

**PISCICULTURE IN WEST DINAJPUR
DISTRICT : AN APPRAISAL
WITH SPECIAL REFERENCE TO WORLD BANK
ASSISTED INLAND FISHERIES PROJECT**

BY
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Doctor of Philosophy in Arts (Commerce)
of the University of North Bengal*

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P R E F A C E

Out of around 735 lakh metric tons of fish catch from all water resources of the world, Asia, Europe and North America contribute 46%, 12% and 7% respectively while 17% of the total catch is contributed by the rest of world. Japan, Soviet Russia and U.S.A. occupy the pioneer position.

India has abundant natural endowment, conventional wisdom and human skills in respect of intensive fish farming. But in spite of enormous potentials, much headway has not been made. The levels of production and productivity have not been adequate, there being a large gap between the potential and the actual yields. The new technology which seemed technically attractive has failed to produce substantial results in reality. India has made some progress in exploiting the demersal resources of the sea but the progress in inland fisheries and in tapping pelagic resources has been poor. The inland capture fisheries of the rivers and open estuaries are rather limited in their production potential.

In order to develop the culturable and semi derelict fishery resources the Government of India through "Central Board of Fisheries", has launched since 1980 the "World Bank Assisted Inland Fisheries Project" (WBAIFP) in 5 States namely West Bengal, Orissa, Bihar, Uttar Pradesh and Madhya Pradesh with the assistance of "Fish Farmers Development Agency" (FFDA) which is now covering 20 States and 2 Union Territories.

Fishery in India constitutes an important sector of the national economy. It contributes about 2.40% of the gross domestic product. The export of fish contributed Rs. 531.24 crores and India produces above 4% (sixth in rank) of the world fish production.

The contribution of the fisheries sector to the net domestic product has gone up from Rs. 886 crores in 1980 to Rs. 2648 crores in 1988-89.

The State of West Bengal occupies pioneering place in the country in the field of fish seed and adult fish production. The inland fish production increased steadily from 3.40 lakh tons in 1980-81 to 4.70 lakh tons in 1988-89. The Government of West Bengal has initiated steps for intensifying fish culture by implementing "WBAIFP" with the assistance of FFDA. Accordingly the Government of West Bengal selected the district of West Dinajpur, a backward district, with the objective to improve the economic condition of the district and thereby its people.

The district of West Dinajpur produces 4.8% of the total fish production in West Bengal from fresh water resources (1987-88) and it is expected that the production will increase to a considerable extent in the years to come. The district is rich in fishery resources viz., ponds, tanks and dighis and it is thickly interperse with rivers viz., Atrayee, Purnabhada, Tangon, Nagore, Kulik, Sreemati, Gandak and others. Out of the total impounded water area resources of 34,910.43 acres (private ownership 29,990.67 acres and Government ownership 4919.76 acres) the culturable and semi derelict fishery resources of this district are 29275.49 acres of which private ownership is 26,229.86 acres and the Government ownership is 3045.63 acres.

In West Dinajpur district 31.52% of the impounded water area is derelict and semi derelict due to years of neglect. The "WBAIFP" has been put into operation since 1980 engaging a considerable numbers of people along with other fishery programmes (3% of the total workers population in the district) of the sixteen community development blocks related with the pisciculture of this district. A total of 10619.313 acres water area have been taken into consideration in the "WBAIFP" programme for the

improved pisciculture from 1980-81 to 1987-88.

The principal constraints faced by the inland culture fisheries of West Dinajpur district are non-utilisation and under utilisation of readily available culturable waters. This is due to the lack of knowledge and ignorance of the fishermen community and dearth of finance for investment. Besides there are other problems that are a menace to the required development.

The unsatisfactory performance is attributed mainly to absence of rational management, judicious exploitation and utilisation of the resources. Negative socio-economic factors are annoying the cultivators at work.

This study attempts to make an appraisal of the role of pisciculture, specially the "WBAIFP" with a view to reviewing and examining critically the efficiency and degree of achievement of the "WBAIFP" as well as the overall position of the pisciculture of the district of West Dinajpur, and also assessing the impact of the project on the economic development of the district for the period 1980-81 to 1987-88.

Moreover the district of West Dinajpur has been divided into two parts namely, Dakshin Dinajpur and Uttar Dinajpur, since April 1992. The author had to face difficulties in obtaining the required information and statistical data owing to the lack of Administrative link between these two different districts. However the principles and procedures as are shown in the thesis in assessing the achievement of pisciculture activities in erstwhile West Dinajpur district would also be equally applicable in the assessment of the achievement of pisciculture activities in the two districts namely, Dakshin Dinajpur and Uttar Dinajpur.

IV

Economic information on the various aspects of fish culture have seldom appeared in literature and published critique on fish and fisheries of India is meagre though much research work has been done in the biological and marine sciences, it is not properly co-ordinated with the economic theory and management.

The present study is divided into the following chapters:

1. Introduction
2. Fisheries in West Bengal and West Dinajpur.
3. Measures considered for pisciculture in West Dinajpur district.
4. A study of the World Bank aided pisciculture.
5. A study of Demand and Supply constraints.
6. Marketing aspect.
7. Socio-Economic study of the fishermen, owners and farmers of West Dinajpur district.
8. Conclusion and Suggestions.

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I owe a debt of gratitude to late Dr. S. Bhattacharya, Reader, Department of Commerce, M.B.U., my former supervisor who assisted me in formulating the primary idea of this thesis.

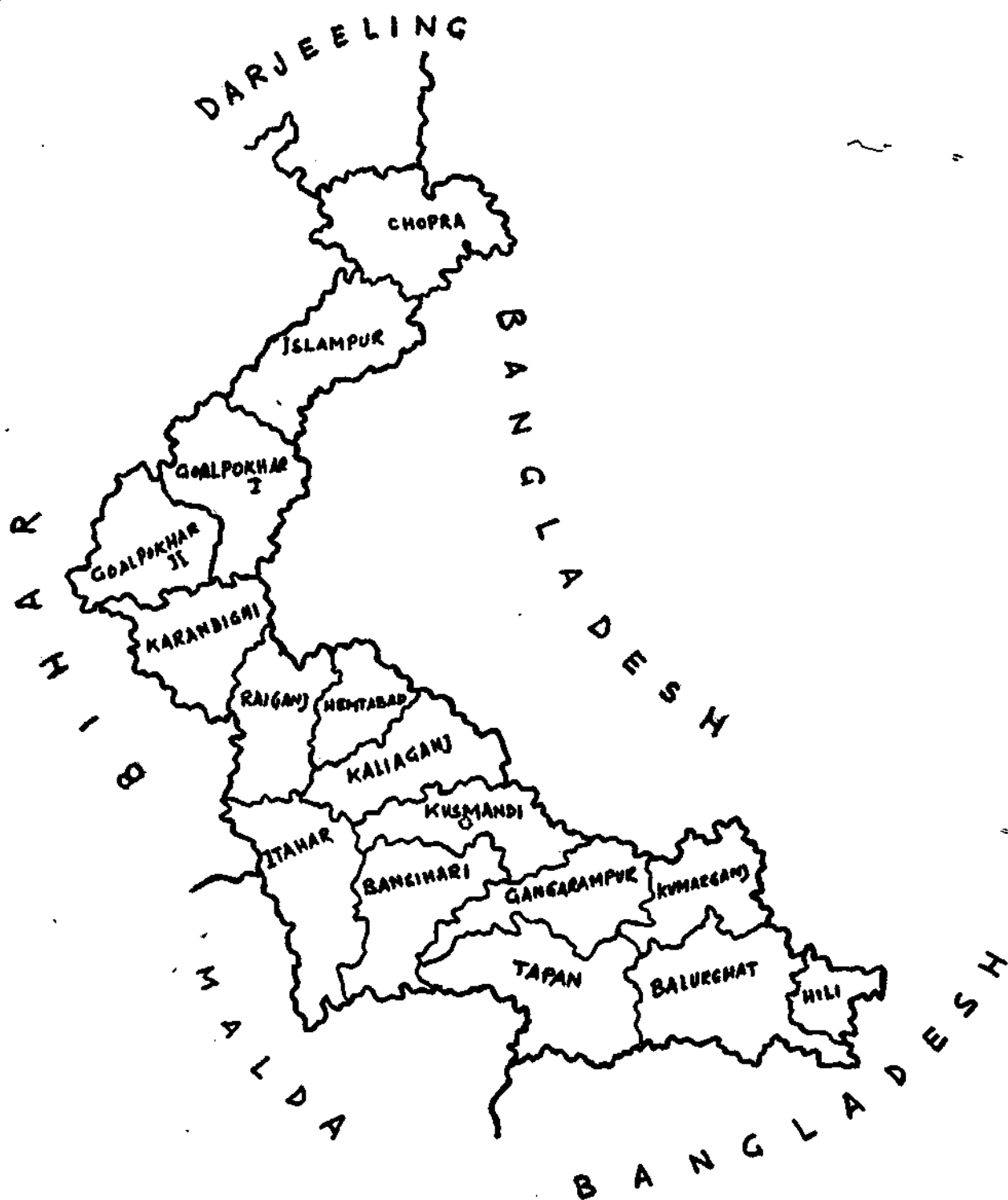
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Though I have tried my best to mention sources of my information, I sincerely crave for the indulgence of those who might have remained unacknowledged due to oversight.

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WEST DINAJPUR DISTRICT

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CHAPTER - 1**INTRODUCTION:**

- i. FISH IN THE WORLD ECONOMY -
INLAND FISHING, MARINE FISHING.**
- ii. PREFERENCE IN INDIA IN INLAND FISHING.**
- iii. ROLE OF FISHING IN INDIA SPECIALLY RURAL
AREAS AS AN AGENT FOR DEVELOPMENT.**

1.1 FISH IN THE WORLD ECONOMY — INLAND FISHING, MARINE FISHING:

The wealth of the sea is vast. The sea is the store house of various important resources - food, industrial raw-materials and other valuable products. All the resources have not yet been exploited because of our limited knowledge about the sea. There is a great possibility of deriving energy which is inherent in the movements of the tides, currents and waves. Minerals like salt, bromine, magnesium, potassium etc and precious stones like corals, pearls, etc are exploited from the sea.

The direct economic importance of the ocean as a supplier of food especially fish is extremely great. Fish provides necessary protein element in the diets of millions of people, particularly of the far eastern countries.

There are 1800 variety of fishes. Most of them are unknown to us and many of the fishes are not used as food for man. Fisheries are confined not merely to sea fishing. Fresh water fishing like fishery in rivers, lakes, ponds, tanks and reservoirs etc is also an important area of 'Fisheries'. Fisheries in most of the countries of Asia, Africa and South America are based on subsistence fishing. Subsistence fishing is practised in the fresh water whereas commercial fishing is developed in sea water.

Fisheries

Sea-Fishing

Fresh-water Fishing

Commercial Fishing

Subsistence Fishing

The multifarious activities in industrial development and economic development of man also accounts for the development of fisheries of the world. Big business units invest millions of rupees in the fishery industries of different fishing areas.

The ports like Grimsby, Hal, London, Yarmouth, Eberdin, Sant James, Halifax, Boston, Vancouver, Los Angeles, San-diego and Bergen have been recognized as organized centres of fishing industry. A good communication through railway and water way have been made to transport the catch to the markets of cities and towns from the said ports. A number of warehouses with cold storage facilities are constructed there and industries using the by-products of fish are being established. Banking facilities, modern appliances, transportation, refrigeration, organisation of industry, the consuming population and the supply of feed stuffs and the price of meat, a close substitute, are the factors which play vital roles in determining the growth of commercial fisheries. As commercial fishing involves large capital outlay, it has become the business of joint stock companies operating large number of vessels and employing a large number of crews in the ventures.

About 2% of the human food in the world are made from sea fish⁽¹⁾. With the increase in global population the crisis of food seems to have been acute and provided this background, fish could supplement a major portion of food for the Global population.

The significance of fish in the world's food balance and in that of individual countries may be evaluated by computing the acreage required to produce equivalent amounts of animal protein employing agriculture technology in its present state. To produce land - animal protein equivalent to the fish protein harvested in Europe would require 6,00,00000 hectares (15,00,00000 acres) equivalent to 40% of the land area under cultivation. The

Soviet Union would require 1% of its cultivated land and China would require 2% and most dramatic of all Japan would require 30% (2).

Out of around 735 lakh metric tons of fish-catch from all water resources of the world, Asia contributes 40%, Europe (including the Soviet Union) contributes 32%, North America 7% and the rest of the world 17% (3).

Per capita consumption of fish in different countries (1989) are given below:

Countries	Consumption per capita (Kilogram)	
Japan	More than	45
Portugal	More than	45
Denmark		27-41
Norway		27-41
Sweden		27-41
Taiwan		36
Malaysia		29
U.K.		13.5
USA		9
Australia		9
Argentina		5
India		3.5

Source: Human and economic Geography, leong, G.C. and Morgan G.C., p. 314, 1989.

The reasons for increase in per capita consumption of fish are the high price and inadequate supply of meat. For this, people of the under developed and developing countries consume fish more than the meat. Moreover the Asians like fish as a main item of their food stuff. The people of the countries like Portugal, Spain and Sweden of the continent of Europe also like fish much and their per capita consumption of fish is also high.

There are four important fishing areas in the world which are all located in the temperate region. More than 3 million men are engaged in fishing in these areas ⁽⁴⁾. The four mentioned fishing areas are -

- a) the North-West Pacific coast
- b) the North-West Atlantic coast
- c) the North-East Atlantic coast
- d) the North-East Pacific coast.

a) North-West Pacific coast (The coast of Japan)

Japan occupies a strategic position for fishing. The mixing of two currents, kuroshio warm waters with cold waters of the oyashio favours the vigorous growth of fish in the inter-island straits and seas and in the nearly shallow waters.

Japan is fortunate in having large marine resources. The fisheries of Japan have an annual production of 8-10 billion pounds and marine products account for about 20-25 percent of the world's total. The coasts of Japan, the pacific waters east of Japan and the yellow and China seas and the coasts of Korea and Karafuto and the margins of the Okhotsk sea- are the areas of concentration of fishing. Japan has a total coast line of 17,000 miles. The areas of Japan's coastal fishing grounds is 9 lakh sq. miles. Besides Japan, the Soviet Union, Korea and China are important producers in the waters bordering their coast.

b) North-West Atlantic (The coasts of New foundland and New England)

The banks off the coasts of the New England and New Foundland constitute one of the most important fishing grounds of the world. They extend from Nantucket to the eastern coast of New Foundland, a distance of 1100 miles with an width of 50 to 250 miles. The continental shelf is very broad and has many fishery banks like, grand Bank, Georges Bank, Sable Island Bank. Fishing vessels of different countries like France, Great Britain, Portugal, Italy undertake fishing in this area. The maximum catches are made in the coasts of Nova Scotia and New Foundland. Two third of the total export of New Foundland are fish and fisher products and most of the people depend mainly on fisheries. The people of Canada and USA mostly undertake fishing in this area. St. John, Halifax, Portland, Gloucester, Nova Scotia, Providence, Boston and New York are the ports through which fishing is largely done.

c) North-East Atlantic (The coasts of North-West Europe)

The sea in this area are an important fishing ground of the world. Britain, France, Holland and Norway are the four leading nations participating in, large-scale fishing. Belgium, Denmark and Spain also take part in fishing in this area. The North sea contains submerged land and is shallow with many fishery banks viz. Doggers Bank and Great Fisher Bank. UK, France, Belgium, Netherlands, Denmark, Germany, Norway and Sweden with their vast markets are situated around this fishing ground. 1,15,000 people of Norway are engaged in fishing. Iceland topped in 'catch of fish per capita' (Yearly 3,200 kg.). 92% of the total export of Iceland are fish products. Grimsby, Hull, Bergen, Aberdeen, Billings gate and yarmouth are important fishing centres. Pisciculture is practised in the Thames Estuary, inland sea creeks of Denmark of Morbihan in Brittany.

The economy of Norway and Iceland depends mainly on fishing and its trade.

d) North-East Pacific (The Western coasts of North America)

The area that extends from Alaska to California is another important fishing ground in the world. The value of the catch in USA exceeds 65 million US dollars annually. The catch of Canada was also of the same value. Conservation methods have recently been undertaken by international agreement. California has developed fish canning. Fish canning is important in the USA, Japan, Canada, UK, Netherland and Federal Republic of Germany as shown in Table 1.1.

Table 1.1

Canned Fish in 1988 (in '000' metric ton)

Countries	Quantity
USA	498
Japan	296
Canada	78.4
UK	36
Netherlands	33
F.R. Germany	27

Source : U No. Statistical year Book

Per capita catch of fish in Japan is the highest (without considering Iceland here) followed by Canada, Denmark, UK and the USA as shown in Table 1.II.

Table 1.II
Per capita catch 1980 (in Kilograms)

Countries	Quantity
Japan	58
Canada	55
Denmark	32
UK	25
USA	20
Russia	10
India	3

Source: U No. Statistical year Book.

The fisheries of Japan are in a leading position over those of all other nations - (1) in the actual number of people making a livelihood (10% of total population) out of it,

(2) in the relative number of persons engaged in and dependent on the industry,

(3) in the quantity of fish catch annually from the water,

(4) in the relative importance of fishery products in the domestic economy,

(5) in the ingenuity and skill shown by the people in devising and using fishing appliances, and preparing catch for use,

(6) in the extent to which the fisheries of foreign countries have been studied and the best methods adopted to home conditions,

(7) in the extent to which aquaculture has been carried out,

(8) in the zeal, initiative and intelligence displayed by the Government in promoting the development of the fisheries and welfare of fishing population.

There has always been a tendency in Japan for artisans or traders to unite in small guilds or associations, like the cartels in Russia, and doubtless this was the case also with regard to fishermen especially as the fishing community were frequently at odds with the local farming community as to various foreshore and inshore rights of fishing and sea-weed collecting, and as some fishing operations require combined effort and expenditure.

There are many progressive capitalists and proprietors who are developing the industry as in Europe. These men are ousting the independent fishermen and bringing them under the control of organised intelligence and capital⁽⁵⁾.

Norway, Japan and New foundland are the three countries in the world where fisheries account so largely in the national economy that their development is taken as one of the major causes of growth. In Japan the primitive methods of fishing universally employed till recent years, have been elaborated and expanded in a wonderful manner since the beginning of the 20th century by the fostering care of the department charged with their improvement. The central and local Governments have been lavish in their expenditure and, as seen to-day in the enormous expansion of the Japanese fisheries and associated industries.

Norway a much smaller country than Japan, with a sparse population and limited funds at her disposal, has been equally enterprising and for her resources, even more generous in expenditure upon development.

In Japan, a "hermit kingdom" till two generations ago, the world had to be searched for methods that were improvements on the cruder indigenous ones; Norway on the other side, had a fishing reputation for individual enterprise and for the excellence of the methods pursued. Her fishing fame dates back to the early

days of the Hanseatic league, whose long-headed merchant princes, with true teutonic foresight and power of organisation, settled in Bergen and made that city the centre of the herring trade. Whatever their faults of arrogance and trade monopoly, these early germans undoubtedly organised the Norwegian fisheries on a commercial basis; they directed the adventurous viking spirit into commercial enterprises requiring equal courage and daring but without futility of the old bloody feuds and forays. The lesson was well learned and Norway is now pioneering the fishing industries to the verge of the Antarctic circle, supported even thereby the resources of the home Government through the medium of the Fisheries Department⁽⁶⁾.

The sea fisheries of Denmark compared with those of Norway are relatively small, and homogeneous to a far greater extent. The coast line is long, but on the most productive sections, those to the West and North, the dangerous character of coast limits the number of fishing harbours suitable to the needs of larger craft of to-day to a very few, and this renders the control of operations by the administration a far simpler task than it is in Norway, where the number of fishing harbour is particularly numerous owing to shelter given by the line of islands that front the coast for hundreds of miles. There are indeed only 23 ports of register in Denmark and many of these have but few boats sailing under their distinctive lettering. Her trade, unlike that of Norway, is largely in fresh fish sent in ice inland to central Europe. This ensures usually good prices and a particularly profitable trade⁽⁷⁾.

About 86% of the total production of fish in the world is raised from the marine water. The maximum inland fish catch are reported from Asia followed by Africa and the minimum from Oceania. From the view point of inland fish production, India ranked second in the world, preceded by only China and followed by USSR. Against a world percentage of about 1%, India's inland fish production constitute as high as 46% of the total fish

Catch⁽⁸⁾. This demonstrates the importance of inland fish culture in India's economy.

