IMM Ltd

DFID's Post-Harvest Fisheries Research

nr international

POST-HARVEST OVERVIEW MANUAL:

Linking the poor to policy in the post-harvest fisheries sector

An output from the DFID-funded PHFRP project R7799

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The Post-Harvest Fisheries Research Programme

The **Post-Harvest Fisheries Research Programme (PHFRP)** is one of ten natural resources research programmes funded by the UK Government's Department for International Development (DFID) and is managed by NR International. The central aim of DFID is to **eliminate poverty** by **improving the livelihoods** of poor people in developing countries. One of the means by which DFID addresses this aim is through its strategy for research in renewable natural resources. The purpose of the strategy is to create benefits for poor people by generating and promoting the use of new knowledge in natural resources management.

Fisheries play an important part in the social and economic lives of vast numbers of people around the world, many of whom are amongst the poorest and most marginalised people in rural communities. In many cases fish harvesting, processing and trade is seen as the employment of last resort when other economic opportunities have run out. There are no accurate figures for the number of people involved in fisheries but it is estimated that, globally, there are tens of millions of people dependent on fisheries for their main source of income for at least some of each year – and this number is rapidly increasing.

The programme **purpose** is a statement of how the programme will contribute to the broader goals of DFID's Research Strategy:

- To produce benefits for poor producers, processors, traders and consumers through the application of new knowledge to the improved utilisation of fish from fisheries in South Asia and East and West Africa.

Two programme **outputs** have been identified to ensure the delivery of this purpose:

- Relevant new knowledge (strategies, management systems, methodologies and tools) developed, which will improve the post-harvest utilisation of fish and which are appropriate to poor producers, processors, traders and consumers

- New knowledge successfully disseminated and promoted to the point where it is taken-up and used by key institutions and other stakeholders within targeted fisheries and wider geographical regions

The **strategy** of the programme is therefore based on the phased implementation of research projects that address the three core elements of the Programme's logframe. These are to:

1. Develop improved methods to assess the magnitude and source of post-harvest losses in capture fisheries and promote their use by key institutions within target fisheries

2. Generate knowledge of the impact on the poor of changes in the utilisation of fish and disseminate this knowledge to key policy makers and stakeholders within target fisheries

3. Develop and promote appropriate value-adding and loss reduction processes and technologies applicable to major poor stakeholder groups in target regions.

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ABBREVIATIONS USED

CCRF	Code of Conduct for Responsible Fisheries
DAC	Development Assistance Committee of OECD
DFID	Department for International Development (UK Government)
FAO	Food and Agriculture Organisation (of the United Nations)
GDP	Gross Domestic Product
IMPEDA	Indian Marine Product Export Development Agency
OECD	Organisation for Economic Cooperation and Development
PHFRP	Post-Harvest Fisheries Research Programme
PHO	Post-Harvest Overview
UNDP	United Nations Development Programme
US	United States
USA	United States of America
WTO	World Trade Organisation

SECTION 1: INTRODUCTION

THE ORIGINS OF THE MANUAL

The Fisheries Post-Harvest Overview Manual has its origins in the early 1990's in South Asia. The UK government funded the post-harvest component of the FAO-implemented Bay of Bengal Programme with the aim of improving the post-harvest utilisation of fish. In order to understand the current situation and the need for possible interventions it was decided that an overview of the sector should be carried out. An overview methodology was subsequently developed by Jock Campbell of IMM in Sri Lanka in 1993, this was further refined in India in 1994 by Jock Campbell and Krishan George, then used by BOBP in Bangladesh in 1995.

This early Post-Harvest Overview (PHO) was quite technically focussed and somewhat simplistic in its structure. It was designed to be progressively developed as more knowledge of the sector became available. However, the tool remained largely unchanged until 2000 when its further development was promoted by the UK Government's Department for International Development (DFID) under its Post-Harvest Fisheries Research Programme (PHFRP) (See box 1).

Box 1: The Post-Harvest Fisheries Research Programme

The Post-Harvest Fisheries Research Programme (PHFRP) is one of three DFID strategic fisheries research programmes. The others carry out research in the areas of aquaculture and genetics, and fisheries management.

The aim of the PHFRP is to produce benefits for poor producers, processors, traders and consumers through the application of new knowledge to the improved utilisation of fish from fisheries in South Asia and East and West Africa.

Its targets for success are that by 2005:

- *The level of post harvest losses have been identified and reduced by 50% in two target fisheries.*
- *The net incomes of poor producers, processors and traders have been sustainably increased in two target fisheries.*
- *Food security amongst poor consumers has been maintained or improved through the availability of affordable fish on local markets.*

The PHFRP commissioned IMM Ltd to carryout a research project on the changes in fish utilisation in India. This research was designed within the poverty reduction framework within which DFID operates. The India Fish Utilisation Project aimed at understanding the changes in the post-harvest sector and the implications of those changes for poor processors, traders and consumers. One element of the research was to take the PHO and develop its structure, content and application to become a practical tool for policy-makers and planners that incorporated an understanding of change within the fisheries sector and the implications of that change for the poor and wider policies.

During 2000 and 2001 the PHO tool was developed, tested and refined and post-harvest overviews were implemented in six coastal states in India. The results of those studies have allowed further development of the PHO tool to the point where it has evolved into a practical manual. The tool is now being generalised for global application and adapted to fit more closely into the Code of Conduct for Responsible Fisheries. The application of this more generalised manual has been tested by Ansen Ward of IMM and Alabi Bortey of the Department of Fisheries Ghana.

Although the PHO Manual has been tested in Asia and Africa it is now a generic tool which is built on a wide range of experience from all parts of the world.

AIM OF THE MANUAL

The PHO Manual is a tool that allows the post-harvest sector to be systematically analysed and understood in terms of its importance and the changes that are occurring within it, and how to respond to those changes to maximise the contribution of the sector to policy objectives. By the post-harvest sector we also include the supply of fish, in part because fishermen engage in post-harvest activities onboard their boats, but also because the supply (in terms of how much fish, in what form, when, how often etc. determines much of what can happen in the processing, trade, transportation and consumption of fish.

This manual specifically addresses the following areas:

- The significance of the sector to national policies and to the livelihoods of different stakeholder groups in the sector
- The current situation in the supply, transformation and consumption of fish
- The changes that are occurring in the sector
- The cause of those changes
- The impact of those changes on policies and the livelihoods of different stakeholder groups
- Options for intervention

The focus on the livelihoods of the poor ensures that the policy options encourage linkages between the needs and aspirations of the weakest members of the sector with the wider goals of society. This reflects international development targets.

Change is an important feature of post-harvest activities. Many activities and stakeholders are in a state of flux. The PHO Manual will help identify key changes, the cause of these changes and the impact they are having on the poor.

The Post-Harvest Overview that emerges from the use of the PHO Manual should be seen as the beginning of an on-going process and that the understanding developed should be updated on a regular basis as new information appears.

THE AUDIENCE OF THE MANUAL

The PHO Manual is a planning tool for use by government as well as the private sector and other institutions and organizations active in the post harvest sector, such as NGOs and community organizations. It is used to assist:

- Identifying and targeting pro poor interventions,
- Dissemination activities by clarifying institutions and their roles,
- Guiding choices with regard to strategies which distribute benefits between social and economic groups in different ways,
- Strengthening the ability of non governmental organizations and fisherfolk associations to assist in the sustainable development of the sector
- Identifying information gaps that can be later filled
- Designing and implementing projects and development programmes.

Application of the Manual involves several stages: secondary data collection and review, followed by primary research, analysis and validation at the institutional and community levels. The aim is to develop an overview of the sector by stakeholders from within and at all levels. Making the process inclusive and participatory fostering ownership by the sector as a whole.

HOW TO USE THE MANUAL

The Manual provides a narrative breakdown of the component parts of the post-harvest sector with examples to illustrate the different elements of it. It also provides a hierarchy of questions that can be used to guide analysis of a particular situation.

By working through the narrative and the examples, and using the questions to guide areas of enquiry, development workers can systematically uncover much of what is happening in their own post-harvest sector. The hierarchy of questions is designed to take researchers to different levels of understanding. Policy-makers and planners may find the higher-level questions a useful guide to directing researchers towards important information that is required for policy formulation and planning. Researchers and development workers may find that the lower level questions suggest ways of looking in more depth at the sector.

It is not envisaged that all the questions should be answered, the manual tries to be complete but that does not mean that it has to used in its entirety before useful information is generated.

The methods for generating the information for the Overview include the following:

1. An institutional and stakeholder group analysis
2. Literature scoping, gathering and reviewing
3. Interviews with key informants in the government, private sector, NGO and post-harvest communities
4. Workshops to brainstorm with key partners in the government, private sector, NGO and post-harvest communities
5. Field visits to verify information and cross check sources.

These are outlined below.

Institutional and Stakeholder Group Analysis

A useful starting point for implementing an overview is to understand who is involved in the sector. A breakdown of which different institutions in government, private sector, academia and civil society can give a good overview of how the sector is structured and where the best places are to look for key informants to help to build up a picture of the sector. Private sector institutions will also involve community-level operators such as fishers, traders, processors, carriers, and others.

Reference to section 6 in the report will be particularly useful here.

Literature review

The Overview, is as the name suggests, an overview. Other tools are available for more in-depth studies. Much of the information for the overview will be obtained from secondary sources. In time it may be possible to commission specific areas of research to complement existing data and these can feed into later editions of the Overview.

Good sources of information that can be used to answer the Overview questions include reports, scientific papers, PhD thesis, newspaper articles, and books which focus on poverty, the macro economy, fisheries, trade and export. Such information may be available from:

- Internet
- libraries
- External agency offices (FAO, EU, World Bank etc)
- NGOs
- Universities
- Research institutes

A literature review can help lay the foundation for an Overview it also helps identify where there are knowledge gaps for which literature is not readily available. Attempts to address these information gaps can be made in workshops and stakeholder interviews.

Key Informant Interviews

Another approach to generating information for an Overview is interview key stakeholders. Identifying who to interview about what can be much easier once you have identified the sort of information that is required and once the institutional section of an Overview has been developed as this will tell you who does what and where.

Once a literature review has been conducted and an early draft Overview has been produced it can be useful to go through the draft and see which of the hierarchical questions have been answered and which haven't and then to identify who or which institutions may be able to answer the questions that haven't yet been addressed. Try to draw up a list of questions that need to be asked and/or a checklist of issues to discuss with the particular individual or institution. It may be that a key individual may have knowledge on a wide range of issues or they may have quite specialised knowledge on only one knowledge gap.

Remember that the term key stakeholders covers a wide range of people from a multitude of different organizations, backgrounds and occupations at the national, regional, local and community levels. They may be people you already know or people you don't.

Workshops

Workshops can be useful for discussing and answering questions or sections of the Manual. They can also be useful mechanisms to cross-check and validate an Overview once it has been developed and to help identify intervention principles and strategies. Workshop activities can include brainstorm sessions of major aspects of the PHO (supply, transformation, consumption, stakeholders, poverty, interventions) which help develop understandings of current key issues, presentations and open discussions. Working group tasks are useful ways of stimulating discussion, information and ideas. Workshop results are used to develop and amend an overview document.

Workshops may be held at the national level or regional level depending on the type of information required. For example in some circumstances there may be a dearth of current information on particular issues in certain areas of a country. One way of

trying to quickly generate an understanding of these issues would be to hold a regional level workshop with relevant stakeholders from the particular area. Workshops could be held at the beginning, during and at the end of the development of an Overview.

Typical stakeholders for an Overview workshop would be drawn from the public, private, NGO and academic sectors.

SECTION 2: FISHERIES POST-HARVEST AND WIDER POLICY

POST-HARVEST IN THE GLOBAL CONTEXT

The Code of Conduct for Responsible Fisheries

In recent years, world fisheries have become a market-driven, dynamically developing sector of the food industry and coastal States have taken advantage of their new opportunities by investing in modern technologies in the harvesting and processing of fish in response to growing international demand for fish and fishery products. By the late 1980s it had become clear that fisheries resources could no longer sustain such rapid and often uncontrolled exploitation and development, and that new approaches to fisheries development, that incorporated the sustainable use of resources, were urgently needed. The situation was further worsened by the realization that many in the sector were being marginalized by these changes.

