



Chapter 1

Introduction

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“Give a man a fish and he will eat for one day; teach him how to fish and he eats for a life time”

-Henry David Thoreau

1.1 INTRODUCTION

Fish farming (culture), also called pisciculture is the principal form of aquaculture. It involves raising fish commercially in tanks or enclosures, usually for food. The discipline of Fisheries and Aquaculture is science, art, business rolled into one. It is science as far as the techniques of fish breeding and production are concerned; an art as far as managing the work skillfully is concerned and a business as far as trading in fish and other aquatic products is concerned. Fishery is the occupation or industry of catching, processing or selling fish or shell fish. Fish farming offers an alternative solution to the increasing market demand for fish and fish protein. Fish farming consists of all the activities from raising of fishes to marketing of fishes through human efforts. In particular, it includes fish seed stocking, rearing, harvesting and marketing of fish raised in freshwater (ponds/tanks) and brackish water. Fish culture in tanks, though in a limited scale, has been practiced in India since as early as 350BC (Nigam, 1997). India rank third among the largest producers of fish in the world. This is growing by leaps and bounds and has considerable employment opportunities. Fish are cultured for several economic values. As a source of human food, the importance of food is as old as human civilization.

Increase in production is one of the basic concerns under different plan period of National Policy. As per the scientific policy of Government of India, the need of our country is to utilize the resources potentials for enhancing the economic development of the country. This will result in increase of per capita income, per capita production, per capita consumption and better socio-economic condition of the people and will able to reduce malnutrition and



vulnerability (Rath, 2000). The fisheries economist attempts to analyse the fisheries as industries, often linked together through the interaction of fish in the sea and a sharing of processing and transportation facilities of the land (Neher, 1990). If we treat fisheries as an industry, the main benefits derived from it are nutritional and food, income, employment, infrastructure rescue and defence services. Fisheries resources are naturally living and self renewing in nature.

Fisheries are cold-blooded aquatic vertebrates which breathe by means of pharyngeal gills, propelling and balancing themselves by means of fins (Jhingran, 1991). (Hickling, 1962) has defined fishes are the most numerous of the vertebrate phylum. Some have defined fish as most efficient among farm animals in converting feed into nutritious food and (Lone, 1988) has described aquaculture as an underwater agriculture (ct. Rath, 2000). Fish is one of the first forms of evolutionarily higher life to appear in water, is among the earliest vertebrates. It was, therefore, regarded as one of the treasures of water.

The vast and varied fisheries resources of India belong to fresh waters (lakes, reservoirs, rivers, beels, tank, ponds, etc.), brackishwater (estuaries, a large number of lagoons, backwater impoundment, and vast area of mangrove swamps containing tidal waters) and marine water. These water resources sustain three categories of fisheries depending upon the adopted system of management. They are capture fisheries, culture fisheries and culture-based capture fisheries. In capture fisheries, fishing is undertaken mostly in sea waters, river systems, estuaries, irrigation canals, reservoirs and big lakes, etc. While capture fishing from rivers, canals and lakes provides freshwater fishes, the estuaries water provide fresh as well as marine fishes and the sea water capture fishing provides marine fishes. In capture fisheries, human intervention mostly comes only at the time of harvest where man has only to reap without having sown.

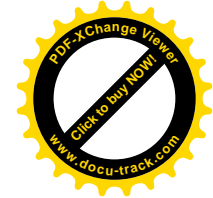


Culture fishery is mainly done in freshwater ponds, tanks and brackish waters. In this type of fisheries, human involvement is very high right from management of water resources and fish seed production to fish harvesting. In this system, fish seed has to be sown, tended and nursed, reared and finally harvested when grown to table size fish in relatively smaller water bodies. Most of the independent factors are well known in culture fisheries and by proper manipulation of these factors the productivity of a particular water bodies can be maximized.

Culture-based capture fisheries is a combination of both culture and capture fisheries and generally adopted for reservoir fisheries. Reservoir fisheries are created by impounding waters from rivers for irrigation, power generation, flood control and other industrial requirements, they are mainly rivers fed. Hence some of fish seed are sown by the nature itself. In this type of fisheries, some of the fisheries independents factors are known and can be controlled.

India is endowed with vast open large water bodies and small closed waters. These waters have multiple uses, ownerships and stakeholders. At times, these constraints in adoption of technologies for realising the full potentials of the waters and result in low levels of fish production. Therefore, concerns of property regime, over exploitation of natural fish stocks, ecosystem degradation, economic losses, etc., require immediate attention. The multiple ownerships of such water bodies for sustainable exploitation of fish stocks can be achieved through community participation and co-management. It is also high time to implement the code of conduct for responsible fisheries (Planning Commission, Government of India, 2006).

In inland fisheries, whether capture or culture, the yield gaps are significant and need to be filled in order to realize the full potentials. Besides enhancing the fish production, production activities can be diversified through integration with agriculture and allied sectors. It will help in optimizing the water productivity using these farming systems and utilization of canal systems; water logged



waste lands and derelict waters. In case of aquaculture, scope exists for bringing more candidate fish species under the umbrella of aquaculture, both in fresh and brackish waters with a focus on food fish, high value species, ornamental species and those with potentials for sport and tourism (Planning Commission, Government of India, 2006).

India has a strong traditional wisdom and know-how in different aspects of fisheries and aquaculture. While the programmes could benefit greatly by harnessing these, it is also imperative that there should be active community participation for their successful implementation (Planning Commission, Government of India, 2006).

Traditionally, women have played an important role in the fisheries sector, with much of the post-harvest handling, processing and marketing being carried out by them. Therefore, women need special attention to improve their role and status, particularly, in case of small-scale fisheries, co-operatives, training, awareness-raising, savings and credit schemes, planning, implementing and promotion of alternative income generating strategies.

1.1 AN OVERVIEW OF WORLD FISHERIES AND AQUACULTURE

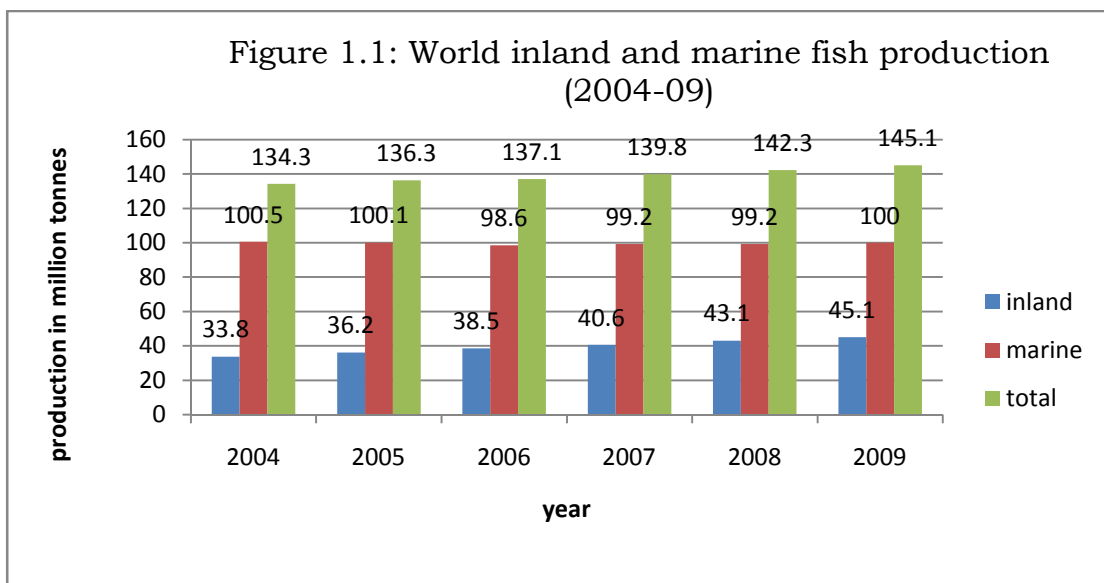
World Fish production:

Capture fisheries and aquaculture supplied the world with about 142 million tonnes of fish in 2008. Of this, 115 million tonnes was used as human food, providing an estimated apparent per capita supply of about 17 kg (live weight equivalent), which is an all-time high. China remains by far the largest fish-producing country; with production of 47.5 million tonnes in 2008 (32.7 million tonnes from aquaculture and 14.8 million tonnes from capture fisheries).

