spoilage. However, once a fish dies, its defence mechanisms stop and enzymatic, oxidative and microbiological spoilage begins to cause quality deterioration.

Several factors tend to influence the rate of spoilage of fresh fish:

- **Time** between death and final use or consumption (Figure 3): Even if fish are chilled using ice, they will gradually spoil over time; processed fish quality also deteriorates over time.
- **Temperature abuse:** High ambient temperatures, such as 20 °C, create favourable conditions for fish spoilage. Low temperatures, such as 5 °C and below, slow the action of bacteria and the rate of spoilage, helping to reduce losses.
- **Handling practices**: Poor handling practices lead to sustained and increased microbial contamination, hastening the spoilage rate of fish. Such practices include: using dirty canoes, equipment, fish boxes and baskets; not washing fish; washing fish in dirty water; placing fish on dirty surfaces; and physically damaging fish by throwing or standing on them.

Besides spoilage, PHFLs are caused by:

- discarding of bycatch at sea because fish is too small or not valuable enough to land for sale;
- poor processing techniques damaging fish;
- animal predation and insect infestation;
- inadequate packaging and storage practices leading to damage of the end product;

- market dynamics, especially fluctuations in demand and supply of fish and fish products, affect price and therefore income.

FIGURE 2
Delays in hauling nets result in poor-quality fish and thus quality loss

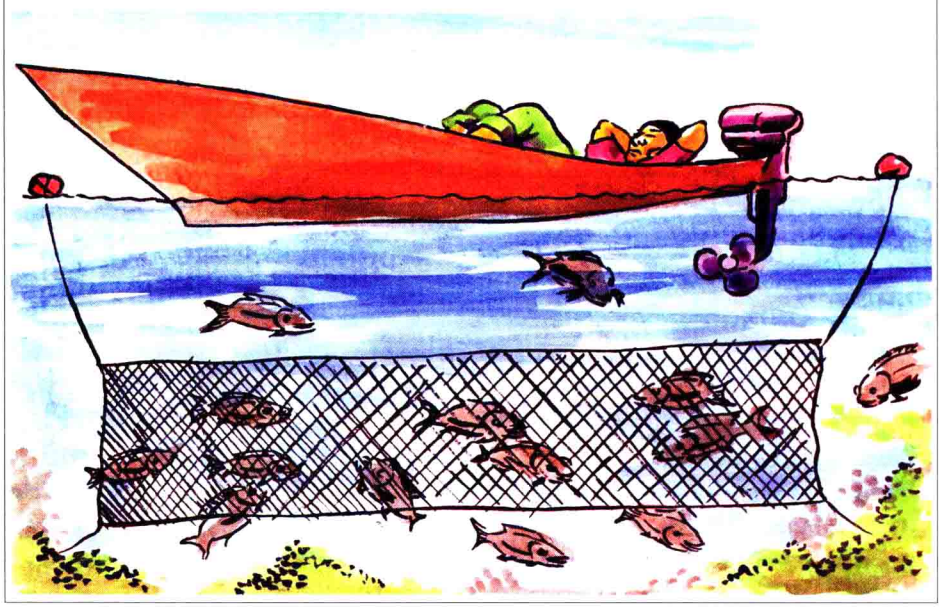
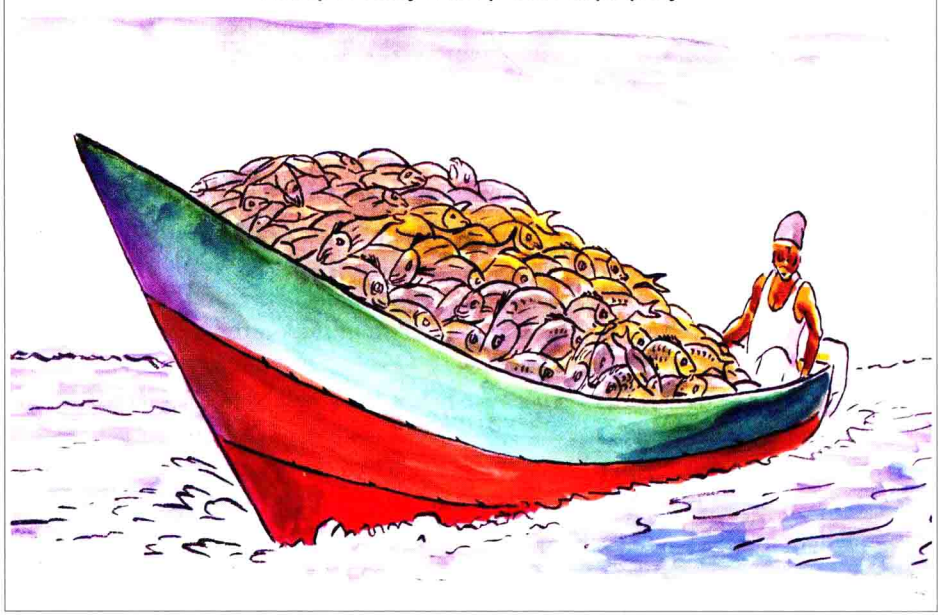