Noting these and other important developments in world fisheries, the FAO Governing Bodies recommended the formulation of a global Code of Conduct for Responsible Fisheries which would, in a non-mandatory manner, establish principles and standards applicable to the conservation, management and development of all fisheries. The Code, was unanimously adopted on 31st October 1995. It provides a framework for national and international efforts to ensure sustainable exploitation and use of aquatic living resources in harmony with the environment and consistent with the need to enhance the livelihoods of those people dependent on the sector. This emphasis on both sustainable use and the needs of people dependent on the sector underlies the structure and content of the PHO Manual.

The Code provides principles and standards applicable to all aspects of fisheries. It also covers the capture, processing and trade of fish and fishery products, fishing operations, aquaculture, fisheries research and the integration of fisheries into coastal area management. The CCRF is very specific concerning the post-harvest sector, it says: "States should give due consideration to the economic and social role of the post-harvest fisheries sector when formulating national policies for the sustainable development and utilization of fishery resources".

POLICY CHECK:

- To what extent has the CCRF been incorporated in to national policies?
- Are there explicit policy commitments to the CCRF?
- In what ways has the post-harvest sector been specifically dealt with in relation to the CCRF?

Planning Check:

- When was the CCRF adopted nationally?
- How has it been incorporated into development plans?
- Have research plans been adapted to cater for the CCRF's information needs?

- How has it affected plans/activities and legislation in fish processing, quality control, domestic trade and export?
- How has the CCRF been used to inform national guidelines?
- Which aspects of the CCRF are particularly relevant to the present and future of the sector?
- What level of understanding of the CCRF is there amongst different groups of stakeholders?

Livelihoods and the Post-Harvest Sector

There are approximately 30 million people engaged in the fisheries sector world wide. Assuming that each person employed has three dependents, this would suggest that at least 120 million people are dependent on fisheries for their livelihoods.

The distribution of those involved in harvesting fish (and by implication those involved in shore-based activities) is as follows:

CONTINENT	PERCENTAGE OF PERSONS EMPLOYED
ASIA	85.0
AFRICA	6.5
N.AMERICA	3.0
S. AMERICA	2.8
EUROPE	1.4
FORMER USSR	0.9
OCEANIA	0.5

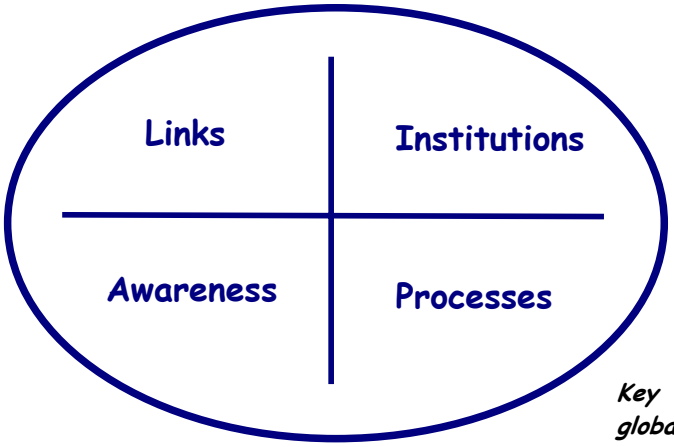
(source: www.fao.org/fi/highligh/fisher/c929.asp)

Not all of those employed in the fisheries post-harvest sector are employed full-time, some are seasonally employed, and others are opportunists in the sector. In addition to those working directly in the sector there are many people who depend on fish as a major component of their food security. Whilst the average consumption of fish globally may be about 13kg whole fish equivalent each year or approximately 16% of total animal protein intake, the importance of fish in the diet is higher than this would suggest. For instance, in low-income food deficit countries the percentage that fish contributes to total animal protein consumed is higher. In addition the total quantity of fish consumed is much less important than the frequency of consumption. Furthermore fish is a major source of vital oils and vitamins that are particularly important to poor and vulnerable people.

Globalisation

The CCRF is, in part, a response to global changes in the fisheries sector. Globalisation of the fisheries sector is both a manifestation and a reflection of those changes. Globalisation is rather like policy, it is easier to talk about than to define. It can be thought of as consisting of a wide network of linkages joining aspects of the sector together that existed in isolation before. In order to cope with such linkages, new global institutions have developed that have created new ways of doing things and a new

awareness of the potential for change. These elements of globalisation are illustrated below:



Key elements of globalisation

Linkages in global fisheries exist, for example, because the seas are joined together and the pollution, habitat degradation, over-exploitation and biodiversity loss in one country's waters affects the supply of fish in another's. Markets are also linked and trade flows have increased dramatically in recent years with more than 40% of the world's fish production by weight now entering international trade making it the most international form of food production. The majority of this is imported by developed countries and developing countries have substantially increased their net receipts of foreign exchange from fisheries over the last 15 years. The global growth of telecommunications has played an important role in the globalisation of fish trade (see box 2) as has the developments in freight technology. Associated with these increased market linkages are new institutions. The World Trade Organisation (WTO) is the agency that is most commonly linked to globalisation but FAO has institutions such as GLOBEFISH, INFOFISH, INFOPECHE, INFOPESCA, INFOSAMAK, EASTFISH and INFOYU operating as independent intergovernmental organisations in the field of fish trade and information dissemination. They also provide a strong networking function linking suppliers to buyers and consumers. The United Nations itself is a significant part of the institutional framework of globalisation. Fish workers are also increasing their networking through global forums and organisations such as the International Collective in Support of Fishworkers (ICSF).

Box 2: Telecommunications in the Globalisation process

An obvious role of telecommunications in globalising the post-harvest sector is the use of the internet to buy and sell fish. But even fishermen are realising the potential benefits of improved market knowledge. Small-scale fishermen in Kerala, South India, are use mobile phones to sell their fish in advance of it arriving at the beach.

There are also a wide range of international processes that have developed in parallel with these institutions and linkages. As mentioned above the CCRF is a response to an awareness of the international nature of fisheries and the problems that the sector faces globally. This builds on earlier global initiatives such as UNCLOS that establishes a framework for the sustainable use of resources, and Agenda 21 that provides the basis for equitable and sustainable development. The World Trade Organization provides guidance that affects the international trade in fish and fishery products. Within the post-harvest context, the Codex Alimentarius is an international process, responding to the need for improved fish quality and safety, as are Hazard Analysis and Critical Control

Point (HACCP) systems. These in turn are responses to the global increased awareness of the importance of fish to the diet. Of particular importance to this Manual is the growing global awareness of the problems of poverty around the world and the global commitment to its elimination.

POVERTY AND POST-HARVEST SECTOR

What do we mean by poverty?

There are as many definitions of poverty as there are agencies that have tried to measure it. But there is a growing consensus around what we are talking about. It is now widely accepted that a lack of money is an inadequate indicator of poverty although measures such as US$1 a day are still used to give broad international comparisons between countries (UNDP, 2000). Most development agencies now agree that poverty is multi-dimensional.

Some agencies have tried to establish a standardised way of measuring those different elements. In 1997, UNDP introduced the concept of human poverty (as opposed to income poverty) to measure what people ***can do*** in their lives rather than what ***they have***. Indicators include life expectancy, literacy, access to health services, access to safe water, and child malnutrition (UNDP, 1997).

Other approaches to poverty place a greater emphasis on the individuals' perceptions of their own poverty and they may try to measure how the poor perceive changes in the outcome of the livelihood strategies that they have chosen to adopt. Experience over many decades has provided us with a wide range of participatory methods for gathering such information.

Box 3: The Dimensions of Poverty

Poverty has many dimensions, not just income deprivation. Often the best people to judge which of those dimensions are most important are the poor themselves. But the poor are not a homogeneous group, different groups of the poor will place different values on different dimensions of poverty, and these values may change in response to seasons and to the changing vulnerability of the poor.

Some key dimensions might include:

- Life expectancy
- Nutrition and wider health
- Access to water
- Income
- The level of marginalization from the political process
- Access to knowledge through literacy
- Exposure to risk
- Access to patronage

Policy Check:

- How is poverty defined nationally?

Planning Check:

- What indicators are used to measure poverty? To what extent do they reflect the different dimensions of poverty noted in Box 3?
- Which specific stakeholder groups have been identified as being poor?
- Which institutions are involved in researching poverty, in co-ordinating poverty reduction strategies?
- How does poverty vary geographically?
- How is poverty changing?
- What information is there on poverty in the post-harvest sector?

These two approaches, the use of objective indicators or the use of subjective indicators, represent two poles in a process where many intermediate approaches have been used. No

one system is necessarily better than the other, they merely tell different things about how poverty operates in a society. Perhaps more important than which approach is adopted is how **consistent** we are in the indicators we use to measure poverty. Trying to measure change in poverty levels by comparing indicators from different systems across times is likely to be difficult if not impossible, but different systems may be complementary.

Two key elements of poverty are:

- That it may mean different things for different people
- There are different degrees of poverty

Particularly when analysing poverty at the sector, community or household level it is important to differentiate groups of the poor and to understand how poverty differs between them. The old, the young, women, the disabled, people from certain tribal/caste/class groups are exposed to different dimensions of poverty. It is important to understand who these different stakeholders are and how they differ from each other. Some people live in extreme poverty and others are just below some poverty line. They are both poor but the quality of their lives is markedly different. In other cases people may be above the poverty line but may be susceptible to falling below it. These we might call the "future poor" (see box 4).

Box 4: The Future Poor

For many people around the world being involved in the post-harvest fisheries sector means being vulnerable. Whether they are the fish smoker in The Gambia whose smokehouse burns down with the loss of stored fish, the fish drier in India whose drying fish rots in unexpectedly persistent monsoon rains, the Mozambican petty fish trader whose stored fish is lost in an unexpected flood, the labourer in an urban fish market whose daily income depends on the availability of fish or the wife whose husband is lost at sea on a fishing trip, these are the people who so often live on

The Importance of poverty reduction

Over a billion people live in poverty around the world. Most of these are in rural communities that depend on the natural resource base for their food, shelter and income. The international community has stated that this situation cannot continue and has acknowledged that the approaches to poverty of the last few decades have been less than successful. The model of economic growth and safety nets for the poor has not worked. New approaches are required that tie the poor much more into the policy process through pro-poor policies and through empowerment.

The 1995 World Summit for Social Development set broad targets for reducing global poverty. The Development Assistance Committee (DAC) of the Organisation for Economic Cooperation and Development (OECD), in agreement with the UN system aims to halve the number of people living in poverty by 2015. Some bilateral funding agencies, such as DFID, have now taken poverty eradication as their primary goal.

In 1991 IFAD (the International Fund for Agriculture Development) identified small-scale fishers as one of the poorest groups globally. This was clearly a broad generalisation that does not reflect the significant variation in poverty in the sector globally. It did, however, cast an important light on those often forgotten people in small-scale fisheries who make up the bulk of the fisheries sector and who contribute so much to local food security. Since then the profile of the poor in fisheries has been raised and poverty in fisheries is better understood, certainly on the capture side of the sector. The post-harvest sector is less well understood. The CCRF specifically addresses poverty as a key element of the context in which it should operate (CCRF, Article 6).

POLICY CHECK:	• How important is poverty reduction in national development policies?
Planning Check:	• What are the key sectors in which poverty reduction strategies are focussed?

Post-Harvest and the livelihoods of the poor

In many parts of the world fish processing and trading are occupations of the poor. Many people operate small businesses that provide a source of livelihood for them and their families. These microenterprises also provide livelihoods for people who help transport, process and pack fish. Labourers are also employed by larger enterprises that are engaged in large scale processing and trading activities supplying fish to either the domestic or export market. In some parts of the world the post-harvest sector is seen as a safety net when employment as wage labour in other sectors is not available. Some women enter the post-harvest sector because they find themselves as the single head of a household and the relatively low entry cost of fish trading allows a woman with a family at least some opportunity to provide for her children.

This is not to say that all the people in the post-harvest sector are poor small-scale operators. Much of the fish passes through large companies for the export trade where good prices prevail and demand is high. The amount of fish entering international trade is increasing each year as demand for fish increases at a rate that is faster than the increase in supply. There are also small-scale traders who deal in specialist products or who sell to local markets who make a good living from fisheries products. Many of these are women who enter the post-harvest sector because their husbands are involved in fish harvesting. Their businesses may grow to be very significant and they may end up owning the boats that fish for them and employing a number people.