Despite the long tradition of aquaculture practices in a few countries over many centuries, aquaculture in the global context is a young food production sector that has grown rapidly in the last 50 years. Aquaculture continues to be the fastest-growing animal-food-



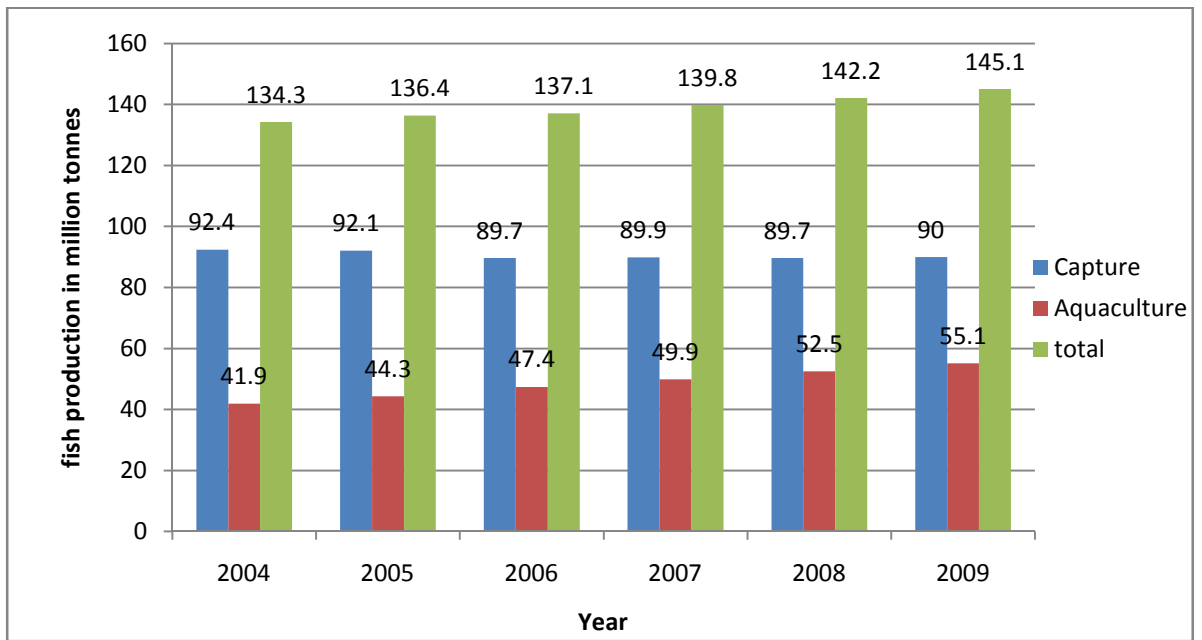
producing sector for high protein food and to outpace population growth. It is set to overtake capture fisheries as a source of food fish as shown in figure 1.2. While aquaculture production (excluding aquatic plants) for human consumption was 41.9 million tonnes per year in 2004, production in 2008 was 52.5 million tonnes, with a value of US\$98.4 billion. The actual total output value from the entire aquaculture sector should be significantly higher than this level, because the value of aquaculture hatchery and nursery production and that of the breeding of ornamental fishes are not included. The contribution of aquaculture to the total production of capture fisheries and aquaculture continued to grow, rising from 34.5 percent in 2006 to 36.9 percent in 2008. Production from aquaculture is mostly destined for human consumption. Globally, aquaculture accounted for 45.7 percent of the world's fish food production for human consumption in 2008, up from 42.6 percent in 2006. Global capture fisheries production in 2008 was about 90 million tons, with an estimated sale value of US\$ 93.9 billion, comprising about 80 million tonnes from marine water. Global inland capture fisheries production showed an overall increase of 1.6 million tonnes from 2004, reaching 10.2 million tonnes in 2008.



Source: FAO, The State of World Fisheries and Aquaculture, 2006 & 2010.



Figure 1.2: World Capture and Aquaculture production (2004-09)



Source: FAO, The State of World Fisheries and Aquaculture, 2006 & 2010.

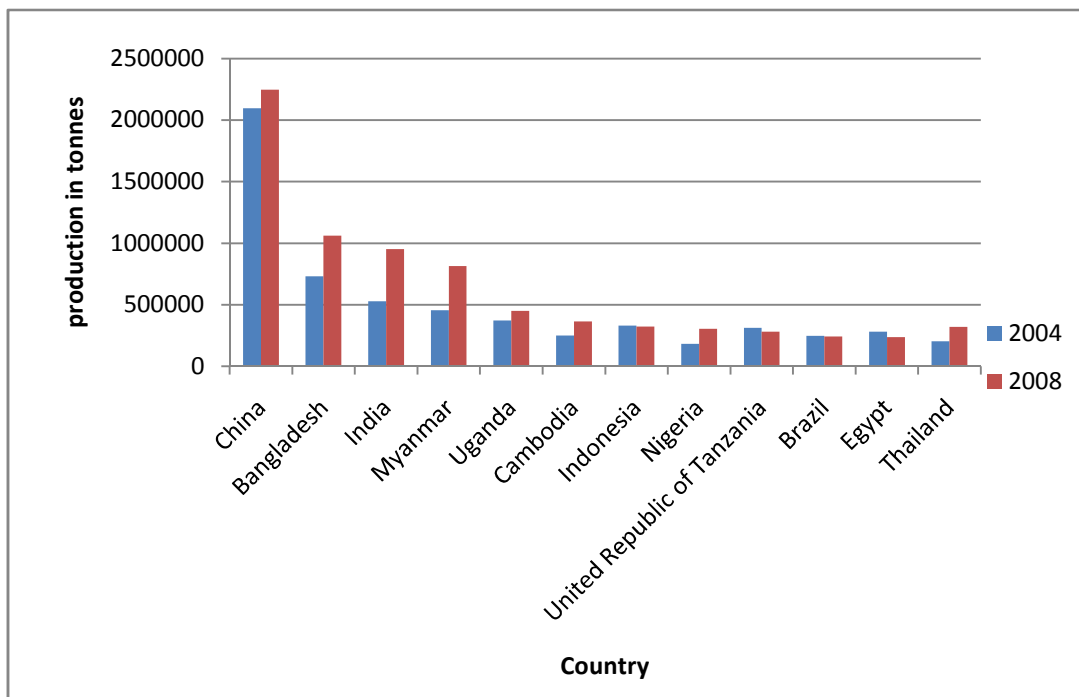
Fishers and fish farmers

The fish sector is a source of income and livelihood for millions of people around the world. Employment in fisheries and aquaculture has grown substantially. According to (FAO, 2010) it is estimated that, in 2008, 44.9 million people (represented 3.5 percent of the 1.3 billion people economically active in the broad agriculture sector worldwide) were directly engaged, full time or, more frequently, part time, in capture fisheries or in aquaculture and at least 12 percent of these were women. It is also estimated that, for each person employed in capture fisheries and aquaculture production, about three jobs are produced in secondary activities, including post-harvest, for a total of more than 180 million jobs in the whole of the fish industry. Thus, the primary and secondary sectors support the livelihoods of a total of about 540 million people, or 8.0 percent of the world population. Employment in the fisheries sector has grown faster than the world's population and then employment in traditional agriculture. In 2008, 85.5% of fishers and fish farmers were in Asia, followed by Africa (9.3 %), Latin America and the Caribbean (2.9 %), Europe (1.0%), North



America (0.7%) and Oceania (0.1 %). China is the country with the highest number of fishers and fish farmers, representing nearly one-third of the world total. In 2008, 13.3 million people were employed as fishers and fish farmers in China, of whom 8.5 million people were full time. In 2008, other countries with a relatively high number of fishers and fish farmers were India and Indonesia. Fishers are often employed in marine and inland waters as part time or as an occasional occupation. In 2008, in addition to the estimated 45 million part-time and full-time fishers, about 6 million occasional fishers and fish farmers were reported to FAO (of whom 2.8 million in India and 1.2 million in China). Among the main reasons explaining this phenomenon are: the variation in seasonal resource availability, seasonal weather fluctuations, limits on year-round activity or on the number of commercial licences and the number of fish caught per trip. Increasingly, operators have to turn to other activities for supplementary income.

