

Post-harvest fish losses in small-scale fisheries: Operator's manual for reducing post-harvest losses to increase income



Illustrations and graphic design were done by Mr Yohane Mwenda and Mr Wilbert Lyamba respectively of Gaba Africa Limited, Dar es Salaam, United Republic of Tanzania. Coordination of this publication was done by Gloria Loriente at FAO, Rome, Italy.

Post-harvest fish losses in small-scale fisheries:

Operator's manual for reducing post-harvest losses to increase income

by

Yahya I. Mgawe

Head of Fisheries Research and Training Section
Ministry of Livestock and Fisheries Development
Dar es Salaam, United Republic of Tanzania

and

Yvette Diei-Ouadi

Fishery Industry Officer
Products, Trade and Marketing Service
Fisheries and Aquaculture Policy and Economics Division
FAO Fisheries and Aquaculture Department
Rome, Italy

FOOD AND AGRICULTURE ORGANIZATION OF THE UNITED NATIONS

Rome, 2011

The designations employed and the presentation of material in this information product do not imply the expression of any opinion whatsoever on the part of the Food and Agriculture Organization of the United Nations (FAO) concerning the legal or development status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. The mention of specific companies or products of manufacturers, whether or not these have been patented, does not imply that these have been endorsed or recommended by FAO in preference to others of a similar nature that are not mentioned.

ISBN 978-92-5-106879-3

All rights reserved. FAO encourages reproduction and dissemination of material in this information product. Non-commercial uses will be authorized free of charge, upon request. Reproduction for resale or other commercial purposes, including educational purposes, may incur fees. Applications for permission to reproduce or disseminate FAO copyright materials, and all queries concerning rights and licences, should be addressed by e-mail to copyright@fao.org or to the Chief, Publishing Policy and Support Branch, Office of Knowledge Exchange, Research and Extension, FAO, Viale delle Terme di Caracalla, 00153 Rome, Italy.

© FAO 2011

About this document

Post-harvest fish loss is one of the major challenges facing many small-scale fishers in developing countries. Bad fishing methods, poor fish handling and processing practices as well as ineffective means of preservation and marketing cause huge losses in terms of physical, quality and market force losses.

The post-harvest fish loss experience presented in this manual was gained through loss assessment studies carried out in five sub-Saharan African countries (Ghana, Kenya, Mali, United Republic of Tanzania and Uganda).

These studies were conducted within the framework of the regional post-harvest loss assessment (PHLA) programme in small-scale fisheries in Africa, a Food and Agriculture Organization of the United Nations (FAO) regular programme activity, to improve the utilization, safety and quality of fishery products.

Mgawe, Y.; Diei-Ouadi, Y..

Post-harvest fish losses in small-scale fisheries: Operator's manual for reducing post-harvest losses to increase income.
Rome, FAO 2011. 22p.

Contents

	page
About this document.....	iii
Introduction	vii
Realizing how post-harvest losses can affect the business.....	1
Secure greater post-harvest benefits.....	2
Post-harvest fish losses	4
Types of fish losses	5
Outline of the chain.....	6
Losses during fishing.....	7
Losses from fishing ground to landing site.....	8
Losses at landing site	9
Losses during transportation.....	10
Losses during processing.....	11
Losses during packaging and storage of cured fish.....	13
Losses during marketing.....	14
Summary.....	16
Conclusion	19
Examples of calculation.....	20

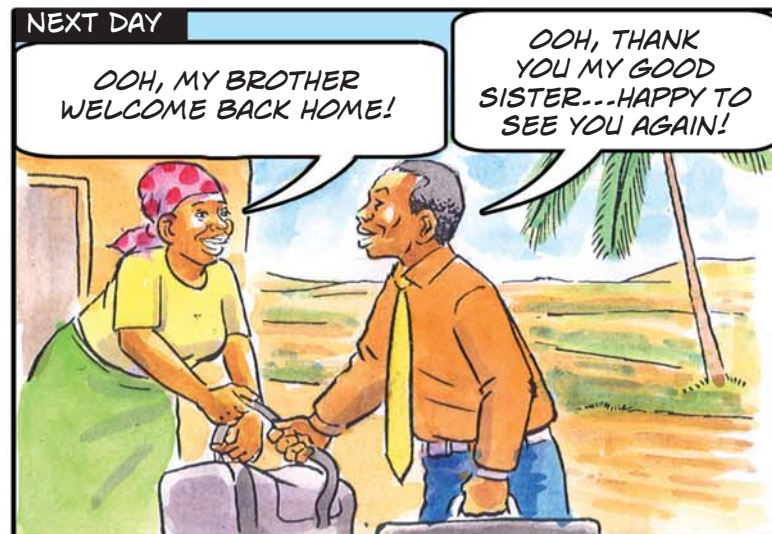
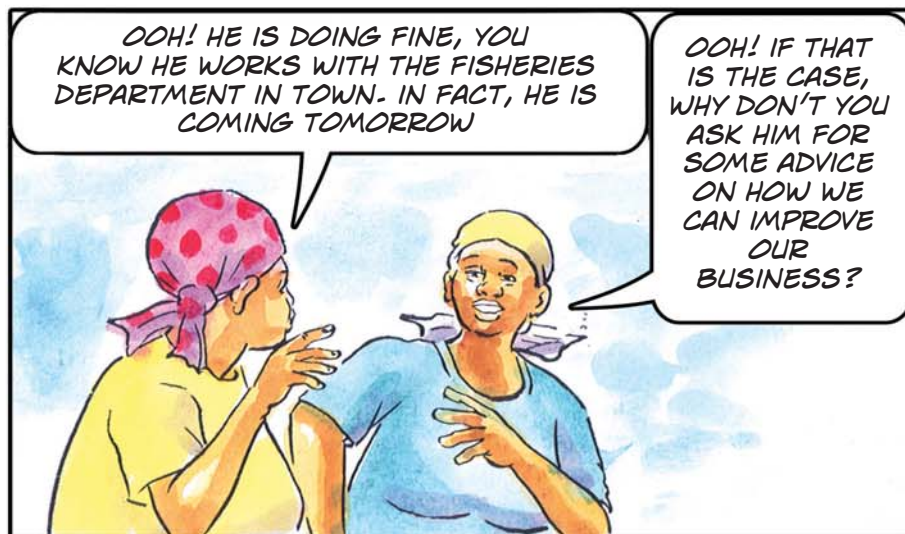
Introduction