Fish has also traditionally been the main animal protein for many low-income people around the world. With increasing demand for fish globally and with the coming of improved transportation and storage systems fish are now able to reach distant urban and international markets where higher prices can be realised. As a consequence the amount, type and cost of fish available to poor is rapidly changing. Large-scale investments in the post-harvest sector are becoming more common and life for the small-scale operator is becoming less stable.

Linking the poor to the policy process

These changes in the sector and wider economy mean that the opportunities for the poor in the post-harvest sector in many parts of the world are also rapidly changing. Because many of these participants in the sector are marginalized from the mainstream because of their poverty they have little or no influence over the policies that affect these changes and their plight often goes unnoticed. In some countries the extreme poor have been called the "hidden poor" because their marginalisation excludes them from formal recognition.

Understanding poverty and the complexity of poor people's lives is the first step towards eradicating poverty. Making the link between that understanding and the policy process is the second step. This is as true for the post-harvest fisheries sector as it is for the wider economy.

POLICY CHECK:	• How are the poor engaged in the policy process?
Planning	• To what extent is decentralisation a meaningful strategy nationally?

Check:	• How are power and resources devolved to the local level? • How successful has this been at empowering the poor? • What are NGOs and similar organisations doing to empower the poor?

POST-HARVEST IN THE NATIONAL CONTEXT

The post-harvest sector can contribute to national development objectives in a variety of ways. These include:

- Poverty reduction
- Food security
- Employment
- Foreign exchange balance
- GDP

Contribution to poverty reduction

The contribution of the fisheries sector to national development objectives is usually measured in production terms. But the sector also has a major social policy role in reducing poverty in rural communities. It may also provide vital food security to poor consumers (see below). Importantly the sector may provide benefits to the poor at crucial times of their lives e.g. when no other food/work is available. Such benefits may be difficult to quantify or they may be small in economic terms but by the criteria that the poor use to define their own priorities these benefits may be vital.

POLICY CHECK:	• In what ways does post-harvest fisheries sector policy reflect national goals on poverty eradication? How is that measured? • How high a priority is poverty eradication in post-harvest policy? How does that prioritisation manifest itself?
Planning Check:	• How many poor people are involved in the sector? • What roles do they play? • In what ways does the sector contribute to poverty reduction in terms of the livelihoods of the poor? • How many poor consumers depend on fish for their food security?

Contribution to food Security

The food security role of fish may take many forms. The most common way of measuring it is the average quantity of fish consumed by each individual each year, the amount of fish as a % of total protein consumed, or as a % of total animal protein consumed. Such figures often conceal more important aspects of food security. A diversity of species of fish can contribute a wide range of vital nutrients to the diet even if the total amount consumed is small. This may be particularly important to very vulnerable groups such as the old, the very young, the sick and pregnant women. Fish can also be vitally important to remote rural communities where few other source of protein are available. Whilst fresh fish is highly perishable in processed forms fish can be stored for long periods of time and can be consumed at times of year when other protein sources may be scarce thus evening out fluctuations in food supplies. In order to meet national food

requirements fish may be imported to compensate for a shortfall in domestic production. Sometimes low value fish is imported and higher value species are exported because of the greater opportunity to generate foreign exchange.

Often fish consumption is linked to special ceremonies or feasts and these vary through the year. In some situations different groups in societies have preferences for certain species or there may be national favourites/preferences. Fish also enters the food-chain indirectly by being fed as fishmeal or even more remotely by being used as fertilisers for crops.

POLICY CHECK:	• How important is fish in national food security? • How is this measured?
Planning Check:	• Are there particular marginalized or vulnerable groups who depend on fish as a vital part of their diets? • Who are these people? Is their dependence recorded at the policy-level?

Contribution to employment

The post-harvest sector employs many people globally but that employment involves a wide diversity of livelihood strategies. Some people are employed full-time, some are part-time, others are seasonal. Amongst these there may be different levels of under-employment where people are not fully engaged in the work they do. There is also a wide diversity of job types (see box 5).

Box 5: The Diversity of Jobs in the Post-Harvest Sector

There are many different jobs available to people in the post-harvest sector these include:

- Fishermen (on board handling and processing)
- Processors (sorters, smokers, salters, driers, picklers)
- Factory workers (in sorting, gutting, filleting, scaling)
- Porters (beach headloaders, cycle transporters, box carriers)
- Traders (wholesalers, retailers, commission agents)
- Ice sellers, salt sellers
- Basket weavers, ice box makers

There are also different reasons why people enter the post-harvest sector. Some people enter the post-harvest sector because it is part of the social/cultural tradition of their community, tribe, clan or caste. Some enter at an early age as children. Others enter the sector opportunistically, when sources of work elsewhere are denied them. Some join because the sector periodically offers the opportunity to make large sums of cash.

There are also significant differences in the way people are employed, some are self-employed through micro-enterprises, and others are employed by someone else on a wage., or on a piece –work basis. Some work in the formal sector others in the informal sector.

There are often significant gender differences in employment in the sector. In many traditional fishing communities around the world the men catch fish and the women process and sell fish. Children also often help, although this may be modified by religious priorities. Linked to the quantity and form of employment is also the quality of that employment. Some people work in high risk, or dangerous jobs. In many cases the work is low paid.

Understanding this diversity is important for designing interventions to support the different stakeholders.

POLICY CHECK:	• How important is employment in the sector to national employment? How many people are involved? • Are those employed particularly poor or vulnerable?
Planning Check:	• To what extent is employment full-time, part-time, seasonal or opportunistic? Is there under-employment in the sector? • What different types of activities are people involved in? How many in each job group? Are there geographical variations in this? • How many are self-employed and how many are wage earners? • Why do these different groups enter the sector? Are there particular driving forces? • What role does gender/religion play in the employment process? • How important are the formal and informal sectors? • Are there certain groups leaving the sector and if so why? • What is the relationship between employment and migration?

Contribution to foreign exchange balance

The rapid expansion of international trade in fish and fisheries products has meant that the sector now contributes very significantly to foreign exchange in many countries. Important in this trade is the number and location of markets, their stability and sustainability, and the cost of entering those markets.

It is important to understand foreign exchange generation in the wider economy and to understand the relative importance of foreign exchange generated from fisheries as opposed to other exported commodities.

Whilst foreign exchange generation may be important, the form and use of that foreign exchange may be more important. In some cases the foreign exchange contributes significantly to government finance through taxes etc. In other cases it may contribute mainly to local industries or to foreign companies based locally.

Another important aspect of foreign exchange is the extent to which the post-harvest sector contributes to reducing the need to import animal protein from other countries and thus reducing the need for foreign exchange to purchase this fish.

POLICY CHECK:	• What is the contribution of the sector to foreign exchange balance? What is the annual value of exports? • What are the trends in terms of export quantities, value, products and markets?
Planning Check:	• How do exports of fisheries products compare with imports of fisheries products? • What are the main products that are exported? • To what extent do fish produced locally substitute for imported fish?

Contribution to GDP

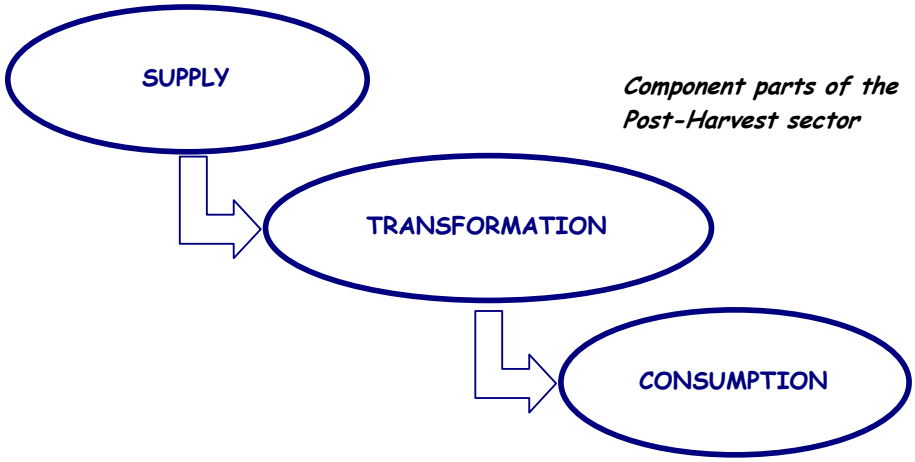
A key economic indicator used by governments is the contribution of the post-harvest sector to Gross Domestic Product (GDP) as an indicator of the overall value of the sector to the economy. This can be represented in monetary form or, often more usefully, as a percentage of total GDP. In some cases the contribution will be skewed towards a few high priced products such as shrimp or tuna.

POLICY CHECK:	• What contribution (in monetary and % terms) to the economy does the post-harvest sector provide to GDP?
Planning Check:	• How does this compare with other commodities/activities? • How do the different products make up this contribution?

Section 3: Assessing the Current Situation in the Sector

INTRODUCTION

The post-harvest sector can be considered as consisting of three components:

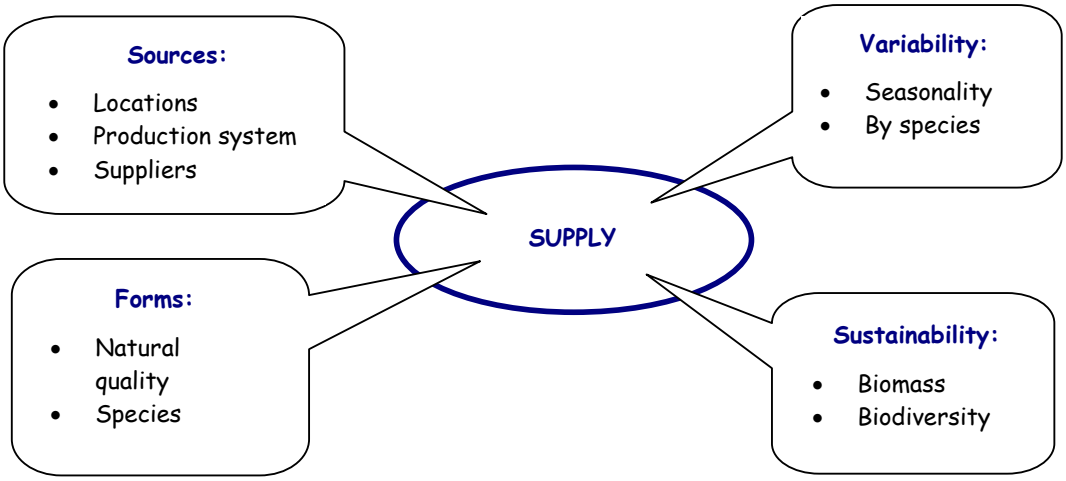


Component parts of the Post-Harvest sector

Dividing the sector into these three components is one way of looking at the sector that increases the ease of analysing it. These three components are discussed in more detail below.

SUPPLY

The supply side of the post-harvest sector in many ways defines what happens in the rest of the sector and it is important to understand this fully. The supply side has various sub-components:



Sources of supply

There are three key elements of the source of supply:

- Location
- Production system
- Suppliers

Fish enters the post-harvest sector from many different geographical locations around the country. From the marine and from inland, but also from other countries as imports. It is also supplied from a diversity of production systems. These might include industrial, semi-industrial or artisanal fisheries, or aquaculture. Within these categories different vessel/gears may be used, further complicating the supply side. In addition it is important to know who is involved in the supply of products, each different stakeholder group may have different needs and aspirations that may influence policy or they may influence the supply of fish to the sector in different ways.

POLICY CHECK:	• Where are the main sources of supply, marine, inland or imports? • What are the key production systems? • Who are the different groups involved in the supply?
Planning Check:	• What is the breakdown of supply by quantity and species for each coastal and inland landing site? • How much fish comes in as imports? Where does it come from? Where does it enter the country? • What are the different production systems in terms of level (industrial, artisanal etc.) and type of technology (gear, vessel, farming systems)? How many of each are based at each entry point? • How is the supply divided between these different production systems? • How do the stakeholder groups differ from each other in terms of their capacities, livelihood strategies and needs?

Forms of supply

The form of supply concerns the species that are landed, and their natural quality. The species mix will have significant importance in terms of demand and prices. It will be important to know the different quantities of the different species entering the sector at each point. It is important to understand the diversity of species groups involved e.g. fish, mammals, crustaceans, echinoderms, molluscs, and seaweeds.

Quality involves not only the age and physical state of the fish but also its physical form and size. The environment in which the fish lives will also affect its quality. Highly polluted waters will affect the quality of the fish produced. Poisons and dynamite used in harvesting the fish are also likely to adversely affect its quality. Also affecting quality is the reproductive cycle of the fish, feedstuff and the type of fishing gear used.