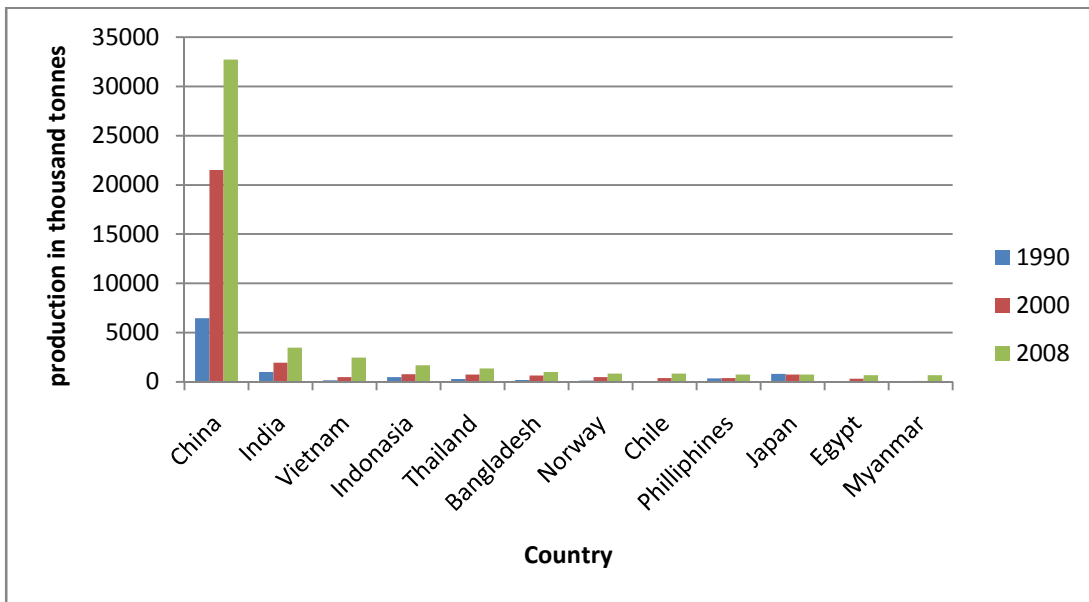
Figure 1.3: Major producer countries of inland capture fisheries



Source: FAO, The State of World Fisheries and Aquaculture, 2006 & 2010.



Figure 1.4: Aquaculture producers Countries



Source: FAO, The State of World Fisheries and Aquaculture, 2006 & 2010.

Fish Utilization and Processing

Fisheries production is rather diversified where species and product forms are concerned. As a highly perishable commodity, fish has specific requirements and a significant capacity for processing. The many options for preparing fish allow for a wide range of presentations, making fish a very versatile food commodity. It is generally distributed as live, fresh, chilled, frozen, heat-treated, fermented, dried, smoked, salted, pickled, boiled, fried, freeze-dried, minced, powdered or canned, or as a combination of two or more of these forms. However, fish can also be preserved by many other methods.

According to Food and Agriculture Organization (FAO), 2010 report on The State of World Fisheries and Aquaculture is found that in 2008, nearly 81 percent (115 million tonnes) of world fish production was destined for human consumption, while the rest (27 million tonnes) was used for nonfood purposes such as fishmeal and fish oil (20.8 million tonnes), culture, bait, and pharmaceutical uses as well as for direct feeding in aquaculture and for fur animals. In



2008, 39.7 percent (56.5 million tonnes) of world fish production was marketed as fresh, while 41.2 percent (58.6 million tonnes) of fish was frozen, cured or otherwise prepared for direct human consumption. This tendency has come about as more fish is used as food and less for producing fishmeal and fish oil. The utilization of fish and, more significantly, the processing methods vary according to the continent, region, and nation and within country.

The fish industry is dynamic by nature and in the last two decades the utilization and processing of fish production have diversified significantly, particularly into high-value fresh and processed products, fuelled by changing consumer tastes and advances in technology, packaging, logistics and transport. Processing is becoming more intensive, geographically concentrated, vertically integrated and linked with global supply chains. These changes reflect the increasing globalization of the fisheries value chain, with the growth of international distribution channels controlled by large retailers. More and more producers in developing countries are being linked with, and coordinated by, firms located abroad. The increasing practice of outsourcing processing at the regional and world levels is very significant, its extent depending on the species, product form, and cost of labour and transportation. For example, whole fish from European and North American markets are sent to Asia (China in particular, but also India and Viet Nam) for filleting and packaging, and then re-imported.

Trade and consumption

Fish and fishery products are highly traded. They have long been commercialized, and in the period 1976–2008 the fishery trade grew significantly, at an average annual rate of increase of 8.3 percent in value terms. This rise was aided by structural changes in the fishery sector, including the growing globalization of the fisheries and aquaculture value chain, and by the outsourcing of processing to countries where comparatively low wages and production costs



provide a competitive advantage. Improvements in processing, packaging, transportation and changes in distribution and marketing significantly changed the way fishery products were prepared, marketed and delivered to consumers.

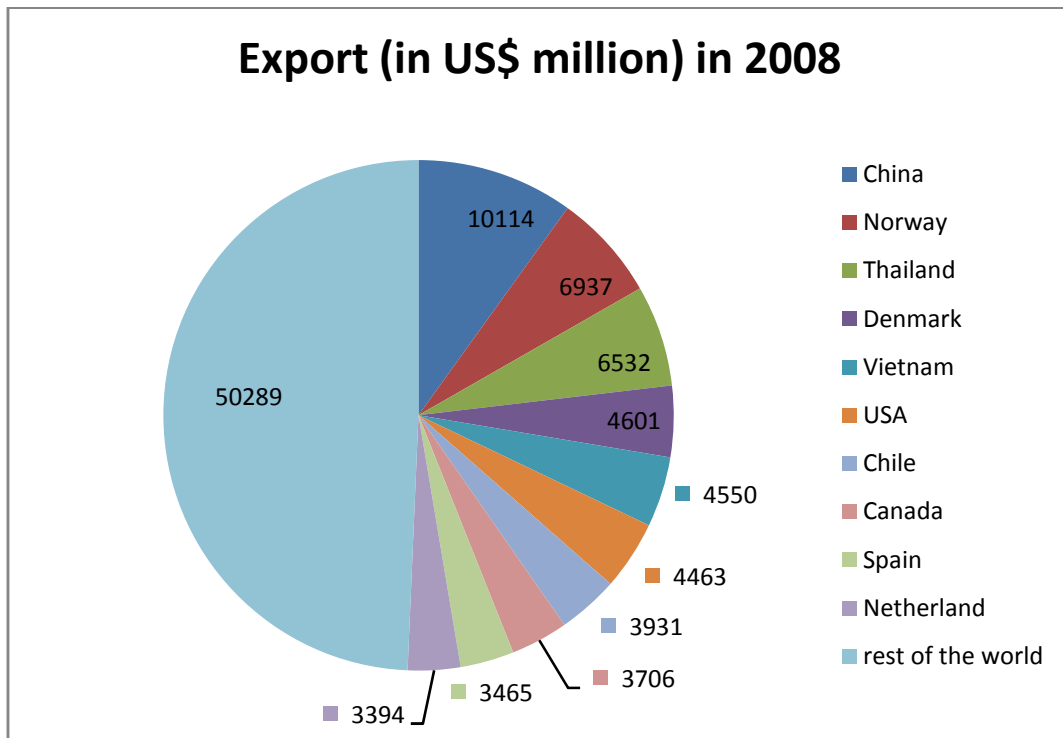
Trade in fish and fishery products is characterized by a wide range of product types and participants. In 2008, 197 countries reported exports of fish and fishery products. The role of fishery trade varies among countries and is important for many economies, in particular for developing nations. Trade in fish represents a significant source of foreign currency earnings, in addition to the sector's important role in employment, income generation and food security

In 2008, exports of fish and fishery products reached a record of US\$102.0 billion, 9 percent higher than 2007, nearly doubling the US\$51.5 billion corresponding value in 1998.