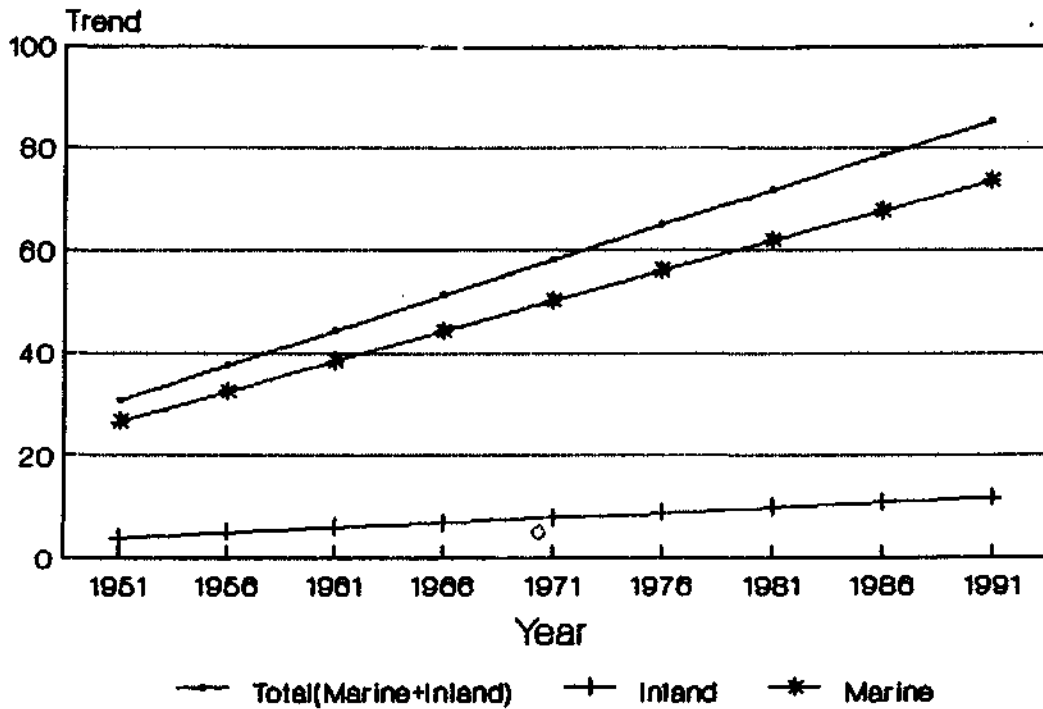
Inland fishing areas of the world are

1. Africa 2. America, North and Central
3. America, South 4. Asia, 5. Europe
6. Oceania 7. USSR 8. Antarctica.

From the Graph 1.1 the trends of world fish production are shown by the least square method of time series for the period 1951 to 1991 (One individual year taken out of every five years covering the period). It is observed that average growth rate (5 yearly) in marine fisheries (5849.13 thousand ton of fish) is higher than in the inland fisheries (964.38 thousand ton). These two sources in combination contributed an average growth rate of 6813.51 thousand ton towards the total fish production of the world. The reasons of 'higher growth rate' in the marine fisheries are - improved mechanisation, maximum fishermen population engaged in marine fisheries and vast water area considered for the marine fisheries⁽⁹⁾.

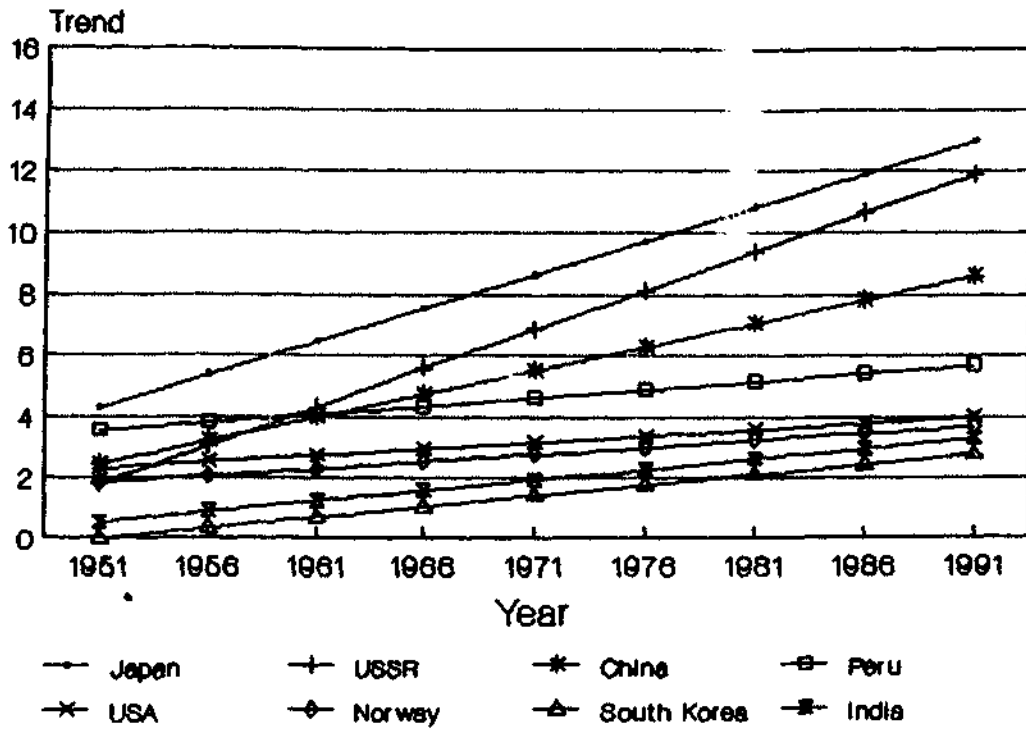
TREND OF FISH PRODUCTION - WORLD

Trend values in '000000' M Tons. Graph-1.1



TREND OF FISH PRODUCTION-Marine+Inland

Trend values in '000000' M Tons. Graph-1.2



From the Graph 1.2 it is observed that the average growth rate (5 yearly) of the total fish production of USSR, worked out from linear trend (1268.81 thousand ton) is higher than the average growth rate of any of the remaining seven countries (where eight top fish producing countries of the world are considered); followed by Japan (1085.14 thousand ton) which together contributed an average growth rate of 6813.52 thousand ton of fish along with all the countries engaged in fisheries towards the total fish production of the world. The trend lines of the countries coincide each other which indicate the similar growth rate of those countries. The reasons for 'higher growth rate' in USSR and Japan are improved mechanisation combining with the Governmental initiatives, skill and ingenuity of the fishing (10) population and successful co-operative activities in the fisheries .

According to FAO, by the turn of this century, the gap between world consumption of sea food and the total world production would be around 20 million tons⁽¹¹⁾.

The amount (Value in US dollar) of imports and exports of fish and fishery products in the world economy have been increased more than five times from 1976 to 1990⁽¹²⁾.

As regards value of total export and import of fish in the world a few countries are dominating the fish trade as is seen in Table 1. III

Table 1. III

Value as P.C. of Total Export/Import of different countries (Fish and fishery products)

Countries		1981	1985	1990
Export of fish	USA, EEC, Canada,			
	Korea Republic,	87.4%	87.9%	78.9%
	Iceland			
Import of Fish	EEC, Japan, USA	83.9%	84.7%	89.3%

Source: Year Book, International Trade Statistics 1985, 1990.

From Table 1. III it is observed that USA, EEC countries, Canada, Korea Republic and Iceland dominate the export of fish in the world and EEC countries, Japan, USA dominate the import of fish.

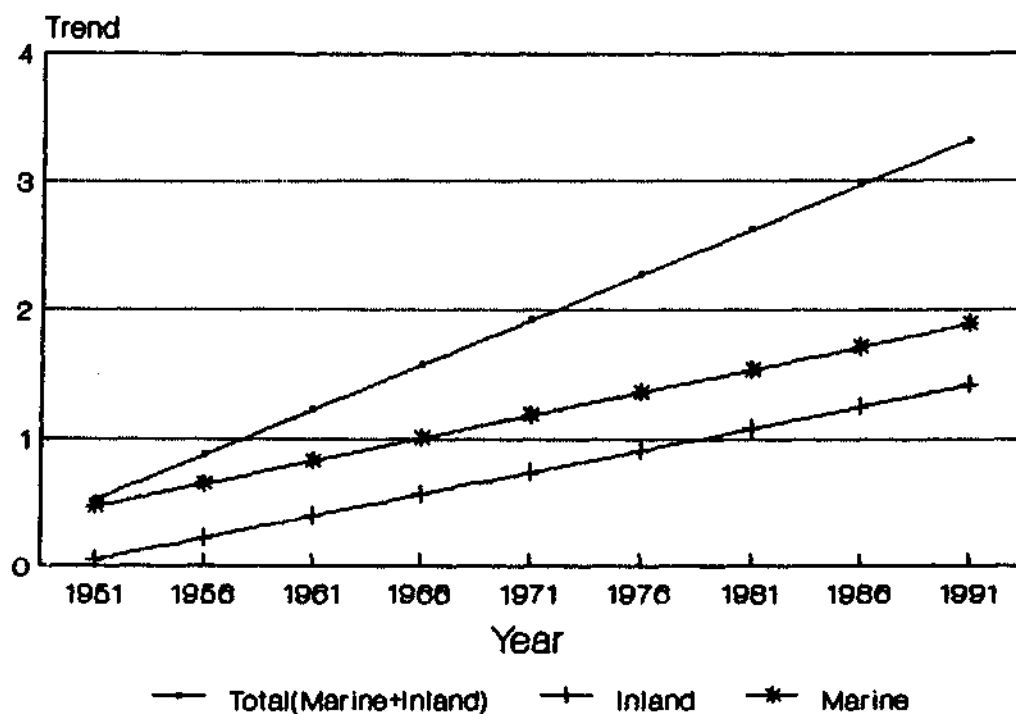
A number of industrial products are made from the scales and shells of fishes. Marine and fresh water shells which are harvested in Australia and Far East are used in manufacture of

buttons, buckles and similar items; fresh water mussel shells are exported to Japan to be used as spherical core matrices for artificial cultivation of pearls. Some of the shells are used for production of toilet articles, knife handles, cufflinks, combs, hairpins and earrings etc. which have much economic importance all over the world. The fishing industry, when developed on a commercial scale gives rise to a large number of ancillary industries. Important among them are ship building, marine engines, nylon manufacturing, net making, freezing, canning, fish meal, fish oil, cold storage, ice-manufacturing and others. USSR invested more than half of her food industry investment since 1952 into the fishing industry⁽¹³⁾. Big fishery units make good marketing facilities, improved transportation and industrial centres which can contribute to the economic development of different countries to a considerable extent.

1.11 PREFERENCE IN INDIA IN INLAND FISHING :

TREND OF FISH PRODUCTION - INDIA

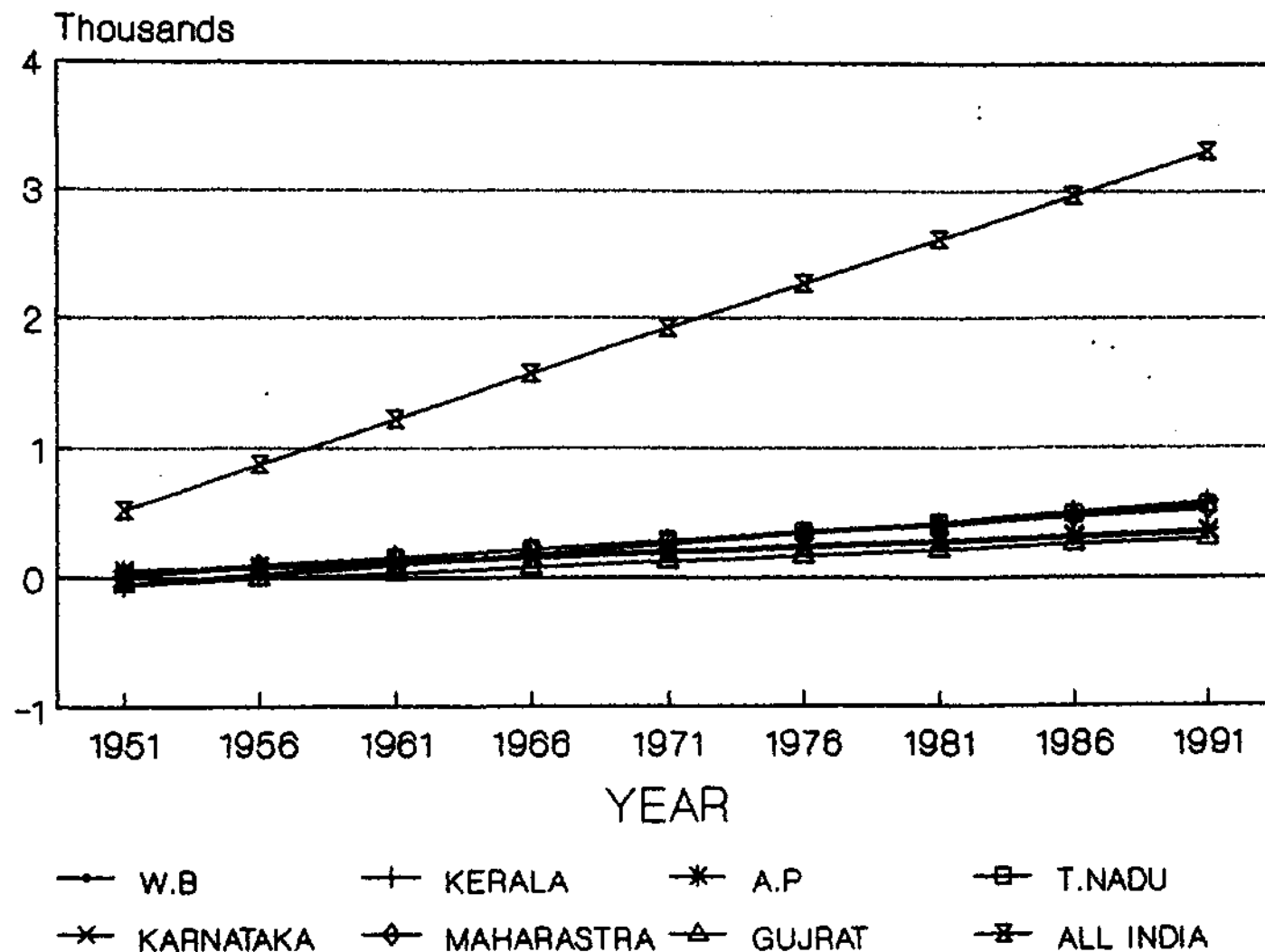
Trend values in '000000' M Tons. Graph-1.3



From the Graph 1.3 the linear trends of fish production in India for the period 1951 to 1991 are shown. It is observed that average growth rate (5 yearly) in marine fisheries (177.60 thousand ton) is slightly higher than that in the inland fisheries (171.08 thousand ton). These two sources combinedly contributed an average growth rate of 348.68 thousand ton towards the total fish production of India. The reasons for 'higher growth rate' in marine fisheries are heavy capital investment, maximum number of fishermen being engaged in marine fisheries, mechanisation in marine fisheries and vast water area considered for the marine fisheries⁽¹⁴⁾.

TREND OF FISH PRODUCTION

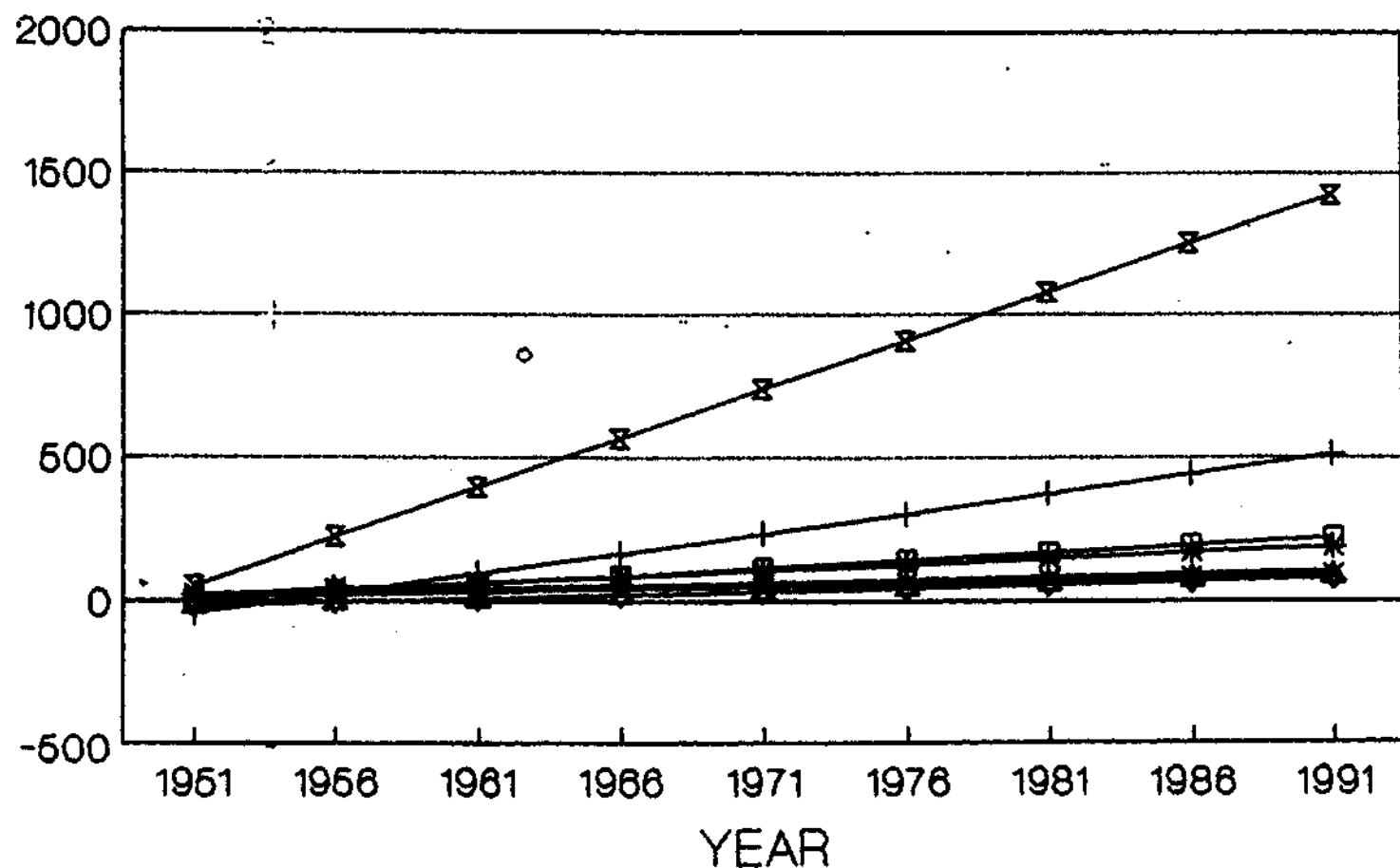
(Marine + Inland). Graph-1.4



From the Graph 1.4 made of the fish production trend (linear) of seven top fish producing states of India it is observed that the average growth rate (5 yearly) of total fish production of Kerala (80.80 thousand ton) is higher than the average growth rate of any of the remaining six countries; followed by West Bengal (79.90 thousand ton). The trend lines of the states coincide each other which indicates the similar growth rate of those states. These states along with others engaged in fisheries jointly contributed an average growth rate of 348.70 thousand ton of fish towards the total fish production of India. The reasons for 'higher growth rate' in Kerala and West Bengal are - maximum utilisation of resources of fisheries i.e. by mechanisation in fisheries, ingenuity of the fishing population and Governmental initiatives in the progress of fisheries⁽¹⁵⁾.

TREND OF FISH PRODUCTION

(Inland). Graph-1.5



From the Graph 1.5, the linear trends of Inland fish production of India comprising of seven important inland fish producing states, are shown for the period 1951 to 1991. It is observed that the average rate of growth (5 yearly) of inland fish production of West Bengal (69.05 thousand ton) is higher than in any of the remaining six countries, followed by Tamil Nadu (26.70 thousand ton) and Andhra Pradesh (20.90 thousand ton) and contributed an average growth rate of 171.10 thousand ton of fish towards the total inland fish production of India. The reasons for higher growth rate in West Bengal are - Governmental initiatives to improve inland fisheries through different schemes, proper training to the fish farmers, maximum utilisation of financial resources and water area resources for inland fisheries (16).

**Average production of Fish for the period 1980-1990
depicted through Pie-diagram**

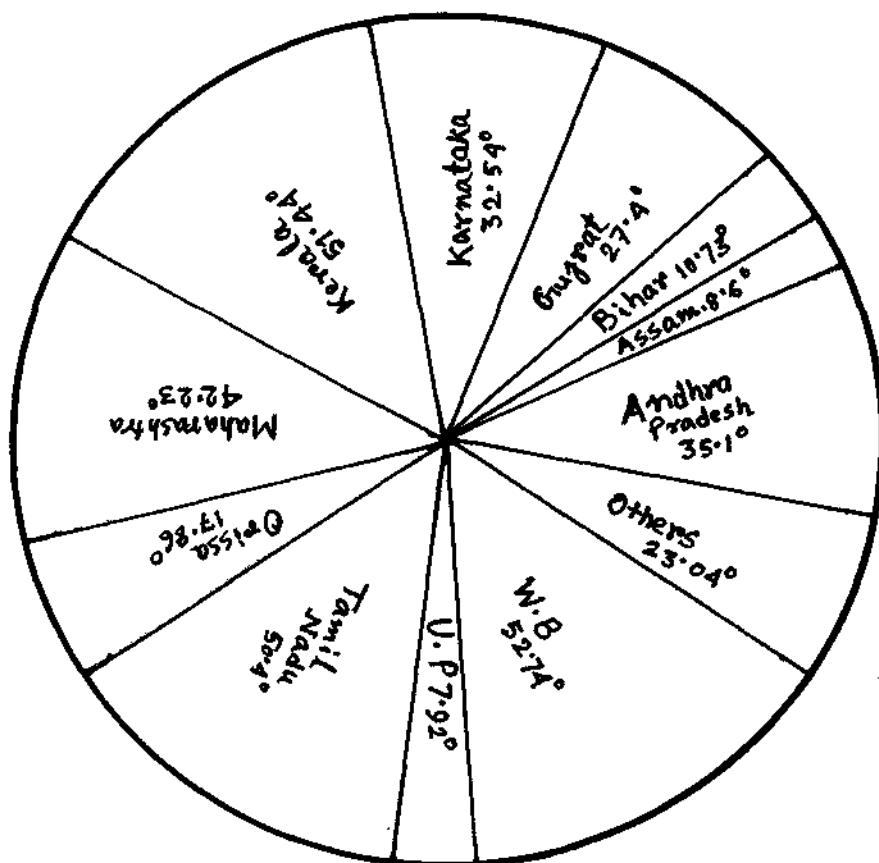


FIGURE - 1.1

From the Figure - 1.1 it is evident that the state of W.B. produced the major portion of fish in India followed by Kerala and Tamil Nadu for the period 1980-1990 on an average.