POLICY CHECK:	• What are the major types of fish that enter the post-harvest sector?
Planning Check:	• What species are landed and where? • What comes from aquaculture and where is it produced?

- What types and amounts are imported?
- In what form do imports arrive?
- Does by-catch feature in landings and how important is this?
- Does by-catch feature in landings?
- What grades of quality are landed at different locations?
- In what way has the harvesting method affected the quality of the fish?

Variability of supply

There are often variations in the quantities and quality of fish landed during the year. Sometimes fishermen do not fish on certain days of the week. In some cases fishing is restricted to certain phases of the moon. Weather conditions can also influence fishing patterns and whole seasons may have limited landings or gluts of landings. There may also be legislation that governs when and how much fish is imported. Fishermen's access to supply may also be influenced by the availability of inputs such as fuel. In addition fish abundance in the wild may vary both in species and quantity, as may the quality of the fish (e.g. the fat content at different times of the breeding cycle).

POLICY CHECK:

- How does fish supply, composition and quality vary and why?

Planning Check:

- What form do annual/monthly/weekly variations in supply take?
- How dos supply vary according to the different sources?
- What effect does climatic and weather change have on the quantity and quality of fish landed?
- Are there seasonal gluts or shortages of fish in the wild?
- Does the quality of certain species vary in the wild?
- How does aquaculture production vary with time?
- How do imports vary with time?

Sustainability of supply

The sustainability of wild fish supplies is in large part a reflection of biodiversity and biomass of the wild stock. Exploitation levels, natural mortality (through disease and predation), aquatic habitat condition and pollution influence these. The sustainability of aquaculture supplies is more under the direct control of the producer. However, these same factors apply along with the influence of inputs to the system.

The sustainability of supply will greatly affect the whole post-harvest sector and needs to be well understood.

POLICY CHECK:

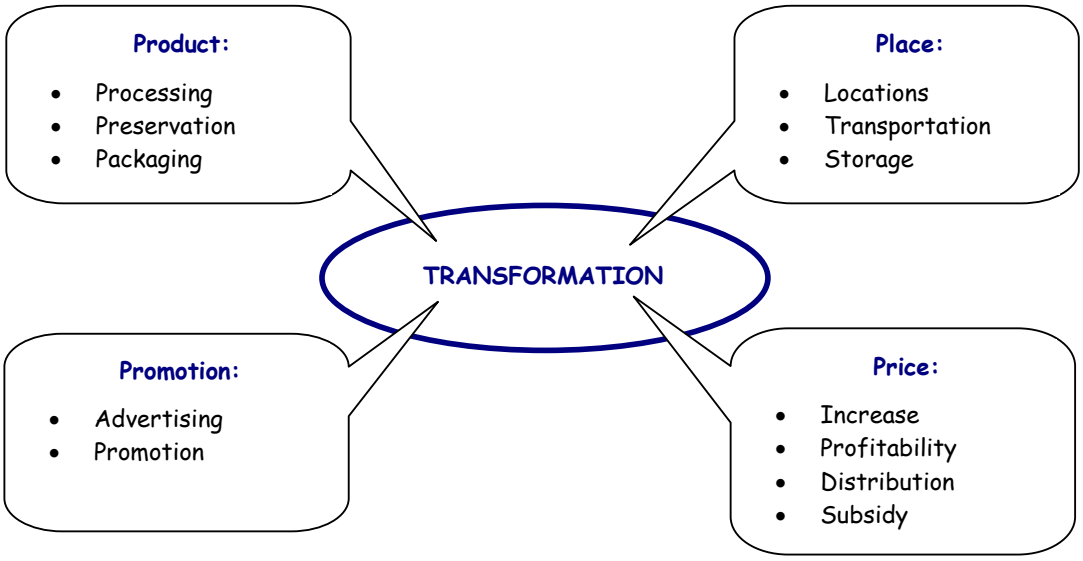
- How sustainable are current supply systems?
- How does policy, legislation and management systems influence the sustainability of supply?

Planning Check:

- What are the main trends in biomass and biodiversity of different species?
- What evidence is there of habitat destruction and pollution?

TRANSFORMATION

After fish enters the post-harvest sector it undergoes a series of changes i.e. the fish are transformed. Transformation can take many forms but these can be grouped under four headings:



Product transformation

Of the 80 million or so tonnes of fish used for human consumption annually, nearly 70% is processed in some way. Some times it is just gutted, sometimes it is scaled and filleted. Shellfish may be shelled. Low value fish may be put through a meat-bone separator and the meat used to form new products e.g. surimi. Larger fish may be cut into steaks either to be sold fresh or processed for canning.

Fish may also be preserved through smoking, sun-drying or salting, or through a mix of these processes. Pickling and cooking are also used to preserve fish and to add flavours. Perhaps two of the most common forms of product transformation are icing and freezing. Icing is often done onboard vessels as well as after landing. On larger vessels as well as in shore-based establishments freezing may be an option. Sometimes this provides an individually blast frozen product, in other situations the fish are frozen as a block.

The technologies used in these different processing and preservation methods are important in the overall economics of the sector, the way they add value to the sector and the way in which fish is distributed and sold. Even slight differences in, for instance, the fish smoking technology used can change the product quality, influence its acceptability to different markets and degrade fuelwood resources at different levels.

Dried fish take many forms. Under some circumstances dried or smoked fish is susceptible to insect infestation which can lead to physical and financial losses. In some situations insecticides are used to combat this problem. These insecticides are generally illegal and potentially dangerous to consumers but their use is common in some countries. Some fish is used for making animal feed (some of which may go to feed other fish in aquaculture) and some go as fertilisers (See box 6) .

Different methods of product transformation are often the basis for employment differentiation within the sector and many people define their livelihoods by their role in this process.

Box 6: Use of Insecticides

There are many reports of inappropriate, potentially harmful agricultural insecticides being used to prevent insect infestation of drying and dried or smoked fish products. Many reports are related to practices in Asia and Africa. Insecticide preparations are used in various ways and pose a health risk not only to the consumer but also to the people who apply these chemicals.

In addition to the way the product is transformed directly there are also changes to its appearance through packaging. The most obvious packaging forms are cans, pouches, and boxes. But the movement and protection of fish often requires them to be stored in ice boxes, baskets, and other containers (See box on Aluminium fish containers in India). In some parts of the world the construction of these containers provides a source of employment for many people.

All too often the transformation of fish is not ideal as poor handling, preservation and processing, poor access to markets or glut landing conditions, result in fish wastage or quality loss. There is increasing awareness of these losses as new methods are developed to identify and quantify them (see PHFRP outputs) and to overcome/ reduce them.

POLICY CHECK:

- What are the main forms of product transformation that fish undergo?
- How many different people are involved?

Planning Check:

- What are the different forms of product transformation in different parts of the country for different species?
- How widely used is icing, smoking, drying, frying, boiling, salting and pickling? What technologies are used? Where are they located? Who is involved?
- How widely used is freezing, canning and mincing? What technologies are used? Where are they located? Who is involved?
- What types of products are made such as surimi, fish sausage, pastes, crackers, beche de mer, fish jerky, fish cakes, soups etc.?
- Which are the most important methods in terms of the number of people involved and the quantity of product used?
- How many different processing plants exist? What do they do, and where are they located? What is their throughput?
- What by-products are produced and traded?
- How much fish is used for non-human consumption and what form does it take?
- What different types of packaging are used and who are involved in making/providing the equipment?
- To what extent is loss (physical, quality or monetary loss) occurring in the sector? Why is it occurring? Where is it occurring? What are the implications for food security?

Place transformation

In some countries fish is mainly consumed where it is landed, but in most countries it is moved to new locations to be consumed. Sometimes the distance between landing and consumption is thousands of miles and the fish may pass through several countries on the way. About 40% of fishery products are now exported, and of these 50% come from

developing countries. The EU, the USA and Japan are the major importers. The change in location of the fish has important implications for who is involved and where the benefits flow. The very process of moving it has employment, cost and technology implications.

In some cases the primary reason for moving it is to aggregate the product. This may be through a processing plant (such as a cannery), through a storage facility (such as freezer plant or dried fish store), through a transhipment point (where product is brought together to bulk it), or through a market where much product attracts more buyers.

Another aspect of place transformation is the mode of movement. Some fish are moved only short distances on foot or trolley by head-loaders or cycle traders, some is carried on buses, pick-ups or on the backs of motorcycles. Others are loaded in trucks and trains, packed in refrigerated containers, or taken by aircraft to distant markets. These modes of transport will each have groups of people associated with them and their livelihoods may be distinctly different from each other.

It is important to understand where the product enters the post-harvest sector, which places it passes through and where it is finally consumed.

POLICY CHECK:	• What are the main flows of fish within the country from landing to consumption? • Why do these flows occur?
Planning Check:	• Where are the main flows of different fisheries products from landing to consumption? How much flows along them? Who is involved? • How is the product moved from one place to another? Why is it moved? • Where do the main trading, processing and marketing activities take place? • Where is fish exported from and to where?

Promotion transformation

Product transformation (see above) plays an important role in the promotion process. The appearance and packaging of the product can do much to promote it. But the type and form of promotion starts with the perceptions of the consumers. Different people in different parts of the world have very distinct and different perceptions of fish. As mentioned above, some people regard iced fish with suspicion "it must be old if it has been iced". Smell, appearance, species and the level of processing may radically affect people's perceptions. In many parts of the world fish has always been the preferred source of animal protein. In others it may be seen as the food of the poor.

Globally there is an increasing awareness of the health benefits of eating fish and this has had a significant influence on the demand for fish, particularly in developed countries. Advertising campaigns and general awareness from the media and as a result of education have informed the public of these benefits and encouraged consumption. In some countries the State has established export Promotion organisations and the FAO has established a number of regional organisations to provide information on the availability, form and price of fish. In some cases the fish sellers have organised themselves into groups to collaborate on the promotion of their products (See Box 7).

Box 7: Ecolabelling

Ecolabelling is a market based economic instrument that seeks to direct consumers purchasing behaviour so that they take account of product attributes other than price. Such attributes can relate to economic and social objectives (fair trade, support to small-scale fishers, discouragement of child labour) in addition to environmental and ecological ones.

Fair trade initiatives aim at improving the living and working conditions of artisanal fisheries workers in an environmentally and socially conscious way. In one initiative in south India fish was exported to Europe and inorder to qualify for a fair trade label the process and activities adhered to the ILOs core labour standards; were small-scale; labour intensive; environmentally friendly; and had no effect on local fish supplies and traditional processing and marketing practices.

In some areas of the world certain species of fish are considered a health risk (such as those which are known to generate ciguatera poisoning) or are not eaten because of a taboo (e.g. in some parts of the world sharks are considered unfit for human consumption). In addition the labelling of products can promote them in the market place and give the consumer confidence in what they are buying. Product origin labels can influence appearance as can eco-labels that promote the environmentally-friendly mode of harvesting. Labels that indicate that the fish has gone through a HACCP (Hazard Analysis and Critical Control Point) process may create the impression of improved quality and safety (See box 8).

Box 8: What is HACCP?

Hazard Analysis Critical Control Point (HACCP) is a tool used by the food industry to ensure that all food consumed is safe to eat. It is a systematic approach to hazard identification, assessment of risk and control. The concept of HACCP was first introduced during the mid 1960s, when a reliable method for manufacturing pathogen-free food was required by the US space programme. It has been successfully applied in the control of safety in low-acid canned foods in the USA and many food companies in Europe and the rest of the world have adopted the approach. Increasingly, regulatory bodies have recognized the usefulness of this tool and it has been incorporated into legislative requirements by the EU, and countries such as the USA, Canada and Australia.

HACCP systems are based on seven principles:

1. Analysis of current system and assess hazards and risk
2. Identify critical control points
3. Set target levels and critical limits
4. Develop a monitoring system
5. Decide what corrective action is required
6. Establish a means of verification
7. Develop a documentation process

POLICY CHECK:	• How is fish promoted nationally and globally by the Government and by the private sector?
Planning Check:	• How are the various fish and fish products perceived by the population at large? • Why do people consume fish? Why do people not consume fish? • What efforts are being made to change people's perceptions of fish? • What public, NGO or private sector initiatives are promoting fish – trade fairs, publicity campaigns, education and training? • What examples are there of how fish trading and processing businesses market or promote their products – e.g. market research, advertising, packaging? • What health benefits are perceived to arise from fish consumption in traditional society – is it used to cure certain ailments? • What are the taboos related to fish? Is fish a cause or perceived to be a cause of ailment or health problems? • Is labelling used to promote the image of the fish and in what form does it take?