China, Norway and Thailand are the top three fish exporters. Since 2002, China has been by far the leading fish exporter, contributing almost 10 percent of 2008 world exports of fish and fishery products, or about US\$10.1 billion. Developing countries, in particular China, Thailand and Vietnam, accounted for 80 percent of world fishery production in 2008 with their exports accounting for 50 percent (US\$50.8 billion) of world exports of fish and fishery products in value terms.

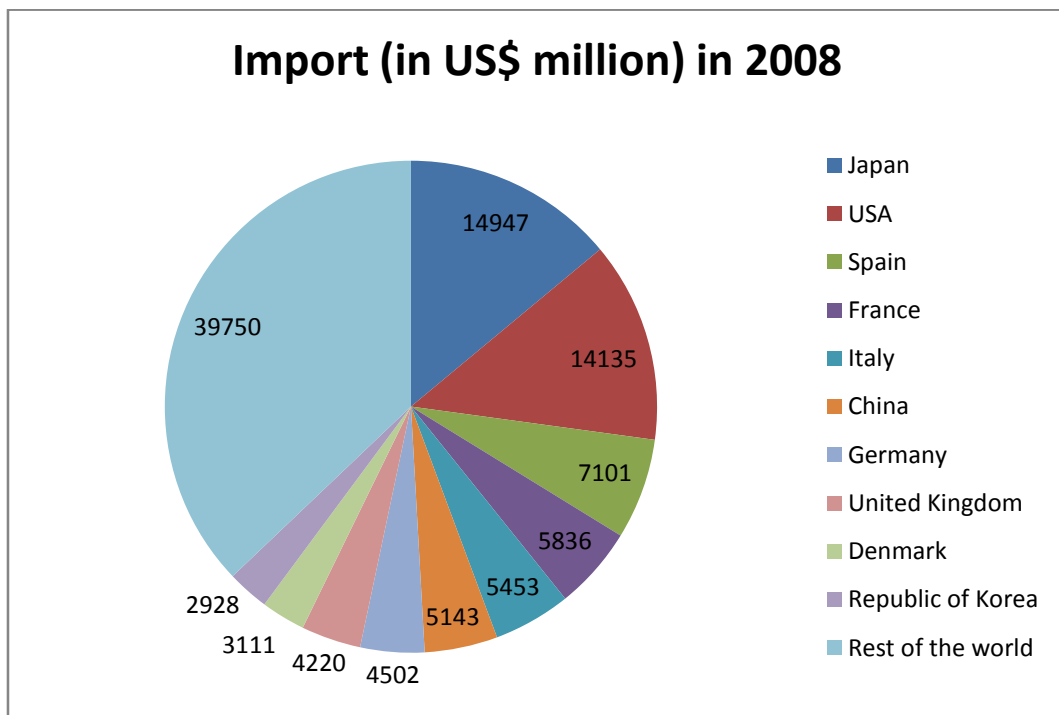
World imports of fish and fish products reached the new record of US\$107.1 billion in 2008, growing by 9 % compared with previous year. Japan, the United States of America and the European Union (EU) are the major markets, with a total share of about 69 percent in 2008. Japan is the world's largest single national importer of fish and fishery products, with imports valued at US\$14.9 billion in 2008. The following table 1.5 and 1.6 shows the main exporter and importer of fish and fisheries products.

Figure 1.5: Exporters of fish and fisheries products



Source: FAO, The State of World Fisheries and Aquaculture, 2006 & 2010.

Figure 1.6: Importers of fish and fisheries products



Source: FAO, The State of World Fisheries and Aquaculture, 2006 & 2010.



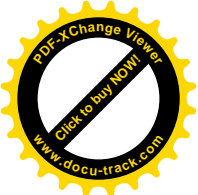
World Fish Consumption

The fishery sector plays a key role in food security, not only for subsistence and small scale fishers who rely directly on fishery for food, incomes and services, but also for consumers who benefit from an excellent source of affordable high-quality animal protein. Fish is also a source of essential micronutrients, including various vitamins and minerals. With a few exceptions for selected species, fish is usually low in saturated fats, carbohydrates and cholesterol. In 2007, fish accounted for 15.7 percent of the global population's intake of animal protein and 6.1 percent of all protein consumed. In terms of a world average, the contribution of fish to calories is rather low at 30.5 calories per capita per day in 2007. However, it can reach 170 calories per capita per day in countries where there is a lack of alternative protein food and where a preference for fish has been developed and maintained (e.g. Iceland, Japan and several small island states).

Health and well-being are among other factors increasingly influencing consumption decisions. Fish has a particular prominence in this respect, following mounting evidence confirming the health benefits of eating fish.

1.3 STATEMENT OF THE PROBLEM

Fish farming is an old age occupation in the country. It has progressed from stocking and harvesting of single species to composite culture like pen culture, cage culture, etc. Some studies have been conducted in this regard in India but a very few has been conducted in Manipur. There is a huge potential of fish farming or cultivation in the state which is still yet to be exploited. Manipur has 56,461.05 hectares of the total area of water and only about 15,000 hectare of water which constitute about 27% of the total water resources have been brought under fish culture. In most of the cases, fish cultivation is under taken to meet the domestic demand whatever little surplus is left out is sold in the market. Commercial cultivation

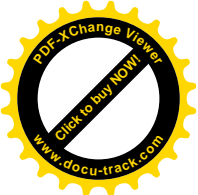


of fish, although undertaken by the farmers in Manipur is not up to the expected level to meet the demand of fish in the state of Manipur. The government is trying to develop fish farming in the state by launching various programmes of fish farming like fishery extension, training, research etc. however despite the efforts made by the government the production of fish in the state are yet to increase upto the desired level. Therefore attention should be given by policy makers so as to increase the production and hence increase employment opportunities.

The present study throws light on the problems and prospects of fish farming in Manipur. The most important problems of fish farmers like problems of finance, marketing and other infrastructural problems are also studied for the purpose of taking necessary steps for improvement of fish production and also the productivity of fish farming in Manipur. The finding will help the decision makers like government, banks and fish farmers and other interested individuals and groups in developing suitable strategies for sustainable fish farming in Manipur to meet the demand not only for the state but also for the neighboring states.

1.4 REVIEW OF LITERATURE

The purpose of this section is to have an assessment of the current literature relating to fish farming in general and business aspect in particular. Much of the literatures are either narrative or explanatory of the process of fisheries development and the importance of fish farming in the rural area. The major part of the literature is the outcome of work and programme of FAO and independents studies made by different researchers in different aspects of fisheries development is also available at present. The literature is divided into two categories viz., national and international studies.



Categories I: International Based Studies

Davies and Sakiamolo (1975) in their summary of the report on “Fish Open World Conference on Cooperative Fisheries” conclude that cooperatives are the agencies best suited for fisher development and that aid to fishermen should be channeled through cooperative organizations.

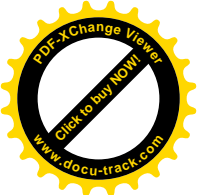
Pollnac (1976) has examined gender division of labour in fishing. In some fishing communities females take over the function of buying and selling of fish, which keep some more profits within the families. He states that since males may fish only intermittently, the females can work year round.

Gerking (1977) has made a study on a global food potential of freshwater fish. The study indicated that freshwater fish can significantly supplement the world’s supply of dietary protein.

Nurujjaman (1998) in the article named fish to alleviate malnutrition stated that fisheries could make a longer contribution to the alleviation of malnutrition in Bangladesh in three major interacting phases of production (catching and cultivation), processing and distribution. Fisheries development policies do not explicitly promote fish consumption or take nutrition objectives into account therefore there is a need to evolve strategies to intensify fish culture programme all over the country as livelihood project and to reduce prices by increasing supplies, and policies to increase income and employment opportunities.

Elhendy (2000) has examined economics of developing traditional fisheries sector production at Saudi Arabia. The study revealed that the number of fishing efforts has more impact on fishing yield north of Red Sea than at the middle section. The study also revealed that the small traditional boat is more efficient than the large one in using trap fishing method, where the production elasticity are 2.09 and 1.13 respectively.