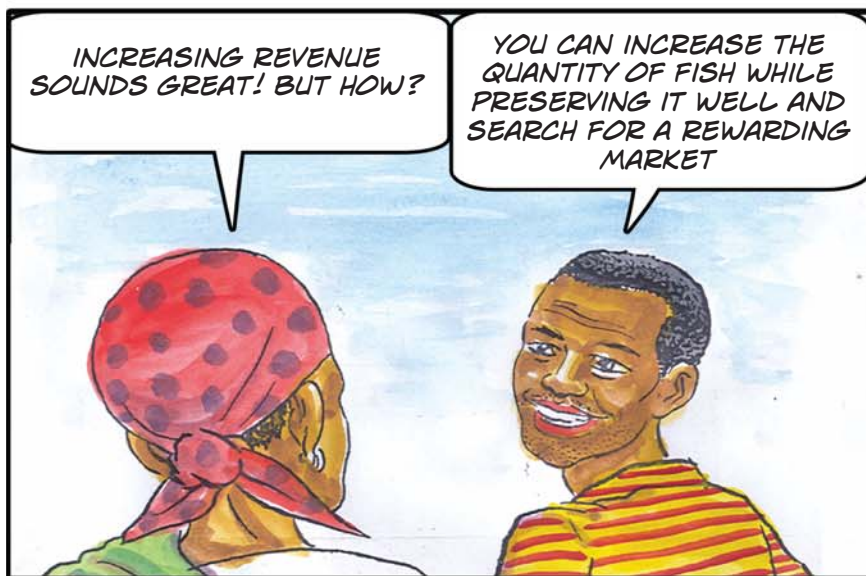
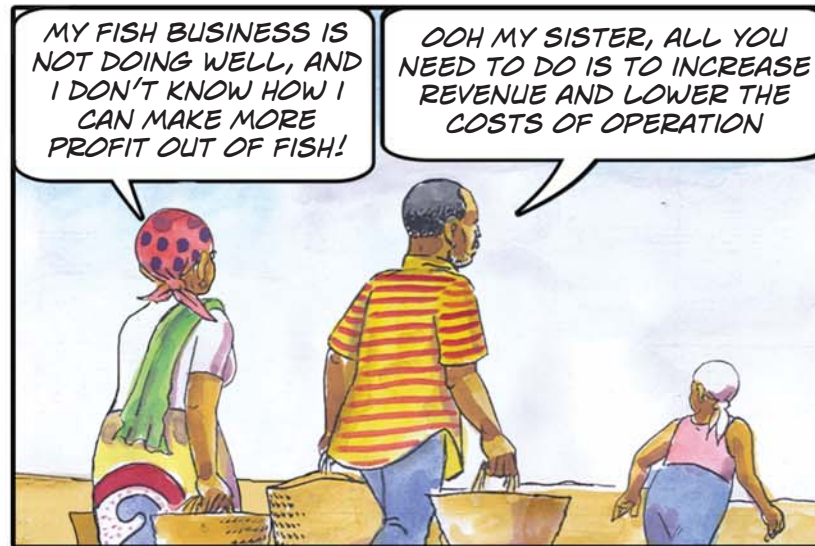
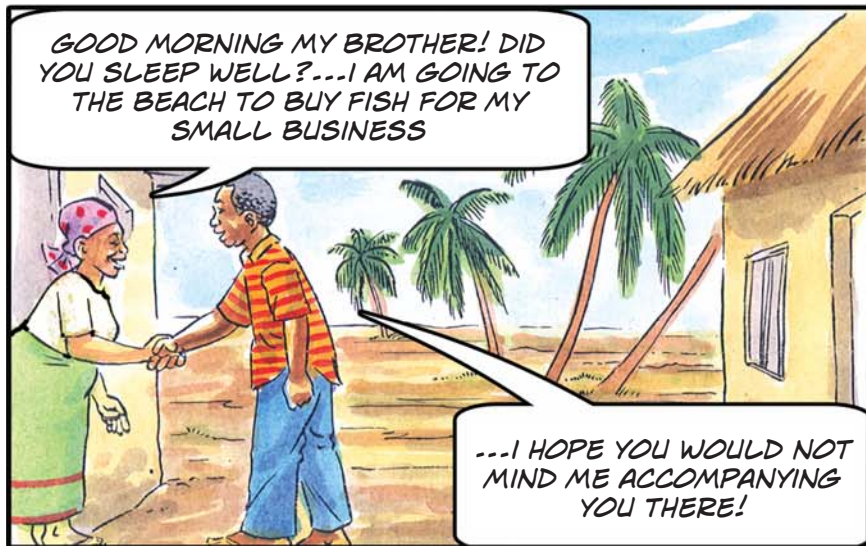
As you know, fish can spoil quickly if you do not take great care as soon as you catch or purchase it. This causes what is called post-harvest losses, which are not only a serious threat to your income but also to the quality of food provided to consumers.

There are several circumstances under which these losses occur. It is important that you have a better understanding of them, of how big these losses are and how you can handle and preserve your fish in order to increase your income while improving the quality of fish supplied to consumers.

This manual has been prepared for fishers, fish processors and traders to understand possible causes of post-harvest fish losses and how these can be assessed and reduced. It has been designed based on experience drawn from the post-harvest operations in your field.

REALIZING HOW POST-HARVEST LOSSES CAN AFFECT THE BUSINESS





ALSO YOU ARE RIGHT! I HEAR THE PRICE OF FISH IN DISTANT MARKETS IS GOOD, BUT I CAN'T AFFORD TO GO THERE!



ANY OTHER IDEAS ON HOW I CAN INCREASE REVENUE?



YES, MY GOOD SISTER! YOU CAN DO IT BY REDUCING POST-HARVEST FISH LOSSES; THE AMOUNT YOU LOSE IN THE PROCESS





TYPES OF FISH LOSSES

GENERALLY, THERE ARE THREE TYPES OF FISH LOSSES: PHYSICAL LOSS, QUALITY LOSS AND MARKET FORCE LOSS



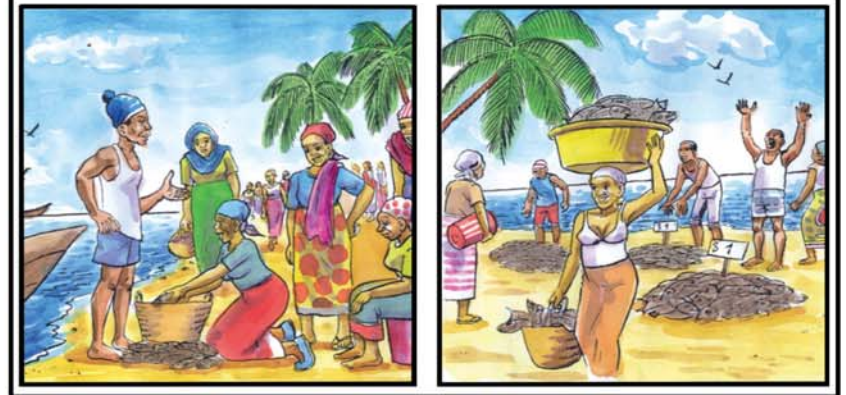
PHYSICAL LOSS IS FISH THAT IS THROWN AWAY OR CONSUMED BY ANIMALS OR BURNED DURING SMOKING. MULTIPLY THE WEIGHT OF FISH LOST BY THE MARKET PRICE TO KNOW THE LOSS TO YOU IN TERMS OF MONEY.