Price Transformation

The price of fish changes along the marketing chain from producer to consumer. This change generates opportunities for income and employment for a wide range of people. Subsidies may also be applied by the Government that help to promote or enhance such benefits. Taxes may also be applied. Gaining an understanding of the way that price changes, why it changes, and who benefits from the change can help to guide economic policies for the sector.

Within the broad national framework of price change that occurs from producer to consumer, there are many variations that arise. Seasonal changes in supply and demand are very common, as are daily fluctuation at different locations resulting from the amount, quality and species offered for sale and the number and purchasing power of the buyers. However, supplies of fish from aquaculture, may smooth out seasonal price fluctuations. The local availability of alternative sources of animal protein may also influence price. The form of buying and selling can also influence the price. Trading through long-term buyer-seller relationships may smooth out price fluctuations. Auctions may increase the variability and cartels may strongly influence who benefits most from the sale.

POLICY CHECK:	• What is the broad national framework of price change for key species that occurs from producer to consumer?
Planning Check:	• How does price change for different products along the chain? Who gains from these changes and by how much? • How do seasonal changes in supply and/or demand affect prices? • How has competition from other sources of protein affected price? • How is price generally determined at the different stages of the chain? What sort of long-term buyer-seller relationships exist? • What role has aquaculture played in affecting price? • What role do subsidies play in price changes along the chain? Who

benefits from them?
- What are the main factors which affect the price of fish?

CONSUMPTION

The contribution that the fisheries sector makes to national food security is a reflection of the importance of local consumption of fish. As mentioned above there are important variations in consumption patterns with variations occurring in the quantity/species consumed by different groups, in different locations, at different times for a range of reasons. In many countries fish remains a vital source of food for the poor and for vulnerable groups (such as the very young, the sick, the old and pregnant women). In such cases the quantity of fish consumed may be much less important than the frequency or diversity of species consumed. A small quantity of fish from a range of species consumed regularly may provide a vital source of vitamins.

The consumption of fish may also be in response to certain festivals or ceremonies. If there is a special time of year for these events this can result in a significant unevenness of consumption.

Different products may also be eaten by different groups of people. The poor or people in remote areas may depend on dried fish. Dried fish are also sometimes exported for consumption by expatriates from the area where the fish are produced. Some communities have traditionally eaten freshwater fish and prefer these to marine fish. Some religions do not allow the consumption of fish with certain characteristics.

Box 9: Food Poisoning and fish

Ciguatera poisoning

A common form of poisoning caused by toxins from marine algae (*Gambierdiscus toxicus*) which can accumulate in some tropical reef species. The toxin is not destroyed by cooking and symptoms of poisoning include diarrhoea, nausea, vomiting and tingling sensations.

Scombroid of histamine poisoning

Associated with the consumption of warm water pelagic fish, the toxin is formed from the breakdown of amino acids in fish flesh after death. Although rarely fatal, fish are screened for this toxin by importers in certain countries. Symptoms of poisoning include itching, headache, nausea, cramps, diarrhoea, vomiting, swelling of the lips and sore throat.

Clupeid poisoning

Sometimes caused by eating pelagic fish from waters in certain parts of the world, little is known about this often fatal toxin.

Pufferfish posisoning

Reported mainly in Japan this often fatal poisoning is caused by the tetrodotoxin present in certain parts of pufferfish, a fish which is a delicacy in Japan. .

There is also demand for fish for feeding to other fish in the aquaculture sector, to feed to livestock and to act as a fertiliser when gluts occur. . Some fish are used as bait in certain fishing methods.

POLICY CHECK:
- What are the main patterns of consumption of fish domestically, in the export market, and between different groups of consumers?
- How do these factors affect national food security?

Planning Check:	• Who are the main consumers of each type of product? • What variation is there in demand between groups, at different times and in different locations? • Are there any particular times of year, festivals, celebrations when demand for fish changes? • What are the main consumer perceptions and preferences for different products? • How do specific vulnerable groups differ in their access to and use of fish? • What is the trade in by-products from processing activities? • What is the trade in products for non-human consumption?

SECTION 4: KEY CHANGES IN THE SECTOR AND THEIR CAUSE

SUPPLY

Changes in supply are perhaps the most controversial of the changes affecting the sector. It is often difficult to get reliable data on landings and fishing effort to know to what extent catches are changing and why. However, in general fishing effort is at or beyond the level that can produce the maximum harvest on a sustainable basis for many fisheries. In addition increasing habitat destruction, pollution, changes in water use, and increasing siltation in rivers means that carrying capacities of many fishing waters are declining. Poaching of resources by illegal foreign fishing vessels further reduce local availability.

In addition to total changes in catch, there are also localised changes in landings. With increasing competition for fish resources, fish harvesting units (both craft and gear) have tended to increase in sophistication and complexity. This has often necessitated greater investment and changes in ownership have often resulted. Bigger boats, owned by fewer hands, with increased need for more stable market outlets have encouraged vessels to abandon smaller landing sites and to congregate in larger sites with more facilities, better shelter, and access to bigger markets for their catch. Such changes have not only influenced where fish enters the market but also who has access to it and thus has changed the livelihoods of many people in the sector.

Fish has also progressively entered export markets and so much more of the fish available does not necessarily originate locally. Furthermore, the expansion of aquaculture, both marine and freshwater has meant that both species composition has changed and many of the supply fluctuations have decreased. The ability to define in advance the size of the harvest from aquaculture also means that the suppliers can make use of changes in demand in the market place. Species composition of wild caught fish has also changed. As fishing pressure has increased so the species composition of the catches has changed, in some cases certain species have all but gone from the catch. In some cases quality has also become more variable; in order to fill their holds, some vessels are spending more time at sea with the resultant variability in the quality of the fish landed.

As the price of fish has increased, reflecting both declining supply and increasing demand, so the value of previously discarded fish has increased and more by-catch that was considered as waste fish is now being landed.

The sustainability of such changes is difficult to determine for many fisheries, and only after some time will it be possible to determine if such changes are permanent, temporary fluctuations, or intermediate steps to further changes in the future.

POLICY CHECK:	• How has supplies of fish changed in recent years and what have been the major reasons for such changes?

Planning Check:	• How have landings changed in terms of species and total landings? • How have these changes occurred across the seasons? • What are the reasons for these changes? • How has the distribution of landings changed across different landing sites? Why has this occurred? • Are the landings originating from different classes of vessels/gears? If so why? • How is the ownership of catching capacity changing? Why has this occurred? • What role has the expansion of aquaculture and increased fish imports played in increasing supplies? • How has the role of by-catch in supplies changed?

TRANSFORMATION

In many parts of the world changes in demand, in technology and in skills have led to major changes in the transformation of products. The increasing demand for fresh fish products, improved availability of ice and ice boxes, and improved access roads have significantly shifted the emphasis of product transformation away from traditional processing and preservation methods towards iced fish. The concentration of fish into fewer landing sites has also promoted the development of more cost-effective ice plants, freezers and cold storage facilities further encouraging a move away from traditional products.

Where fish has been traditionally smoked there is often increasing pressure on timber resources for smoking. Traditionally preferred tree species are generally less available and fuelwood generally is more expensive. In some areas where salt production was widespread, many of the saltpan areas have been converted for use in aquaculture and the cost of salt has risen making the cost of the final product more than traditional consumers are willing to pay.

The increasing demand for fish has also meant that more by-catch is now landed. In addition the use to which low value fish is put is also changing. Less is going to low value use such as fertiliser and cattle feed, and more is going for human consumption.

These changes are also affecting the access that different stakeholders in the post-harvest sector have to the fish and to the relationship between the different groups. In many traditional fishing villages, the wives of fishermen had preferential access to their husbands' landings. Where larger, more sophisticated, higher cost vessels begin to replace many of the traditional craft, so the ownership patterns are changing and women find it more difficult to guarantee access to the fish. Where fish are now landed at larger fishing centres, away from the villages, the village traders and processors must travel to the larger landing sites and may have to compete in a market they little understand. Access to fish under such conditions usually pushes up the transaction costs adding to the price at which they must sell their fish. Even when they are able to access these markets the price of fish may be such that their purchasing power for traditional processing or preservation methods is too low to compete with buyers wishing to store fish on ice for consumers willing to pay more. In addition the makers of traditional packaging for fish, such as woven baskets, are under threat from plastic or fibreglass boxes. Head-loaders and cycle traders are threatened by insulated vehicles or large ice-box deliveries to urban retail stores and more sophisticated market outlets.

The demand for fish for overseas markets is also pushing up the quality requirements for the processing, handling and storage of fish. Quality assurance standards may be non-tariff barriers to trade in some situations; in others they are a reflection of a growing demand for quality produce and a concern for the safety of the consumer. Such standards demand that product is handled and processed under certain conditions that may mean that the some stakeholders are excluded from the processing chain. Tariff and non-tariff barriers to trade have also affected the access which fishery products from developing countries have had. Environmental damage is often used as a factor in banning imports e.g. the USA banned imports of shrimp from India, Malaysia, Pakistan and Thailand because of the alleged lack of enforcement of the use of Turtle Excluding Devices on their shrimp trawlers. All of these changes have affected the price of fish, the general trend of which is upwards.

POLICY CHECK:	• How has the way fish are preserved and processed changed and why? • How have the prices of fish relative to other protein sources changed? • What major changes in the destination of fish have occurred and why?
Planning Check:	• To what extent has ice production, freezer and cold storage facilities increased in capacity and distribution throughout the country? • What impact has this had on traditional processing activities? • It what ways has the concentration of fleets on fewer landing sites affected traditional processing and trading practices? • How have changes in fuelwood and salt supplies affected processing? • How has the role of by-catch changed in the market? • How have these changes affected the different stakeholders in processing and trading? Why have they been affected? • How have the different roles and responsibilities of men and women in the sector changed? How has this affected the household? • How have these changes affected the makers of traditional packaging materials? • How has demand for product from overseas changed processing, packaging, storage and handling procedures? • How have foreign safety, environmental, and hygiene regulations impacted upon the sector?

CONSUMPTION

As discussed above, the changes in supply, transformation and demand are affecting consumption patterns (See box 10.). A change in the place where fish is landed has meant that for many fishing villages less fish is available in the household. The increased cost of investing in catching power (vessels, gear and motorised propulsion), the need to use ice for longer fishing trips, and the cost of accessing centralised landing facilities and increasing demand from both rising local populations and from global demand, all mean that fish prices have gone up.

Box 10: Changes in Utilization

Fish is a very important component in the diet of the population of Asia and there are many traditional products made from fish. Products such as fish sauces, fish pastes, fishballs and fish crackers do not retain the main characteristics of the fish from which they are made. Increase in demand and reduction of traditional sources of raw material for manufacture of these types of product have created a market for bycatch fish for the manufacture of these products. In Vietnam an estimated 150,000 tonnes of bycatch are used for making fish sauce and in Thailand and other South Eastern Asian nations selected bycatch species with the correct gelling properties are used for making fishballs and other comminuted fish products. Before the 1980s these species had been part of the trash fish which was either thrown away or used as raw material for fish meal production.

Even urban consumers may find it difficult to access fish where there is a strong emphasis on the export market. Poorer consumers are finding it progressively more difficult to find traditionally processed products (such as dried, salted and smoked fish) and the cost of these has gone up. Fish is moving away from being the "poor man's food"; more and more of it is part of rich people's diets. People are now also eating species that they formerly did not eat.

POLICY CHECK:	• How have changes in fish supply and transformation affected national food security and how are the poor specifically affected?
Planning Check:	• How have macro-level consumption patterns changed? • Does a greater percentage of fish now enter the international markets? If so, which ones? • How has the consumption of fish in fishing villages changed and why? • How have changes in the price of fish affected access to fish by different consumers? • How have the poor been affected? How have they adapted or coped? • Is any domestic shortfall in supply being met by increased imports or fish from aquaculture?

SECTION 5: THE IMPACT OF CHANGE

The impact of these different changes has been partially discussed in the text above. However, it is important that the implications of these changes are fully understood in relation to the contribution that the sector makes to the achievement of national development objectives so that suitable policy responses can be identified, balanced against each other and coalesced into development strategies.