Hussian (2003) has also made a case study on market intermediaries and their marketing margin for inland fish in Lahore



district. The study indicated that share of marketing intermediaries in the consumer's rupee is substantial and there is need to increase the government shops to reduce the marketing margins and thereby to enhance the producer income. Sarker (2006) has made a case study on the entrepreneurs barriers of pond fish culture in Bangladesh in Mymensingh District. The study has revealed that ponds fish culture has some potential barriers like lack of technical knowledge on pond management, unavailability of credit and poor extension service and lack of information, and lack of quality fish fry and fingerlings. Ali (2008) has made an economic analysis of fresh fish marketing in Maiduguri Gaboru market Kachallari Alua Dam landing site of Northeastern part of Nigeria. The study has also revealed that fish marketing is a lucrative business if well managed.

Dey (2005) studied the pattern of fish consumption and Food Security in selected Asian countries and found that fish consumption varies widely with economic position of the households, in terms both per capita consumption increases in income. The share of fish protein in total animal protein expenditure is higher for lower income groups; per capita fish consumption is substantially higher in rural areas than in urban areas.

Abbott (2007) has made a study on market resource links and fish vendor livelihoods in the upper Zambezi River Floodplain. The study depicted that most vendor come from fishing households, but their stock is often an accumulation of purchases from other fishers and there is little evidence of formal arrangement between fishers and vendors. The study also indicated that fisheries management must be developed with a careful understanding of how changes in access and use will affect vending livelihoods.

U.,U., Garbriel (2007) studied on the economic benefit and ecological efficiency of integrated fish farming in Nigeria and the study depicted that integrated fish farming is more profitable than unitary system of fish farming as it ensures a spread of financial risk for its varied and financial risk for its varied and diversified nature in rearing



of fish, animals and crops the study also point out the importance of linkages between aquaculture and the environment.

Nabi (2008) studied on constraints to the adoption of rice-fish farming by small holders in Bangladesh and found that in spite of its potential, the adoption of rice-fish farming among small holders in Bangladesh is low. Rice-fish technology is not structured and is adopted by only those who are better placed to assume the risks. This will accelerate only when policy makers acknowledge its constraints and structure extension services accordingly.

Emokaro (2009) has examined the efficiency of resource use and elasticity of production among catfish farmers in Kaduna, Nigeria. It was shown in the study that catfish farmers in Kaduna were not efficient in their use of production resources. Labour and fingerlings were underutilized while pond size and feeds were over utilized.

Categories II: National Based Studies

Kurien (1978) has made a study on the impact on fish economy by the entry of big business into fishing. The study stated that the current involvement of Indian and foreign big business in Indian fishing is in fact the logical extension of trends that was set in motion in the fish economy, with their emphasis on modernization and capital intensive technology.

Singh and Samphath (1983) studied on the role of financial institutions in development of integrated Fish Farming in India and revealed that the inland fisheries development activities in the country has completely changed and fish farming requires sufficient investment. Since most of the farmers belong to poorer sections of the society, it requires huge financial institutions as well as government organizations for intensive fish farming for self sufficiency of inland fish production from small water holdings through self employment of rural youth.

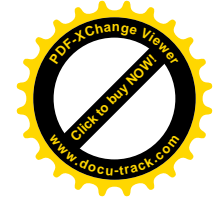


Singh (1983) highlighted the discussion on demand, supply and strategies for fish marketing. The discussion made a conclusion that there was a huge gap in the demand-supply of fish. To estimate the demand for fish, the factors affecting demand and the length of period for which the estimates be made should be studied in more detail. It was concluded that there was an immediate need for development and marketing of fish in view of a large demand-supply gap.

Gupta (1983) study revealed that in India, fish farming is subject to constant returns to scale, production technology is far from the optimum – in particular, organic fertilizer is excessively applied while inorganic fertilizer is scarcely used, application of the optimum production technique would reduce the production cost by about 33% and raise the profit rate by about three times at the current yield rate of 828 kg./hectare, and if fish farming is attempted to achieve the maximum possible profit/hectare, the yield rate would multiply by about three times and the profit rate by over six times.

Indian institute of management (IIM), Ahmadabad (1984) studied on the marketing of inland fisheries in India. It studied the available resources of inland fisheries in India. Study shows that there is a wide gap between demand-supply of fish. To meet this demand, maritime catch was expected to contribute no more than the half of this demand. Therefore the balance has to come from the inland fisheries sector. The studies show that the inland fish marketing system in India consists of several sub-systems viz marketing structure, the infrastructure facilities to fisher folks/farmers, transport, intermediaries, commission agents, and other linkage of credit-marketing structure.

Srivastava (1983) in his paper an attempt has been made to analyze the marketing pattern (use flows, physical flows, channel flows and fishermen's share in consumer rupee) of fresh water fishes and to summarize the key areas for action to improve the marketing system and farmer's share in consumer rupee.



Misra (1987) in his book Fisheries in India has revealed that poaching acts as a major constraint leading to poor performance of fish production particularly in West Bengal tanks and ponds. Other problems like lack of proper transportation facility, suitable marketing management are also identified.

Chattopadhyay (1987) in his study on problems and prospect of pisciculture discussed various institutional, technical and financial factors which are found detrimental to smooth functioning and increasing fish production in Birbhum district of West Bengal.

Ramana (1990) in their study have attempted to identify various marketing channels of fish and work out marketing costs and margins for different varieties of fish and studied the economies of conversion of fresh fish into dry fish. The study identified three different marketing channels.

Singh (1990) has made a study on the economics of fishing Industry in Manipur. The study highlights the important of fish in the families of Manipur and also assess the level of fish production and feasibility of the various programmes taken up by the government.

Ghosh (1991) points out that the various development programmes in the Kerala's inland fisheries are formulated on the basis of obsolete data and due to this basic draw backs; most of them fail to accomplish their targets. The paper gives a detailed account of both the traditional and modern devices used in inland fishing in various parts of the state.

Prakash (1991) made an attempt to study the economics of inland fish culture in west Godavari of Andhra Pradesh. Shortages of feed and high feed prices were the common problems of all categories of fish farmers and are responsible for the high cost of farming. The study further reveals that fish farming is a male dominated occupation.

Sebastian (1991) analyzed the area and diversity of available water resources in Kerala along with the problems in inland fishing and fish marketing in the state. According to his study, over fishing



and environmental changes leave adversely affected the available of many wild fishes in the state. Syam and Tripathy (1992) analyzed the experience of a village in Bhubaneswar of Orissa under composite fish culture. The experience of this village shows that aquaculture diversified in many ways is capable of contributing significantly towards a qualitative shift in the socio- economic status of the poor by enlarging the scope of self employment.

Singh (1995) has made a case study on the production and marketing of inland fish in Samastipur. The study has revealed that the process of production and marketing is not properly organised and there is no proper infrastructural facilities for production and marketing of fish.

Moorti and Chauhan (1996) studied on cooperative management of Reservoir fisheries of the pong dam reservoir in Himachal Pradesh. The study found that the number of fisheries cooperative societies and their membership had increased significantly over the period, 1980-1981 to 1990-91. The major share of the consumer's rupee goes to the producer/fisherman (52.43%) followed by wholeseller/contractor (12%) and the retailer (10%). The study also shows that the fishery cooperatives have been successful because they have been collecting and marketing of fish in the area.

Singh and Choudhury (1996) performed a case study on the Captain Bhery Fishermen's Cooperative Society in West Bengal. The study said that this cooperative has been successful in terms of both the average yield of fish per hectare of water as well in terms of its impact on the economic well being of its members and the non members working for it. This has been possible due to the active financial, technical and administrative support extended to it by the directorate of fisheries, the state government and the loyalty of its members who are both the employers as well the employees.

Shyam (1998) in the article status of fisheries in India stated that all-round development in agriculture and aquaculture, providing nutritious proteinous food is pre-requisite. There is wide gap of



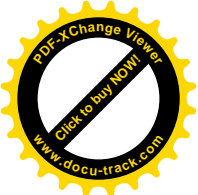
demand-supply of fish. India has already upgraded traditional aquaculture system supported with a strong base of modern scientific aquaculture. Fisheries would not only help in mitigating the food problem but also ensure judicious utilization of water resources for optimum fish production, generation of large scale employment, particularly improvement in the quality of life of rural poor and earning foreign exchange.