QUALITY LOSS IS THE DIFFERENCE BETWEEN THE POTENTIAL VALUE OF BEST QUALITY FISH OR FISH PRODUCT AND THE PRICE WHEN ITS QUALITY IS DOWNGRADED. IT HAPPENS BECAUSE OF MISHANDLING, LACK OF ICE AND INADEQUATE PROCESSING AND PRESERVATION OF FISH. FOR INSTANCE, WHEN YOU DELAY IN PROCESSING FISH THAT IS NOT ICED, THE QUALITY OF THE FINAL PRODUCT WILL BE



MARKET FORCE LOSS HAPPENS BECAUSE OF CHANGES IN SUPPLY AND DEMAND OF FISH. YOU MUST WATCH MARKET TRENDS TO AVOID LOSSES. THIS CAN HAPPEN DURING BUMPER SEASONS ESPECIALLY WHEN YOU DO NOT TARGET OTHER ALTERNATIVE MARKETS.

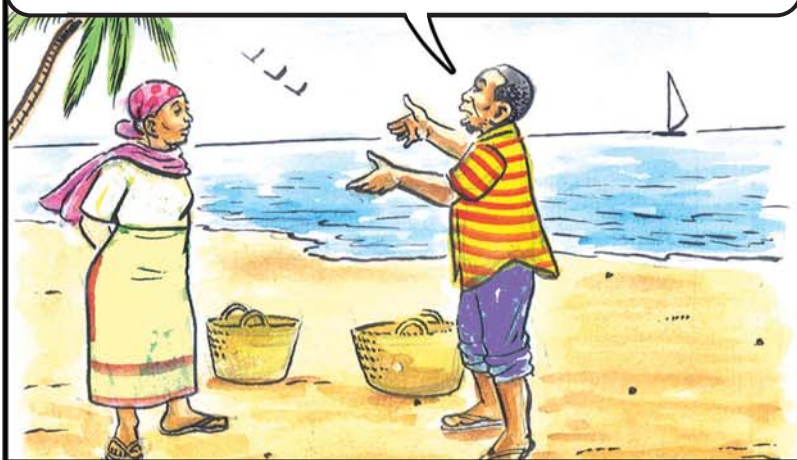


OUTLINE OF THE CHAIN

MY SISTER! AS A MATTER OF FACT, FISH SPOILAGE AND LOSSES BEGIN IMMEDIATELY AFTER THE FISH HAS BEEN CAUGHT AND CONTINUE ALL ALONG THE CHAIN IF NECESSARY MEASURES ARE NOT TAKEN ON TIME. THEREFORE BE CAUTIOUS WHEN BUYING YOUR FISH. ALWAYS SELECT THE GOOD ONES.



LET ME OUTLINE THE CHAIN AND I WILL EXPLAIN HOW LOSSES OCCUR AT EACH STAGE.



A CHAIN OF POST-HARVEST FISH LOSSES

LOSSES DURING FISHING

LOSSES FROM FISHING GROUND TO THE LANDING SITE

LOSSES AT THE LANDING SITE/SALES OF FRESH FISH

LOSSES DURING TRANSPORTATION OF FISH

LOSSES DURING

LOSSES DURING PACKAGING AND STORAGE

LOSSES DURING MARKETING

LOSSES DURING FISHING

SOME FISHING METHODS CAUSE QUICK SPOILAGE OF FISH...OTHER METHODS CAN EVEN DESTROY FISH HABITATS, REDUCING FISH CATCHES AND SUSTAINABILITY OF RESOURCES.



DELAYS IN PULLING IN NETS ALLOW FISH CAUGHT IN THE FIRST HOURS TO SPOIL AND CAUSE LOSSES. FISHERS SHOULD NOT LEAVE THE NETS IN THE WATER TOO LONG!



SIMILARLY, DYNAMITE FISHERS AND THOSE USING OTHER BAD METHODS LAND FISH THAT HAVE BEEN DAMAGED. THIS CAUSES HIGH LOSSES TO FISH OPERATORS WHO BUY THEM FOR SELLING OR PROCESSING.



PEOPLE WHO USE TOXIC MATERIAL CATCH SPOILED FISH WHOSE QUALITY HAS ALREADY GONE BAD. SUCH FISH WILL CAUSE YOU A LOSS AND ALSO BE HARMFUL TO CONSUMERS.



LOSSES FROM FISHING GROUND TO LANDING SITE

EVEN IF FISHERS CATCH A LOT OF FISH, THEY NEED TO PRESERVE IT RIGHT FROM THE TIME IT IS CAUGHT.

IF THEY DON'T USE ICE OR INSULATED CONTAINERS, OR IF THEY TREAD ON FISH, THEY WILL CAUSE SPOILAGE AND/OR PHYSICAL DAMAGE. THAT MEANS QUALITY AND PHYSICAL LOSSES.



FAILURE TO USE ICE LEADS TO A HIGH SPOILAGE RATE, SO FISH WILL FETCH A LOW PRICE.

FISH SHOULD BE GUTTED IF POSSIBLE, KEPT WITH ICE IN GOOD INSULATED CONTAINERS AND REACH THE LANDING SITE QUICKLY.

FISH HANDLED PROPERLY MAY BE SOLD IN A SHORT TIME AT A GOOD PRICE. ALSO, IT CAN BE EVEN SENT TO OTHER MARKETS WHERE THE PRICE IS HIGHER.

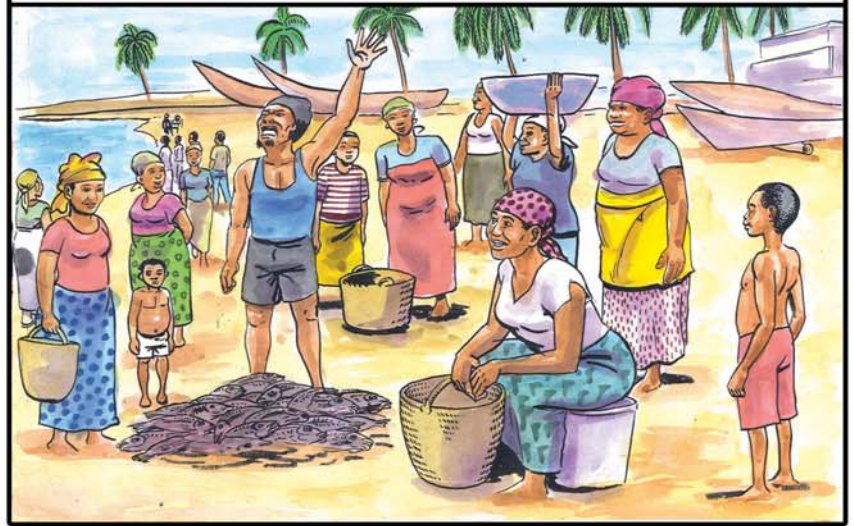


LOSSES AT LANDING SITE

WASHING FISH IN BEACH WATER AND KEEPING IT IN THE DIRECT SUN ON DIRTY GROUND, WILL CAUSE QUALITY LOSS, REDUCING POTENTIAL INCOME.