Average Inland Fish production for the period 1951-1991 (one individual year taken out of every five years covering the period) depicted through Pie-diagram:

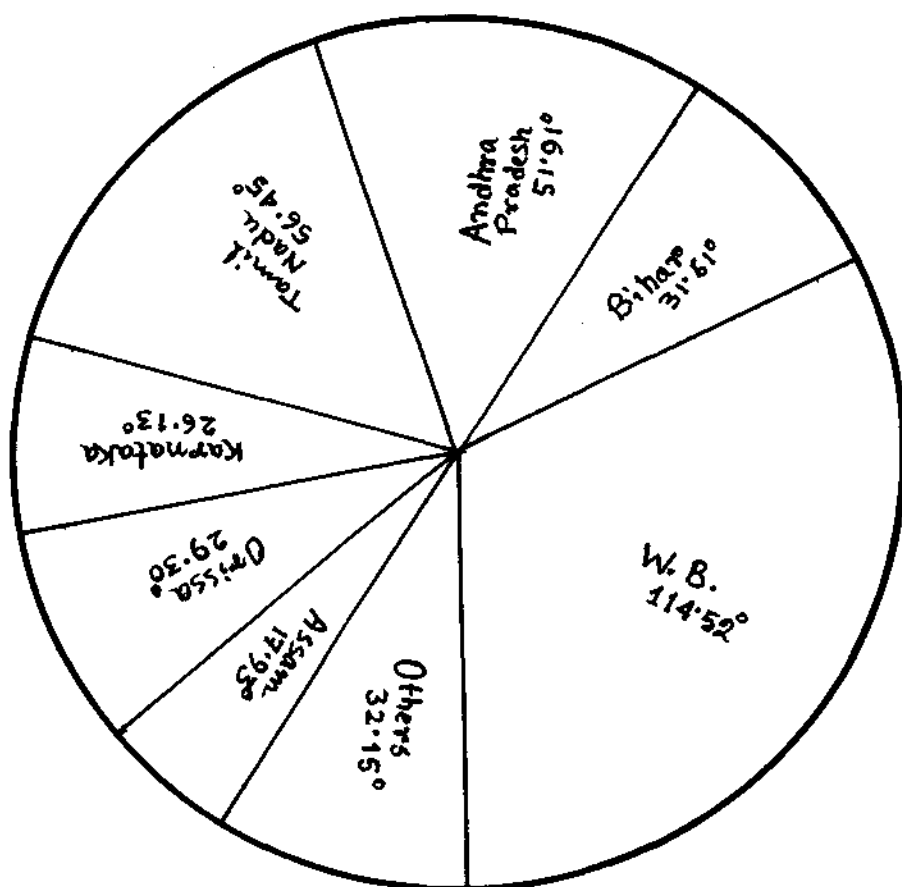


FIGURE - 1.2

It is also observed from the Figure 1.2, that W.B. produced the major portion of fish from inland water areas followed by Tamil Nadu and Andhra Pradesh for the period 1951 to 1991 on an average.

The fresh water inland fisheries of India involves three types of activities : (a) capture fisheries undertaken mainly in rivers (b) stocking-cum capture fisheries practised in reservoirs and (c) culture fisheries practised in ponds and tanks.

India has a 29,000 k.m. stretch of rivers and canals, 1.45 million hectare reservoirs and 0.75 million hectare tanks and ponds. There has been a steady growth in fish production from inland fisheries ⁽¹⁷⁾.

The potential fresh water ponds tanks and reservoirs with favourable climate and environmental conditions can be used for pisciculture in India. In addition the available riverine water have been traditionally providing subsistence to a large number of fishermen, and large proportion of seed for pisciculture.

The actual area of brackish water available in India is about 0.90 million hectare. In addition lands adjacent to it could be utilized for aquaculture and the total available area is more. One estimate puts this at about 1.406 million hectare. Out of readily available 0.90 million hectare, only an area of about 50,000 hectare is presently used for culture, mostly by traditional methods.

The present annual production from fresh water ponds, on an average, is only 1560 kg per hectare as against the technologies available at the research institutions for a production of 10 tons per hectare per annum. The total production of these water bodies is estimated to be in order of 17,000 tons as against the theoretically expected production of 4.5 million tons, even when a conservative estimate of annual productivity of 5 tons per hectare is taken into account. As India has been concentrating its efforts on the export front, no major attempts have been made for the development of the domestic market. The projection indicates that by the turn of the century domestic

demand would be 12.5 million tons and not more than 50% would be met through marine resources⁽¹⁸⁾. Fresh water fishes are used for meeting domestic consumption. Peoples of eastern region and northern region of India are having a habit of taking fish of the fresh water for consumption, mainly for want of sufficient marine water resources for 'fishing' in these regions.

Therefore, inland fisheries have to play a vital role. It is in this context that the Government of India has accorded high priority to the following three fresh water subsystems:

- i) Brackish water shrimp culture development programme.
- ii) Reservoir fisheries development programme.
- iii) Expansion of carp hatchery and pond development programme.

The National Commission on Agriculture (NCA) projected the demand for fish for the year 2000 as 5.53 million tons as a high estimate (Table 1.IV). In making these projections they used the available population projections and urbanisation (Table 1.V). The NCA has taken note of the differential demand between rural and urban population both in terms of higher growth and higher per capita consumption for the urban population.

Table - 1.IV

Demand Projection of Fish (in million Tons)

Sector	1980		1985		2000	
	High	Low	High	Low	High	Low
Rural	1.50	1.34	1.85	1.48	2.39	1.89
Urban	0.85	0.76	1.16	0.93	3.14	1.70
Total	2.35	2.10	3.01	2.41	5.53	3.59

Source: Report of the NCA, Part III (1)

Table - 1.V

Population Growth and Urbanisation

Year	Total population (Million)	Decimal growth (%)	Urban population (Million)	Percentage of urban population to Total
1961	442.21	-	79.61	18.00
1971	550.70	24.53	110.04	19.88
1980	659.54	19.76	146.96	22.28
1985	724.91	-	172.18	23.75
2000	935.35	19.11	272.86	29.17

Source: Report of the NCA, Part VIII (1)

The NCA's supply forecast was based on very optimistic assumptions (given in Table 1.VI). Therefore this demand supply gap was not projected to be positive. In practice, however, while the fish production has not been stepped up sufficiently during the last three decades it has failed to make any major impact either in the form of net availability, or per capita availability, or price stability.

Table - 1.VI

Supply forecast for Fish and Fishery
products (in million tons)

Source	1971	1985	2000
Fish catch: Inland	0.70	2.27	4.50
Marine	1.10	2.01	3.50
	1.80	4.28	8.00
Estimated export	0.04	0.10	0.25
Fish meal and other industrial products	0.15	0.40	1.00
Balance available for human consumption	1.61	3.78	6.75

Source: Report of the NCA, Part III (1)

There has been a growing demand supply gap for edible fish in the domestic market resulting in a more rapid rise in fish prices than other commodities as is shown in Table 1.VII.

Table - 1.VII
Wholesale Price Indices

1970-71 = 100

Year	Price Indices			
	All commodities	Food articles	Meat	Fish
1953	46.7	43.9	38.3	27.0
1960	54.2	48.3	44.3	34.4
1965	71.2	70.0	74.0	84.0
1970	99.0	100.4	98.1	97.7
1975	175.8	170.2	202.5	157.9
1976	172.4	152.2	191.7	172.7
1977	185.4	170.8	215.9	192.3
1978	184.9	173.4	225.9	228.9
1979	206.5	181.3	255.8	253.4
1980	248.1	200.7	306.4	267.0
1981	278.4	230.3	330.4	346.6
1982	285.3	244.7	358.0	429.8
1983	308.1	275.9	376.5	451.6
1984	334.0	294.6	409.5	433.9
1985	353.3	312.4	489.9	484.6

Source: Compiled from various issues of wholesale price indices in India, Govt. of India.

It was observed from the 'Indian Institute of Management - Ahmedabad' study 1986-87, that although inland fish production is only one third of total fish production in India it contributed about 57 percent of the total domestic fresh fish supply.

IMA studies took into account the growth rates of the population till the year 2000, projected income increases, rate of increase in fish eating habit (put at 5.6 percent per annum compound rate) and price and income elasticities, arrived at a total domestic demand of 12.5 million tons. More recently a Government of India Study Group has toned down the projected demand for the year 2000 to only 6.2 million tons⁽¹⁹⁾.

It has been recognised that inland fish production will have to increase by about seven times during the next two decades to meet this demand⁽²⁰⁾.

Fresh water inland fish culture (pisciculture) cover all activities from raising to marketing of fishes through human effort. In particular, it includes fish seed stocking, rearing, harvesting and marketing of fish raised in fresh water ponds and tanks.

The importance of fresh water fish culture in India is being increasingly emphasised due to the following reasons:

- a) A growing domestic demand for fish.
- b) Augmenting marine production is difficult without considerable resources and effort. Therefore, the demand-supply gap will have to be bridged only by inland fishery system to a great extent.
- c) Natural sources of fish supply are depleting due to overfishing, creation of barriers across river systems, pollution, steeply increasing cost of fuel with resultant high cost of fishing and labour.

Fresh water fish culture could be the only answer to bridge the demand-supply gap. Also in fish farming, fresh water ponds have a high potential in India⁽²¹⁾. Further fresh water fish culture has the following added advantages.

(a) Species mix in capture fisheries can hardly be influenced whereas culture fisheries determine the species mix to suit consumer's taste.

(b) The supply of fish from capture resources is difficult to schedule, requiring costly storage facilities thus leading to serious price fluctuations. Supply of fish from culture is under human control.

(c) Fresh water fish culture provides adequate employment potential.

(d) It is possible to transform barren lands not useful for agriculture into fresh water ponds.

Growth of modern fisheries requires a high degree of capital intensity, significant upgradation, technology and large scale development of infrastructure. Less developed countries like India would therefore, have to depend on external assistance on a significant scale in order to embark upon an ambitious programme of fisheries development.

External assistance for fisheries development is available to the country either in the form of direct aid or soft loan from international institutions like the World Bank, UNDP, FAO etc or it can also be obtained through bilateral arrangements with specific countries. Contributions from international funding agencies have been predominant till the mid eighties. However, in recent years bilateral assistance has also started making a significant contribution to the inflow of external assistance for fisheries development in India.

Out of a total amount of Rs. 1276 million of external assistance received till December 1988, more than 65% (Rs. 832 million) has been provided by the World Bank⁽²²⁾.

External Finance

Direct aid or soft loan for infrastructure development through Govt. Projects or centrally sponsored projects.

Credit to Financial Institutions

NABARD :

SCICI :

IDBI :

NCDC :

The external finance plays a crucial role in directly financing government projects and also augmenting the financial resources of the existing financial institutions which provide long term as well as short term finance for fisheries project at the enterprise level.

In the inland fisheries sector, International Development Authority (IDA) has sanctioned a major project namely 'World Bank Assisted Inland Fisheries Project' (WBAIFP) which commenced in May 1980. The 'WBAIFP' introduced in 1980 in the State of West Bengal, Bihar, Orissa, Uttar Pradesh and M.P. to utilise the resources for pisciculture in an intensive and scientific way having considered the advantage regarding the licensing policy of ponds and tanks followed by these states and also considered the priority given to the 'State Fisheries Development Corporation' and Co-operative Sectors by WB, MP, UP, Bihar and Orissa with a view to ensure good revenue from the inland fisheries⁽²³⁾. The externally aided project financed through National Bank for Agriculture and Rural Development (NABARD). The details are given in Tables 1.VIII, 1.IX and 1.X.

Table - 1.VIII

Details of Inland Fisheries Project funded by NABARD

1. Name of the Project	: Inland Fisheries Project
2. Date of Commencement	: 5.5.1980
3. Date of closure	: 30.9.1988
4. i) Project cost	: US \$ 40 Million
ii) IDA credit	: US \$ 20 Million
iii) IDA credit routed through NABARD	: US \$ 9.3 million (revised to US \$ 12 million by Govt. of India during 1988)

Table 1.IX

Programme Sanctioned by NABARD

Name of the State	Items of Investment (Rs. in million)					
	Fish pond Development			Hatchery Development		
	Units	Financial Assistance	Refinance Assistance	Units	Financial Assistance	Refinance Assistance
	(Nos.)	Rs.	Rs.	Nos.	Rs.	Rs.
Uttar Pradesh	109	152.1	129.6	5	14.5	11.6
Madhya Pradesh	48	69.5	55.0	3	13.8	11.1
Bihar	155	390.6	357.9	4	10.6	9.5
Orissa	NA	89.1	80.2	5	31.3	28.2
West Bengal	169	167.7	152.5	11	20.8	18.7
Total		869.0	775.2		91.0	79.1

Source: World Bank Annual Report, Washington DC, 1980, 88.

Table - 1.X**Achievement of Programme Sanctioned by NABARD**

Name of the State	Items of Investment (Rs. in million)					
	Fish pond development		Hatchery development		Total	
	Financial Assistance	Refinance Assistance	Financial Assistance	Refinance Assistance	Financial Assistance	Refinance Assistance
Uttar Pradesh	29.6	25.1	11.3	9.1	40.9	34.2
Madhya Pradesh	16.6	13.3	7.8	6.3	24.5	19.6
Bihar	17.8	16.0	5.1	4.6	22.9	20.6
Orissa	76.8	69.2	28.7	25.9	105.5	95.1
West Bengal	101.5	91.4	7.8	7.1	109.3	98.5
Total	242.3	215.0	60.7	53.0	303.0	268.0

Utilisation of IDA Credit by NABARD : US \$ 11.7 million

Source: World Bank Annual Report, Washington DC, 1980, 88.

1.III ROLE OF FISHING IN INDIA SPECIALLY RURAL AREAS AS AN AGENT FOR DEVELOPMENT:

An important advantage of employment opportunities is derived from the fishery activities of the country, the rural section of the population which is benefited most⁽²⁴⁾. About 80 percent of the Indian Fishermen and related workers are engaged in the rural sector⁽²⁵⁾. Heavy pressure of the population on arable land, coupled with conditions of the backward technology and organisation has resulted in severe under employment and low output per engaged person. Fishery activities may provide some additional employment.

Public revenue from fisheries would be welcome in the context of present financial position of a large number of Indian states. The revenue from fish culture has reached a level of about 20 percent in the case of Gram Panchayat of some states like Orissa, UP⁽²⁶⁾.

Having a coastline of over 2 million Sq. Km. of Exclusive Economic Zone (EEZ), of which 4.15 lakh sq. km. are continental shelf rich in demersal and mid water fish resources⁽²⁷⁾, India has a great scope to raise its fish production commercially. The fishing industry when developed on a commercial scale, gives rise to a large number of ancillary industries. Extraction of oil and fat from fish, making leather goods from the skins of large fish, making manures, fish canning etc. are important. Tamil Nadu has more than 650 factories along the sea coast for producing manure and fish oil, fish liver oil such as 'shark liver oil'. West Bengal has such a factory at 'Junput' on the Contai coast of Midnapur. Maharashtra and Kerala have also set up a few shark liver oil factories⁽²⁸⁾. Fish canning, though not very important in India, is practised on a limited scale in the states like Kerala, Karnataka, Goa, Maharashtra and Tamil Nadu. There are 25 canning plants in these states having a total

capacity of 84.5 tons per day. There are also 128 ice plants and 217 freezing plants with capacity of 1805.14 tons and 2118.6 tons per day respectively situated mainly in the State of Kerala, Maharashtra, Gujrat, Tamil Nadu, Karnataka, Andhra Pradesh, West Bengal, Goa and Orissa ⁽²⁹⁾.

The fishery sector is important for Indian economy as it contributes a source of employment for 95 lakh fishermen (including the occasional fishermen), an average per capita supply of 3.5 kg of animal protein food and 3.67% to the nation's total export earnings ⁽³⁰⁾. Exports of fish products accounted for about 23% of the total exports of principal agricultural commodities ⁽³¹⁾.

Table 1.XI disclosed that fishery sector involves 56.847 lakh fishermen (excluding the occasional fishermen). Of this 16.39% are actively engaged in fishing (9.31% on a full time basis); another 10.16% are engaged in activities related to fishing like marketing, net mending, fish curing and processing. Out of the 5.29 lakh full time active fishermen, about four lakh fishermen are in the marine sector and about 1.29 lakh are on full time basis in the inland sector. The position is reverse in the case of part time fishermen (i.e. about 3 lakh in inland sector and 1 lakh in marine sector). These data do not include occasional fishermen but their number should be higher than the active fishermen and many do not belong to the traditional fishermen communities.

Table - 1.XI**Fishermen population in India (1981)**

Particulars	(Figures in Lakh)		
	1972	1977	1982
Total Number of Fisherman	50.458	40.849	56.847
Male (Adults	14.581	8.520	17.697
Female (adults)	14.035	7.136	15.661
Children	21.842	25.193	23.489
Engaged in Actual fishing	7.682 (15.22)	8.612 (21.08)	9.317 (16.39)
Full time	3.826	4.511	5.290
Part time	3.856	4.101	4.027
Engaged in related operation	4.936 (9.78)	6.561 (16.06)	5.776 (10.16)
Fish marketing	2.603	3.585	3.246
Net repairing	1.650	2.083	1.863
Fish curing/processing-	0.683	0.893	0.667
Others	0.140 (0.28)	0.210 (0.51)	1.387 (2.44)

Note: The data presented above do not include numbers from Manipur, Nagaland, Meghalaya, W.B., Sikkim, Arunachal Pradesh and Mizoram (these data are incomplete and still under publication). Figures in parentheses are percentage of total number of fishermen.

Source: Hand Book of Fisheries Statistics, 1986.

Contribution to GDP and exports

Fishery sector of India contributed about 2.40 percent to the GDP originating from agricultural, forestry, logging, fishing, mining and quarrying Group (shown in Table 1.XII). Exports of fish and fish products were about 4,600 million in 1986-87 and these accounted for about 3.67 percent of total exports from the country (shown in Table 1.XII). In 1989-90 with an export of 110843 tons of fish and fishery products valued at Rs. 634.99 crores the growth is expected to be 11.09 percent in volume and 6.21 percent in value as against 1988-89 (shown in Table 1.XIII). Thus fishery sector is important both from the point of view of the population involved and its contribution to exports.

Table - 1.XII

Contribution of Fishing Industry in Indian Economy

Year	Agricultural, forestry and logging, fishing, minning and quarrying	Fishing	Fishing (%)	Total Export	(Rs. in crore)	
					Exports of fish products	Share of fish products (Percent)
1970-71	17,307	229	1.32	1535	35.07	2.28
1975-76	27,732	526	1.90	4042	127.00	3.14
1980-81	42,668	845	1.98	6711	234.84	3.47
1981-82	47,375	931	1.97	7806	286.01	3.66
1982-83	50,568	1019	2.02	8803	361.36	4.10
1983-84	63,194	1191	1.88	9771	373.02	3.82
1984-85	65,174	1460	2.24	11744	384.29	3.27
1985-86	69,513	1666	2.40	11012	398.00	3.61
1986-87				12567	460.67	3.67

Source: Report on currency on Finance (1986-87)
Reserve Bank of India, 1986-87.

There has been a phenomenal growth in the export of marine products during the last two decades. About 110843 tons of marine products were exported in 1989-90. These amounted to Rs. 6349.9 million with the unit value realisation of Rs. 57.29 (shown in Table 1.XIII and Figure - 1.3). Shrimp has been a dominant item in the sea food export. During the last eight years, shrimp has, on an average, constituted 64 percent of the total marine products export in terms of volume and 84 percent in terms of value⁽³²⁾.