IMPACT ON POVERTY REDUCTION

A key part of this Post-Harvest Overview manual is to link poverty to policy in line with the CCRF, the international development targets and the development frameworks of many of the countries that will use this document.

The major changes in the sector will affect the poor in two ways:

- A change in livelihood opportunities
- A change in food security

Both of these may also have follow-on effects on other aspects of their lives.

Changes in livelihood opportunities include both positive and negative changes. In the main these will be changes in employment, income or risk. Employment may become more uncertain, levels of under-employment may rise or fall, there may be a need to diversify into other livelihoods, and incomes may go up but so may costs. In addition to changes in individual incomes/risk there are also household changes to consider. These may be particularly important where both the husband and the wife are involved in the fisheries sector. In some countries, declining fishing opportunities locally have encouraged fishermen to migrate to other areas. This has sometimes led to a fall in household income security with women being left behind to fend for themselves and their children.

As discussed above the poor's access to fish for food is changing and in many parts of the world fish availability to the poor is falling. This may not affect their condition adversely if alternative sources of protein and essential minerals are available. However, there is growing concern that the food security of poor people dependent on fish is declining.

POLICY CHECK:	• How many poor people are adversely or positively affected by the changes in the sector? • What are the implications of these changes for national poverty reduction policies?

Planning Check:	• How have employment opportunities for the poor in the sector changed? Have these changes been positive or negative? • How have income levels of the poor changed? • How have individual changes affected the households of the poor? • What livelihood strategy changes have the poor adopted to adapt to or cope with these changes?

IMPACT ON FOOD SECURITY

The implications of change for national food security is poorly documented in most countries. The implications for the households of the poor and vulnerable is even less understood. In some cases the role of fish in the diet of the poor may be being replaced by other protein sources or the poor may be eating smaller amounts of fish less frequently.

In addition to the food security of the poor there may also be concerns for food security in wider society. Fish is an important part of the healthy diets of many people. Adverse changes in diet can affect their health and thus their ability to happily and usefully contribute to wider society. Adverse changes in food security can also affect the ability of the workforce to contribute as effectively to the development of the economy.

It is likely that any changes in food security will be unevenly spread through society. Differences will occur between urban and rural consumers, between coastal and inland villages, between the rich and the poor, between men and women, the old and young, and between tribal/caste/religious groups. Food security needs to be considered from a variety of perspectives, these are outlined in Box 11.

Box 11: Food Security Considerations

Food security aspects of fish need to be considered from several perspectives:

- The quantity of fish available/individual
- The access which individuals have to that fish as a result of price
- Its seasonal availability
- The intrinsic quality of the fish in terms of its contribution to the diet
- The quality of the fish as a result of the environment in which it has lived (e.g. the water pollution levels)
- The quality of the fish as a result of its transformation (e.g. perished product; the use of pesticides on fish)

POLICY CHECK:	• How has food security changed as a result of changes in the post-harvest sector? • What are the implications of these changes for national food security policies?
Planning Check:	• How has the food security of different groups of poor people changed? How has this affected the most vulnerable groups (e.g. those with no alternatives, the old, sick, very young and pregnant women? • How have changes in the contribution of fish to food security affected the ability of the population to contribute happily and usefully to society? • Have these changes affected the effectiveness of the workforce? • What differences in food security have occurred across society? • How has access to fish for different groups changed? • How has seasonal availability changed? • Has environmental degradation affected the quality of the fish? • Have inappropriate practices in the transformation process adversely affected the quality of fish?

IMPACT ON EMPLOYMENT

As mentioned under the impact on poverty, changes in the post-harvest fisheries sector are also affecting employment. In some situations the number of people

involved in the sector has increased with more people entering petty trading activities. This is often the response to a decline in livelihood opportunities in other sectors, fish trading is frequently seen as a low skill, low investment opportunity. This may result in increasing competition between workers resulting in falling wages, increased conflict, and under-employment.

In some fisheries the shift in emphasis away from traditional processing and traditional markets towards more centralised processing for exports, has meant that the work opportunities in the traditional sector have declined but have increased in the formal sector. This may also be accompanied by a shift in employment opportunities from rural landing sites to around urban landing sites. The implications for such shifts are different for different people. Women in particular may find it difficult to travel far from their homes and so work opportunities for them may be disproportionately changed.

POLICY CHECK:	• How has employment in the sector changed? How has this affected particular groups?
Planning Check:	• How has the number of people employed in the sector changed? • Has there been a shift in balance between different forms of work in the sector (e.g. from processing to trading)? • How have wages changed for different groups? Has conflict increased? Has under-employment increased? • How have changes affected migration patterns? • Have people in the sector diversified their livelihood strategies and in what ways? • How have changes in the export market affected employment opportunities and work quality? • How have changes in employment opportunities for men and women differed?

IMPACT ON FOREIGN EXCHANGE GENERATION

Perhaps one of the most significant changes in the post-harvest sector in developing countries has been the increase in contribution of the fisheries sector to the generation of foreign exchange. In part this has come from the sale of fishing licences to foreign vessels, but a large part has come from the massive expansion of exports.

POLICY CHECK:	• How has foreign exchange from the fisheries sector changed in recent years
Planning Check:	• Has this change resulted from changes in the export of product? • What are the major markets? • What is the foreign exchange generated from the fisheries sector used for?

IMPACT ON GDP

The contribution of the sector to GDP is a good indicator of the changes in the sector as a whole. Increases in contribution to GDP in real terms are likely to reflect

a growth in the sector. This may be in line with growth of the economy generally but changes in the percentage contribution of the sector to GDP will reflect relative differences in balance with the overall economy. However, a static GDP figure can misrepresent the degree of change within the sector. If parts of the sector have increased and others declined, the overall contribution of the sector to the economy may have remained static. It is important to try to understand change in GDP beneath the surface.

POLICY CHECK:	• What has been the change in the contribution of the post-harvest fisheries sector to GDP over recent years?
Planning Check:	• How have these changes manifested themselves? • Are they similar in different parts (traditional, small-scale, export, industrial, marine, inland etc) of the sector?

SECTION 6: CURRENT INTERVENTIONS IN THE SECTOR

INSTITUTIONS PROVIDING SUPPORT TO THE SECTOR

There are a number of public, academic and civil society institutions which have an influence on the post-harvest fishery sector and the livelihoods of stakeholders. There may also be externally funded agencies and projects. These are outlined below.

Government

Perhaps the most obvious government institution is that of the **Fisheries Department** which may be part of a stand-alone ministry or subsumed by a ministry with a broader remit such as the **Ministry of Agriculture**. Sometime a Ministry of Food may be the responsible agency. The Fisheries Department is usually responsible for collection of statistics; creating policy for the sector; implementing that policy through legislation, financing support activities, providing information, giving training, and establishing standards; and monitoring the progress of the sector toward the achievement of national development objectives. As such it may well involve a range of sections that cover these aspects. One particularly important area will be the research arm.

There may also be bodies that are concerned with specific areas of the sector such as **standards** of food quality or export standards. **Export bodies** may also be concerned with the promotion of export of fisheries products and **Customs and Excise** may be concerned with the flow of the products across borders. Where resources are being exploited there may be involvement of an **Environmental Protection Agency** that controls fish and fuelwood exploitation, or pollution from factories. The **Department of Forests** may also be a key institution where fuelwood for fish smoking is important.

The **Police**, **Navy**, **Coast Guard**, **Ports Authorities** and **Department of Transport** are concerned with activities associated with boats and the movement of fish. **Revenue Collectors** may also have information that shows the movement of fish.

Where poverty alleviation or reduction is an important component of policy, there may be a ministry concerned specifically with the implementation of a **Poverty Reduction Strategy**. The Overview can be an important contribution to the informing the poverty reduction strategy and linking implementation of the Overview to the strategy can support uptake of the Overview's findings. Closely linked to these are likely to be the **National Planning Office** and the **Ministry of Finance**.

In many countries there will be a process of decentralisation and a **Department of Local Government** may be able to provide useful regional statistics and contacts that can provide specific local information.

As the sector provides much employment, the **Department of Employment** or of **Rural Affairs** might be important to contact for specific employment information. For specific key stakeholder groups such as women there may be a **Department of**

Women's Affairs that may be concerned with aspects of gender differentiation and gender roles. A **Cooperative Department** may be involved in the organisation of community groups within the fisheries sector and an **Enterprise Development Department** may be involved in developing small-scale enterprises covering different parts of the sector. There may also be **Training Institutions** within government that are concerned with providing technical training to rural people.

Academic

Academic institutions include **Universities**, that may have sector-specific departments of social science departments that deal with specific issues concerning the people who work in the sector. They may also have departments dealing with Food Science, Economics, Trade, Rural Development, or Environment.

Research Institutes may be attached to government departments of they may be stand alone.

Civil Society

Community-level institutions may be involved in the management of aquatic resources or make interventions that affect how and when people can engage in post-harvest activities. **Local religious institutions** can also play an important role in providing development support to adherents of their faith.

There are very often **representative agencies** of the men and women involved in the sector. These might be associations of particular gear/boat owners, processors, traders, exporters or others.

There are likely to also be a range of **Non-Governmental Organisations** concerned with poverty alleviation, rural development, environmental issues or specific locations.

Externally Funded Interventions

Government may also work through a range of externally funded **development projects** that are designed to specifically intervene in the fisheries post-harvest sector. There may be other that have their focus elsewhere but contain a post-harvest component.

These may be **bilateral** collaborations between the government and a foreign government. They may also be implemented through a regional ort international body such as the **European Union** of the **United Nations**.

POLICY CHECK:	• What type of government, academic, civil society or externally funded agencies are involved in the sector?
Planning Check:	• What are their aims? • In what ways are they involved? What are they doing? • Who are they working with? Where are they working? • What resources do they have available to do their work? • In what ways can they contribute to our knowledge of the sector?

CURRENT INTERVENTIONS

The potential to positively improve the livelihoods of the poor dependent on the post-harvest sector and increase the contribution of the sector to wider national development objectives is, in many countries, considerable. This potential is often overlooked because of the emphasis that has traditionally been placed on catching more fish rather than more effectively using what we have landed.

An important part of deciding what interventions may be possible is to define what is currently being done in the sector. This will provide an insight into the strategies of the private sector, and the support provided by government and NGO agencies.

The following sections review possible interventions in the supply, transformation and consumption parts of the sector. These should be compared with the actual interventions locally and possible changes in strategy identified.

Of particular importance in this process will be understanding what the current policies are that support or obstruct such interventions, what policy instruments (such as plans, projects, laws, service delivery mechanisms, information flows, networks, agreements, partnerships etc) are available to support their use.

POLICY CHECK:

- What position does the post-harvest sector have in development policy? To what extent is it seen as a key sector?
- What policy instruments are in place to support it?

Planning Check:

- To what extent do donor-funded fisheries projects address post-harvest issues?
- How developed is the legislative environment surrounding the sector?
- What government and academic institutions are funded to study and work with the post-harvest sector and what sort of work are they doing?
- What percentage of the government fisheries budget applies to post-harvest aspects?

SUPPLY-SIDE INTERVENTIONS

The major aims of supply-side interventions are to conserve the productivity and diversity of supply. Such interventions should also consider when and where supplies are made.

The main interventions include developing programmes of resource conservation that target the sustainable harvesting of the resources. This may require partnerships with other countries where shared stocks are considered. The involvement of the community in resource management interventions are likely to improve their acceptability and their uptake. Interventions in the area of habitat conservation/restoration will also be important to ensure the carrying capacity of the aquatic environment. Such options will necessitate inter-sectoral co-operation and co-ordination. In some cases it will be possible to enhance supplies through access to under-utilised resources, stock enhancement, investing in sustainable aquaculture and importing fish from other countries.

The post-harvest sector also has a contribution to make to environmental sustainability through the sound disposal of wastes from the sector, particularly refrigerants and waste processing water.

An important option available to governments is to provide support to enable different stakeholder groups to differentially benefit from the available resources. In many cases, increased pressure on the resource leads to greater marginalisation of the poor. Support to the development of the small-scale fleet, preferential access to resources for traditional fishing communities, enforced use-rights for the small-scale fishers, improved infrastructure at smaller landing sites, support for small-scale aquaculture can all help. Such options need to be formulated within a cohesive pro-poor policy framework that understands and takes account of the needs and aspirations of the poor producers, their capacity to respond to such interventions, and their current strategies to cope with, or adapt to, change.