TAKING A LONG TIME BARGAINING WHILE THE FISH CONTINUE TO SPOIL RESULTS IN FISH FETCHING A LOW PRICE.



NO MATTER HOW HARD YOU SHOUT, FAILURE TO USE ICE AND INSULATED CONTAINERS, COMBINED WITH LONGER BARGAINING TIME, WILL MAKE THE FISH SPOIL FASTER, LOWERING ITS VALUE.



THE USE OF ICE AND A SIMPLE INSULATED CONTAINER CAN MAKE A BIG DIFFERENCE IN REDUCING QUALITY LOSS AND SAVE HUGE AMOUNT OF MONEY.



IT IS THE QUALITY THAT DETERMINES THE FISH PRICE AT THE END OF A DAY.



TRANSPORT CANOES CAN CAPSIZE, CAUSING LOSS OF HUMAN LIFE AND POST-HARVEST FISH LOSS.



HEAD CARRYING FRESH FISH OR USING BICYCLES COULD LEAD TO RAPID SPOILAGE DUE TO HIGH TEMPERATURE AND DELAYS.



PUSHCART AND OPEN PICK-UP, IF NOT COVERED, WILL LEAD TO CONTAMINATION AS WELL AS SPOILAGE DUE TO HIGH TEMPERATURE.



TRANSPORTATION OF FISH IN AN OPEN CANOE IS NOT RECOMMENDED, HIGH TEMPERATURES WILL MAKE FISH SPOIL QUICKLY. USE INSULATED CONTAINERS WITH ICE FOR GOOD QUALITY FISH AND SAFE TRANSPORTATION.



THE USE OF INSULATED BOXES FOR FRESH FISH OR CRATES FOR CURED FISH COULD REDUCE LOSSES, ESPECIALLY WHEN TRANSPORTING FISH IN AN INSULATED OR WELL-COVERED TRUCK.



OVERLOADING TRUCKS INCREASES LOSSES DUE TO FRAGMENTATION OF CURED FISH AND SOMETIMES BREAKDOWNS SUBJECTING FISH TO DELAY AND SPOILAGE.



LOSSES DURING PROCESSING

REMOVE THE GUT CONTENT, WHICH HARBOURS PLENTY OF SPOILAGE MICROBES.



SPLIT THE FISH TO DRY QUICKLY.



WASH IT BY USING CLEAN WATER BEFORE STARTING THE PROCESSING.



SALTING BINS MUST BE COVERED PROPERLY, OTHERWISE BLOWFLY INFESTATION CAN CAUSE HIGH LOSSES DURING WET SALTING.



SUNDRYING FISH ON SANDY GROUND CONTAMINATES FISH AND DELAYS THE DRYING PROCESS, CAUSING HIGH LOSSES. AGAIN, LOSSES ARE VERY HIGH WHEN IT RAINS!



ANIMAL PREDATION AND BLOWFLY INFESTATION CAUSE LOSSES WITH SERIOUS FINANCIAL IMPLICATIONS.



DRYING FISH ON RAISED RACKS IS BETTER. THERE ARE VARIOUS WAYS TO SCARE BIRDS AWAY, TRY USING THEM.



LOSSES DURING PROCESSING

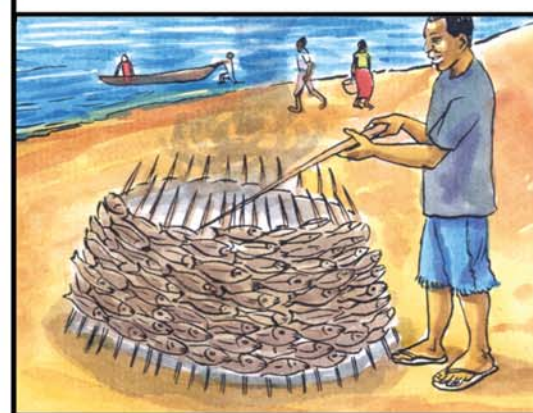
THE DRUM OVEN USES LARGE AMOUNTS OF FUELWOOD. HIGH PRODUCTION COST AND POOR QUALITY PRODUCT.



CYLINDRICAL MUD OVEN USES LARGE AMOUNT OF FUELWOOD TO SMOKE A LIMITED AMOUNT OF FISH AT A TIME.



BARBEQUE METHOD PROCESSES VERY SMALL AMOUNTS OF FISH AT A TIME. HIGH FUEL CONSUMPTION AND TIME-CONSUMING.



FISH SMOKING ON OPEN RACKS TAKES A LONG TIME AND PRODUCES POOR QUALITY PRODUCT.



THE CHORKOR OVEN CAN REDUCE LOSSES AS IT PRODUCES GOOD QUALITY PRODUCT, FUEL CONSUMPTION IS LOW AND YOU NEED A SHORT TIME TO SMOKE A LARGE AMOUNT OF FISH COMPARED WITH OTHER METHODS!

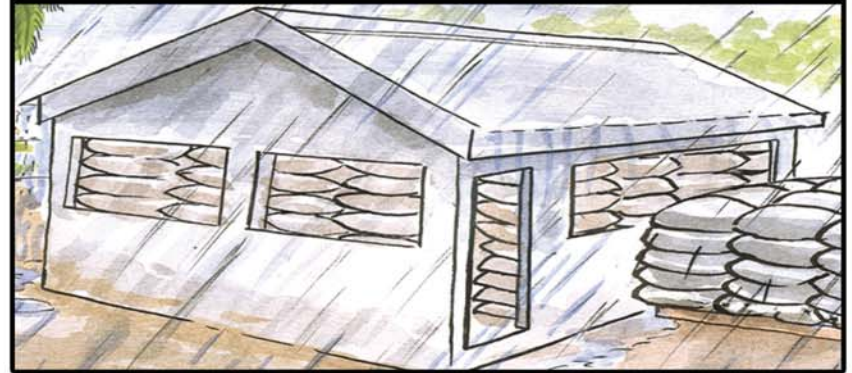


LOSSES DURING PACKAGING AND STORAGE OF CURED FISH

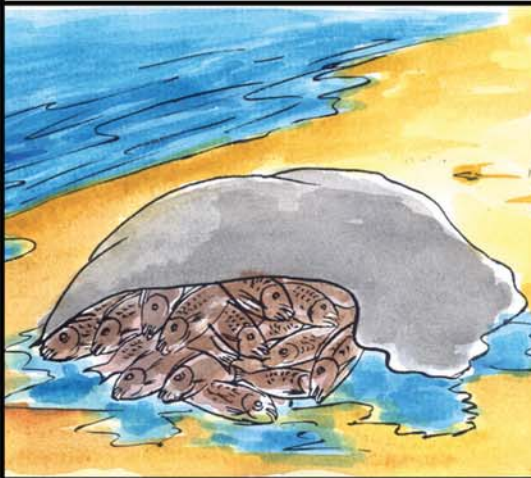
OVERLOADING THE PACKAGE IN AN EFFORT TO REDUCE TRANSPORTATION COST MAY CAUSE PHYSICAL DAMAGE-FRAGMENTATION ENDING UP WITH PRODUCTS FETCHING A LOW PRICE - LOSS!