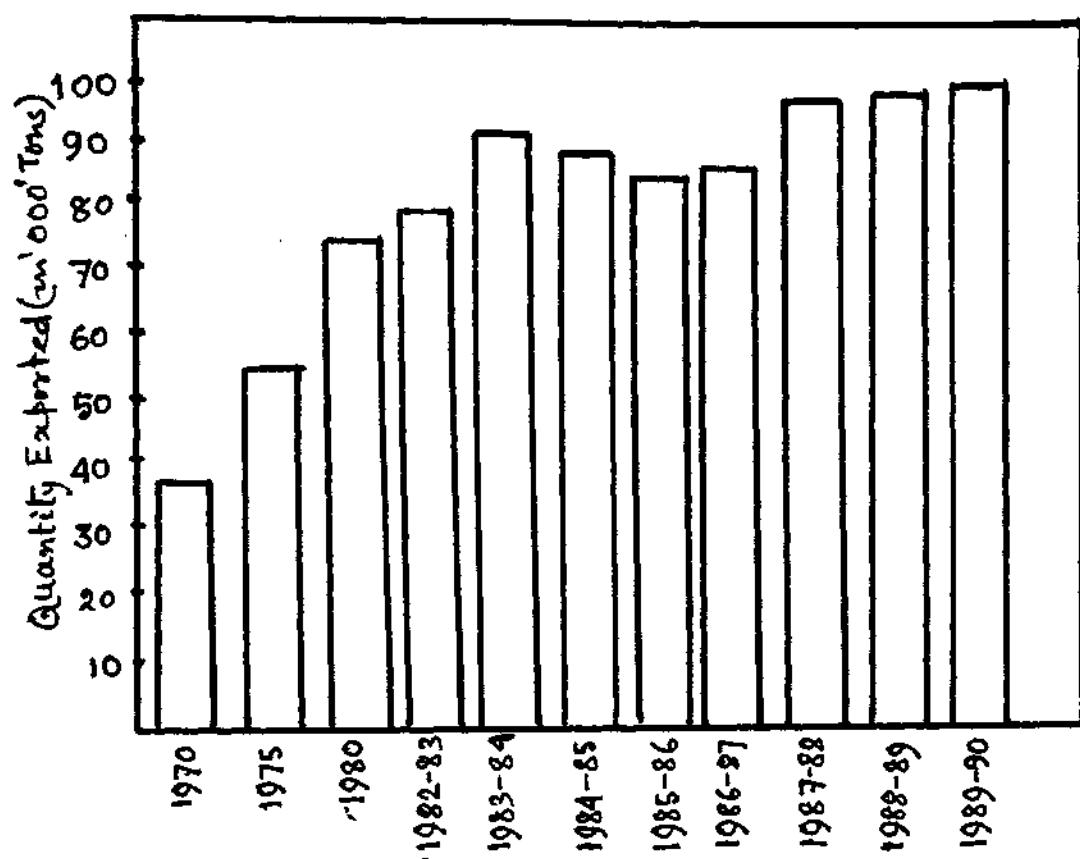
Table - 1.XIII

Export of Indian Marine Products

Year	Quantity in Tons	Value in Rs. million	Average Unit Value Rs./Kg
1970	37,175	355.4	9.66
1975	53,412	1041.1	19.14
1980	74,542	2188.8	29.36
1982-83	78,175	3613.6	46.22
1983-84	92,691	3730.2	40.24
1984-85	86,187	3842.9	44.58
1985-86	83,651	3980.0	47.58
1986-87	85,843	4606.7	53.66
1987-88	97,179	5312.4	54.72
1988-89	99,777	5978.50	59.92
1989-90	1,10,843	6349.9	57.29

Source: MPEDA, Cochin

FIGURE - 1.3
(B A R D I A G R A M)



Japan imports all item of sea foods from India, the USA only shrimps continuously, and fish recently. Frozen cuttle fish and squids are exported mostly to Europe and to some extent to Japan. Europe takes small quantities of shrimp. Japan is the major importer of Indian Marine products (Sea food), it imports about 34.86% quantity and 58.92% value of the total exports of marine products of India followed by USA importing 13.84% quantity and 12.32% value in 1988 as is shown in Table 1.XIV.

Table - 1.XIV

Major importers of Indian marine products and their share in exports

Country		1985	1986	1987	1988
Japan	Quantity %	47.16	44.85	43.28	34.86
	Value %	68.04	67.62	66.55	58.92
USA	Quantity %	13.37	12.96	14.67	13.84
	Value %	13.20	12.48	13.27	12.32
France	Quantity %	3.35	4.87	5.06	4.75
	Value %	1.57	2.58	2.85	2.41
Netherlands	Quantity %	0.72	0.99	0.49	0.88
	Value %	0.98	1.57	0.87	1.06

Source: DATA BANK compiled by THE ECONOMIC TIME, Calcutta, 21.2.92, p. 63.

Agriculture has, of late, received considerable attention in this country and much is being done to improve the productivity of land but very little emphasis has been laid on the development of the derelict and semi-derelict water courses which once used to give a prolific supply.

Government of India through 5 year plans initiated measures for the development of fisheries. With the passage of time fisheries development programmes gained much importance. Though between 1st and 6th plan outlay for fisheries increased by 72.35 times but in reality the percentage of fisheries outlay to total outlay increased only by 0.12%. Though the percentage in relation to total plan outlay for agriculture and allied activities increased by 3.23 times (i.e., from 1.74 to 5.62) as is shown in Table 1.XV.

Table 1.XV**Investment in various Five Year Plans**

(Rs. in crores)

Five Year Plans	Total outlay	Total outlay for agriculture and allied sectors	Total outlay for fisheries	Percentage of fisheries outlay to	
				Total outlay	Total outlay for agriculture and allied activities
I	1960	294	5.13	0.26	1.74
II	4600	529	12.26	0.27	2.32
III	7500	1068	28.27	0.38	2.65
IV	15902	2728	82.68	0.58	3.03
V	39322	4302	151.24	0.38	3.52
VI	97500	6609	371.14	0.38	5.62

Source: Fisheries Division, Ministry of Agriculture and Co-operative, Govt. of India.

The three segments of rural economy fishery, agriculture and animal husbandry are closely interrelated to each other. Fishery and agriculture can complement each other. Pond embankments could be used for growing napier grass and berseem for the purpose of fishery. Vegetables grow well on bunds which are fertilised with pond silt rich in plant nutrients. Some by-products of agriculture such as wheat and ricebran and oil cakes could be profitably used in fishery. In rural India huge tanks and 'Jalkars' came under the supervision and control of the 'Panchayets' and fishery Co-operatives' for the purpose of producing fish and the rights of pisciculture are given to the Gram Panchayets and the Co-operatives to look after the proper maintenance, repairing of tanks and also to investigate the progress of pisciculture as a whole.

65% of the total marine fish landed in India are contributed by rural based small scale fisheries⁽³³⁾. Co-operatives helped the poor fishermen of the rural coastal areas in procuring engines and other necessary accessories. Fisheries have great potential for 'Panchayats'. It is not only a revenue yielding business but will supply the villagers with much needed protein.

Thus the fishery in India has many dimensions to serve as a developmental agent towards the country's economy such as -

- (a) to increase food production and thereby raise the nutritional standard of the population. (b) to generate income, employment and growth of subsidiary industries;
- (c) to ensure welfare of the fishermen community through different fishery programmes;
- (d) to maximise foreign exchange earnings through export of marine products ; and
- (e) to increase the commercial activities within the country.

In conclusion it is observed from the present analysis that out of 86% of the total production of fish from the marine waters of the world Japan, USA, China, Canada, Russia, Norway, Peru, South Korea and India dominate the position. More than 3 million men are engaged in fishing in the four important fishing areas of the world located in temperate region. The areas are (a) The North-West pacific coast (b) The North-West Atlantic Coast (c) The North-East Atlantic Coast (d) The North-East Pacific Coast.

USA, EEC countries, Canada, Korea Republic and Iceland dominate the export of fish in the world and EEC Countries, Japan, USA dominate the import of fish.

Against a world percentage of about 14%, India's Inland Fish Production constitutes 46% of its total fish catch. Average growth in marine fisheries in India is higher than that in the inland fisheries. Inland fishery suffers from the lack of improved mechanisation which is imperative for the modern capital intensive programme of fishery.

The states of West Bengal, Kerala, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra and Gujarat produce the major portion of fish in India and West Bengal produces the highest portion of fish in the country having the highest average growth rate in the inland fisheries.

'International Development Authority' has sanctioned the World Bank Assisted Inland Fisheries Project' which commenced in May, 1980, and was introduced in the states of West Bengal, Bihar, Orissa, Uttar Pradesh and Madhya Pradesh to utilise the resources of pisciculture in an intensive and scientific way.

Fishery sector of India contributed about 2.40% to the GDP Originating from agricultural, forestry, logging, fishing, mining and quarrying group and this sector engaged about 56 lakh fishermen (1982). It serves as a developmental agent towards the country's economy by

- (a) increasing food production and thereby raising the nutritional standard of the population.
- (b) generating income, employment and growth of subsidiary industries.
- (c) ensuring welfare of the fisherman community.
- (d) increasing foreign exchange earnings through the export of fish.
- (e) increasing the commercial activities within the country.

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CHAPTER - 2**FISHERIES IN WEST BENGAL AND WEST DINAJPUR:**

- i. EVOLUTION OF FISHERIES AND PISCICULTURE
IN WEST BENGAL.**
- ii. COMPARATIVE STUDY BETWEEN NORTH AND
SOUTH BENGAL.**
- iii. NATURE OF RURAL DEVELOPMENT IN WEST DINAJPUR
AND PISCICULTURE AS AN AGENT FOR DEVELOPMENT.**
- iv. OBJECTIVE OF THE THESIS.**

2.1 EVOLUTION OF FISHERIES AND PISCICULTURE IN WEST BENGAL:

The noted naturalist Buchanan Hamilton undertook the enquiries on the fish and fisheries of Bengal in 1794. He in his report published in 1822 stated that the fishery question in Bengal was of the utmost importance. The importance of pisciculture can be well understood from the fact that the East India Company initiated measures for the development of the pisciculture as early as in 1794⁽¹⁾.

Another naturalist Dr. M.C. Chelland continued the work of Buchanan and he in his report published in 1839 pointed out the immense benefits which might be derived by judiciously manipulating the fresh water fisheries. He did noteworthy work on salt lake fisheries.

At the instance of the Government of India, investigations were undertaken by surgeon Major Francis Day, Inspector General of Fisheries in India, in the year 1868 in regard to the effect of snicuts or weirs on migratory fishes. A complete report on the fresh water and sea fisheries of India was published by the Government in 1873 on the basis of Day's investigations. The results of his studies were published in 1889 under the title "Fauna of British India, Burma and Ceylon". It contained valuable description of the rivers and irrigation works, of tanks and jheels, of the fish fauna in fresh water, their migration and breeding habits, of the causes of mortality among fry; of the fish trade; of fishermen and fish implements as well as fish enemies; and an elaborate account was also given of the steps which were considered necessary for improvement of the fisheries.

The marine fisheries survey in Indian Water was first taken up by Lt. Col. A. Clock and the results of his survey "Investigator" were published in 1896 highlighting the potentialities of marine fisheries in India.

The Government of Eastern Bengal and Assam carried out surveys on the fish and fisheries of the Eastern Bengal and Assam in 1907 and the first fisheries department was created in Bengal in February 1908. In 1910, the department of fisheries of the province was amalgamated with the department of Agriculture and thus the Director of Agriculture also became the Director of fisheries.

In December 1914 an extensive investigation on the fisheries and fish trade of the Bengal province was carried out by the Directorate of Fisheries, Government of Bengal, Bihar, and Orissa. However, the Fisheries department was abolished in 1923 in pursuance of the recommendation of 'Bengal Retrenchment Committee' owing to paucity of funds⁽²⁾.

For about 14 years, that is from 1923 to 1937, there was no activity at the Government level (Including pisciculture) in Bengal and the reports and recommendations put forward by different experts from time to time were virtually shelved into cold storage⁽³⁾.

The State Government appointed A.C. Lahiri, a Deputy Collector and special official, to enquire into the fishery rights in Bengal in 1938; the report made various suggestions and recommendations in 1939 in regard to the possibilities of State Control of fisheries with reference to the rights of land lords under the permanent settlement, and also about the possibility of conferring occupancy rights on fishermen and farmers on the analogy of those rights enjoyed by the tenants in lands under the Bengal Tenancy Act.

The fishery department of the province was revived in 1942 with the objective to increase the internal fish production through capture and culture fishery and its proper distribution⁽⁴⁾.

On this basis, an organisation was set up and technical officers were recruited. Unfortunately, however, before any plan and programme could be implemented, the objectives had to be revised by the Government in view of the emergency arising out of the second world war and the apprehended invasion of Bengal by Japan ⁽⁵⁾.

Restrictions imposed on the free movements of fishermen with their boats in the coastal and estuarine areas and the emergency conditions as a whole crippled the fish trade to a great extent. The revised policy of the Fisheries Department was primarily to assist the military authorities in procuring fish for the army consumption and thus, the idea of developing the internal resources was entirely sidetracked. Even after the cessation of war in 1945, the Department had very little development work to do excepting rendering free technical advice to fish farmers and running of some nursery projects for fry production and distribution in some selected districts along with procurement and distribution of capital goods like yarn, coal-tar, etc, to needy fishermen at subsidised rates. The significant work done by fisheries Department in prepartition days was carrying out a detailed survey of the spawn catching centres in Bengal as also of the difficulties and requirements of the catchers, etc. ⁽⁶⁾

Post Independence:

In August 1947, the province was partitioned, most of the Hindu member of the staff opting for West Bengal while the Muslims for East Bengal in view of insecure conditions prevailing at both sides of the border.

After partition in August 1947, the Government of the newly created State of West Bengal felt that the fishery resources being shrunken as a result of partition, there would be hardly any justification to have a full fledged Directorate like that of the undivided Bengal. It was, therefore, decided to have a small

set-up under one Director for the three wings, viz., Agriculture, 'Animal Husbandry and Veterinary' and Fisheries⁽⁷⁾.

The Government of West Bengal created a separate directorate of fisheries in 1950 specially to organise the deep sea fishing venture⁽⁸⁾.

With the launching of Five Year Plans on and from 1951 the venture got a thrust. A number of schemes and projects on pisciculture, were introduced and implemented with the objective to provide short, medium and long term financial assistance to inland fisheries for the development of pisciculture. As a result a number of fish farms were established in different districts of West Bengal. The basic objective was to increase fish production and to organise co-operations of fishermen, rendering training facilities, distributing minikit (fertilisers, fry), arranging benefit for service party group of farmers for distribution of devices for catching fish including carrying out survey of fishery resources all over the State of West Bengal to ascertain the present position and conditions etc and also to solve the problems and difficulties in different spheres of fisheries activities⁽⁹⁾.

For deciding about the policies and programme to be followed by the State Government in the process of development a Fishery Advisory Board consisting of official and non-official members and headed by the Minister in Charge of 'Fishery Department' was set up by the Government in 1949. The Fishery Development Corporation (FDC) started its activities with the same objective and the Government of West Bengal expressed its unwillingness to take over 'Central Fisheries Corporation' (through which Central Government tried to develop its fishery activities in different states) in the Fishery Development Corporation in 1969⁽¹⁰⁾.

World Bank Assisted Inland Fisheries Project (WBAIFP) with their varied programmes have been introduced in 1980 in West Bengal, Bihar, Orissa, Uttar Pradesh and Madhya Pradesh to run for a period of 5 years (extended again for 3 years) with the intent to utilise the resources for pisciculture in an intensive and scientific way and to reduce the gap between demand and supply of fish.

The Government of India and National Bank for Agriculture and Rural Development Corporation formerly known as Agriculture Refinance and Development Corporation and the State Government are participating in the project by signing agreement separately with the International Development Authority* under the Development Credit Agreement No. 9631E. The Government of West Bengal has initiated steps for intensifying fish culture and considerable investment have already been committed. Fish Farmers Development Agencies have been established in the State to extend facilities for the fish seed at cheaper rates, long, medium and short term loan along with subsidy. Extension services have been geared up at the village level. Training programmes and other allied activities for fish farmers have been adopted to improve the condition⁽¹¹⁾.

West Bengal is well endowed with inland water resources in the form of hill streams, river, canals, wet lands, ponds and tanks etc.

The following are the water resources available in the state characterised differently as in Table 2.1.

Table - 2.1**Inland water resources in West Bengal (1980-81)**

Total Tank Area	2,73,000 hectares
Cultural Area	1,92,000 "
Rivers	1,74,000 "
Beels and Bagra	42,000 "
Reservoirs	17,000 "
Khals	81,000 "
Bharis	30,000 "

Source: Directorate of Fisheries, Govt. of West Bengal.

Out of the total tank water area (2.73 lakh hectare) 70.33% are already available for pisciculture. 19.97% of the water area are in semi-derelict condition but can be made available for pisciculture with some improvement. 9.7% are in derelict condition requiring heavy capital investment for reclamation⁽¹²⁾.

Out of total inland water area resources of West Bengal, 2.84 lakh hectares are being utilised for fisheries⁽¹³⁾.

It is possible to produce 16.46 lakh tons of fish yearly from the source of tank water area only (i.e. 2,73,000 hectares) by implementing scientific pisciculture in the State as against the total requirement of 9 lakh tons of fish yearly⁽¹⁴⁾.

Table - 2.II
Total Fish Production in West Bengal

Year	Production in '000' ton
1980-81	370
1981-82	379
1982-83	388
1983-84	395
1984-85	402
1985-86	424
1986-87	470
1987-88	505

Source: Directorate of Fisheries, Govt. of W.B., 1990

From the Table 2.II it is seen that in no one year from 1980-81 to 1987-88 the State, 'West Bengal' can produce her needed quantity of fish (i.e., 9 lakh ton).

Table - 2.III
Water Area and Number of Beneficiaries In Inland Fisheries Project (other than traditional culture)

Year	Water Area covered under Inland Fisheries Project (hectare)	Number of Beneficiaries
6th Plan		
1981-82	10,160.34	10,501
1982-83	12,002.66	10,794
1983-84	20,595.66	55,781
1984-85	35,715.43	93,683
7th Plan		
1985-86	46,063.12	1,52,205
1986-87	52,766.89	1,70,816
1987-88	59,587.04	1,91,457
1988-89	66,804.38	2,13,109
1989-90	73,535.31	2,29,936

Source: Directorate of Fisheries, Govt. of West Bengal.

From the Table 2.III it is found that till 1987-88, it has been possible to cover 59,587.04 hectares under the inland fishery programme and the area was raised upto 73535.31 hectares in 1989-90 engaging 2,29,936 beneficiaries in this avocation in 1989-90.

The 'World Bank Assisted Inland Fisheries Project' (WBAIFP) started with a target of 85,000 acre of Inland water areas for the first five years of the programme i.e., 1980-81 to 1984-85 for the purpose of pisciculture.

Table - 2.IV

Water Area covered by Pisciculture (WBAIFP)

Year	Water area covered acre	% of culturable inland water area covered
1980-81	12,847.62	2.68
1981-82	13,950.54	2.91
1982-83	14,886.46	3.10
1983-84	22,619.22	4.71
1984-85	24,975.79	5.20
1985-86	25,223.30	5.25
1986-87	25,894.85	5.39
1987-88	27,706.70	5.77
TOTAL	1,68,104.48	35.02

Source: Directorate of Fisheries, Govt. of West Bengal.

From the Table 2.IV it is observed that 89,279.63 acre of water area had been covered by pisciculture for the period 1980-81 to 1984-85 i.e., 18.60% of total culturable water area of West Bengal had been considered for pisciculture in the state for the period 1980-81 to 1984-85.

After achieving the target within the said period the project has been allowed to continue to operate. A total of 78,824.85 acre water area had been covered by pisciculture for the period 1985-86 to 1987-88 as against the target water area of 25,000 acre for 1985-86 and 18,750 acre each for 1986-87 and 1987-88 i.e., 16.43% of total culturable water area of West Bengal had been covered in the period of 1985-86 to 1987-88 with a total 35.02% of total culturable water area had been considered for pisciculture under the WBAIFP for the period 1980-81 to 1987-88 which clears 113.96% of the total target water area for 1980-81 to 1987-88 had been covered; that is water area covered for pisciculture was more than the target set for the purpose.

From 1951 to 1988 about 40% of total culturable water area of West Bengal had been covered for pisciculture under different schemes⁽¹⁵⁾. As a result West Bengal ranked first in the production of fish in the country from 1986 to 1992 successively⁽¹⁶⁾.

Table - 2.V

Rate of increase in production and population

Year	Total Production of fish in lakh ton	% increase	Population in lakh	% increase
1980-81	3.70	-	545	-
1990-91	7.00	89%	680	24.7%

Source: Directorate of Fisheries, Govt. of West Bengal.

It is observed from the Table 2.V that the rate of increase in fish production in West Bengal is 3.60 times of the rate of increase in population. But no impact of this increased production has been visible on the price of fish in the market. Price of

fish in the market has increased manifold from 1980-81 to 1990-91. Therefore the increase in production of fish is not reflected in the market as regards price formation.

Table - 2.VI

Training of Fish Farmers and Fishermen in W.B.

Year	No. of farmers trained in Inland Fishery	No. of fishermen trained in Marine Fishery	Total
1980-81	1,190	124	1,314
1981-82	1,278	111	1,389
1982-83	4,728	120	4,848
1983-84	4,896	160	5,056
1984-85	22,180	180	22,360
1985-86	23,085	259	23,344
1986-87	22,033	280	22,313
1987-88	21,212	280	21,492
Total	1,03,602	1,514	1,05,116

Source: Directorate of Fisheries, Govt. of West Bengal.

From the Table 2.VI it is observed that 1,05,116 fish farmers and fishermen got training in the State of West Bengal from 1980-81 to 1987-88 most of whom are fish farmers and most of the fish farmers are directly involved in pisciculture activities.

Table - 2.VII**Production of Fish Seeds (Fry)**

Year	India (In million)	West Bengal (In million)	Share of West Bengal (%)
1984-85	5,639	4,200	74.5
1985-86	NA	5,000	-
1986-87	9,300	6,100	65.6
1987-88	9,500	7,005	70.1

Source: Directorate of Fisheries, Govt. of W.B.

From the figures available for the period 1984-85 to 1987-88 as shown in the Table 2.VII is seen that more than 70% of the total fish seed production in India was accounted for by West Bengal alone, helping a lot for the improved pisciculture in the State.

In the process of development of fisheries a three tier system of management and administration in Fisheries Co-operatives operates in the State. At the village level, producers' societies or primary societies are engaged in production. Central Societies, operating mostly at the district level are mainly concerned with procurement and supply of inputs. At the State level, an Apex body, West Bengal State Fishermen's Co-operative Federation Ltd., is looking after management of different Co-operative societies below, arranging supply of inputs and procuring finance for development in the co-operative sector.

The following Table 2.VIII will adequately disclosed the position of Fishery Co-operatives in the State of West Bengal.