FIGURE 3
Fish spoil easily if not preserved properly



MAIN TYPES OF LOSSES COVERED IN THIS MANUAL

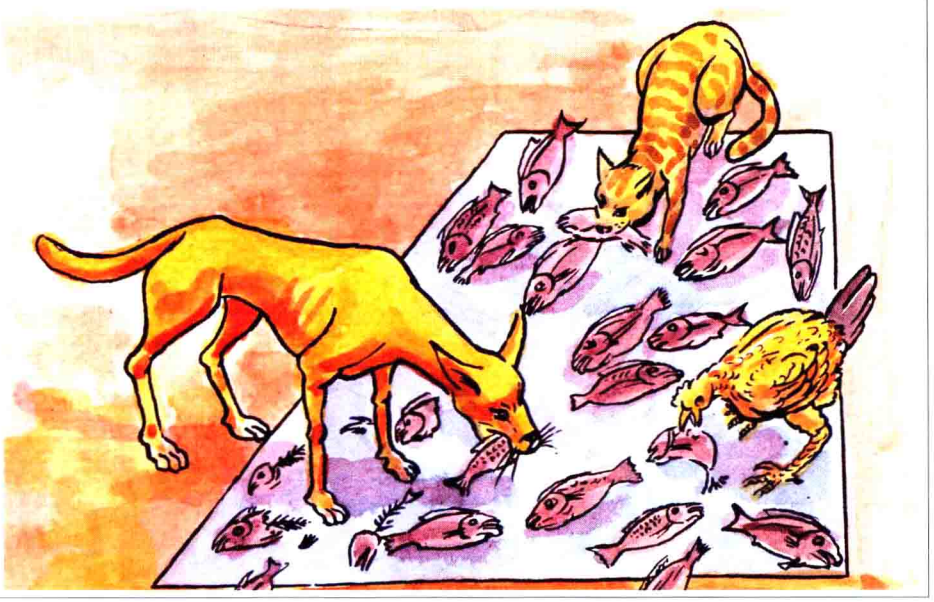
There are three types of loss considered in this guide that affect SSF stakeholders:

- physical loss;
- quality loss;
- market force loss.

Physical loss

Physical fish loss refers to fish that, after capture or landing, is not used. It is either thrown away accidentally, voluntary or as authorized. Physical loss can be caused by theft, by insects eating the fish, or by bird or animal predation (Figures 4 and 5).

FIGURE 4
Animal predation causes fish loss



Examples

- Fish have spent many hours caught in the fishing gear (Figure 2). The fish have been dead in the water and have begun to spoil. By the time the fishing gear is hauled into the canoe, the fish have become too spoiled to fetch a good price and market and are not worth landing, and, therefore, they are thrown away at sea.
- In many tropical countries, small-sized fish such as sardine and anchovy are sun dried in the open air before being packed and distributed. When catches are high, e.g. during the rainy season, the fish cannot be dried properly and spoil. Severe spoilage means that the fish are often thrown away.

- Fishing for high-value species such as shrimp is often associated with high levels of bycatch. In some fisheries, most bycatch is discarded at sea as it consists of low-value, small fish that are not worth landing.

FIGURE 5
Physical losses can occur during transportation

Quality loss

Quality loss refers to fish that has undergone changes owing to spoilage or physical damage and has suffered quality deterioration (Figure 6). Such fish is sold for a lower price than that which would have been achieved if the fish were of "best quality". This is the most common PHFL in many areas.

Examples

- Poor transport as well as inadequate market information result in operators storing their fish and fish products for long periods. In the process, spoilage occurs and the quality of fish is degraded, leading to low selling prices.
- Some fresh-fish traders do not use ice. They buy fresh tilapia early in the morning and struggle to sell the bulk during the day. The fish is exposed to high ambient temperatures and sold for about US$1 per kilogram in the morning, and the price gradually declines during the course of the day to less than US$0.5 per kilogram in the evening (Figures 7 and 8). Any leftover fish at the end of the day has to be sold for less than US$0.2 per kilogram to traditional fish processors. Given the situation, most customers wait until evening, when a fish seller is desperate for buyers as the quality is degrading

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