

## **1.0 INTRODUCTION**

The small-scale fisheries of developing countries play a vital role by supplying most of the fish used for direct human consumption and also by providing a large number of people with a relatively low-cost and nutritious food. Fish is often the cheapest form of an animal protein available.

Small-scale fisheries are characterized by being highly labour-intensive and requiring low capital investment. They are located in coastal areas or near lakes, estuaries or rivers, catching fish mainly in shallow-waters. Improvements to the fishing operation have been introduced, such as the use of motorized boats and winches to haul nets, but there have been few technological improvements to the handling and processing of the catch, with the exception of the introduction of ice and insulation. This may be because, in the past, increased fish production has received far higher priority from development agencies and local governments than the handling, processing and marketing of the catch.

There is often a gender division of labour associated with small-scale fisheries operations. Women are usually confined to on shore activities such as processing and marketing where the work will not conflict with other household duties, while the men go fishing. While women are often culturally forbidden from fishing they usually have a central role in the processing and marketing of fish and derive substantial status and income for their households from these activities. The importance of women in small scale fish processing needs to be recognised.

Fish is an extremely perishable food commodity. For no other kind of food is there so much observed evidence of serious loss at every stage from harvest to consumption and so little documentation of the overall proportion of losses from fish production (ECA, 1984). Exact assessment of post-harvest loss of fish is very difficult to quantify in developing countries because most of the artisan catch is unrecorded and is caught by unregistered fishermen. It passes through many hands on its way from harvest to consumption. It has been estimated that 10 percent by weight of the world fish catch is lost by poor handling, processing, storage and distribution.

Because fish is a low-acid food which supports the growth of pathogens (microorganisms causing disease) careful handling and rapid processing are essential. The fish is usually neither chilled nor adequately protected from the sun both on board fishing vessels and at the landing site. Basic principles of hygiene may have been unknown or seldom applied so that by the time processors buy the fish, it may already have reached various stages of spoilage. Bacterial and enzymatic spoilage is the most important at this stage. Bacteria present on the surface and in the guts of the dead fish multiply rapidly, invading the flesh. By the time there is evidence of slim on the skin and an unpleasant smell, it is too late to take any preventing action. At ambient tropical temperatures, fresh whole fish is rendered inedible within twelve hours (FAO, 1981). Removing the guts and disposing of them properly will help inhibit flesh deterioration.

The longer the processor leaves the fish before processing, in conditions favourable to spoilage, the greater the losses. It is quite common to see 'ripe' fish, which was intended, to sale in a fresh form being processed as a last resort. Additionally, moist fish is susceptible to damage by blowflies, specially their larvae. Insanitary conditions on or near beaches, where the bulk of the catch is landed are excellent breeding grounds for blowflies. The adult flies will not lay eggs on fish, which have been adequately dried, and efficient processing will therefore help prevent this type of spoilage.

Traditional drying is often rudimentary and good hygiene is rarely practised. During the rainy season, when humidity levels are high, sufficient drying cannot be achieved using traditional methods. In such conditions, stored dried fish will also re-absorb moisture and become susceptible to bacterial, fungal or insect attack.

Losses may also result during storage from attack by animal pests, which can gain access. In such cases, attention must be paid to the adequacy of protection for stored fish. Further losses occur during transport and distribution to inland markets, mainly due to physical deterioration of the fish. This may be brought about directly or indirectly by incorrect handling techniques, inadequate packaging materials offering little protection and poor processing techniques. An effective approach for increasing the amount of fish available for consumption is to minimize these substantial post-harvest losses. Now that fish resources are frequently over-exploited, there is increasing emphasis on upgrading post-harvest technologies.

Traditional marketing channels can be complex social systems, not only in distribution patterns but also in the roles played by men and women.

The location of the fishing ground in relation to the markets may determine the proportions of fresh to processed fish for sale. With no ice refrigeration facilities available to artisan fish processors and in order to sell the fresh fish before it is spoiled, distribution is limited to markets within easy access. For distant markets or those to which access is difficult, the fish is preserved by traditional processing techniques such as salting, drying and smoking. Taking into consideration poor infrastructure and limited transport facilities, traditional fish processing is often the only option. Unfortunately, in areas where fresh fish is a more desirable commodity, artisan fish processors, with their less popular dried products, may face fierce competition from large-scale fish processors who have access to refrigeration and transport facilities.

Fish processors are not only limited by their traditional methods and by economic pressures, but also by the variable nature of fish supplies. The amount of locally exploitable fish may change due to seasonal fluctuations in fish movements and availability, man-made environmental changes or changes in climatic conditions. In addition, adverse weather, for example the monsoon, may make fishing too difficult. Fishermen may also have other seasonal occupations such as farming, which interfere with their fishing activity.