Rao (1998) studied on the investment pattern for aquaculture farms and stated that criteria for investment in aquaculture farms should be based not on economic management but also on the fisheries aspects of management. A talented farmer has to acquire understanding of all problems including the risk factors as well as the maintenance of accounts and records. Above all his ability to discern between the wrong and right decisions would enable him to make his farm a success.

Rao and Chowdary (1988) the study presents marketing costs and margins received by the producers at different local markets in Andhra Pradesh and West Bengal. The study discusses marketing cost incurred on packing material, labour, transport, commission, discount etc. by the middlemen both in the local markets and Howrah markets and % share of different varieties of fish. The study also attempts to discuss the marketing costs to find the share of various functionaries in consumer's rupee.

Srivastava (1999) study aimed at examining the present status of aquaculture in India, economies of both brackish water and fresh water aquaculture products. According to the study marketing is the most essential and important link in the success of aquaculture, but it is the most neglected activity. There is also lack of marketing infrastructure in the country.

Shobhana (2001) discussed the nature of the fish processing industry in India, focusing on issues concerning the migrant women workforce. The paper discussed different issues regarding women workforce like migration and patterns of recruitment, condition and



culture of workforce, regional variations and health and safety of workers.

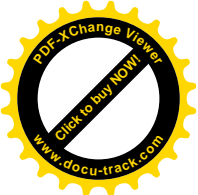
Hapke (2001) has examined the impact of mechanization and commercialization on the petty traders, gender and development in a south Indian Fishery. The women role in the in the fish economy have been overlooked, they have experienced economic marginalization at the same time that their labour has become increasing important for household survival.

Charo (2002) said that poverty alleviation and food security are primary goals in the developing world, the initiation and implementation of cheaper breeding programs will ensure that the genetically improved materials are accessible to the rural fish farmer. To fully benefit from improved breed programs, farmers should also enhance pond water quality and improve fish nutrition.

Bhatta (2003) has made a study on the trends and composition of marine fish production in Karnataka. The study argued that not only there has been a falling trend in production but also a change in species composition resulting in the decline of hitherto commercial important fish as well as those consumed by local communities and also stated that the decline is not just a seasonal fluctuation but an indication o fish famine in terms of both production and accessibility.

Kumar (2004) studies detail of the export performance on Indian fisheries. Fisheries exports have registered a tremendous growth during the period 1987-2000 and the export basket of fisheries products has become reasonably diversified. Trade reforms of 1990's seem to have further facilitated the export of fish and fish products from India and feared import surge after opening up of the economy is not still visible.

Goswami (2004) study has clearly indicated that rice fish culture is a viable, environment friendly, low cost, low risk additional economic activity with multiple benefits including increased income and greater availability of fish to rural farming community. Kujur (2005) also said that integrated pig-cum-fish farming is also a



profitable system of fish farming and it also increase the supply of animal protein and also employment among the rural people.

Kar (2005) studied on the production, marketing and constraints of fish cultivation in Haryana and found that the state of Haryana has done fairly well in promoting fish culture. The state government is encouraging inland fish cultivation by imparting training to the farmers through the state fishery department and also providing financial stipend to the trainees as incentives. Traditional method of fish farming is still prevailing. Besides production there is problem of marketing as well. A substantial amount of producers share in consumer' rupee is taken by the middlemen.

Katiha (2005) studied on economics and constraints of pen culture and fish seed raising in beels of Assam and found that the activity was economically feasible with positive benefit cost ratios. Marketing of fish plays important role in the success of fisheries operations. It becomes increasing important in the remote areas in Assam. All the fishers reported lack of transportation facility and poor roads from fishing site to local market as major problem. There is lack of ice on storage system resulting to spoilage and affecting price of fish.

Rudra and A.K (2005) studied the pattern of male, female and contact labour use in production of fish in Cooch Behar district of West Bengal. The study indicates that both average cost of production and net income per acre is highest on large size groups. The study also reveals that wage discrimination among the male, female and child labour is quite high in the study area.

Sukuraman P.K. (2005) studied on the status of fish and fisheries of river Godavari. The study found that the fisheries has drastically declined due to the continuous drought which again showed that the situation has not changed even after three decades, despite increased effort and reduction of mesh size in the catch.



Sultan S (2005) studied on commercial fisheries in Pahunj Reservoir under different Fishing Regimes. The study found that the fish yield and catch differ in different fishing regimes i.e. royalty system, quota system and free fishing regime and also reveal that free fishing regime is better for the reservoir.

Katiha (2005) studied the past trend, present status and future prospects of inland Aquaculture in India and observed that freshwater aquaculture observed tremendous growth in the past 15 years, but immense scope still exists for horizontal expansion and increases in productivity. The benefit-cost ratios for most different system of aquaculture varied from 1.22 to 1.86. The return to capital was much higher than return to labour, due to the low labour input.

Dey (2005) stated on the status and economics of fresh water aquaculture in selected countries in Asia and revealed that freshwater fish farming is generally profitable in Asian. The results of the production function analysis revealed that further used of farm based feed after a certain level of application cannot increased productivity as the law of diminishing marginal productivity sets in. Feed use is largely determined by the income and ownership status of the farmer. Provision of institutional credit and more secured access to the water bodies would help poor farmers adopt appropriate technologies.

Maiti,.Banerjee and Akbar (2005) study revealed that fishing is an important sector of economy for Andaman population as they earns their livelihood from this enterprise. Considering the importance of this sector, a rapid change has undergone to bring all round development of the area.

Goldburg (2005) has made an analysis of future seascapes, fishing and fish farming. The studt indicated that the depletion of many marine fisheries has created a new impetus to expand seafood production through fish farming, or aquaculture.

Roy (2006) made an analysis of marketing of fish fingerlings and environmental awareness level of fishermen in Dakshin Dinajpur



District of west Bengal. The study revealed that small and marginal farmers dominate the fishery and about 10% of fish farmers earn their major earning from fishing. Three to four middlemen have been noted in the existing four marketing channels. Insignificant price variation among the channels has been confirmed by low value (7.25%) of coefficient of variation (C.V). the fisherman's share to consumer price has been found to be 62.80% which is higher than other agricultural crops.

Department of Fisheries, Government of Manipur (2007) has mentioned that fish farmers play a great role in enhancing fish production in the state. With proper assistance to the fish farmers and fishermen, the production rate of table fish can be increased manifold not only to meet the requirement of the state, but also to export to the neighboring states where demand is very high.

Phazhani (2007) studied on wage and employment of fishing labourers in Tirunelveli District, Tamil Nadu and found that fish workers have no assets of their own except their own labour and also revealed that only 49.05% of the sample population is employed. The annual average income of the households comes to Rs 14,150 which is below poverty level of income. The value of Gini-coefficient (0.4954) indicates high degree of inequality in income distribution. This situation compels them to accept the conditions lay down by the owner-worker and they receive a portion of daily catch as their wage share.

Sarangi (2008) in his article, fish farming improves prospects for Kendrapada outlined the importance of pisciculture in job creating and also revealed that institute of fresh water aquaculture is doing much to encourage it. Increased aqua and pisciculture activities would aid the economy here and also help in reduce the extent of nutrition related disorders among local people.

Kumar (2008) studied on changing structure, conduct, performance and policies of domestic fish marketing in India. The total marketing costs of auctioneer, wholesaler, retailer, vendor,



marine fishermen cooperative society have been found to be Re 0.98, Rs8.89, Rs 6.61, Rs 4.50, Rs 6.00, and Rs 3.51 respectively. The marketing efficiency has been found more in the marine species than fresh water species, since the latter travel longer distances from the point of production to consumption centre. C. O.

Sharma (2010) has made a case study on the socio-economic and technological appraisal of fishermen in Narmada river basin (M.P.) the study depicted that enhancing the welfare of fisher community with equitable distribution of income and creating efficiency through proper technical and institutional services which can ensure that output caters to increasing demand in Narmada region.

Bairagya (2011) has made an analysis of profitability of fish farming in West Bengal and the study depicted that fish farming is a viable and profitable venture and also helps in generating employment among the rural people. Hishamunda (1998) also said that fish farming is a profitable business and the income generated by fish production is superior to other crops raised.

Sawant (2011) has made a study on the problems and solutions of commercialization of Fishery and aquaculture products in India. He mentioned certain strategies to make a positive start towards commercialization of fish and fish product in India.