Table - 2.VIII

Fishery Co-operative Societies in W.B.

	Inland	Marine	Total
1. Number of Primary Societies	769	38	807
2. Number of members (Fishermen/Farmers)	70,439	1605	72044
3. Number of Central Societies	18	1	19

Source: Directorate of Fisheries, Govt. of W.B., 1988

Table - 2.IX
Allocation and Utilisation of Fund in State Plan Budget

Period	Year	Allocation (Rs. in lakh)	Utilisation (Rs. in lakh)	Percentage of Utilisation
First plan	1951-56	134.47	40.30	26.22
Second plan	1956-61	75.74	60.02	79.24
Third plan	1961-66	204.55	111.64	54.58
Annual Plan	1966-67	55.00	43.90	79.82
Annual Plan	1967-68	55.00	41.46	75.36
Annual Plan	1968-69	55.00	43.55	79.16
Fourth Plan	1969-74	274.76	255.19	92.88
Fifth Plan	1974-79	1049.73	834.16	79.46
Annual Plan	1979-80	447.00	226.49	50.67
Sixth Plan	1980-81	510.00	326.27	63.97
Sixth Plan	1981-82	560.00	269.36	48.10
Sixth Plan	1982-83	371.00	281.06	75.76
Sixth Plan	1983-84	450.00	431.54	95.90
Sixth Plan	1984-85	730.00	674.14	92.35
Sixth Plan	1985-86	750.00	737.75	98.36
Seventh Plan	1986-87	810.00	780.14	96.31
Seventh Plan	1987-88	850.50	811.02	95.41
Seventh Plan	1988-89	900.00	801.79	89.08
Seventh Plan	1989-90	945.00	778.62	82.39
Eighth Plan	1990-91	1100.00	-	-

Source: Directorate of Fisheries, Govt. of M.E.

From the Table 2.IX it is observed that the fund allotted for fisheries in West Bengal have not been utilized fully in any of the plan period (from 1st plan to seventh plan). Though maximum utilisation of fund is found to have been made in the 7th plan period (average 92.31%). With the progress of new plan period the utilization of fund also increases which indicates the importance of the fishing sector in West Bengal for the years to come.

In the Inland Fisheries sector, West Bengal disclosed the highest productivity followed by Madhya Pradesh, Maharashtra, Uttar Pradesh and Andhra Pradesh as is shown in Table 2.X.

Table - 2.X

Comparative productivity and water areas of Inland Fish Production of Major States (1967-68)

State	Water area (comprising, ponds/ tanks, reservoirs and baels and Baers) in lakh hectare	Production (Ton)	Production per hectare (Ton)
West Bengal	3.35	4,42,794	1,322
Uttar Pradesh	4.45	83,130	0.186
Andhra Pradesh	7.51	1,21,106	0.161
Tamil Nadu	8.01	93,600	0.116
Gujarat	2.13	22,562	0.106
Kerala	2.76	26,510	0.096
Madhya Pradesh	3.60	62,495	0.190
Maharashtra	2.18	41,146	0.188
Karnataka	6.96	42,000	0.060

Source: Dept. of Fisheries, Govt. of West Bengal.

2.II COMPARATIVE STUDY BETWEEN NORTH AND SOUTH BENGAL:

An attempt to make a comparative analysis for distinctive character of pisciculture in South Bengal and North Bengal, the two different sides of the State of West Bengal, is needed. It is true that the major portion of water areas for pisciculture are situated in South Bengal and major portion of production of fish in West Bengal comes from South Bengal districts. Moreover the yield (that is production per acre) of fish in South Bengal district is higher than the yield made by the North Bengal districts. Considering better scope and prospect in South Bengal districts regarding pisciculture, the West Dinajpur district of North Bengal also has a good prospect of pisciculture.

To concretise the above statement the following analysis are given.

Table - 2, XI

Proportion of Impounded Water Area between South Bengal and North Bengal

% of Total Water Area of North Bengal on Total Water Area of W.B.	% of Total Culturable Water Area of South Bengal on Total Water Area of W.B.	% of Total Culturable & semi derelict water Area of North Bengal on Total Culturable & semi derelict water Area of W.B.	% of Total culturable & semi derelict water Area of South Bengal on Total Culturable & semi derelict water Area of W.B.
12.17%	87.83%	11.98%	88.02%
		13.71%	86.29%

Source : Directorate of Fisheries, Govt. of West Bengal (1964-65)

From the Table 2, XI it is observed that total water Area, total culturable water Area and total Culturable and semi derelict water Area of South Bengal comprising of eleven districts in respect of total water Area, total culturable water Area and total culturable and semi derelict water Area of W.B. (Comprising sixteen districts) are greater than the total water Area, total culturable water Area and total culturable and semi derelict water Area of North Bengal (comprising 5 districts). The scope of pisciculture is better in the districts of South Bengal than the districts of North Bengal. Hence the major portion of plan allocation for fisheries sector are spent in the districts of South Bengal.

Table - 2.XII

Proportion of Impounded Water Area between W.D and North Bengal

% of Total W/A of W.D. district on Total W/A of North Bengal	% of Total culturable W/A of W.D. district on Total culturable W/A of North Bengal	% of Total Culturable and semi derelict W/A of W.D. district on Total Culturable and semi derelict W/A of North Bengal
48.90%	61.62%	52.91%

Source: Directorate of Fisheries, Govt. of West Bengal (1984-85)

It is also observed from Table 2.XII that out of total W/A of North Bengal, W.D. district alone occupies 48.90% of total W/A and 61.62% of total culturable W/A and 52.91% of total culturable and semi derelict W/A of North Bengal which indicates the importance of W.D. district for potential W/A resources of Pisciculture.

Table - 2.XIII

Proportion of Impounded W/A between M.D. and M.B.

% of Total W/A of M.D. district on Total W/A of M.B.	% of Total culturable W/A of M.D. district on Total culturable W/A of M.B.	% of culturable and semi drelift W/A of M.D. district on total culturable and semi drelift W/A of M.B.
5.9%	7.8%	7.2%
Rank	5th	7th
Source: Directorate of Fisheries, Govt. of West Bengal (1984-85)		

It is observed from Table 2.XIII that M.D. district was placed 6th in respect of having 5.9% of the total water area of M.B. and placed 5th in respect of having 7.8% of the total culturable water area of M.B. and placed 7th in respect of having 7.2% of the total culturable and semi drelift water area of M.B.

Table - 2.XIV

Proportion of cultured Water Area between South Bengal, North Bengal and West Dinajpur district

% of cultured M/A of North Bengal on total cultured M/A of M.B.	% of cultured M/A of South Bengal on total cultured M/A of M.B.	% of cultured M/A of West Dinajpur on total cultured M/A of M.B.	% of cultured M/A of West Dinajpur district on total cultured M/A of North Bengal
15.71%	84.29%	4.50%	29.02%
Rank	11th	2nd	

Source: Directorate of Fisheries, Govt. of M.B. (1984-85)

From the Table 2.XIV it is observed that the districts of North Bengal used only 15.71% of the total cultured M/A of M.B. The districts of South Bengal used 84.29% of the total cultured M/A of M.B. for pisciculture which indicates the fact that the districts of South Bengal got better scope in pisciculture than the districts of North Bengal. It is also observed that in M.D. district 4.50% of the total fish cultured M/A of M.B. had been taken for fish cultivation under different schemes (of Govt. and traditional culture) which place M.D. in the 11th position out of total cultured M/A of sixteen districts of M.B. and it was also observed that M.D. district alone had 29.02% cultured M/A of the total cultured M/A of five districts of North Bengal and M.D. district got second top priority out of the districts of North Bengal in respect of potential water area resources and cultured water area resources. (Vide Annexure - I).

Table - 2.XV

Proportion of production of Fish (from the impounded water area) between South Bengal, North Bengal and W.D. district.

% of production of North Bengal on total production of W.B.	% of production of South Bengal on total production of W.B.	% of production of W.D. district on total production of North Bengal
13.53%	86.46%	3.80%
		2nd
		10th
		2nd

Source: Directorate of Fisheries, Govt. of W.B. (1964-65)

It is observed from Table 2.XV that in respect of production of fish in different districts of W.B. from the cultured impounded W/A, the districts of North Bengal produced 13.53% of the total production of W.B. with an yield of 2.45 quintal per acre and the districts of South Bengal produced 86.46% with an yield of 2.91 quintal per acre indicating clearly that the lions share of production came from the districts of South Bengal. It is also observed that W.D. district produced 38.60% of the total production of fish produced in five districts of North Bengal ranking second in North Bengal with an yield of 2.42 quintal per acre ranking second in respect of yield in North Bengal and W.D. district produced nearly 3.80% of the total production of fish in W.B. ranking tenth in W.B. with an yield of 2.43 quintal per acre ranking sixth in respect of yield throughout the districts of W.B. a fact that shows its (W.D.district) prospect for pisciculture (Vide Annexure - I).

Table - 2aXV2

Proportion of Cultured Water Area between S. Bengal, M. Bengal and W.D. district in 1987-88 (WBAIFP)

% of cultured water area of M. Bengal on total cultured water area of M. Bengal under WBAIFP	% of cultured water area of S. Bengal on total cultured water area of M. Bengal under WBAIFP	% of cultured water area of W.D. district on total cultured water area of M. Bengal under WBAIFP	% of cultured water area of W.D. district on total cultured water area of M. Bengal under WBAIFP
14.21%	88.79%	8.14%	87.34%
Rank		6th	1st

SOURCE: Directorate of Fisheries, Govt. of W.B.

From the Table 2.XVI from the available bulk of information it is observed that in respect of 'World Bank Assisted Project' of pisciculture the districts of North Bengal used 14.21% of the cultured water area of West Bengal under NRAIFP. The districts of South Bengal used 85.79% water area for pisciculture under NRAIFP which indicates that the districts of South Bengal got better scope in pisciculture than the districts of North Bengal.

It is also observed that in West Dinajpur district 8.14% of the total fish cultured water area of West Bengal (under NRAIFP) had been taken for fish cultivation under the 'World Bank Assisted Inland Fisheries Project' (NRAIFP) ranking sixth out of the total cultured water area of sixteen districts of West Bengal under NRAIFP and it is also observed that West Dinajpur district alone had 57.24% cultured water area of the total cultured water area of five districts of North Bengal and West Dinajpur district got first periority out of the districts of North Bengal in respect of potential water area resources and cultured water area resources.

(Vide Annexure - II)

Table - 2, XVII

Proportion of production of Fish between S. Bengal, W. Bengal and M.D. district in 1967-68 (WBAIFP)

Rank	% of production of W. Bengal on Total production of W. Bengal under WBAIFP		% of production of S. Bengal on Total production of W. Bengal under WBAIFP		% of production of M.D. district on total production of W. Bengal under WBAIFP		% of production of M.D. district on Total production of W. Bengal under WBAIFP	
	13.6%		86.31%		7.93%		57.98%	
					5th		1st	

Source: Directorate of Fisheries, Govt. of W.B.

It is observed from the Table 2, XVII that in respect of production of fish in different districts of West Bengal from the cultured impounded water area under WMAIFP, the districts of North Bengal produced 11.69% of the total production of West Bengal under WMAIFP, with an yield of 5.98 quintal per acre while the districts of South Bengal produced 86.31% with an yield of 6.17 quintal per acre. This clearly indicates that the lion's share of production comes from the districts of South Bengal (Vide Annexure-II).

It is also observed that West Dinajpur district produced 37.98% of the total production of fish produced in North Bengal districts under 'WMAIFP' thereby ranking first in North Bengal and fifth in West Bengal with an yield of 5.98 quintal per acre ranking eighth in respect of yield throughout the districts of West Bengal. West Dinajpur district producing nearly 7.93% of the total production of fish in West Bengal under 'WMAIFP' with an yield of 5.98 quintal per acre ranked second in North Bengal districts in respect of yield which shows its (W.D. district) future prospect in pisciculture.

From the above discussion it is observed that South Bengal districts have better yield. The reasons for better yield were proper utilisation of resources and benefits distributed for pisciculture in most of the districts of South Bengal.

Soil composition of a fishery area has direct bearing on inland fish production and proper planning for development of fishery largely depends on this important technical aspect. In this regard the districts of South Bengal like, 24 Parganas (North and South), Burdwan, Bankura, Midnapur and Murshidabad are rich in fishery development and comparatively better than the districts of North Bengal like Jalpaiguri, Darjeeling and Cooch Behar⁽¹⁷⁾.

The reasons for better yield in "WBAIFP" are also that ⁽¹⁸⁾ 'the farmers engaged in traditional culture are not patronised'.

Another important component of a successful pisciculture programme is the extension programme where the districts of South Bengal are in a better position having extensive extension programmes ⁽¹⁹⁾. The extension programme may serve as a catalyst in the diffusion process. Extension agents are supposed to preach the benefits of a new farm technology and this promise should be heard and acted upon by most of the innovative farmers ⁽²⁰⁾. This is instrumental to creating an awareness among the farmers to shift from traditional to modern intensive pisciculture.

Training in fish farming technology creates scope to induct the fish farmers and employ themselves in meaningful occupation as is shown here. Trained farmers are able to create a new cadre of fish farmers in the village communities. Training enhances innovative and allocative ability of the farmers to decode information, to evaluate costs and benefit and to quickly allocate resources in a cost-efficient manner reducing the risk element in innovation. Trained fish farmers are more efficient in creating a better yield than the untrained fish farmers ever are ⁽²¹⁾.

Table - 2.XVIII

Proportion of Trained Farmers and Water Area covered under the 'WBAIFP' (in 1985-86)

District	Water area covered hectare	Trained farmers (in number)	Trained farmers: water area covered
Murshidabad	2689.44	4891	1.82:1
West Dinajpur	2889.35	1767	0.68:1

Source: Directorate of Fisheries, Govt. of W.B.

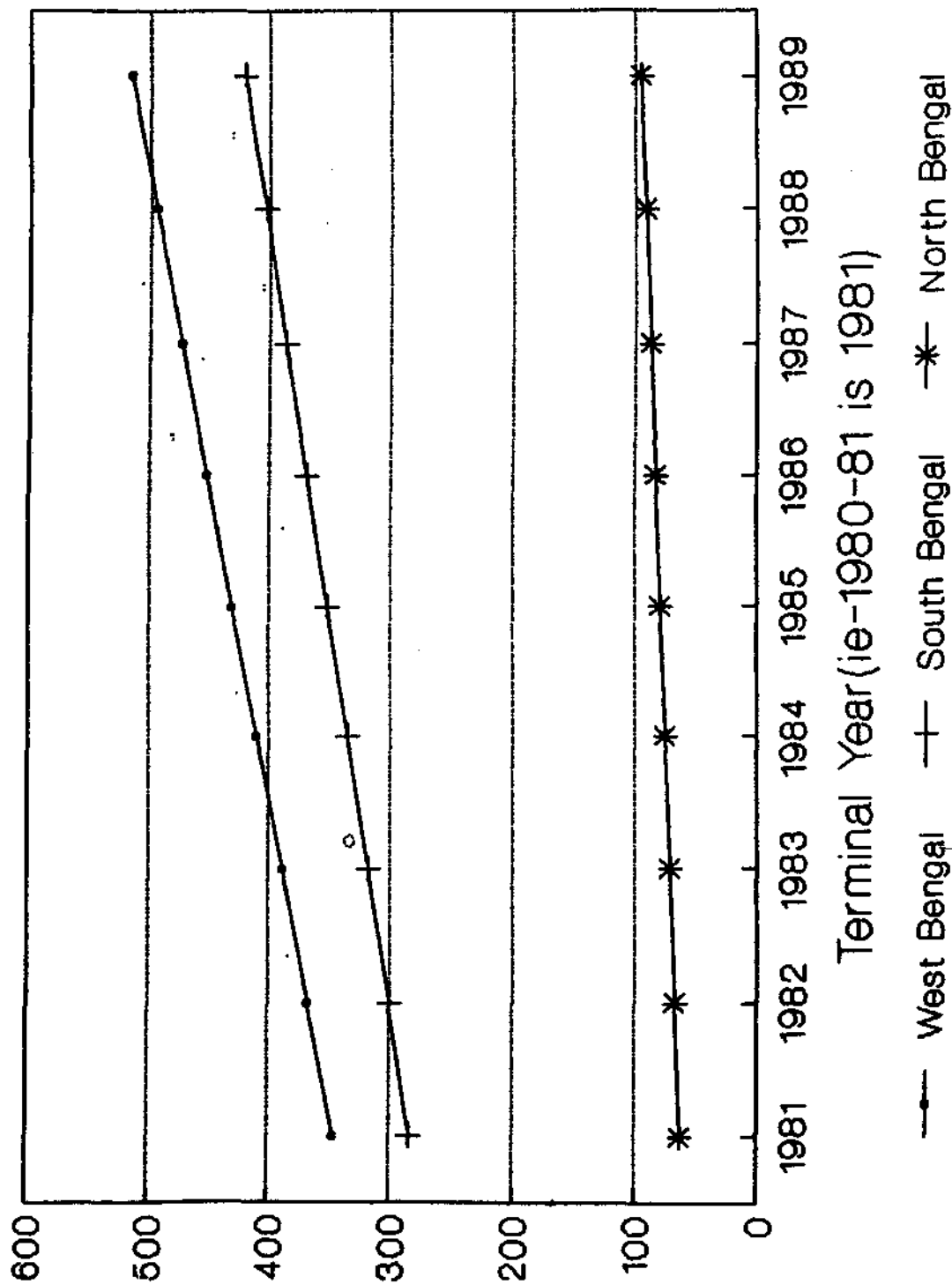
From the Table 2.XVIII where two districts are chosen, one each from South Bengal and North Bengal i.e., Murshidabad and West Dinajpur district giving a comparative picture of trained fish farmers in respect of water area covered under 'WBAIFP' it is shown that for one hectare of water area covered for pisciculture there are 1.82 number of trained fish farmers in Murshidabad district whereas in the district of West Dinajpur there are 0.68 number of trained fish farmers for one hectare of water area covered for the same purpose. The comparative advantage regarding the number of trained farmers might have led to the better yield in Murshidabad district⁽²³⁾.

From the Graph 2.1 it is seen that the trend of fish production of W.B., South Bengal and North Bengal are plotted by the method of least square method of time series for the period 1981 to 1989. It is also observed that South Bengal has an average annual rate of growth (17.10 thousand Ton) which is more than the Growth shown in North Bengal (4.07 thousand ton) and both the region of West Bengal combinedly contributed an average annual growth rate of 21.18 thousand ton towards the total fish production of the State of West Bengal.

The trend of fish production of W.D. district if plotted on the graph will be lying almost on the base line as it (W.D. district) produced about 2% of the total production of fish in W.B. during the period 1981 to 1989 having a very low average annual rate of growth (i.e., 1.54 thousand ton).

TREND OF FISH PROD.

Graph-2.1



2. III NATURE OF RURAL DEVELOPMENT IN WEST DINAJPUR AND PISCICULTURE AS AN AGENT FOR DEVELOPMENT:

The district of West Dinajpur is mainly a rural area having a total area of 5,340 sq. km of which 5,297.40 sq. km are rural area. It has a total population of 24,04,947 out of which 21,36,221 are rural people⁽²³⁾. The district of West Dinajpur is located on the northern part of West Bengal at a height of 15 metres from the sea level and is bounded by the district of Darjeeling (in the north), Malda (in the south), Bangladesh (in the east) and Bihar (in the west). The district has three sub-divisions namely, Balurghat, Raiganj and Islampur and sixteen police stations with equal number of development blocks. Regeneration of the rural economy of the district of West Dinajpur depends upon mainly on that of agriculture. Most of the peasants live at bare subsistence level. Entrepreneurial activity is practically absent and social system practically denies opportunities for creative facilities. The abundance of working population (32.09% of total population) leads to cheapness of workers⁽²⁴⁾. Marginal productivity of disguised unemployed are zero or nearly zero and percentage of non-working population to total population of the district is 67.92% which indicates the presence of unemployment problem in an acute form. 63.7% of the population whose occupation is agriculture are marginal farmers (holding upto 1 hectare land) and 8.7% are small farmers (holding above 1 hectare and upto 2 hectares) using obsolete machineries⁽²⁵⁾. As a result the district of West Dinajpur is suffering from 'economic backwardness'.

In West Dinajpur district 78.9% of the total workers are agricultural workers yet the number of acres of cultivated land per agriculture worker was 1.23 which shows presence of underemployment in the agriculture sector⁽²⁶⁾.

There are 6,60,000 hectares gross cropped area with a net cropped area of 4,03,000 hectares and irrigated area at 21% of net cropped area having cropping intensity of 163% and 24% of the total population are engaged in agricultural activities indicating that the district is mainly dependent on the agriculture for its development⁽²⁷⁾. Agriculture is the main hope of 89% of the rural population of the district for its development⁽²⁸⁾.

In addition to agricultural occupation, animal husbandry, irrigation, forestry, co-operation, profession and self employment like tailoring, shoe repairing and others, retail trade and business (small), industries like small scale industries, handloom, village artisan and others, the pisciculture is also considered an agent for the rural development of the district.

Government and others adopted different measures utilising their resources with the help of various rural development agencies and programmes e.g., IRDP, SC & ST Dept., NREP, RLSP, Agriculture Department, Animal Husbandry department, Forest department, cottage and small scale Industry department, Home Transport department, DFO, FFDA and rural banks. They are also adopting such minimum needs programmes as elementary education, rural electrification, water supply, rural roads, housing assistance etc. for the purpose of rural development as 99.20% of the area of the district of West Dinajpur are considered as rural area⁽²⁹⁾.