POLICY CHECK:	• What are current policies of government to conserve, sustainably use and enhance the productivity of, fisheries production? • What the key policy instruments are there to achieve this?
Planning Check:	• What are the main interventions options envisaged by such policies? • What resource conservation/ sustainable-use policies are in place? What instruments are available for their uptake and use? How have the poor been involved in designing and implementing these approaches? • What measures have been taken to identify and promote alternative income opportunities for those people who have been displaced from the sector? • What measures are in place to ensure the biological diversity of supply? • What options are in place for protecting the environment at the inter-sectoral and international levels? What measures are in place for protecting the environment from activities within the sector such as fuelwood degradation, pollution from waste-water and release of damaging refrigerants? • What options are in use for enhancing the supply through aquaculture, stock enhancement, habitat rehabilitation, reduction of discards and importing increased supplies? • What measures are in place for maintaining/improving the quality of the supply of fish from different sources? • What measures are in place to enhance the location of landings and to link seasonal fluctuations in supply to demand? • What institutions are involved in the processes? • To what extent, and how, are these options targeted at different stakeholders, particularly the poor? • To what extent have the needs, aspirations and capacities of the poor been taken into account in developing these options? • To what extent have coping and adaptive strategies of the poor been taken into consideration?

INTERVENTIONS IN TRANSFORMATION

Interventions in transformation are reviewed separately as product interventions, place interventions, promotion interventions and price interventions.

Product interventions

Many of the interventions aimed at improving product transformation are concerned with maintaining the quality of the product. Improvements in fish processing technologies are widespread such as improved fish smoking and drying methods. However, such technological interventions have a variable success rate and it is important to understand why some have succeeded and others have failed. The Bay of Bengal Post-Harvest Fisheries Project spent much of the early years of its work promoting technological improvements with few sustainable successes. It was only after technology was closely linked to the social, economic and cultural aspects of the livelihoods of the processors and traders that major positive changes were observed. Linked to such processing changes have been efforts to improve input supplies such as salt and fuelwood (see box 12).

Box 12: Fuelwood plots in the Gambia

In an attempt to keep up with the demand for fuelwood for fish smoking in The Gambia the Fisheries and Forestry Departments worked together to provide a forestry resource capable of supplying local fish processors with fuelwood on a sustainable basis.

Where major technological changes have been introduced these have often created opportunities for more educated and better off stakeholders to capture such opportunities. In some cases such interventions have promoted inward migration of people not traditionally involved in the sector but wishing to take up the newly generated opportunities. Building upon traditional skills and technologies, rather than introducing new ones, can create the opportunities for those in the sector to evolve their practices more easily (see box 13). Perhaps one of the most important developments to occur recently has been that of facilitating the greater involvement of the processors and traders in developing their own solutions to perceived problems. Assisting such people to form self-help groups to access credit, achieve economies of scale in purchasing, transporting and selling products, or lobbying for change in the sector can be beneficial.

Box 13: Wet Season Losses in India

Loss of processed fish during the wet season in India is high as weather conditions change resulting in high spoilage.

A project funded by DFID's Post-Harvest Fisheries Research Programme worked with local women to identify their own solutions to these problems, to test them and to modify them to their specific needs.

Not all changes in practices have been beneficial. The increase use of pesticides on dried fish has been a major concern. This is often outlawed but legal restrictions are often poorly enforced. Awareness about the adverse effects of such practices can help if alternative and viable strategies are made available.

Perhaps the biggest change that has occurred recently in product transformation has been through the growth of private sector ice plants. Often the uptake of ice from such plants has resulted from improved road access to remote landing sites linked to both increased demand for better quality fish and improved awareness of the benefits to processors/traders of preserving their fish. In many situations, however, the quality of the icing process is poor and government programmes to improve such practices have been implemented. Linked to this has been the growth in programmes in product quality, safety and hygiene, some of these have been linked to export requirements. Interventions have sometimes focussed on systematic approaches such as HACCP (see box 14) or have been linked into international quality standards such as the Codex Alimentarius.

Box 14: Systematic approaches to traditional fish processing

Systematic approaches to fish quality control, such as HACCP, tend to be thought of as practices that mainly apply to commercial operations involving high technology processing plants. A project funded by DFID's Post-Harvest Fisheries Research Programme has developed a systematic approach that can apply to traditional fisheries and help to identify critical points for change in practices.

Where people have been displaced from the processing and preservation sector, interventions to help people seek appropriate alternative livelihoods have been used.

POLICY CHECK:	• What policies exist for promoting product transformation? • What measures are available and in use for implementation of these policies?
Planning Check:	• What interventions have been implemented to improve the efficiency and sustainability of post-harvest technologies in processing and preservation? How have these been linked to the social, economic and cultural needs and capacities of the different stakeholders? How have these been adapted to address the specific needs of the poor, especially women? • To what extent have traditional skills and technologies been built upon and developed? • In what ways has support been provided to develop or improve self-help groups? • How successful have been programmes to reduce the use of insecticides in fish preservation? • To what extent have fish loss assessment studies been carried out to understand how, where and in what form loss occurs? What measures have been taken to reduce such losses? • To what extent are the sanitary/ quality assurance standards of international instruments, such as the Codex Alimentarius, encouraged/enforced locally in the processing and handling of fish? • To what extent are systematic approaches to quality assurance and food safety (such as HACCP) used? Which institutions are involved? • To what extent are national processing and trade policies guided by the policies of regional/ international trade organisations? • To what extent have efforts been made to harmonise regional standards on quality control? • What regulations are in place to ensure fish quality and safety? How are they enforced?

- In what ways have the different stakeholder holder groups in the sector been involved in the decision-making processes about possible interventions? What participant groups exist and how effective are they?

Place interventions

A key intervention in place transformation has been the development of feeder roads to remote locations that have allowed fish to be traded with greater ease. In many situations that has facilitated year-round access to markets where only dry season access was possible before. In some communities increased access has been a mixed blessing for the poor. Where such change has been accompanied by the development of social structures in the communities to allow the poor to access credit for taking up the additional costs of entering new trade opportunities, such opportunities have helped the poor. In some situations, however, improved road access has created opportunities for wealthier traders from outside to enter communities and displace local processors.

Another place-related intervention has been that of providing points of aggregation for product. Private sector processing/storage plants have created opportunities for processors and traders to trade their products. The construction of public fish markets has also created opportunities for traders and consumers to interact.

Policies to allow fish to be moved across national borders can also promote place transformation. Where these are supported by changes in the way officials deal with traders seeking to benefit from such policies, the movement across borders is greatly facilitated.

Such changes in the way product movement is promoted can have profound effects on the livelihoods of the many people who are involved in transportation such as head-loaders, cycle traders etc.

POLICY CHECK:

- How have fisheries policies and transport policies been linked to improve market access for remote communities?

Planning Check:

- How has feeder road access to remote communities been enhanced?
- To what extent have feeder road developments been linked to increasing the capacity of the poor to access the opportunities created by improved access?
- How has the ease of movement of product across international borders been facilitated? How has this impacted upon the livelihoods of the poorer processors and traders?

Promotion interventions

Promoting awareness in the general population about the benefits of fish in the diet can contribute significantly to improved health. This becomes more important when the benefits of fish for vulnerable groups are promoted. In addition to the inherent health benefits, the benefits of good quality handling, storage and processing can reduce loss and improve quality to consumers. The promotion of new species of fish from imports, aquaculture or previously underutilised resources can also open up new opportunities on the domestic market. Promotion of products internationally has enabled some countries to increase their access to lucrative international markets.

POLICY CHECK:	• How has fish been promoted domestically and internationally?
Planning Check:	• What institutions (private sector and government) are involved in the promotion of fish domestically and internationally? • How successful has this been? Are there opportunities for increasing this role? • Has promotion been used to encourage the consumption of fish by vulnerable groups? • In what ways have fish markets been provided or improved to encourage the better appearance of fish?

Price interventions

The extent of involvement of the state in prices of fish is a contentious issue. Subsidies of the sector are frowned upon by many economists and taxes by government are frowned upon by the private sector. Establishing fixed prices for fish can also distort the market. The government can play an important role in ensuring that the transaction costs of the sector are kept low through efficient operation of the market, the promotion of policies to support the sector, improved efficiency of regulation, the elimination of corruption, effective competition in the market place and transparency of market practices.

POLICY CHECK:	• In what ways do government policies incorporate concern for fish prices?
Planning Check:	• In what ways are subsidies applied to the sector? • What taxes are applied to the sector? • Are market prices for fish controlled by the government? • What measures are in place to promote low transaction costs in the sector? • How has the efficiency of operation of regulations governing fish trade and processing been improved? • How does corruption affect the efficiency of the market and how is it currently being dealt with?

INTERVENTIONS IN CONSUMPTION

The main interventions on the consumption side of the sector are indirect and covered under supply and transformation. Direct interventions include using fish to target specific audiences e.g. in school meals provided by the state, in hospitals, or as food aid.

Other interventions may involve improving the access which specific groups have to fish through development of access channels or closing some channels off e.g there could be a ban on the export of certain types fish to encourage its use for domestic consumption. Improving market access for products to reach specific groups may also affect uptake.

POLICY CHECK:	• What current interventions are in place to influence fish consumption nationally?

Planning Check:	• Is fish used in a targeted manner to address the needs of particular groups, such as school children? • Are specific measures used to increase access of fish to specific groups?

SECTION 7: DEVELOPING AN INTERVENTION STRATEGY

Using the PHO Manual to review a particular country's or region's post-harvest fisheries sector will provide the following information:

- The contribution of the sector to national development objectives
- How the sector makes that contribution
- The changes that are occurring in the sector
- The implications of those changes for the wider economy
- The sort of interventions that are, and can be, made to the sector

Given this information it should be possible to identify the priority areas within the sector that need intervention in order to maximise the contribution of the sector to national development targets. This requires comparing the current contribution of the sector with the likely future contribution as a result of the changes in the sector. The likely decline in the contribution of the sector in the areas of poverty reduction, food security, employment, foreign exchange balance and GDP when compared with the relative importance of those areas in national development policy, will give a clear indication of the areas to focus intervention on.

Section 6 gives an indication of the current intervention and suggests ways that might not be being used. These can help to suggest ways of overcoming the sorts of problems identified. Analysis of the sector using a SWOT analysis provides a way forward.

The SWOT analysis identifies key issues which could be the focus of intervention. The interests of different stakeholders and institutions are likely to lie with different issues. Some issues may take a precendent and there may be need to prioritise issues in relation to objectives and available resources.

From a macro level perspective interventions should feed into a common objective for the post-harvest fishery sector. A guiding objective for the sector should be sufficiently broad to allow for the needs of any intervention but ties in such interventions to national development policy. Such an objective would be:

To maximise the contribution of the fisheries post-harvest sector to the achievement of national development objectives in terms of poverty reduction, food security, employment, foreign exchange balance and economic growth.

In order to sustain, develop and enhance the strengths of the sector, capitalise on the opportunities that exist, address the weaknesses and counteract the threats so that this objective a set of principles for intervention within the post-harvest sector have been developed as part of the PHO process. The principles are designed to broadly guide those institutions wishing to become involved in the development of the sector.

They have been based on the FAO Code of Conduct for Responsible Fisheries (CCRF), and the understanding of the post-harvest sector gained from the overviews implemented in the field.

The principles are centred on 10 key themes: enhancing livelihoods, promoting the needs of the poor, ensuring stable and sustainable supplies, enhancing supplies, improving utilisation, reducing negative environmental impact, promoting sound international trade, regulating international trade, improving food security and promoting institutional support. These themes are shown below. Each with a set guiding principles.

What the Overview does not provide are the specific strategies or options that institutions and stakeholders may wish to consider in relation to applying a particular principle. For practical purposes it makes good sense to leave these decisions to the intervener as they will know best their objectives, mandates, skills, experience, networks and resources which would need to be mobilised for a particular intervention strategy. In broad terms though inspiration for strategies may be derived from the following:

- FAO guidance documents on implementing the CCRF
- What has worked well in fisheries in other countries
- What has worked previously in fisheries in the country concerned
- What has worked well in other sectors
- The coping and adaptive strategies of the people in the sector

Considered in conjunction with the set of principles should be the various knowledge gaps which have been identified at the end of several sections of the Overview. In some instances it may be difficult to move forward on a particular principle without first addressing a knowledge gap.