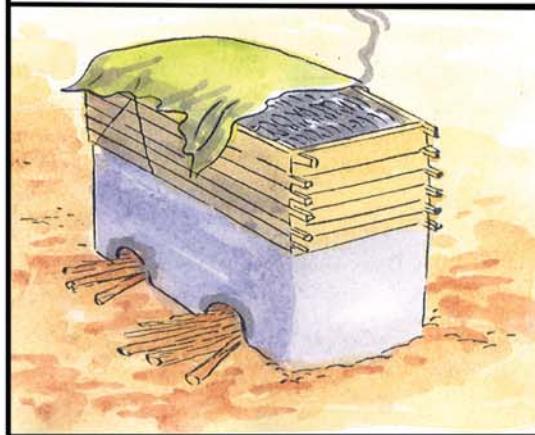
CURED PRODUCTS SHOULD BE STORED IN A WELL-VENTILATED, WELL-CONSTRUCTED AND SECURED WAREHOUSE. OTHERWISE, HUMIDITY, ANIMAL PREDATION, THEFT OR RAIN MAY CAUSE PHYSICAL AND QUALITY LOSSES.



COVERING THE FISH ON BARE GROUND WILL NOT HELP!



PUTTING FISH IN TRAYS ON TOP OF A CHORKOR OVEN WITH REGULAR RE-DRYING OR RE-SMOKING IS BETTER.

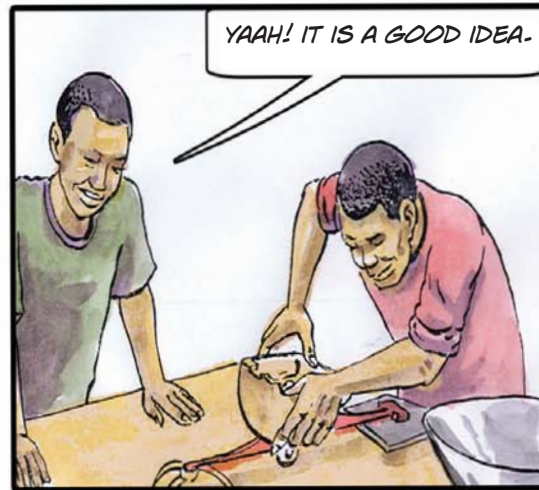
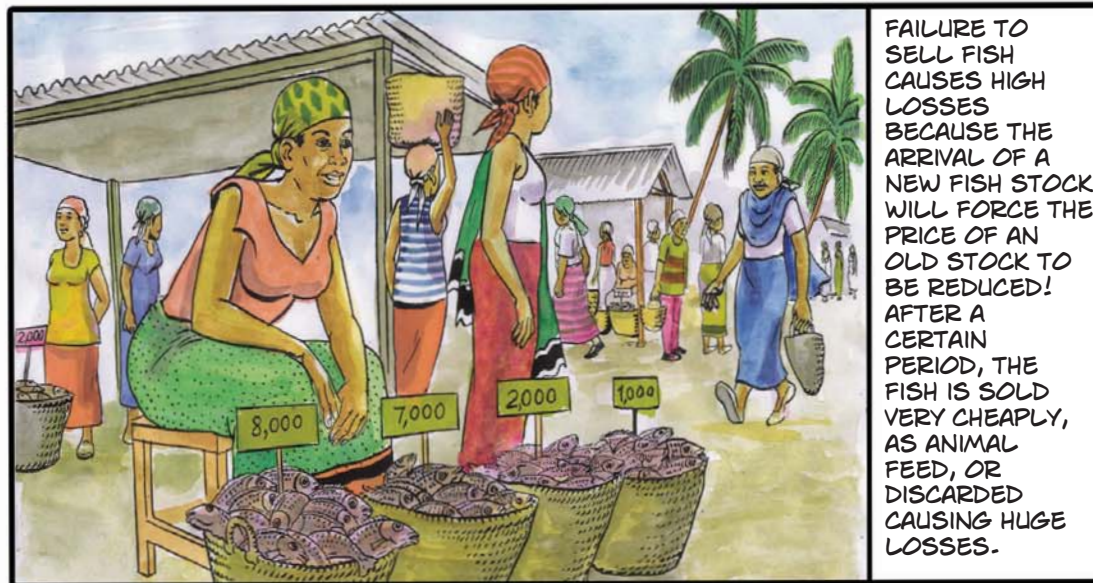


SOME FISH OPERATORS FUMIGATE THE STORED PRODUCTS TO REDUCE LOSSES. HOWEVER, THIS CAN ADULTERATE THE FISH AND MAKE IT TOXIC FOR HUMAN CONSUMPTION IF THE PRODUCTS ARE NOT AUTHORIZED.



ALL TYPES OF LOSSES OCCUR AT THIS STAGE DUE TO:

1. DELAY IN SELLING A CONSIGNMENT OF FISH.
2. OVERSUPPLYING THE MARKET - ASSOCIATED WITH LACK OF MARKET INFORMATION.
3. MARKETING MALPRACTICES.





LACK OF ENTREPRENEURSHIP SKILLS IS ANOTHER PROBLEM THAT CAN CAUSE LOSSES.