The district of West Dinajpur is rich in fishery resources namely, ponds, tanks, dighis, rivers, rivulets and tributaries. Of the total area of West Dinajpur district 9.23% is the water area as is shown in Table 2.XIX.

Table - 2.XIX

Distribution of total water area in W.D. district

Total area of W.D. district Sq. K.	Types of Tank Fisheries			River Khari Beels	Total Acres	% of water area on Total area of W.D. district
	Cultur- able	Semi derelict	Derelict			
	Acre	Acre	Acre	Acre	Acre	
5340	23907.28	5368.21	5634.94	22393	57303.43	9.23

Source: FFDA, Balurghat, W.D.

The ownership pattern of the water resources indicate a division between the Government ownership and private ownership of which the private ownership dominates the position (Vide Table 2.XX below):

Table - 2.XXDistribution of water area to their ownership
(only Tank fisheries)

Particulars (Types)	Ownership pattern		Total (Acres)
	Private (Acres)	Government (Acres)	
Culturable	22,391.18	1516.18	23,907.28
Semi derelict	3,838.76	1529.45	5,368.21
Derelict	3,760.81	1874.13	5,634.94
Total	29,990.67	4919.76	34,910.43

Source: FFDA, Balurghat, W.D.

Potential resources for the development of fisheries and the upliftment of neglected sections of the population through fisheries are quite conspicuous in the district of West Dinajpur. Intensive and scientific pisciculture in the inland water areas has expanded the employment opportunities and augmented the income of not only the fish pond owners but also of the fishermen and fish farmers who work in them and most of the latter group belong to the scheduled castes and scheduled tribes and are living below the poverty line.

Pisciculture not only provides the much needed protein feed in the district of West Dinajpur but also 13710 farmers depend on pisciculture directly for their livelihood from 1960-61 to 1967-68⁽¹⁰⁾. Besides, several others are engaged in ancillary vocations such as net making, basket making, fish processing and transportations. Pisciculture utilises the by-products of agriculture such as oilcakes, rice and wheat bran and those of animal husbandry such as cattle dung and poultry manure. It also contributes towards improving public health by reducing the sources of water-borne scourges like malaria, filaria, encephalities etc. The technique of breeding fish has now been considerably simplified and educated unemployed can undertake fish breeding and fry fingerling production programmes in seasonal ponds to meet the seed requirements effectively and helping the unemployed youth through pisciculture towards self employment. In recent times, there have been remarkable technological advancements which would enable higher yield from pisciculture operations. These include, formulation of fish feed, encapsulation process of feed, development of mechanised feed dispensing devices, control of diseases, genetic upgrading, hybridisation etc. Experience in agriculture and animal husbandry has demonstrated the advantages of using genetically uniform material produced by selective breeding and hybridisation. Similar work on fish has begun recently and modern genetic methods are found applicable in the

case of fish too to produce hybrids of desirable quality and quantity.

The three segments of rural economy—pisciculture, agriculture and animal husbandry are closely interrelated. Pisciculture and agriculture do complement each other in the district of West Dinajpur. Pond embankments are used for growing napier and berseem for rearing grass carp (a species of fish). Some vegetables grow well on bunds which are fertilised with pond silt, rich in plant nutrients. This pond silt is in many ways equal in value to good quality compost and is used as a fertiliser for garden and field crops. The pond embankments are also planted with fruit trees like coconut, banana and papaya from which regular income comes from their day-to-day operations. Mulberry is also grown in areas where silk worm rearing has been concentrated, as in the blocks of 'Hemtabad' and 'Kushmandi' of West Dinajpur district. Pupae of silk worm are rich sources of protein feed for growing fry, fingerling and for adult fish. Some by-products of agriculture such as wheat, rice and oilcakes are profitably used in pisciculture and assist the pisciculture to make it a successful agent for the rural development of West Dinajpur district.

The pisciculture in West Dinajpur district serves as a measure for rural development investing finance from the financial institutions through technological innovation, decentralisation policy and typing up of the fishery schemes with IEDP, SCP and TSP evoked much response from the small and marginal farmers as well as general farmers because of the lucrative subsidy element of the dovetailed schemes. It has also enrooted the schemes in the alleviation of rural poverty which is a primary constraint of this district by distributing minikit in the form of fertilisers, fry, arranging fishing implements like nets, boats and rehabilitation for the poor farmers free of cost.

Nearly 2% of the total workers population in the district of West Dinajpur are, in some way or other related with pisciculture. A total of 13,710 beneficiaries got direct benefits for culture of fish in different schemes and traditional fisheries from 1980-81 to 1987-88 out of which 9842 belong to scheduled castes and tribes who are mainly either small or marginal farmers and were haunted by the spectre of poverty for a long time ⁽³¹⁾.

The total requirement of fish in the district of West Dinajpur is 2,51,760 quintal and the deficit in production in 1980-81 was 1,62,793.70 quintal whereas the deficit in 1987-88 was 1,09,143.58 quintal which shows clearly the steady supply of fish in the district reducing the deficit by 32.96% ⁽³²⁾.

2. IV OBJECTIVE OF THE THESIS:

With the intent to increase the production of fish in the district of West Dinajpur different attempts have been made on the level of Government and also private individuals. Pisciculture in this district has to face many problems, such as pollution of water areas, urbanisation of the rural area, preference to agriculture, economic-handicap of fishing community, Co-sharership of tanks retarding progress, jute steeping, poaching and deliberate poisoning, want of proper marketing policies, problem of fishery co-operatives and want of skilled management etc.

A study of the process of pisciculture in the district is needed to overcome the difficulties in this field. The main objectives of the present study is to review and examine critically the process and progress of pisciculture in the district of West Dinajpur, regarding water area achieved in different years, and to assess the project's efficiency and also to examine the impact of the 'Fishery Project' on the economic development of the district.

Time Period:

The present study covers a time period of eight years that is from 1980-81 to 1987-88. The 'World Bank Assisted Inland Fisheries Project' initially started in West Dinajpur district in 1980-81. The present study considers the completed eight years i.e., 1980-81 to 1987-88.

Methodology:

The present study is a time series analysis in relation to the project itself. However to appraise the efficiency of the project and to evaluate its impact on different numbers of variables, application of sophisticated statistical methods and use of simple mathematical tools have been sought for.

Data Base:

The present study is based on primary as well as secondary sources of data and information. The primary data are collected through questionnaire method and through personal interviews with Government officials directly connected with the implementation of the 'Inland Fisheries Project' assisted by the World Bank and also through interviews with the fishermen, different individuals and Organisations concerned, namely proprietors, partners, Co-operative Societies and others.

Limitations:

The World Bank assisted pisciculture in West Dinajpur district envisaged the culture of fish in relation to mainly fresh and semi-saline water areas, available in the district of West Dinajpur, and a few culture relating to saline water, riverine water and paddy fields and also rearing of fry and fingerling to be used as fish seed for fish culture.

In the present study the pisciculture in derelict water, riverine water and paddy fields and rearing of fry and fingerling are not included as all these three types of culture and also the rearing of fry and fingerling are just in an embryonic stage in the district and are yet to be implemented. Thus the present study considers only the pisciculture relating to the fresh water areas and semi-derelict water areas of the district under the 'World Bank Assisted Inland Fisheries Project' specially, to assess the achievement and the overall position of pisciculture in the district of West Dinajpur.

Information exclusively about pisciculture in different places are not always available. The information on pisciculture are often collected along with the 'inland fisheries' in most of the events.

Moreover apart from the inadequacy of Co-ordinated information, there is a communication gap sometimes in between the interviewers and the interviewees. Since no records are maintained by the respondents the information supplied by them are mostly from their memories, which do not seem to be fully correct and dependable. The most important limitation is the measurement of non-parametric variables. The scale used in this context is in most cases standard scale. However, where standard scale was not available, most appropriate one was developed to explain statistical relation with maximum accuracy.

Review of literature:

Information on the various aspects of fisheries including pisciculture have seldom appeared in literature. The information wherever available is scanty and scattered and published critique on fish and fisheries is meagre. Though much research work has been done in the biological and marine sciences, it is not properly Co-ordinated with economic theory and management.

However, 'Economics of fisheries' by Hansen Roegvalder (lund 1974) stated a few problems of efficiency in fishery activities; 'Notes on fisheries in Japan' by Nicholson Sir FA (Madras 1907) stated how Japan developed her fishery activities with the indigenous craftsmanship in fishermen and how the fishery contributed a major part towards the Japan's economy; 'The Fisheries of Norway and Denmark' by Hornell James (Madras 1921) explained the comparative condition of fishery in Norway, Japan, Denmark and Newfoundland, their evolution of fishery and the contribution of fishery towards their respective national economy; 'Report on the Fresh Water Fish and Fisheries of India and Burma' by Day F (Calcutta 1873) covered a period of 20 years and it contained valuable descriptions of the rivers and irrigation works of tanks and Jheels of India, of the fish in fresh water, their migrations, breeding habits and of the fish trade; 'Reports on the results of enquiry into the fisheries of Bengal and into fishery matters in Europe and America' by Gupta K.G. (Calcutta 1908) described the observations about the fisheries position in countries like USA, UK, Canada, Austria, France and Bavaria and proposed enactment of a Fisheries Act and recommended the setting up of a Fishery Department in Bengal; 'Fisheries in Indian Economy' by Bhattacharya S M (Calcutta 1921) stated how fishery (including pisciculture) contributes towards the Indian economy specially the rural economy. But there is no mention of the procedures to test the efficiency of the fishery activities; 'Fisheries of West Bengal' by Saha K C (Calcutta 1970) highlighted the potentialities and underlined the limitations of resources and suggests solutions to the problems of pisciculture in West Bengal; 'Indian Fisheries 1947-1977' by Marine products Export Development Authority (Cochin 1977) stated how Indian fisheries (after independence of the country) developed through Governmental initiatives and others but the literature does not co-ordinate

itself with the economic theory and management; 'Economics of Fisheries' by Subba Rao N (Delhi 1986) reviews and examines critically the process and progress of fisheries development in the State of Andhra Pradesh during the planned era; 'Fish and Fisheries of India' by Jhingran V S (Delhi 1988) discussed about the considerable progress in exploiting the demersal resources of the sea and the poor progress in inland fisheries (including pisciculture) in India. But the critical assessment of fishery activities is absent in the literature; 'Fisheries in India' by Misra Sibranjan (New Delhi 1987) mentioned that the new technology which seemed technically attractive has failed to produce substantial results for the absence of rational management; 'Fishery Sector of India' by Srivastava U K, Dholakia Rohul, Vathsala S and Chidambaram K (New Delhi 1991) had undertaken a study in response to a request from the World Bank through Government of India to assess the present constraints and future prospect of Indian fishery sector; 'Fishery Development in West Dinajpur — its problems and prospects' by WDA (Balurghat 1986) explained the different problems that are faced by the pisciculture in West Dinajpur district; 'Inland Fishery Programmes' by DFO (Balurghat 1988) discussed the varied programmes needed for the improvement of pisciculture in the West Dinajpur district.

To conclude the present analysis, it is found that, in 'Bengal Province' since 1794 (before the independence of the country) the importance of pisciculture was felt and East India company initiated measures for the development of the pisciculture in the province. But fishery activity got no such stress before the launching of 'Five year plans' of the country on and from 1951 (after the independence). A number of schemes and projects on pisciculture were introduced and implemented for the development of pisciculture in the State of West Bengal (created after partition of 'Bengal' in 1947).

The 'World Bank Assisted Inland Fisheries Project' (WBAIFP) started in 'West Bengal' in 1980 to continue for a period of eight years with the intent to utilise the resources for pisciculture in an intensive and scientific way. The WBAIFP covered 35.88% of the total culturable water area for the period 1980-81 to 1987-88 and 113.96% of the target water area for 1980-81 to 1987-88 had been achieved under this project.

About 40% of the culturable water area of West Bengal had been covered for pisciculture under different schemes for the period 1951 to 1988. More than 70% of total fish seed production in India (1987-88) have been contributed by West Bengal alone. Maximum utilisation of fund is found to have been made in the 7th plan period. West Bengal disclosed the highest productivity in Inland fisheries followed by Madhya Pradesh, Maharashtra, Uttar Pradesh and Andhra Pradesh.

Major portion of production of fish in West Bengal comes from South Bengal districts and the yield (i.e., production per acre of water area) of fish in South Bengal is higher than the yield made by the North Bengal districts. The West Dinajpur district of North Bengal also has a good prospect of pisciculture even after considering the better scope and prospect in South Bengal districts.

In total 13710 fish farmers were depending on pisciculture directly (through different schemes) for their livelihood from 1980-81 to 1987-88 in the district of West Dinajpur. The pisciculture in West Dinajpur district serves as a measure for rural development through technological innovation, decentralisation policy investing finance from the financial institutions and tying up of the fishery schemes with IRDP, SCP and TSP and draw out much response from the small and marginal fish farmers as well as general farmers. It has also tried to alleviate the rural

poverty with other schemes operating in the district.

The objective of the present study is to assess the achievement of the pisciculture activities of the district of West Dinajpur as a whole and to find out the impact of fishery project in the rural economy of the district for the period 1980-81 to 1987-88.

The study is based on primary as well as secondary sources of data and information and the analysis of the 'study' is mainly based on time series. It covers a time period of eight years i.e. from 1980-81 to 1987-88 when the 'WBAIFP' was operating in the district with the intent to utilise the resources of pisciculture in an intensive and scientific way.

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CHAPTER - 2**MEASURES CONSIDERED FOR PISCICULTURE
IN WEST DINAJPUR DISTRICT:**

- i. MEASURES FOR DEVELOPMENT.**
- ii. MEASURES ADOPTED BY THE GOVERNMENT
FROM ITS OWN RESOURCES.**
- iii. MEASURES ADOPTED WITH THE WORLD
BANK ASSISTANCE.**

3.1 MEASURES FOR DEVELOPMENT:

The resources for pisciculture in the district of West Dinajpur are abundant and is in a prominent position in North Bengal. But before the independence of the Country (1947) there were no such measures taken for the development of pisciculture and the fishery activities were mainly confined to the efforts of a few individual fish farmers of the district. Fish production depended on unofficial capture fishery mainly. After the independence of the country organised pisciculture activities were introduced in the district through different five year plans of the country starting from 1951. There were as many as twelve schemes introduced in the district from the year 1951 to 1988 in spite of few individual entrepreneurship in this profession to develop the pisciculture in the district of West Dinajpur .

The different measures introduced for the development of pisciculture in the district of West Dinajpur from 1951 upto 1988 were.

1. Pilot Scheme for the development of tank fisheries through long, medium and short term loan and subsidies.
2. Scheme for assisting the needy fishermen and Co-operatives by granting loans.
3. Training facilities and technical assistance for the fish farmers.
4. Distribution of fry and fingerling of exotic species of fish having commercial importance and fish pond fertilisers free of cost to the fish farmers to increase fish production by organising Co-operatives of the fishermen and Fish Production Groups.

5. Granting financial assistance and subsidies to needy fishermen for enabling them to purchase fishing implements such as nets, boats, etc, to catch fish.
6. Rehabilitation facilities extended to the poor farmers.
7. Streamlining lease arrangement of water bodies to the co-operatives and individual fish farmers.
8. Typing up of the pisciculture scheme with other organisations of rural development.
9. Target setting activities.
10. Dredgation, dewatering and renovation of the derelict and semi derelict tanks.
11. Rearing of fry and fingerling.
12. Demonstration of fish farms.

From the Table 3.1 it is observed that the developmental measures for pisciculture activities in the district of West Dinajpur since 1951 was insufficient. It is also observed that out of all the developmental measures, the maximum number of farmers and fishermen got benefits within a short period since the 'World Bank Assisted Inland Fishery Project' (WBAIFP) was introduced in 1980 and continued upto 1988 in comparison with the number of farmers and fishermen who got benefits of different schemes within a span of thirty seven years i.e. from 1951 to 1988. 55.03% of total water area of the district had been covered through different Governmental schemes and the schemes of 'World Bank Assisted Inland Fishery Project' from 1951 to 1988. Of this 30.43% water area i.e. 55.28% of cultured water area covered by the 'WBAIFP' which clears the measures taken by the Government to develop the pisciculture and fishery activities in the district from 1951 to 1979 were comparatively Poor than the measures taken by the 'WBAIFP' with the assistance of the Government from 1980-1988.

Table 3.I

Nature of Fishery Developments and their Extent

YEAR	NUMBER OF FARMERS GOT LOAN FACILITIES	NUMBER OF FARMERS GOT TRAINING	NUMBER OF FARMERS GOT FRY, FERTILISERS MANURE	NUMBER OF FISHERMEN GOT FINANCIAL ASSISTANCE TO PURCHASE NETS, FISHING IMPLEMENTS	NUMBER OF FISHERMEN/FARMERS GOT REHABILITATION FACILITIES	NUMBER OF FARMERS GOT REARING FACILITIES	TOTAL WATER AREA CULTURED (ACRE)	% OF CULTURED WATER AREA AGAINST TOTAL WATER AREA
1951-61	510	160	210	275	-	40	At the end of '61 995	2.85
1961-71	985	790	445	582	-	52	At the end of '71 4005	11.47
1971-81	4,621	2,245	1,740	925	6	121	At the end of '81 13300	38.10
1981-88	13,324	4,730	3,820	2,720	81	242	At the end of '88 19210	55.03
TOTAL	19,440	7,925	6,185	4,502	87	455	At the end of '88 19,210	55.03
WRAIFP 1980-81 to 1987-88	7,678	3,682	1,675	533	87	192	10,619.31	30.42

Source: D.F.O. Balurghat, W.D.

... was taken by the 'WBAIFP' with the sanction of the Government from 1930 to 1968.

3.II. MEASURES ADOPTED BY THE GOVERNMENT FROM ITS OWN RESOURCES:

The Government continued the different measures for the development of pisciculture since 1931 in the district of West Dinajpur from its own resources. The WBAIFP was also introduced from the year 1930.

Out of the total water area of 34,910.43 acre in the district of West Dinajpur 29,275.49 acre culturable and semi derelict water area are available for pisciculture and could be exploited with less difficulties through different schemes of pisciculture; of which 3045.63 acre water area is of the Government ownership. 19210.00 acre water area had been considered for pisciculture in different schemes since 1931 to 1968. Besides these there are 22,393 acre river, khari, beels left for capture and culture fishery.

Table - 2.11

Contribution of the Government for Fishery Developmental Measures adopted from its own resources

Year	Loan disbursed for culture, seedling, excavation	Supply of fry, fertili- sers	Assistance to purchase fishing implements, nets, boats	Rehabilita- tion	Subsidies of fry	Bearing of fry	Demon- stration	Training	Inputs supplied to co- operatives	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1951-61	3,10,800	42,250	34,500	-	56,300	62800	12360	-	-	5,19,010
1961-71	12,50,525	1,92,340	1,05,800	-	2,03,000	89440	22425	-	8,17,000	26,79,530
1971-81	48,25,320	7,82,600	4,45,000	-	12,95,200	519200	34200	-	18,05,800	96,97,320
1981-88	1,15,24,674	12,85,000	9,72,400	18,18,950	79,20,100	1088800	85500	6,48,800	72,10,000	3,95,45,924
TOTAL	2,48,41,319	23,09,190	15,57,700	18,18,950	94,64,600	1750940	1,54,485	648800	9832800	52371784
WBATP 4926994	963200	293023	1818950	8630075	876150	80,230	2,55,570	53,04,053	21366745	
80-81 to 87-88										

SOURCE: D.P.O., Balurghat, M.D.

From the Table 3.II it is observed that the amount given for loan, subsidy and spent for fry and fertilisers, nets, fishing implements, rehabilitation of the fish farmers, rearing, demonstration, training and inputs supplied to the Co-operatives and Fish production Group (FFG) for the development of pisciculture in the district of West Dinajpur from the year 1951 to 1988 was Rs. 5,23,71,784 out of which Rs. 2,13,66,743 (i.e. 40.80%) were made for the "WBIAIFP" which started from the year 1980. It is also observed that rehabilitation facilities were extended only to the fish farmers and fishermen under the "WBIAIFP". Moreover the amount spent for different measures adopted for the development of pisciculture in the district of West Dinajpur from 1951 to 1988 were insufficient considering the vast tank water area (34910.43 acre) of the district of West Dinajpur.

3.III. MEASURES ADOPTED WITH THE WORLD BANK ASSISTANCE:

The World Bank Assisted Inland Fishery Project started in 1980 in the district of West Dinajpur to develop the inland fishery activities in addition to the existing schemes of the Government. The Government have also extended its assistance to "WBIAIFP" since 1980 for improved method of pisciculture for the rural farmers of the district giving a scope for additional employment in this avocation. In doing such arrangements of institutional finance, training of the fish farmers, formation of Co-operatives and Fish Production Group, leasing, target setting, subsidy, rehabilitation, benefit for service party Group, minkit distribution and devetailing activities were made for proper exploitation of the water resources of the district. The activities are as follows:

Institutional Finance: Farmers got the financial assistance for pisciculture as loan for short term (one year) and long term (7 to 10 years) from different nationalised bank branches and Co-operative land development bank of the district.

Fish Farmers Training: Fish farmers training is an important programme to make the project a success. The programme aims at massive training and extension work for orienting the rural people specially belonging to scheduled castes and tribes towards pisciculture by disseminating of improved technology of fish production enabling them to ensure credit utilisation. The programme envisaged to secure the participation of intending persons, pisciculturists in harnessing the huge potentialities of fisheries in the district of West Dinajpur. The stress was, therefore, laid not only on the dissemination of fisheries technology but also on the bringing of awareness that pisciculture is no less important an economic pursuit in rural economy than crop husbandry. The following procedures are followed:

(i) Fish farmers at the grass root level recommended by local panchayat are selected for training. Persons owning an water area of at least 0.15 acres are generally sponsored by panchayat.