Bangladesh is abundant in water resources and the rainfall and upstream water flow is high in the country due to monsoon. The fresh water from the river and inland region flow into the Bay of Bengal through innumerable rivers making it a large sanctuary for fish and aquatic species. The fishermen communities in the coastal region of Bangladesh provide the necessary fish and animal protein for the people of the country. They work in the Bay of Bengal day and night in rain, wind and during the bad weather like storms and cyclones, yet they are still poor. These fishermen live in the coastal districts of Bangladesh e.g. Khulna, Sathkhira, Bagerhat, Noakhali, Barisal, Patuakhali, Lakhapur, Chittagong, Cox's Bazar and the off shore islands.

Population pressures and inadequate infrastructure is the main cause for the growth of fishermen communities in the coastal areas. The Hindus of the country were fishermen by generation. Traditionally, the Hindus were fishermen by profession from time immemorial but the new entrants are mainly the poor Muslim communities. A number of traditional and social practices of the Hindus are related with the trade. Contrarily, the fish catching and trading activities of the Muslim is not much rooted as an old-age tradition. Therefore, particular cultural traits are not found among the Muslims. Some other important causes for increase in the population of the coastal fishermen community is river erosion, land-lessness and persistent poverty. Fragmentation of cultivable land is throwing more and more family out of the land. Consequently, subsistence fishing in rivers, estuaries or in the seas have become the last resort of the rootless people.

Fisheries provide livelihood to about 12 million people of the country, directly or indirectly. This figure is about 12% of the total population of the country (Sikdar, 1999). But the irony is that the 12 million strong fisherfolk of Bangladesh are the poorest people (Chowdhury, 1994). Fishermen are the main forces behind harnessing the enormous fishery resources which have contributed 5% to GDP, 16.7% national income, 10% foreign exchange earning and 16.8% agricultural production (Rab, 1999). Fish has provided 60% animal protein to human (Amin, 1998). The role of fisheries in the economy of the country is indeed highly significant in supplying nutritional benefit to the people of the country, providing employment and earning foreign currency.

A large number of people, especially the poor in the rural coastal regions are engaged in artisan fishing in the sea and estuary of the Bay of Bengal (Hasan, 2001). This research is about such a fishermen community of a remote coastal area of the country. These fishermen communities often live in sparsely populated remote coastal zones. Their main livelihood is fishing in the Bay of Bengal using traditional methods and techniques throughout the year. These coastal communities are very inaccessible for communication by road, rail and water transport from major urban centres of Bangladesh

Kolapara upazila of Latachapali Union under the district of Patuakhali represent such a remote coastal area situated in the southwestern region of Bangladesh. This research takes Kolapara upazila popularly known by many as Kuakata, a beautiful sea beach on the Bay of Bengal and is inhabited by a group of fishermen community both local and ethnic (Rakhain Tribe) in origin. Kolapara is located at a distance of 93 kilometers from the district headquarters of Patuakhali. It lies between 21° 48' and 22° 05' north latitude and 90° 05' and 90° 20' east longitude. It is bounded by Amtali upazila in the north, in the south by the Bay of Bengal, in the east by Galachipa upazila and in the west by Amtali upazila.

The investigation focused on the fisheries activities of the fishermen community through field investigation as well as on the quality aspect of dried fish through laboratory analyses.

#### **Broad objectives of the present study were:**

1. To research, describe and analyze from the perspective of poor fisher folk, the present method of fish preservation, processing and marketing in the fishing communities of the study area.
2. To do laboratory analyses of some selected important fresh and processed species collected from the study area.

Specific objectives of the field investigation were:

- a. **To identify the total** villages of the study area.
- b. To identify the **fishermen villages** of the study area.
- c. To identify and investigate the **shutki points** and **shutki mahal** in the study area.
- d. To collect various information on **fish preservation and processing activities** of fishermen.
- e. To collect various information on **fisheries activities** of fishermen.
- f. To identify the **fish landing centers, fresh arots and local fish markets** and to investigate them in detailed.

- g. To identify the **shrimp fry collection** area and study on fry collectors.
- h. To identify the **marketing systems** of different fish product
- i. To study the **daily fish consumption** level.
- j. To identify the different **credit sources**.
- k. To make **suggestion** for improving the fisheries activities

Specific objectives of the laboratory were to examine:

- ◆ **organoleptic** parameters (colour, odour, texture, appearance, eye, gill etc.) of dried and fresh fish
- ◆ **microbiological** parameters (Standard Plate Count, Total Coliform, Faecal Coliform, *Salmonella* and *Virio sp.*) of both dried and fresh fish
- ◆ **biochemical** parameters (proximate composition, TVB-N, TMA-N and pH)
- ◆ water reconstitution rate