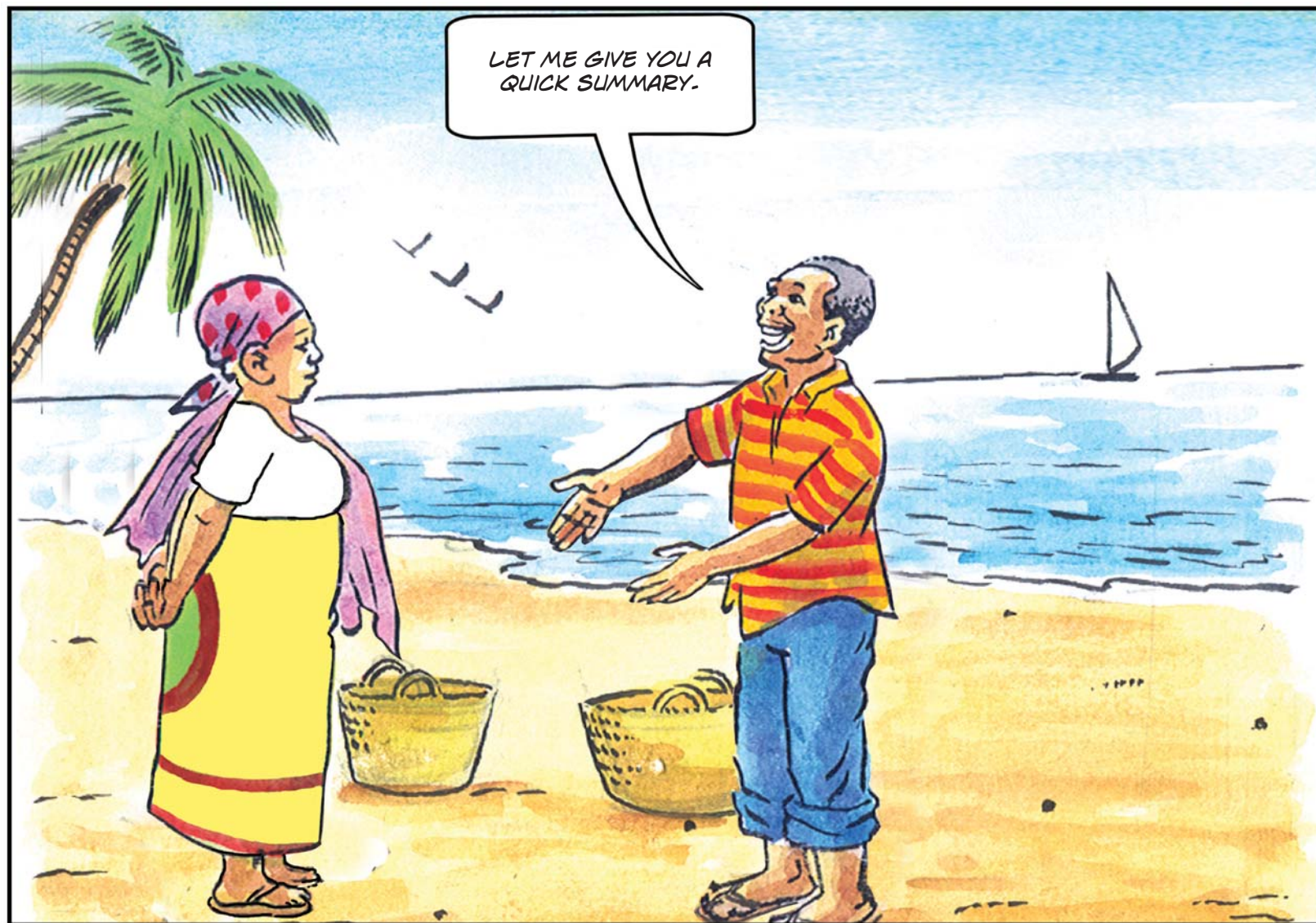
A WOMAN SELLING SMOKED FISH, BOUGHT 17 BASKETS OF FRESH FISH FOR PROCESSING. SHE PAID US\$ 6 FOR THE FRESH AND SOLD THE FINAL PRODUCT AT US\$ 8, BELIEVING SHE HAD MADE A PROFIT.



UNFORTUNATELY, SHE DID NOT ADD-UP ALL THE COSTS PROPERLY: LABOUR (US\$ 0.2), SALT (US\$ 0.3), FUELWOOD (US\$ 0.6), AND FOOD FOR LABOURERS (US\$ 1.0). THE SUM OF THE FOUR ITEMS IS US\$ 2.1, REFLECTING A FINANCIAL LOSS OF US\$ 0.1 TO A POOR LADY.



OH MOTHER, WHAT HAVE YOU DONE? IT IS A LOSS!



OPERATOR	HOW SHE/HE LOSES	HOW TO REDUCE THE LOSSES
Fisher	<p>Bringing spoiled fish because of failure to use ice, keep fish in insulated container or bring fish quickly.</p> <ul style="list-style-type: none"> • Damage due to fishing method. • Poor quality fish because of unsuitable fishing method. 	<ul style="list-style-type: none"> • Use authorized fishing methods. • Go fishing with enough ice and insulated containers for the trip. • Do not set nets or gear in the water for long periods of time. • Pack fish in an insulated container with enough ice as soon as it is caught. • Use good quality ice and use good icing practice. • Don't delay getting back to landing site after fishing. • Don't leave fish exposed to the sun. • Handle the fish with care and don't throw or drop the fish. • Prevent the fish from being contaminated with dirt, fuel and any other harmful substances.
Fish monger at the beach	<ul style="list-style-type: none"> • Buying already poor quality fish from fisher. • Not using ice. • Taking a long time bargaining while the fish continue to spoil. As a result, it fetches a low price. 	<ul style="list-style-type: none"> • Unload the fish from the canoe quickly. • Carry and keep the fish in clean containers. • Keep the fish chilled at all times if possible. • Don't place the fish directly on the bare ground (to avoid contamination). • Keep the fish shaded from the sun. • Sell the fish quickly to the buyer. Avoid delays in bargaining over the price. • Purchase good quality fish. • Use clean water to wash the fish. Avoid using beach water that may be polluted to wash the fish.

OPERATOR	HOW SHE/HE LOSES	HOW TO REDUCE THE LOSSES
Fish processor	<p>Purchasing fish that has already spoiled. This means the processed product looks bad and the product fetches a low price because processing does not improve quality of a spoiled fish.</p> <ul style="list-style-type: none"> • Delay in processing. • Inadequate processing techniques. • Inadequate packaging. • Not protecting fish from rain, birds, insects, animals. 	<ul style="list-style-type: none"> • Purchase good quality fish for processing. • Prepare the fish quickly for processing. • Wash the fish using clean water to remove any sand and dirt. • Keep or store fish in clean containers and use ice, if possible, when processing is delayed. • Always use improved fish processing techniques that produce good quality products, avoid contamination and attack by animals and pests and reduce processing costs (eg. raised racks for drying, chorkor oven for smoking). • Always handle fresh and processed fish carefully to avoid damage and contamination. • Package processed products using clean and protective material or containers. • Store processed fish in a clean and proper environment free from contamination, vermin and pests.
Fish trader and Retailer	<p>Storing the fish for a long period can degrade quality. Consequently, fish fetches a low price. Failure to seek other markets, ending up oversupplying the same market.</p> <ul style="list-style-type: none"> • Changes in demand and supply. • Unreliable transport facilities. • Lack of knowledge of markets and prices. 	<ul style="list-style-type: none"> • Make sure the fish is transported using clean and proper containers as quickly as possible from the market or landing site. • Make sure your selling place is clean and provides protection for the fish from all weather (eg. sun and rain). • Protect the fish from insects. • Use ice to keep fresh fish chilled. • Monitor market trends and prices so you can buy and sell at the best prices. Mobile phone is a good way to get prices from different places.

NOTE:

TO ASSESS PHYSICAL LOSS:

WEIGH THE AMOUNT OF FISH LEFT AFTER ANIMAL/INSECT PREDATION (OR WHAT HAS BEEN DISCARDED). YOU SUBTRACT FROM THE WEIGHT OF THE INITIAL PURCHASE TO HAVE THE AMOUNT OF FISH LOST.