(ii) Maximum 20 trainees are accommodated in each batch for a duration of 15 days.

(iii) The time and venue of the training programme are jointly fixed by 'Block Development Officer' and 'Fishery Extension Officer' of the block to suit the need of farmers. The site is generally located preferably near a village tank where pisciculture is practised.

(iv) Candidates were selected out of the trained and experienced candidates of grass root level training for further training of one month.

(v) Both the grass root level training and district level training were organised exclusively for the farmers belonging to scheduled castes and scheduled tribes.

(vi) A very small number of candidates were selected for a training of three months at Kalyani training Centre, Nadia, from 1984-85.

(vii) The trainee receives a stipend of Rs. 9.00 per day during the course of training from 1984-85 and accommodation facilities are given in district level training and training at Kalyani for three months specially.

(viii) On successful completion a certificate was issued to the farmers.

Co-operative Societies

Towards achieving the objectives of supplying the inputs like fish seed, Mohua, superphosphate, lime the "West Bengal State Fishermen Co-operative Federation Ltd" had been entrusted with the task of supplying inputs to the remotest points through the "Central Fishermen Co-operative Society Ltd". The Central Fishermen Co-operative Society in turn supplied inputs to the fish farmers through their agencies at the block level.

Out of the total fisherman population of 17500, only 4145 came under the purview of fishery Co-operatives. There are 12 numbers of fishery Co-operatives in the district of West

Dinajpur. The Co-operative Societies are mainly dependent on capture fishery. Northern Zone of this district is bestowed of a number of beels and Jhills colloqually known as "Khari" (Jalkar). These potential assets of fisheries practically lay untapped for its proper exploitation and development as these area are in lease possession of the poorest members of the society, most of whom belong to scheduled Caste and Tribes.

These potential Jalkars are fluvelile only during monsoon months as these are connected with a narrow link with some river. Fishermen Co-operatives having the lease possession of these jalkars earned their subsistence, livelihood by catching fish migrating upwards to these jalkars during monsoons. During the rest part of the year these fishery bases remain practically barren and the fishermen are thrown out of their vocational employment. In order to have substantial employment as well as to boost up fish production from these areas, it is contemplated to bring these areas, under 'World Bank Assisted Inland Fisheries Project' by formulating need-based schemes befitting the water areas. These areas on proper development can be potential spot for culture fishery for a period of eight months of a year. The culture aspect of Khari, Jalkar will be managed by fishermen, shareholders of the Co-operative Society. Consequently they will earn from this programme for uplifting their livelihood. Besides these, government owned tank water area and water area of the individuals are used for pisciculture under the Co-operative Societies.

Fish Production Groups

The creation of a special infrastructure at the community level namely "Fish Production Groups" since September 1974 was initiated as a part of implementation of recommendations of 'National Commission on Agriculture' on nursery rearing practices

and subsequently formed part of advance action programme in the World Bank Project in respect of the supply of quality fry, fingerling to the fish farmers. Its main functions were (i) Group planning (ii) Common aids and mutual help (iii) credit through Group action (iv) Distribution and marketing. Though in the district of West Dinajpur the activity like distribution and marketing are almost absent.

The problems of small fish farmers in the district are mainly (i) Arrangement of inputs (ii) Arrange of periodical netting at low cost (iii) Dearth of quality fish seed (iv) Training in fish pond management (v) Harvesting and marketing.

The FPG could be a suitable answer to all the above problems.

Leasing: Arrangement of long term lease of large water units owned by the State or Central Government for a period of 7 to 10 years to the Primary Fishermen Co-operative Societies and individual fish farmers in order to draw credit support under the Project was an attempt not only to bring bigger areas under scientific fish cultivation in order to create marketable surplus in production of fish but also to some extent to stop the wretched plight of the poor fishermen from fishery profession and to give them employment in many cases all the year round. Arrangement of short term lease (1 year) to oral lease holders of ponds in the district of West Dinajpur under the "WDAIFP" were also made to bring the project towards success.

Target Setting

Block-wise and bank-wise allocation of the target under this programme was approved in the standing committee of "Fish Farmers Development Agency" comprising of Additional District Magistrate as Chairman of this Committee, Chief Executive

Officer FFDA, District Fishery Officer, lead Bank Officer, Officers from the District Co-ordinating Branches of State Bank of India, Allahabad Bank, Central Bank of India, United Bank of India, United Commercial Bank, United Industrial Bank, Co-operative land Development Bank, Gour Gramin Bank, Bank of India, Punjab National Bank, Project Officer-Integrated Tribal Development Programme, District Manager, Scheduled Caste and Tribal Development and Finance Corporation.

Every sphere of the programme was discussed in details to acquaint the members so that they may independently work on the schemes. The decision of the standing committee is then communicated to sabhapaties, panchayat samity and all Block Development Officers of this district for their action with copy to all banks and Government agencies related with this programme. In the mean time panchayat functionaries and Bankers of the blocks were invited to a block level seminar and the mode of operation for preliminary selection of beneficiaries are explained to them. It was also decided that Pradhan of each Gram Panchayat would prepare mouza-wise list of fish farmers with the help of the other members of his panchayat under different criteria such as scheduled caste, scheduled tribe, General, small and marginal farmers etc.

Subsidy:

All the farmers under "WBAIFP" are entitled to get subsidy from "Fish Farmers Development Agency" (FFDA) and the farmers holding upto 5 acres of water area and 2.5 acre water area (i.e., small and marginal farmers) and the farmers belonging to scheduled castes and scheduled tribes get subsidy from DDA, SC and ST department,

Under the institutional sector of the WBAIFP, the Fish farmers took institutional loan along with subsidies from the different departments of the Government and FFDA. A maximum of 70% of the total cost of a scheme for fish culture of WBAIFP was available as subsidy to the small and marginal farmers belonging to scheduled caste and scheduled tribe of which FFDA contributes 25%, Special Component plan (SCP) and Tribal Sub-Plan (TSP) contributed 25% to the fish farmers belonging to scheduled caste and scheduled tribes and District Rural Development Agency (DRDA) contributed 25% to the farmers for being small and marginal farmers and the balance of the total cost of the scheme (30%) was supplied by the financial institutions like nationalised banks, co-operative land development banks as loan. The marginal and small farmers and farmers belong to Scheduled caste and Scheduled tribes get extra benefits of subsidy for fish culture (as mentioned above) from the year 1983-84 in the district of West Dinajpur.

Small and marginal farmers other than scheduled caste, and scheduled tribes for the fish culture got 50% subsidy of the total cost of a scheme of which FFDA and DRDA contributed 25% each and the balance of the total cost of Scheme (50%) was supplied by the financial Institutions as loan.

Farmers belonging to scheduled caste and Scheduled tribes but neither small nor marginal for the culture of fish got 50% subsidy of the total cost of a scheme of which FFDA contributed 25% and SCP, TSP contributed 25% to the farmers for being scheduled caste and scheduled tribes; the balance of the total cost of the scheme (50%) was supplied by the financial institutions as loan.

General farmers, neither small nor marginal, and not even belonging to scheduled castes and scheduled tribes for the

culture of fish got 25% subsidy of the total cost of Scheme from FFDA and the balance of the total cost of the Scheme (75%) was supplied by the financial Institutions as loan.

Under non-institutional sector of the WBAIFP the farmers for the culture of fish got subsidy @ 25% of the total cost of Scheme from FFDA and the balance of the 'total cost' was arranged by the farmers individually.

From the year 1980-81 to 1982-83 farmers got only 25% subsidy of the total cost of scheme (from FFDA) in the culture of fish of "WBAIFP".

Rehabilitation:

To rehabilitate the poorer section belonging to scheduled caste and scheduled tribes, who are also small and marginal farmers willing to engage themselves in pisciculture, the fishery department arranged them with huts at the pond site in different blocks of the district of West Dinajpur.

Service party Group:

Arrangement for distribution of devices for catching fishes among the service party groups belonging to scheduled caste and scheduled tribes comprising of maximum ten fishermen families are made to boost up the fish production in the district.

Minikit:

Minikit in the form of fry and superphosphate are given to the poor small and marginal farmers free of cost to accelerate the pisciculture activities in the district of West Dinajpur.

Devetailing:

Devetailing WBAIFP with other organisation of Rural Development by tying up of the schemes with Integrated Rural Development Programme (IRDP), special component plan (SCP) for Scheduled Caste and tribes and Tribal Sub-Plan (TSP) for tribes has evoked much response from the small and marginal farmers because of lucrative subsidy element of the devetailed Scheme. It has also enrooted the schemes in the alleviation of rural poverty.

Right from the selection of prospective farmers upto the execution of the fish culture process, the WBAIFP schemes are nurtured by Bankers, Fishery extension officers, Panchayet functionaries, members of Co-operative and Fish Production Group giving scope to minimise the number of declined cases are having perennial flow of applications for credit support from the fish farmers and also for increased mobilisation of credit support. It has also infused a new look into the bankers towards the potentiality of fishery for investment : 'World Bank Assisted Inland Fishery Project' made an attempt to improve the economic profile of the district of West Dinajpur. The WBAIFP started phase-wise, the first stage of the phase being the period 1980 to 1985 and the latter being the rest of the period upto 1988.

Different attempts have been made right from the district level to Gram Panchayet level (i.e. grass root level) to popularise the improved methodology of pisciculture, Government officials of the district administration and rural development, panchayet functionaries, members of Co-operative societies and Fish production Group had extended their support in motivating the rural fish farming. However institutional finance (for example bank loan, subsidies were arranged to improve the effectiveness of all the programmes) were made in all the sixteen blocks of the district of West Dinajpur. The total outlay can

broadly be divided into two groups, rather the improvement programme followed a definite pattern of progress through two sectors i.e. institutional sector and non-institutional sector. The distribution system was based on geographical areas and by dividing the entire district into respective blocks. The finance for the operation of the programme was channelised through nationalised banks of the respective blocks as well as separately through different number of State Government Offices.

For implementing the WBAIFP at the district level a standing committee was formed having representatives of the FFDA, Zilla Parishad, Panchayet and B.D.Os. Normally the basis of target fixing was based on the availability of water areas and prospective farmers in the respective blocks.

For the implementation of the programme a total water area of 10,275 acre was the target for the WBAIFP in the district of West Dinajpur for the period 1980-81 to 1987-88 of which Institutional responsibility was for 8037.50 acre to be achieved through different number of nationalised banks and Co-operative land development banks of the Government of West Bengal and the balance 2237.50 acre remained for non-institutional one indirectly by the Government through FFDA along with the individual investment of fund by the farmers.

Table - 3.III**Target Water Area**

Year	Institutional Acre	Non-Institutional Acre	Total Acre
1980-81	275	105	380
1981-82	425	200	625
1982-83	1000	250	1250
1983-84	1475	400	1875
1984-85	1150	350	1500
1985-86	975	275	1250
1986-87	1012.50	257.50	1270
1987-88	1725	400	2125
T O T A L	8037.50	2237.50	10275

Source: FFDA, Balurghat, W.D.

Out of total target water area of 10275 acre 78.22% water area had been considered for fish culture under the WBAIFP in the institutional sector where the fish farmers get loan from financial institutions and lucrative subsidies from different departments like SCP, TSP, DBDA and FFDA and 21.78% water area had been considered for fish culture under the WBAIFP in the Non-institutional sector where the farmers get subsidy from FFDA and the rest of the total cost of the scheme was to be arranged by farmers themselves from their own resources. It is also observed that activities like loan advancing, training, organising Co-operatives and Fish Production Group, leasing, target setting, subsidies distribution, rehabilitation, benefit of service party Group, minikit distribution, dovetailing were continuing more fluently in the year 1987-88 than other years i.e., from 1980-81 to 1986-87 and considering 20.68% of the total target water area (10,275 acre) by combining the institutional

and non-institutional responsibility in the year 1987-88, which was the highest in the period 1980-81 to 1987-88.

In the process of WBAIFP in the district of West Dinajpur FFDA arranged funds out of World Bank Assistance for training the fish farmers for improved pisciculture and for granting subsidy with the Bank loan to the fish farmers of the district of West Dinajpur during the period 1980-81 to 1987-88 to the extent of :

Training to the Fish farmers	Rs. 2,55,000
Subsidy for fish culture given to the fish farmers	Rs. 74,52,425
Bank loan (Institutional Loan)	Rs. 1,47,80,981
TOTAL	Rs. 2,24,88,406

Source: FFDA, Balurghat, W.D., 1988

In implementing the 'World Bank Assisted Inland Fishery Project' the 'Fish Farmers Development Agency' meets three basic needs of fish farmers (i) Technical Support, (ii) Extension Support, (iii) Financial support.

The impact of the Co-ordinated extension programmes was reflected in FFDA's achievements towards the fulfilment of the target.

The introduction of inland fisheries programmes under WBAIFP in West Dinajpur district has streamlined most of the bottlenecks in the inland fish cultivation. The programme has got four sub schemes and other subsidiary activities.

Schemes:

- (i) Utilisation of extending culturable tank for intensive pisciculture.

- (ii) Semi-derelict Tank requiring about one feet excavation and culture.
- (iii) Semi-derelict Tank requiring about two feet excavation and culture.
- (iv) Semi-derelict Tank requiring about one metre excavation and culture.

The sub schemes of WBAIFP have been implemented through different number of activities dovetailing with other governmental programmes with the assistance of the Government namely arrangement of institutional finance, training of the fish farmers, formation of Co-operatives and Fish Production Group, leasing, target setting, subsidy distribution, rehabilitation, benefit of service party Group, minikit distribution.

On the whole the 'World Bank Assisted Inland Fishery Project' in West Dinajpur district started with an enthusiastic and concerted effort as in the matter of assessment of total water areas and semi-derelict water areas, fixation of targets both subdivisionwise and blockwise, co-ordination activities of the district fishery cell. Besides efforts to have a comprehensive grasp of the total inland fisheries development plan in the district by different operating and co-ordinating agencies like standing committee of the FFDA, BDOs of the respective blocks, the co-operative societies - central and primary one, FFDA, DFO including nationalised banks and co-operative land development bank, the WBAIFP also initiated measures to make the fisheries programmes a successful one.

To conclude the present analysis, it is found that, before the independence of the country (1947) the fishery activities were very much insufficient in the district of West Dinajpur as no measures were taken from the Government for the development of fisheries. Fish production in the district entirely depended on a few unofficial capture fishery.

Pisciculture activities started officially by the Government since 1951 through the introduction of the 'five year plan' of the country for economic development.

It is also observed that from the year (1951) of introduction of fishery development programmes upto 1979 the fishery activities were poor whereas with the introduction of World Bank Assisted Inland Fishery Project (WBAIFP) since 1980, the fishery development measures received a new life and a maximum water area i.e. 55.28% of the cultured water area were covered during the period 1980-81 to 1987-88 through the WBAIFP. The amount spent on different developmental measures for pisciculture in the district were also insufficient. Approximately on average Rs. 1500 per acre of water area were allotted for the pisciculture in the district of West Dinajpur from 1951 to 1988, whereas maximum cost of a scheme of pisciculture is Rs. 17,760 per acre and the lowest is Rs. 4850 per acre for the period 1980-81 to 1987-88 in spite of cost for other development programmes connected with the pisciculture.

Attempts were made to develop pisciculture activities through WBAIFP in the district of West Dinajpur by arranging massive three-tier training programme, co-operation of the fish farmers, rehabilitation of the fish farmers and other dovetailing activities with the Government in addition to the financial assistance as loan from the banks and lucrative subsidy element.

Scientific and improved pisciculture started with the objective to develop the fishery activities through WRAIFP by connecting the district administration with the rural fish farmers. Maximum target water area were considered for the institutional sector and the remaining were for the non-institutional sector where individuals or rich farmers could get the facilities of improved pisciculture and they also get the facilities of subsidy as an incentive and extensive training facilities. Massive extension programme carried on by the Fishery Extension Officers included an effort to give the suggestions and advices from time to time and also to bring the optimum skill of the fish farmers in the district which would not only help to increase the production of fish but also give scope to the rural people to be self employed through pisciculture and different fishery activities thereby improving their social and economic status, which could be a good machinery to improve the economic condition of the district of West Dinajpur as a whole. The pisciculture and fishery activities could be a good alternative occupation in this district in addition to the first and traditional occupation, 'Agriculture' (1).

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CHAPTER - 4**A STUDY OF THE WORLD BANK AIDED PISCICULTURE:**

- 1. ITS NATURE AND SCOPE.**
- 11. ACHIEVEMENT.**
- 111. CONSTRAINTS.**

4.1 NATURE AND SCOPE:

West Dinajpur district is a rural area of the State of West Bengal. In this district 'World Bank Assisted Inland Fisheries Project' (WBAIFP) was introduced in 1980 with the objective to improve the economic condition of the poor mass in the district. The improvement programme started gathering momentum. The rural farmers were motivated and were imparted training at the grass root level for pisciculture purpose.

With the objective to develop the culturable and semi derelict fishery resources in the district of West Dinajpur the Government launched the WBAIFP by the establishment of 'Fish Farmers Development Agency'. The introduction of inland fisheries programmes of the WBAIFP has streamlined most of the bottlenecks of pisciculture in the district and gave impetus to pisciculture as a gainful occupation in the rural areas. Besides, arrangements were made for flow of institutional finance, grants and subsidies for the development of pisciculture for the different schemes for utilisation of fresh and semi derelict tanks. Blockwise and bankwise target of the programme of WBAIFP was approved in the Standing Committee of Fish Farmers Development Agency (FFDA) comprising of Collector/Additional District Magistrate as the Chairman of the Committee, Chief Executive Officer, District Fishery Officer, Officers from the District Co-ordinating branches of different nationalised banks, rural banks and co-operative land development branches, Project Officer, DRDA, Special Officer Tribal Welfare Department, District Manager SC & ST. Every sphere of programme was discussed in details to acquaint the members so that they might independently work on the various programmes of the WBAIFP. The decision of the Standing Committee was then communicated to the Sabhapatis, Panchayet Samity and all BDOs of the district and all banks

and Government agencies related with these programmes were posted with information and a modus operandi for preliminary selection of beneficiaries were settled in Co-operation with the Pradhan of each Gram Panchayat to exploit properly the water areas of the district through pisciculture. In addition to the above, the different organisations like FFDA (Fish Farmers Development Agency), SCP (Special Component Plan), TSP (Tribal Sub Plan), DRDA (District Rural Development Agency) extended benefits of subsidies to the general farmers, the small and marginal farmers and the farmers belonging to SC & ST along with the massive extension services of the fishery officers.

Arrangement of long term lease of large water bodies owned by the Government for a period of 7 to 10 years, specially to the primary fishermen Co-operative Societies and arrangement of short term lease of ponds, tanks were made to bring maximum water areas of this district under scientific fish cultivation.

Co-operative societies are responsible for supplying the inputs like fish seed, mohua, superphosphate, lime etc. to the fish farmers of the remotest points of the district with the help of 'West Bengal State Fishermen's Co-operative Federation Ltd,' and are also engaged in fish culture in the leased out water areas of the Government.

Minikit in the form of fry fingerling, superphosphate are given to the small fish farmers (holding upto 5 acre water area) and marginal fish farmers (holding upto 2.5 acre water area) earning below Rs. 3500 p.a., free of cost.

Rehabilitation by arranging huts for the SC and ST small and marginal fish farmers earning below Rs. 3500 p.a., are made to gear up the activities of the "WBAIFP".

Arrangement for distribution of devices for catching fish among the service party group comprising eight to ten families of the fishermen specially for SC and ST small and marginal farmers earning below Rs. 3500 p.a. were made to accelerate pisciculture in the district of West Dinajpur. Arrangement of long term and short term loan to the prospective fish farmers of the district for improved pisciculture were also made.

Out of the total area (5340 Sq. Km) of the district of West Dinajpur, 5297.40 Sq. Km. i.e., 99.20% of the total area are rural area. 32.08% of the total population are workers comprising agricultural labour, cultivator, owners of household industries, marginal workers and others out of which agricultural labour and cultivators are 24.33% , 67.98% are the non-working population, 39.39% of the total population belong to SC and ST most of them being poor and 2.18% of the total population are marginal workers who participated in the productive work for less than 183 days in a year. Moreover 63.7% of the population whose occupation is agriculture are marginal farmers (holding upto 1 hectare of land) and 8.7% are small farmers (holding above 1 hectare to 2 hectare of land)⁽¹⁾.

The above position indicates the need for new and alternative occupations like pisciculture through "WBAIFP" considering the backward economic condition of the district where entrepreneurial activity is almost absent and social system denies opportunities for creative facilities. Besides these, there is prolific availability of water areas in the district as the resources of pisciculture. There is 34,910.43 acre of tank water areas out of which 29,275.49 acre are culturable and semi derelict. WBAIFP considers primarily the culturable and semi derelict water areas for improved pisciculture by their varied schemes with the assistance of the Government.

The potential for the development of fisheries and upliftment of the sizeable poor section of the population through pisciculture are quite important considering the possibility of employment opportunity and the "WBAIFP" has a great scope in this respect through the implementation of this project in the district which may also serve as a measure for alleviation of rural poverty of the district.