The following is the set of guiding principles for the post-harvest fishery sector, according to the 10 themes.

1. **Enhancing the livelihoods of those involved in the sector through:**
    a. Giving due consideration to the economic and social role of the post-harvest fisheries sector when formulating national policies for the sustainable development and utilization of fishery resources.
    b. Ensuring that participants in the sector are well represented in the decision-making processes.
    c. Building on the social and commercial linkages within the sector to ensure stronger networks, collaboration and organisation within the sector.
    d. Recognising the dynamic nature of the livelihoods of those in the sector and reflecting this in the policy-making and service delivery processes.

e. Recognising that those involved in post-harvest activities are also dependent on the services of other sectors such as agriculture, health and education.
f. Designing and promoting credit mechanisms to specifically suit the sector.
g. Promoting safe, healthy and fair working and living conditions and ensure they meet international standards.
h. Promoting the development and uptake of safe technologies for the sector.
i. Protect the rights of fishers and fishworkers, particularly those engaged in subsistence, small-scale and artisanal fisheries, to a secure and just livelihood, as well as preferential access to traditional fishing grounds and resources.

2. **Promoting the specific needs of poor workers in the sector through:**
   a. Collaborating with the poor in the research process to understand the needs, aspirations and capacities of the poor who work in and depend for their livelihood on the sector.
   b. Recognising the value of, and using, indigenous knowledge in the research and development process.
   c. Actively involving the poor in the decision-making process of the sector.
   d. Raising the awareness and the capacities of the poor in the sector to their potential to contribute to the sound management and development of the sector.
   e. Where it is necessary for people to leave the sector, developing alternative livelihoods options, through systematic and participatory approaches, that specifically address the needs, aspirations and capacities of the poor.
   f. Working with the poor to develop specific credit facilities that deal directly with the needs, aspirations and capacities of the poor.
   g. Facilitating the organisation, empowerment and mobilisation of the poor to allow their more effective participation in all aspects of the sector.

3. **Ensuring stable and sustainable supplies of fish through:**
   a. Balancing fishing effort with the sustainable use of resources where possible.
   b. Conserving aquatic resources where necessary.
   c. Adopting a precautionary approach to resource-use.
   d. Ensuring compliance with, and enforcement of, management measures, and monitoring and controlling fishing.

e. Recognising the importance of the potential role of the community in resource management and supporting Involvement of the community in co-management efforts.
f. Basing management decisions on scientific evidence and taking account of traditional knowledge.
g. Developing and applying selective and environmentally safe gear and fishing practices.
h. Co-operating bilaterally, regionally and globally in research and management efforts.

4. Enhancing supplies of fish through:

a. Protecting and rehabilitating critical aquatic habitats.
b. Developing fisheries based on under-exploited resources.
c. Considering sustainable aquaculture, and culture-based fisheries, as a means to promote diversification of income and diet and to minimise adverse effects on the environment and local communities.
d. Selectively importing low cost fish when catches are low.

5. Improving the utilisation of fish through:

a. Promoting research in fish technology and quality assurance and support projects to improve post-harvest handling of fish, taking into account the economic, social, environmental and nutritional impact of such projects.
b. Promoting cooperation and facilitating the development and transfer of appropriate technologies to ensure that processing, transporting and storage methods are environmentally sound and in so doing learning lessons from other parts of the world and from past experiences.
c. Promoting and enforcing guidelines, laws, regulations and practices that improve sanitation and hygiene at all stages of the post-harvest sector from harvest to consumption.
d. Raising local quality standards to meet those of the highest international level.
e. Understanding the losses in products that are occurring in the sector and promoting loss reduction.
f. Encouraging and supporting those in the sector to harvest, handle, process and distribute fish to maintain its nutritional value, quality and safety and to minimise waste and environmental damage.
g. Promoting the incorporation of appropriate HACCP processes throughout the sector down to the community level.
h. Promoting the cooperation between Institutions in order to facilitate the production of value-added products by the sector.

6. **Reducing negative environmental impacts through:**
    a. Ensuring that environmental effects of post- harvest activities are considered in the development of related laws, regulations and policies without creating any market distortions.
    b. Promoting the use of resources, especially water and energy, and in particular wood, in an environmentally sound manner.
    c. Linking fuelwood-use for post-harvest activities to wider forestry conservation policies.
    d. Encouraging, where appropriate, the development of community fuelwood lots linked to processing activities.
    e. Investigating, learning lessons from elsewhere and seeking international guidance on, alternatives energy efficient processing approaches.
    f. Ensuring that international and domestic trade in fish and fishery products accords with sound conservation and management practices through improving the identification of the origin of fish and fishery products traded.
    g. Cooperating with other States in complying with relevant international agreements regulating trade in endangered species.
    h. Working with other States to develop international agreements for trade in live specimens where there is a risk of environmental damage in importing or exporting States.

7. **Promoting sound international trade through:**
    a. Observing the principles, rights and obligations established in the World Trade Organization (WTO) Agreement and striving to cooperate with other States to develop internationally acceptable rules or standards for trade in fish and fishery products in accordance with those principles, rights, and obligations.
    b. Ensuring that international trade in fish and fishery products does not compromise the sustainable development of fisheries and responsible utilization of living aquatic resources.
    c. Striving to ensure that measures affecting international trade in fish and fishery products are transparent, based, when applicable, on scientific evidence, and are in accordance with internationally agreed rules.
    d. Ensuring that fish trade measures adopted to protect human or animal life or health, the interests of consumers or the environment, should not be discriminatory and should be in accordance with internationally agreed trade rules, in particular the principles, rights and obligations established in the Agreement on the Application of Sanitary and Phytosanitary

Measures and the Agreement on Technical Barriers to Trade of the WTO.

e. Avoiding directly or indirectly creating unnecessary or hidden barriers to trade which limit the consumer's freedom of choice of supplier or that restrict market access.
f. Cooperating with other States to review the appropriateness of standards applicable to international trade; and promote adherence to, and effective implementation of, relevant international standards for trade in fish and fishery products and living aquatic resource conservation.
g. Not undermining conservation measures for living aquatic resources in order to gain trade or investment benefits.

8. Regulating international trade through:

a. Ensuring that the laws, regulations and administrative procedures applicable to international trade in fish and fishery products should be transparent, as simple as possible, comprehensible and, when appropriate, based on scientific evidence.
b. Facilitating, in accordance with their national laws, appropriate consultation with and participation of industry as well as environmental and consumer groups in the development and implementation of laws and regulations related to trade in fish and fishery products.
c. Simplifying the laws, regulations and administrative procedures applicable to trade in fish and fishery products without jeopardizing their effectiveness.
d. Ensuring that, when changes to legal requirements affecting trade in fish and fishery products with other States are necessary, sufficient information and time is given to allow the States and producers affected to introduce, as appropriate, the changes needed in their processes and procedures.
e. Periodically reviewing the laws and regulations applicable to international trade in fish and fishery products.
f. Collaborating with other States in the region, to review the appropriateness of harmonising as far the standards applicable to international trade in fish and fishery products in accordance with relevant internationally recognized provisions.
g. Collecting, disseminating and exchanging timely, accurate and pertinent statistical information on international trade in fish and fishery products through relevant national institutions and international organizations.
h. Promptly notifying interested States, WTO and other appropriate international organizations on the development of and changes to laws, regulations and administrative procedures applicable to international trade in fish and fishery products.

9. **Improving food security, especially of poor consumers, through:**
    a. Ensuring that appropriate measures are adopted to guarantee the right of consumers to safe, wholesome and unadulterated fish and fishery products.
    b. Closely linking food security in fish to the supply, availability and cost of other protein sources.
    c. Actively discouraging, through guidelines, awareness, laws and regulations, all unhealthy chemical introductions into the supply chain.
    d. Working with the industry to ensure that set minimum standards for safety and quality assurance are effectively applied throughout the industry. Where possible the implementation of quality standards agreed within the context of the FAO/WHO Codex Alimentarius Commission and other relevant organizations or arrangements should be promoted.
    e. Working with the industry to establish and maintain effective national safety and quality assurance systems to protect consumer health.
    f. Supporting cooperation between states in the region to achieve harmonization, or mutual recognition, or both, of national sanitary measures and certification programmes as appropriate and explore possibilities for the establishment of mutually recognized control and certification agencies.
    g. Assessing the potential and appropriateness of evening out supply fluctuation through fish storage.
    h. Encouraging the use of fish for human consumption, rather than for other purposes, and promote consumption of fish whenever appropriate.
    i. Conducting international trade in accordance with the principles, rights and obligations of relevant international agreements and develop policies and practices in ways which do not obstruct trade, cause environmental damage or generate negative social impacts.

10. **Promoting sound Institutional Support to the sector through:**
    a. Raising the profile of the post-harvest sector on the national policy agenda.
    b. Building capacity for both understanding the post-harvest sector and intervention in the sector at national, district and community levels.
    c. Ensuring that adequate funding and priority is given to post-harvest research.

d. Adopting multi-disciplinary and multi-agency approaches to interventions in the sector and forming partnerships between agencies to ensure coordination and increased effectiveness.
e. Recognising the importance of statistics related to the livelihoods of people and ensuring that adequate and appropriate information on these aspects of the sector is generated for policy processes.
f. Ensure transparency of, and the participation of fishworkers, industry and environmental organisations in, decision-making related to laws and policies.
g. Working with aid agencies, multilateral development banks and other relevant international organizations to ensure that policies and practices related to the promotion of international fish trade and export production do not result in environmental degradation or adversely impact the nutritional rights and needs of people for whom fish is critical to their health and well being and for whom other comparable sources of food are not readily available or affordable.
h. Working with those involved in the sector to avoid conflict and where necessary to resolve it.
i. Ensuring that the livelihoods of those in the sector are taken into consideration in wider planning processes, especially those linked to coastal area management.
j. Recognising the holistic nature of the livelihoods of people in the post-harvest sector and striving to promote more integrated planning and service delivery.
k. Ensuring that the infrastructural needs of the sector, especially roads linking landing sites to markets, are incorporated into wider infrastructural development policies.

SECTION 8: USEFUL WEB LINKS

DFID's Post Harvest Fisheries Research Programme	http://www.nrinternational.co.uk/old_site.html
Sustainable Livelihoods	http://www.livelihoods.org/
FAO	http://www.fao.org/
The Codex Alimentarius	http://www.codexalimentarius.net/
The Codex Alimentarius (fish components)	http://www.codexalimentarius.net/STANDARD/volume9/vol9_e.htm
The Code of Conduct for Responsible Fisheries	http://www.fao.org/fi/agreem/codecond/codecon.asp
Globefish	http://www.globefish.org/
INFOFISH	http://www.infofish.org/
INFOPECHE	http://www.globefish.org/entry_infopeche.htm
INFOPESCA	http://www.infopesca.org/
INFOSAMAK	http://www.globefish.org/entry_infosamak.htm
EASTFISH	http://www.eastfish.org/english.htm
INFOYU	http://www.globefish.org/entry_infoyu.htm
World Trade Organisation	http://www.wto.org
Agenda 21	http://www.unep.org/unep/partners/un/unced/agenda21.htm
UNCLOS	http://www.unclos.com/
UNDP	http://www.undp.org/
OECD	http://www.oecd.org/EN/home/
UNIFEM and fish processing	http://www.unifem-eseasia.org/Projects/Haiphong.html
Kyoto and food security	http://www.fao.org/fi/agreem/kyoto/H12F.asp
Fishbase	http://fishbase.org

SECTION 9: USEFUL DOCUMENTS

1. DFID (undated). Post-Harvest Fisheries: A Manual of Information and Guidelines for NGOs and Development Agencies Working with Artisanal Fishing Communities. DFID Post-Harvest Fisheries Project, Chennai, India.
2. Clucas, I.J. and Ward, A.R. (1996). Post-Harvest Fisheries Development: A Guide to handling, Preservation, Processing and Quality. Natural Resources Institute, Chatham Maritime, Chatham, UK.
3. FAO (1995). Code of Conduct for Responsible Fisheries. FAO, Rome, Italy.
4. FAO (1998). Responsible Fish Utilisation. FAO Technical Guidelines for Responsible Fisheries, 7. FAO, Rome, Italy.
5. Townsley, P. (1993). A Manual on rapid Appraisal Methods for Coastal Communities. Bay of Bengal Project, Chennai, India.