Food and agriculture organization (FAO) United Nation made different studies and performed several activities for the upliftment of fishery sector in India. In 2000 FAO made a study on production, accessibility, marketing and consumption pattern of fresh water fish farming and the study revealed that a significant proportion of the Indian population does not eat animal protein including fish. Therefore fish produced by one state is moved to other states. At the primary market the main constraint for Indian fish farmers are lack of bargaining power and market information and barriers to enter in the market. Lack of transportation and iced facilities is also the problems faced by fish farmers' physical facilities and infrastructures in all types of market are far from satisfactory.



FAO (1987) made a study on bank credit for artisanal marine fisher folk in Orissa. Tietze (2004) made a study on the technology, economic status, social organization and cognitive patterns of marine fisher folk of Orissa. Again he (2007) made a study on credit and micro finance needs in inland capture fisheries development and conservation in Asia. Roy (1985) under BOBP performed a consultation programs on social feasibility of coastal aquaculture at madras. Under FAO fishery program, Sugunam (1997) studied on fisheries management of small water bodies in seven countries in Africa, Asia and Latin America and the study revealed that the potential of fisheries in small water bodies is often poorly realized and sometimes it is unrealized. Kurien (1980) made a critical analysis on fishermen's cooperatives in Kerala and found that during the past six decades, cooperative organizational is one of the subject most widely discussed in the area of fisheries. Yet, one of the most disappointing aspects of development programs for fishermen relates to cooperatives. FAO (1985) studied on the organization of fish marketing in madras fishing harbor and the study indicated that while the modernization of fishing technology and fish transport noticed at a large landing centre has benefited some women by way of higher earnings or new earning opportunities, it has aggravated income disparities among fisherwomen.

From the above literature survey, it is found that various studies regarding fish farming in regards of socio-economic condition, marketing, financial and important of fish farming in creating employment, income generation and also the gap between demand and supply have been conducted in India. It is found that socio economic condition of some farmers has improved due to the adoption of fish farming. And also revealed that fish farming requires huge investment and most of the farmers are poor so they need financial assistance from different organizations. Problems of marketing of fish are prevailing in most of the places in India and fish farmers also faced certain infrastructural problems like of transportation of fish,



poor road condition and storage of fish. However, a few studies have been conducted to explore the problems and prospects, mainly regarding marketing and financial problems, of fish farming in the North-Eastern part of the country and Manipur in particular. There are some studies on sustainable fisheries on Loktak Lake, economics of fishing in Manipur and production of fish farming with scientific view have been undertaken in the study area. A comprehensive study of fish farming for the entire Manipur with commercial point of view has not been undertaken. Thus, in order to address the gap that exists in this part of the country, the present study has been undertaken.

1.5 OBJECTIVES:

The main objective of the present study is to review the present status, constraints and prospects of fish farming in Manipur.

More specifically the objectives are:

1. To assess the socio-economic conditions of fish farmers in Manipur.
2. To examine the problems of finance faced by fish farmers in Manipur.
3. To analyse the problems relating to marketing of fish in the state of Manipur
4. To examine the existing infrastructural problems of fish farming in Manipur.
5. To examine the prospects of fish farming in Manipur.

1.6 HYPOTHESES:

H₀₁: There is no relationship between social factors and training.

H₀₂: There is no relationship between problems of fish farming and productivity of fish.



1.7 METHODOLOGY AND PROCEDURE

Human beings are rational. They have many problems or questions in their mind which he wants to solve it. Research methodology helps in solving it in a systematic manner. The present chapter deals with the methods adopted in conducting the present study. It includes description of the universe, procedure of sampling, and method of data collection, research design, tools and techniques of data analysis. The methodology and procedure details have been discussed below:

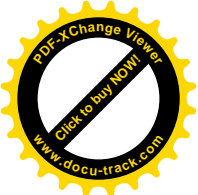
Research Design:

The present study is based on descriptive research design, as it was not possible to control all the variables directly to realize the objective of the study, the study only report what has happened or what is happening. The main purpose of descriptive research is description of the state of affairs as it exists at present. In the present study descriptive research has been used to discover cost even the researcher cannot control the variables. In social science and business research, the Ex post facto research is quite often used in descriptive research studies. The literal meaning of Ex post facto is 'after the fact' or "retrospectively'. It refers to those research studies, which examine and investigate the possible cause and effect relationships by observing an existing condition or state of affairs and searching in time for plausible reasonable casual factors. In effect, the researcher investigates the factors seemed to be associated with certain occurrences or conditions.

Sampling design

1. Universe:

The first step in developing any sample design is to clearly define the universe. The universe of the present study consists of all the fish farmers of Manipur.



2. Sampling unit:

A sampling has to be decided properly before selecting sample. The sampling unit of the present study is the fish farmers of the valley districts of Manipur viz. Bishnupur, Imphal East, Imphal West and Thoubal.

3. Source list:

It is also known as sampling frame. It contains the name of all the items of a universe. The list of fish farmer is collected from the Department of Fisheries, Government of Manipur.

4. Size of sample:

Sample size is calculated using sample size calculation software at 95 % confidence level with 5% precision. Sample size thus taken is 370 fish farmers.

5. Sample design:

Stratified sampling technique has been used to select the sample for the present study. The district is divided into different sub-districts (the different sub-district are called strata). And then we select items from each stratum to constitute a sample as shown in the following table 1.1. Since each stratum is more homogeneous than the total population, we are able to get more precise estimates for each stratum; we will get a better estimate of the whole. Method of proportionate allocation under which the sizes of the samples from different strata are kept proportionate to the size of the strata is used. From each stratum, sample is selected using a convenience sampling method.

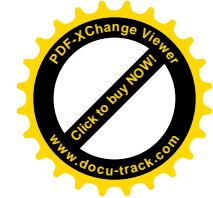


Table 1.1 Sample size distributions

| Sl. No. | District | Sub District (Strata) | Population (fish farm) | Sample size |
|---------|-------------|-----------------------|------------------------|-------------|
| 1 | Bishnupur | Bishnupur | 55 | 2 |
| | | Moirang | 1892 | 70 |
| | | Nambol | 657 | 24 |
| 2 | Imphal East | Jiribam | 1034 | 38 |
| | | Keiraobitra | 792 | 29 |
| | | Porompat | 3202 | 118 |
| | | Sawombung | 1028 | 39 |
| 3 | Imphal West | Lamlelpat | 90 | 3 |
| | | Lamsang | 257 | 9 |
| | | Patsoi | 203 | 8 |
| | | Wangoi | 460 | 17 |
| 4 | Thoubal | Kakching | 34 | 1 |
| | | Lilong | 16 | 1 |
| | | Thoubal | 292 | 12 |
| Total | | | 10012 | 370 |

Source: Department of Fisheries, Government of Manipur, 2008

Profile of the study area:

The study is conducted in valleys districts of Manipur viz. Imphal west, Imphal east, Bisnupur and Thoubal.

Imphal West District:

It is a valley district of Manipur. It is a tiny plain at the centre of Manipur surrounded by Plains of other districts. Imphal City, the State Capital is the nodal functional centre of this District. It is surrounded by Senapati District on the north, by Imphal East and Thoubal districts on the east, on the south by Thoubal and Bishnupur district, and on the west by Bishnupur and Senapati Districts. It extent from 93°45` E To 94°15` E longitude and 24°30` N To 25°N



latitudes with a total geographical area of 558 sq. km. It has a population of 4,44,382 of which 197699 (44.49%) population live in rural and the remaining 246683 (55.51%) live in urban according to 2001 census. The district has four sub-divisions, viz., (i) Lamsang, (ii) Patsoi, (iii) Lamphelpat and (iv) Wangoi. One of the important places in Imphal Weast is Khwairamband market or Ima market (mother market). This is the most important market in the district. A unique market runs by women having 3000 imas (or mother) who run the stalls. This is a large crowded market at the heart of Imphal city. Imphal west district has total fisheries resources of 14521 hectares. This includes 2869 ha of ponds/tank, 8125 ha of lakes/ beels, 2186 ha of rivers/streams, 1125 ha of paddy field and 216 ha of reservoirs.