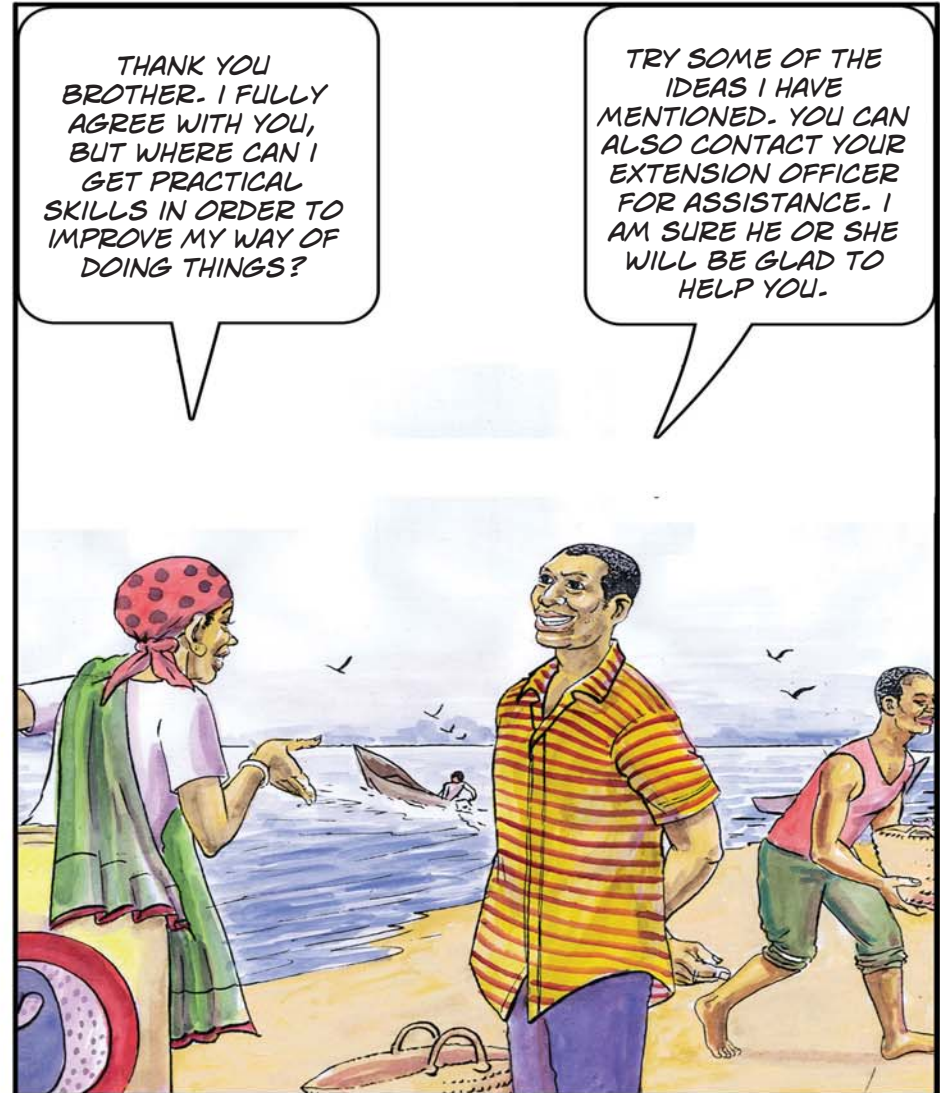
THIS DIFFERENCE IS THEN MULTIPLIED BY MARKET PRICE TO HAVE THE MONETARY VALUE OF THE FISH LOST (MONEY BEING LOST).

TO ASSESS QUALITY LOSS:

DETERMINE THE QUANTITY OF FISH BEING SOLD AT A REDUCED PRICE AND GET ITS TOTAL VALUE. THEN MULTIPLY THIS SAME QUANTITY OF FISH BY MARKET PRICE FOR GOOD QUALITY FISH. THE DIFFERENCE BETWEEN BOTH VALUES EXPRESSES THE QUALITY LOSS IN MONETARY TERMS.

TO ASSESS MARKET FORCE LOSS:

DETERMINE THE QUANTITY OF FISH BEING SOLD AT REDUCED PRICE AND ITS TOTAL VALUE. THEN MULTIPLY THIS SAME QUANTITY BY MARKET PRICE. THE DIFFERENCE BETWEEN BOTH VALUES EXPRESSES THE MARKET FORCE LOSS IN MONETARY TERMS.



1/ Physical loss

- A fisher brought back 5 containers each with 15 kg of cassava fish inside. During offloading from the canoe, some fish got lost owing to spilling and thefts at this crowded landing site. The fisher later realized at the end of the operation that only 4 and a half containers of fish remained for sale. The physical loss is therefore 5 containers minus 4.5 containers = 0.5 container, equivalent to $0.5 \times 15 \text{ kg} = 7.5 \text{ kg}$ of fish lost. At the time, 1 kg of fresh cassava fish was sold by the fisher to fishmongers at \$ 2. In monetary terms, this means that the fisher incurred during the landing of fish, $7.5 \text{ kg} \times \$ 2 = \$ 15$ worth of losses.
- A fish processor purchased a container of 20 kg of fresh anchovies. She spread these on the bare ground to dry. If there were no losses during drying from birds and animals eating the drying fish and some fish left on the ground, then she would normally expect to get 7.5 kg of dried fish. However, due to these

losses she actually obtained only 6 kg of dried fish. This constitutes a physical loss of $7.5 \text{ kg} - 6 \text{ kg} = 1.5 \text{ kg}$ dry weight (which is about 4 kg of fresh anchovies).

Considering that at this location 1 kg of dried anchovies is sold at \$ 2, if she produced 7.5 kg, she would earn $7.5 \text{ kg} \times \$ 2 = \$ 15$, but she actually received $6 \text{ kg} \times \$ 2 = \$ 12$. So she made a financial loss of $\$ 15 - \$ 12 = \$ 3$. Perhaps if she had protected her fish better during drying, she would not have made this loss and would have gained an extra \$ 3!

2/ Quality loss

- A processor kept in her storage room boxes of smoked fish to be sold during the lean season. Each box contained about 500 kg of fish. Unfortunately, due to poor storage conditions and no regular checks on the quality of the fish during storage, the quality

of some fish suffered because of humidity and insect infestation. Out of 500 kg of fish in a box 95 kg had to be sold at a low price of \$ 3 per kg while the good quality product could be sold for \$ 5.5 kg.

So, the processor incurred a quality loss of 95 kg. If this entire box was sold at the best price of \$ 5.5, it would fetch $(500 \text{ kg} \times \$ 5.5) = \$ 2750$.

However, as some fish were downgraded, the processor received $95 \text{ kg} \times \$ 3 + 405 \text{ kg} \times \$ 5.5 = \$ 285 + \$ 2227.5 = \$ 2512.5$.

If she had looked after her fish better and stored it well and avoided a quality loss then she could have sold all 500kg for \$ 5.5. In which case her income would have been $500 \text{ kg} \times \$ 5.5 = \$ 2750$.

But in reality because of poor storage she lost a potential income of $\$ 2750 - \$ 2512.5 = \$ 237.5$.

So due to quality loss the processor lost \$ 237.5 of income.

- A vehicle breakdown occurred during the transportation of fresh fish to a distant market. The fish was iced before the journey, but not enough ice was used. Then due to the breakdown, the fish was then subjected to high daily temperatures for a long time. Upon arrival at the market, it was found that some fish had spoiled and the quality deteriorated. A woman fish trader who had 100 kg of Tilapia on the vehicle was now unable to sell all her fish at the market price of \$ 5 per kg paid for good quality fish. Instead she had to sell 30 kg for \$ 5/kg, 40 kg for \$ 3.5/kg and 30 kg for \$ 2/kg.

So, her actual income was $30 \text{ kg} \times \$ 5 = \$ 150$ for good quality fish, $40 \text{ kg} \times \$ 3.5 = \$ 140$ for medium quality fish, $30 \text{ kg} \times \$ 2 = \$ 60$ for poor quality fish; $\$ 150 + \$ 140 + \$ 60 = \$ 350$.

If the vehicle had not broken down and the fish

had been iced properly and all had arrived in the market in good condition then the trader would have had a potential income of: $100 \text{ kg} \times \$ 5 = \$ 500$.

So, in this case she made a loss in income of $\$ 500 - \$ 350 = \$ 150$. This was due to $\approx 70 \text{ kg}$ of fish suffering a quality loss.

3/ Market force loss

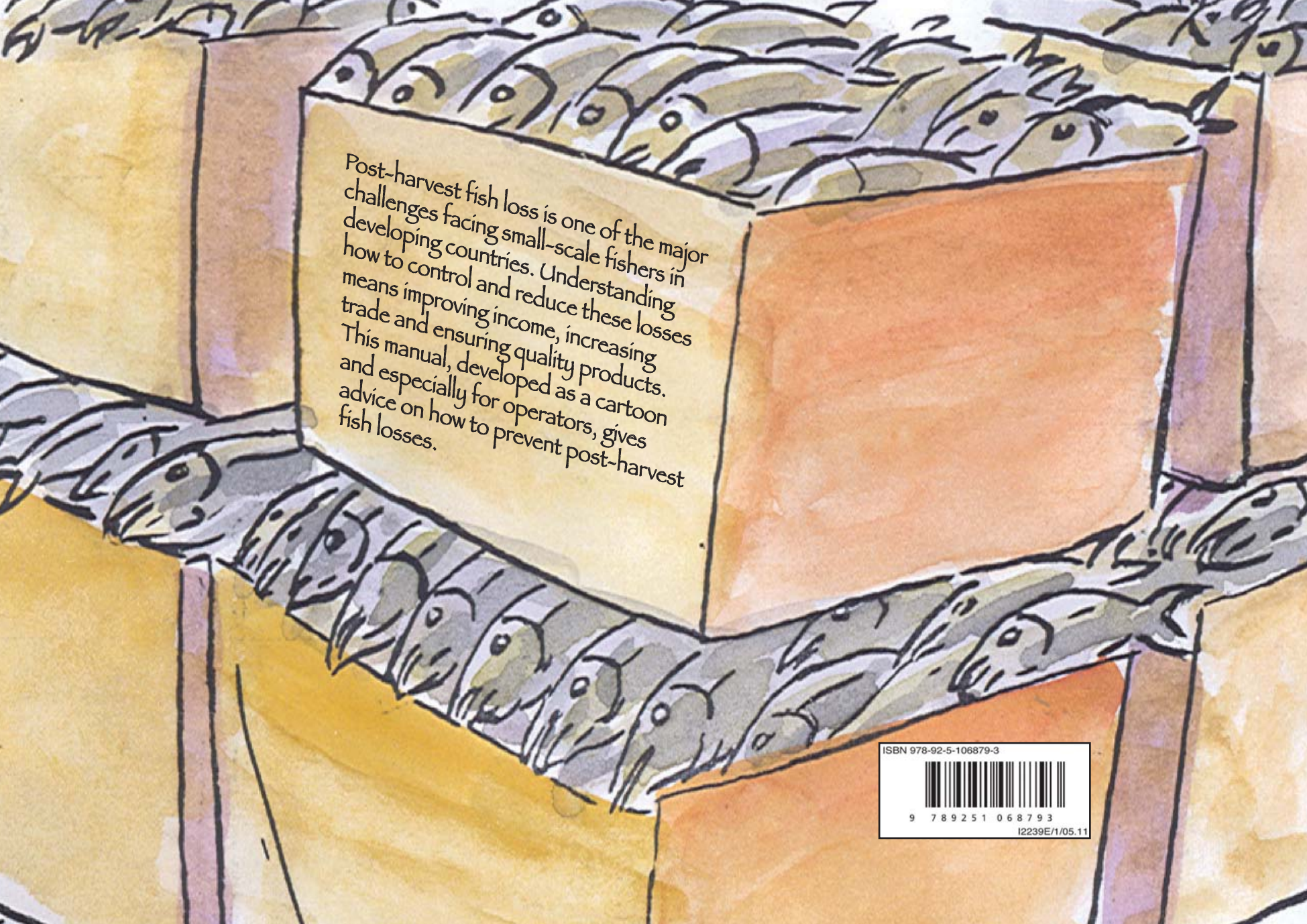
- Wednesday is the weekly market in Buesi city, an occasion for all to buy a diversity of goods, stock up on supplies for household use, especially for fish traders who need to sell their fish and buy other foodstuffs before returning to their village. However, this day is known to be the day when most of the fishmongers and traders of the area bring their stocks of fish products, which can lead to an oversupply of fish on the market.

A fresh fish trader brought a container of 50 kg of fresh fish. She could not sell on that day at the market price she wanted even though the fish was of good quality. She was hoping for $\$ 6/\text{kg}$ but the price on the day had fallen to $\$ 4/\text{kg}$.

To avoid any risk of further losses as time progressed and the fish lost quality and spoiled, she sold all her fish to an intermediary for $\$ 4/\text{kg}$. If she had been able to sell all her fish for $\$ 6/\text{kg}$, then her income would have been $50 \text{ kg} \times \$ 6 = \$ 300$.

However, due to market forces and not quality, she ended up selling for $\$ 4$ per kg $50 \text{ kg} \times \$ 4 = \$ 200$.

So, she made a loss in income of $\$ 100$!



Post-harvest fish loss is one of the major challenges facing small-scale fishers in developing countries. Understanding how to control and reduce these losses means improving income, increasing trade and ensuring quality products. This manual, developed as a cartoon and especially for operators, gives advice on how to prevent post-harvest fish losses.

ISBN 978-92-5-106879-3



9 789251 068793

I2239E/1/05.11