Imphal East District:

Imphal is also one of the valley districts of Manipur. It extent from 93°45` E To 94°15`E longitudes and 24°30` N To 25°N latitudes. It has a total population of 394876 of which 286566(72.57%) live in rural and 108310(27.43%) live in urban. There are four Revenue Sub-Divisions in the district namely; (1) Porompat Sub-Division; (2) Sawombung Sub-Division; (3) Keirao Bitra Sub-Division and (4) Jiribam Sub-Division. The total number of SDC Revenue Circles in the district is 9 (nine). There are 237 Revenue villages in the district. Imphal East has 156882 workers (main and marginal workers) in which 31768 are cultivators, 22371 are agricultural labourers, 23618 are household industry and 76125 belong to other workers. Imphal East has total fisheries resources potential of 2869 hectare, in which 825 ha are in the form of ponds/tanks, 237 ha of lakes/beels, 859 ha are rivers/streams, 697 ha are in the form of paddy fields and reservoirs accounts for 251 ha.

Bishnupur:

Bishnupur is also the valley district of Manipur. The Bishnupur with its headquarter at Bishnupur (27 Km. from Imphal) was opened



on 25-05-1983. Stretching between 93.43 ° E and 93.53 ° E Longitudes and 24.18 ° N and 24.44 ° N Latitudes the total geographical area of the District is 496 Sq. Km. It is bounded on the North by Imphal west District, on the South by Churanchandpur District, on the east by Imphal and Thoubal Districts. According to 2001 Census the total population of the district is 2,08,368 having a density of 341 per Sq. Km. and out of the total population 1,33,627 (64.13%) live in rural and 74,741 (35.87%) live in urban area. There are 64 Revenue villages in the District. For a better and convenient administration the District is divided into three Sub-Divisions, viz (1) Bishnupur Sub-Division with its HQ at Bishnupur and (2) Moirang Sub-Division (opened on 12-12-83) with its HQ at Moirang and (3) Nambol Sub-Division with its HQ at Nambol. Bishnupur has 89703 workers (main and marginal workers) in which 25196 are cultivators, 14107 are agricultural labourers, 11395 are household industry and 39005 belong to other workers. Bishnupur has total fisheries resources potential of 14447 hectare, in which 2356 ha are in the form of ponds/tanks, 8016 ha of lakes/beels, 2789 ha are rivers/streams and 1286 ha are in the form of paddy fields.

Thoubal:

The district of Thoubal, which occupies the bigger portion of the eastern half of the Manipur Valley, takes the shape of an irregular and triangular with its base facing north. It lies between 23° 45' N and 24°45' N latitude and 93°45' E and 94°15' E longitude. It has a total area of 514 sq.km. It has a total population of 3,64,140. About 2,32,868 (63.95%) of the total population live in the rural areas whereas only 1,31,272 (36.05%) of the population found in urban areas. The district is bounded on the north by Imphal district, on the east by Ukhrul and Chandel districts, on the south by Chandel and Churachandpur districts and on the west by the districts of Imphal and Bishnupur. There are three Revenue Sub-Divisions in the district namely; (1) Lilong Sub-Division; (2) Thoubal Sub-Division and



(3) Kakching Sub-Division. The district runs an international road that leads to Myanmar (Burma) via Moreh and Tammu. The district of Thoubal has 177343 workers (main and marginal workers) in which 66854 are cultivators, 36812 are agricultural labourers, 20193 are household industry and 53484 belong to other workers. Thoubal has total fisheries resources potential of 12167 hectare, in which 2016 ha are in the form of ponds/tanks, 6728 ha of lakes/beels, 1987 ha are rivers/streams, 1168 ha are in the form of paddy fields and reservoirs accounts for 268 ha.

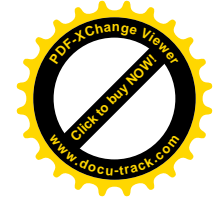
Procedure of Data Collection:

The study is based on both primary and secondary data. To collect the primary data, interview schedule was designed by the researcher accomplishing all the queries relevant to various aspects of the problem. The researcher personally met the fish farmers located in various areas of the valley districts of Manipur where research has to be performed. The researcher established a rapport with them and the purpose of visit was explained. The researcher distributed the schedule and requisite direction and instruction are given to the fish farmer and asked them to fill carefully. For the fish farmer who are uneducated, researcher asked the questions and researcher filled the schedule. The researcher requested the fish farmer to fill all the items freely and requested not to leave any of the items and can spend as much time as required. The researcher also mentioned that their answers will be kept confidential and will be used for the research purpose only.

The secondary data of the study include various journals, text books, magazines, web sites, existing literature and other solvency works and published and unpublished data.

Tools used for the study:

The present study comprises of two major variables i.e., problems in fish farming and productivity of fish, for which data were



collected through interview schedule developed by the researcher so that the objectives of the study may be realized with more precision. Problems in fish farming are taken as independent variables and productivity of fish has been considered as dependent variable.

Techniques of Analysis

The collected data were classified and tabulated according to the objective of the study. To analyse the data, descriptive statistics like percentage, mean and standard deviation were used. To know the relationships between the variables, coefficient of correlation and chi square were used. Three point Scaling methods were also used to know the degree of problems faced by the fish farmers. At the first stage, the respondents are asked to indicate the level problems on three point scale with the ratings high degree of problem, medium degree of problem and low degree of problem and weights have been assign as 3,2 and 1 respectively.

The mean value has been calculated for each attributes as mention below:

Mean value = $\frac{fx}{n}$,

Where f = number of responses obtain for each rating,

x = the value assign and

n = number of observation

At second stage, the mean value of different problems faced by fish famers is calculated.

Scope and Reference Period

Study covers the fish farms undertaking in the above mentioned four valley districts of Manipur. The fish farms include those which have been undertaken for commercial purpose in fresh water ponds and lake irrespective of ownership and area of fish farms and primary data for the present study were collected during March 2010 to October 2010.



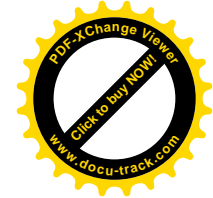
1.8 SIGNIFICANCE OF THE STUDY

Fish farming is under taken to meet the domestic demand whatever little surplus is left out is sold in the market. Commercial cultivation of fish, although undertaken by the farmers in Manipur is not up to the expected level to meet the demand of fish in the state of Manipur. The government is trying to develop fish farming in the state by launching various programmes of fish farming like fishery extension, training, research etc. however despite the efforts made by the government the production of fish in the state are yet to increase upto the desired level.

The present study throws light on the problems and prospects of fish farming in Manipur. The most important problems of fish farmers like problems of finance, marketing and other infrastructural problems are also studied for the purpose of taking necessary steps for improvement of fish production and also the productivity of fish farming in Manipur. The present study finds out the various infrastructures and schemes available to the fish farmers by which they can increase the production to a great extent. Proper analysis of the marketing channels of fish will help in proper flow of fish and fish products to the market and made available of fish on time and will benefit the fish farmers through remunerative price and farm gate will effectively linked to the market and thus increase marketing efficiency. The study also helps to understand the socio-economic conditions of fish farmers. By studying the prospects of fish farming, it can encourage people to take up fish farming as a source of their livelihood and can also encourage farm entrepreneur.

1.9 LIMITATIONS

1. Most of the relevant information has been obtained from published data of various agencies and as such it is subject to all limitations inherent in a published statement.



2. The primary data were collected through interview schedule from some selected respondents and hence all the limitations of sampling are likely to be here in the study. As all the fish farmers did not keep the written records. The data based on the memory of fish farmers only.
3. The study covers only the valley districts of Manipur .date could not be collected from hill districts of Manipur due to inaccessibility of the hills districts and also due to cost and time factors.

1.10 CHAPTERIZATION

The present study is divided into seven chapters.

Chapter 1 : Introduction

Chapter 2 : Brief profile of fisheries sector in India: Growth and Sustainability

Chapter 3 : Fisheries sector in Manipur: A brief profile

Chapter 4 : Fish farmers in Manipur: A Socio-economic Analysis

Chapter 5 : Problems of fish farming

Chapter 6 : Prospects of fish farming in Manipur

Chapter 7 : Summary of Major Findings, Suggestions and Conclusion

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