4.IX ACHIEVEMENT:

The district of West Dinajpur is rich in fishery resources viz. ponds, tanks, dighis and is thickly interspersed with rivers like Atrayee, Punarbhaba, Tangon, Nagar, Kulik. 31.52% of the water areas in the district are derelict or semi derelict and are facing the problems like pollution, urbanisation, preference to agriculture, economic handicap of the fishing community, Co-sharership that retard progress, jute steeping, poaching and deliberate and hostile act of poisoning, want of skilled management, want of proper marketing policies, monopolistic control of fish trade, problem of fishery Co-operatives etc.

The need for increased fish production was felt as early as in 1980 through scientific pisciculture, the year of implementation of the WBAIFP in the district. Though steps were initiated to modernise fisheries, there is not much of an improvement even after eight years of the WBAIFP. Out of total inland water area (Tanks and ponds) 34,910.43 acre, only 10,619.313 acre have been taken in the programmes of WBAIFP confined to cur fish in the district of West Dinajpur from 1980-81 to 1987-88.

Absence of detailed and in-depth periodical studies and scientific analysis is the main reason for these unfortunate situations. A deep study of the ongoing process in the fisheries of the district of W.D. is needed in order to come to proper

and correct conclusions of the policies of the WBAIFP used. The present study is aimed in this direction.

The main objective of the present study is to review and examine critically the process and progress of fisheries development in the district of W.D. for water area achieved in different years from 1980-81 to 1987-88 of the WBAIFP specially and to examine the project's efficiency and also to examine the impact of the project on the economic development of the district.

As a prelude to the main analysis concerning productivity, cost, ownership and operators, yield, adoption of modern practices in respect of various inland fisheries programmes of the WBAIFP of the district of W.D. and governmental programmes with a view to reach the objective of the study mainly the project's efficiency in the implementation of the programmes of the World Bank Assisted Inland Fisheries Project (1980-81 to 1987-88) in W.D. district. The study infers by using the Kernal Pearsons Co-efficient of correlation, standard error, probable error, Co-efficient of variation, simple average and other simple mathematical tools of varied number of series of mathematical data available from different government offices and non-governmental institutions and also from sample survey connected with the WBAIFP of W.D. district and pisciculture of W.D. district as a whole wherever possible by considering a few parameters like the relationship of the allotted fund and sanction, estimated output and actual output, water area and cost per acre, water area and yield (production per acre), number of beneficiaries and yield, simple average, standard deviation and co-efficient of variation of the production of fish (quintal), yield, yield and number of beneficiaries from 1980-81 to 1987-88; distribution of the number of units^{and} water area, distribution of number of water units not receiving financial assistance (Govt.) by reasons from the sample survey; benefit cost ratio of intensive culture of fish (WBAIFP) and traditional culture of fish etc,

Production of Fish

The 'World Bank Assisted Inland Fishery Project' (WBAIFP) showed lack of efficiency to achieve even the district average yield (5.78 quintal per acre) for the water area achieved through the implementation of the WBAIFP in different years from 1980-81 to 1985-86 which is a result of combined activities of institutional sector and non-institutional sector excepting the year 1986-87 and 1987-88 where the project achieved the district average yield showing its better position in this respect.

For the implementation of the WBAIFP in the district in different years from 1980-81 to 1987-88 Balurghat Sub-Division made the highest yield (6.22 quintal) in comparison with other two Sub-Divisions namely Raiganj Sub-Division and Islampur Sub-Division. Therefore the project was operating more efficiently in respect of fish culture in Balurghat Sub-Division than the other two Sub-Divisions. The project was to some extent successful in enhancing yield in some blocks like Balurghat, Kumarganj, Gangarampur, Tapan of Balurghat Sub-Division; Kaliyaganj and Raiganj blocks of Raiganj Sub-Division but was not so efficient as to enhance the yield (in comparison with the district average yield 5.78 quintal for the period 1980-81 to 1987-88 for the water area achieved through the WBAIFP) of other blocks for the period 1980-81 to 1987-88; the performance of the project was very poor in the blocks of Islampur Sub-Division where the district average yield of 5.78 quintal had not been achieved in any of the blocks. The project failed to extend the scope of fish culture programme to each and every block of the district of West Dinajpur and some blocks were partially untouched in this respect. Moreover the district average yield (5.78 quintal) was also poor in comparison with the average yield as per schemes of the "WBAIFP" which is 10 quintal per acre. Therefore there was a lack of efficiency of the management of the project to convince the farmers for optimum utilisation of resources throughout the period 1980-81 to 1987-88 in the district.

(Vide Annexure - III)

It was observed that Balurghat Sub-Division and Raiganj Sub-Division spent 48.36% and 49.02%. Gangarampur block of Balurghat Sub-Division spent 16.10% of the total cost under WBAIFP of fish culture programme for the water area achieved during 1980-81 to 1987-88, the highest among the blocks. Islampur Sub-Division spent only 11.62% which proved that the management of the WBAIFP could not enlighten the maximum fish farmers of the three Sub-Divisions for utilising their available culturable and semi derelict water area by arranging distribution of different benefits and scopes of the WBAIFP throughout the district of West Dinajpur.

It was also observed that 74.49% of the total production of fish under WBAIFP had been produced in the institutional sector by spending 74.46% of total cost achieving 73.67% of total cultured water area achieved under WBAIFP in the district which disclosed the fact that the institutional sector of the project was comparatively more efficient than the other sector (Non-institutional sector) which produced 25.51% of the total production, spent 25.54% and achieved 26.33% water area under WBAIFP (Vide Annexure - III, IV and XIII).

In respect of the number of beneficiaries engaged with this programme of the project in the district of West Dinajpur it was observed that the project was competent in involving maximum number of fish farmers in this programme in 1987-88 followed by the year 1984-85 but the project was not found competent enough to bring the farmers of Islampur Sub-Division in this programme and the farmers of Islampur Sub-Division were deprived in this respect.

However the management of the WBAIFP was successful in engaging maximum number of farmers belonging to scheduled caste and scheduled tribe (76.59%) in this programme in the district,

most of whom were poor, small and marginal farmers. Therefore a considerable portion of the poor farmers got their livelihood through this programme (Vide Annexure - VI).

Over and above in respect of optimum production of fish according to the schemes of WBAIFP, efficiency of the project was lacking. In an acre of water area the production of fish is required to be 10 quintals and it was seen that in none of the years, in none of the Sub-Divisions and in not a single block the farmers were able to produce the optimum quantity of fish (i.e., 10 quintals per acre of water area) in spite of receiving different benefits of WBAIFP and others in respect of pisciculture in the district from various sources.

In respect of net revenue for the water area achieved through the implementation of WBAIFP in different years from 1980-81 to 1987-88 for fish production in the district, the net revenue was highest in 1986-87 which disclosed the efficiency of the project but on the other hand, failure to raise the net revenues in the other years of the period 1980-81 to 1987-88 disclosed the lack of efficiency of the project and the failure of the management to offer these schemes and processes to the fish farmers which could be beneficial to them. As regards net revenue, 1987-88 stood next to 1986-87 for the implementation of WBAIFP. Though the project was efficient to some extent in 1987-88 in respect of making net revenue, there was lack of efficiency of the project to spread widely the schemes, processes and benefits throughout the period 1980-81 to 1987-88 to raise the net revenue to match with that achieved during the year 1986-87.

As a Sub-Division Balurghat Sub-Division made the highest net revenue for the implementation of the WBAIFP in different

years from 1980-81 to 1987-88, i.e. 37% of the net revenue of the district of West Dinajpur (net revenue comprising of three Sub-Divisions) followed by Raiganj Sub-Division (33.54%) and Islampur Sub-Division which made the lowest net revenue i.e. 29.46% for the period 1980-81 to 1987-88. This picture disclosed that the implementation of the project in Balurghat Sub-Division was more efficient than in the other two Sub-Divisions in respect of making revenue.

Balurghat Sub-Division made a net revenue of Rs. 7645.02 in 1987-88 and Gangarampur block of Balurghat Sub-Division made a net revenue of Rs. 9232.85 in 1986-87 which were the highest among all the Sub-Divisions and blocks respectively from 1980-81 to 1987-88 and disclosed the efficiency of the project in 1987-88 for Balurghat Sub-Division and Gangarampur block in 1986-87. It was also seen that by spending 11.62% of the total cost under WBAIFP, and covering 13.25% water area and making 29.46% net revenue in the district, Islampur Sub-Division had been neglected and disclosed the lack of efficiency of the management of the project for failing to cover the maximum water area of Islampur Sub-Division and to Convince the farmers of this Sub-Division along with the farmers of Balurghat Sub-Division and Raiganj Sub-Division.

It is also observed that in Banshihari block, Kushmandi block, Hentabad block of Raiganj Sub-Division, Karandighi block, Goalpokhar I block, Goalpokhar II block, Islampur block and Chopra block of Islampur Sub-Division net revenues were the minimum which disclosed that the project failed to enhance the net revenues in all the blocks of the district matching with the cost and water areas and to keep net revenues stable in all the years from 1980-81 to 1987-88 by offering suitable schemes, procedures, benefits to the fish farmers and by considering the available culturable and semi derelict water areas in

different Sub-Divisions for the WBAIFP, (Vide Annexure - V and XXIII).

From the Table 4.I it is observed that only 64.30% of the allotted amount had been sanctioned for the period 1980-81 to 1987-88 in the district of West Dinajpur for the culture of fish and 35.70% of the allotted amount had not been sanctioned to the farmers for the culture of fish which disclosed the lack of efficiency of the management of the WBAIFP for not spending the allotted amount in full properly in time in the district of West Dinajpur within the period 1980-81 to 1987-88 for the development of pisciculture and many prospective fish farmers of the district did not obtain the benefits of credit allotted by the banks for the development of pisciculture and to make themselves self employed as well. However in the year 1984-85 and 1985-86 it was found that maximum amount of the allotted amount had been sanctioned i.e. 93.20% and 94.24% respectively, which indicate the efficiency of the project in the two successive years 1984-85 and 1985-86 in comparison with other years.

From the Table 4.II it is observed that actual output was always less than the estimated output. 59.92% of the estimated output were produced in total actually for the period 1980-81 to 1987-88 which disclosed the fact that the WBAIFP could not efficiently operate. In many cases it was seen that the farmers got finance from the bank as loan and partly as subsidy from different departments, the total of which was less than the estimated project cost of the schemes introduced in the district from 1980-81 to 1987-88 for the farmers' inability to perform well regarding the progress of the schemes accepted by the farmers and produced less than the estimated output.

It was also found that the actual output produced in the institutional sector was more than the actual output produced in the non-institutional sector indicating that the institutional sector was in a slightly advantageous position.

Table - 4.1

Statement showing the amount of loan not sanctioned by the Bank against the allotted amount (MAATP)

Year	Amount disbursed by the Banks Rs.	Allotted to Banks for disbursement Rs.	Amount not sanctioned by the Banks Rs.	Percentage of sanctioned amount against allotted amount	Percentage of non-sanctioned amount against allotted amount
1980-81	1,89,100	5,50,000	3,60,900	34.38	65.62
1981-82	2,86,600	9,00,000	6,13,400	31.84	68.16
1982-83	8,77,800	16,00,000	10,22,200	36.11	63.89
1983-84	22,87,400	40,00,000	17,12,600	57.19	42.81
1984-85	27,96,050	30,00,000	2,03,950	93.20	6.80
1985-86	50,54,200	50,00,000	9,45,800	84.24	15.76
1986-87	38,86,525	66,00,000	27,13,475	58.89	41.11
1987-88	46,30,300	80,00,000	33,69,700	57.88	42.12
TOTAL	1,97,07,975	3,06,50,000	1,09,41,625	64.30	35.70

SOURCE: RTDA, Balurghat, M.D.

Table - 4.11
Statement of Estimated output and Actual output (WRAIPP)

Year	Estimated output (EO)				Actual output (AO)				% of A.O. on E.O		
	Institutional		Non-Institutional		Institutional		Non-Institutional		Total	Insti-tutional	Non-tutional
	Quintal	Quintal	Quintal	Quintal	Quintal	Quintal	Quintal	Quintal			
1980-81	950	362.50	1312.50	530.35	185.08	715.43	55.83	51.86	54.51	54.51	54.51
1981-82	1484.25	723	2207.25	775.59	380.22	1155.81	52.25	52.59	52.36	52.36	52.36
1982-83	3033.25	543.25	3576.50	1592.45	259.88	1852.33	52.50	47.84	21.79	21.79	21.79
1983-84	10380.33	5973.75	16354.08	6187.64	3380.57	9568.21	59.61	56.59	58.51	58.51	58.51
1984-85	13284.63	6369	19653.63	7730.28	3299.84	11028.92	58.19	51.81	56.12	56.12	56.12
1985-86	15845.85	3435	19280.85	9586.15	1913.56	11499.71	60.50	55.71	59.64	59.64	59.64
1986-87	15550	4762.50	18312.50	9332.77	2884.71	12117.48	68.14	60.57	66.17	66.17	66.17
1987-88	16000	5795.75	21795.75	10113.69	3362.38	13476.07	63.21	58.81	61.83	61.83	61.83
TOTAL	74528.31	27964.75	102493.06	45748.92	15666.84	61414.96	61.38	56.82	59.92	59.92	59.92

Source : FYDA, Belurghat, W.D.

Table - 4.IIX

Distribution of Water Area and cost per acre (WBAIFP)

Total (a)			Institutional (b)		Non-Institutional (c)		N.B.: Cost does not include marketing cost, interest on loan, lease rent etc. i.e., considering only the 'culture cost'.
Year	Water area acre	Cost per acre Rs.	Water area	Cost per acre Rs.	Water area	Cost per Acre (Rs)	
1980-81	131.25	2529.52	95	2610.53	36.25	2317.24	(a) Co-efficient of correlation (r)=0.849483 SE =0.0904217 PE =0.0664 Hence Significant
1981-82	220.73	2500.84	148.43	2506.23	72.30	2489.63	
1982-83	357.65	2516.43	303.32	2505.52	54.33	2577.08	
1983-84	1715.41	3497.70	1118.03	3148.39	597.38	4151.46	
1984-85	2035.36	3341.03	1398.46	3332.38	636.90	3360.03	
1985-86	2013.09	4869.29	1669.59	5045.92	343.50	4010.74	(b) Co-efficient of correlation (r) =0.8693587 SE =0.0866 PE =0.0584 Hence Significant
1986-87	1891.25	5150.49	1415	5166.70	476.25	5102.36	
1987-88	2254.58	5123.48	1675	5203.16	579.58	4893.20	
Source: FYDA, Balurghat, W.D.							(c) Co-efficient of correlation (r) =0.7840043 SE =0.1362373 PE =0.09183 Hence, Significant

It is observed from the Table 4.III that cost per acre of water area raises as the water area raises. It is also evident that cost per acre of water area raises in case of institutional sector more than the non-institutional sector as the water area raises, the co-efficient of correlation 0.87 approx. and it is more than in the case of non-institutional sector because of high cost of scheme due to high market price of inputs, new technology adopted to cover the raising water area year after year required for "WBAIFP" culture. The project failed to convince the farmers to accept the schemes of 'low cost' for short term period having big scope for making high profit and shown the lack of efficiency of the project (Vide Table 4.IX).

From the Table 4.IV it is evident that yield increases as the water area increases. This is because of improved scientific culture of 'WBAIFP'. It is also evident that institutional sector are slightly more benefited than non-institutional sector through WBAIFP. Hence the project was more efficient in respect of yield of the institutional sector by adopting improved scientific culture.

The Table 4.V shows the increasing tendency of yield per acre as the number of operators (beneficiaries) of Water units increase and positively related. It indicates more involvement of farmers solving rural unemployment with the increase in yield of fish culture under WBAIFP disclosed the efficiency of the project in this respect.

It is clear from the Table 4.VI that yield per acre decreases gradually as the size of the water units increases. The co-efficient of correlation between yield and size is therefore, negative (is - 0.9893).

The smaller water units are found to be more efficient than the larger ones.

Table - 4. IV

Distribution of yield (Per acre) and the Water Area (under MRAIPP)

Year	Total (a)		Institutional (b)		Non-Institutional (c)	
	Water area (acre)	Yield (Quintal)	Water area (acre)	Yield (Quintal)	Water area (acre)	Yield (Quintal)
1980-81	131.25	5.45	95	5.58	36.25	5.11
1981-82	220.73	5.24	148.43	5.23	72.30	5.26
1982-83	357.65	5.19	303.325	5.25	54.33	4.78
1983-84	1715.40	5.58	1118.033	5.53	597.36	5.64
1984-85	2035.36	5.42	1398.46	5.53	636.90	5.18
1985-86	2013.09	5.71	1669.59	5.74	343.50	5.57
1986-87	1891.25	6.41	1415.00	6.52	476.25	6.06
1987-88	2254.58	5.98	1675	6.04	579.58	5.80

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Source: VTDA, Belurghat, M.D.

(a) $r = 0.6590771$

$SE = 0.199976$

$FE = 0.134838$

Hence, correlation exists

(b) $r = 0.6479486$

$SE = 0.2051185$

$FE = 0.1383534$

Hence, correlation exists

(c)

$r = 0.6409622$

$SE = 0.2083822$

$FE = 0.1404998$

Hence, correlation exists.

Table - 4.V

Distribution of yield by the total Number of beneficiaries (WBAIFP)

Year	Number of beneficiaries	Yield (Quintal)
1980-81	84	5.45
1981-82	116	5.24
1982-83	524	5.19
1983-84	783	5.58
1984-85	1568	5.42
1985-86	1399	5.71
1986-87	1456	6.41
1987-88	1748	5.98

Source : FFDA, Balurghat, W.D.

Co-efficient of correlation (r) = 0.6597299

SE = 0.1996716

PE = 0.1346785

Hence, significant.

Table - 4.VI

Distribution of yield per acre by size class in 1987-88

Size-class of water units (Acre)	Per acre yield (overall) in 1987-88 (Quintal)	
Upto 0.19	5.30	
0.20 - 0.99	5.22	
1.00 - 4.99	5.09	
5 to 10	4.88	
		Co-efficient of correlation (r) = -0.9893 SE = 0.01064 PE = 0.00717
		Hence, significant.

Source: Field Survey.

Table - 4.VII**Distribution of Production of Fish under WBAIFP**

Year	Production (Quintal)
1980-81	715.43
1981-82	1155.81
1982-83	1852.33
1983-84	9568.21
1984-85	11029.92
1985-86	11499.71
1986-87	12117.48
1987-88	13476.07

Source: FFDA, Balurghat, MD

Average production = 7676.87 quintal

Co-efficient of variation (V) = 66.37%

S.D. = 5095 Quintal

It is observed from the Table 4,VII that average production of fish under WBAIFP for eight years (1980-81 to 1987-88) was 7676.87 quintal and the Co-efficient of variation was 66.37% with a standard deviation of 5095 quintal approximately which disclosed that the production was less consistent. The reason was that maximum amount of rupees invested from the year 1983-84 and for varied extension services of different departments connected with fish culture, more securities of improved techniques were given to the farmers through the programmes of rehabilitation, minikit, service party Group, training etc. and a hike in production came from 1983-84 onward.

There is a lack of efficiency of the project in respect of all the benefits of NDAIFP activities in the district for improved pisciculture throughout the proposed project period i.e., 1980-81 to 1987-88.

Table - 4.VIII
Distribution of yield under NDAIFP

Year	Yield (quintal)
1980-81	5.45
1981-82	5.24
1982-83	5.19
1983-84	5.88
1984-85	5.42
1985-86	5.71
1986-87	6.41
1987-88	5.98

Source: FYDA, Balurghat, W.D.

Average Production = 5.62 quintal

Co-efficient of Variation (V) = 6.78%

SD = 0.381 quintal

The Table 4.VIII discloses that the average yield of fish under NDAIFP for eight years (1980-81 to 1987-88) was 5.62 quintal, co-efficient of variation was 6.78% with a standard deviation of 0.381 quintal which disclosed that the yield was consistent. The reason was that the maximum water areas were taken under the fish culture of NDAIFP from 1983-84 onward which could match the yield for eight years giving no chance of hike in the yield and leaving a consistent trend in the yield. The project could be called apparently efficient for this consistency but at the same time the project failed to cover the maximum water areas in the initial years (1980-81, 1981-82, 1982-83) and the achievement of water areas in respect of fish culture

in those years was well behind the target set for the fish culture under WBAIFP.

Table - 4. IX

Distribution of yield and Number of beneficiaries (WBAIFP)

Year	Yield (Quintal)	Number of beneficiaries
1980-81	5.45	84
1981-82	5.24	116
1982-83	5.19	524
1983-84	5.58	783
1984-85	5.42	1568
1985-86	5.71	1399
1986-87	6.41	1456
1987-88	5.98	1748

Source: PFDA, Balurghat, W.D.

It is evident from the Table 4. IX above that yield for eight years of the implementation of the WBAIFP in terms of beneficiaries grows consistently with a minimum degree of variation (6.78%). Average yield 5.62 quintals shows also good performance. Hence the project can be said efficient in this respect.

It is observed that though the cost per acre is high in case of operations following intensive culture practices under WBAIFP the net revenue or profit will be highest in this case because of highest yield per acre under traditional system the cost of production is very low and the yield per acre is also very low. So the net revenue that is obtained is the lowest.

From the Table 4. X it is quite evident that the benefit-cost ratio is the highest in the traditional methods of fish

Table - 4.X
Benefit Cost statement (WBAIFP)

System of fish culti- vation	Per acre income Rs. (rounded in Rs)								Per acre cost of production Rs.							
	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88
Traditional (other than WBAIFP)	1830	2328	2532	3318	3752	5264	8390	7056	820	850	950	1100	1100	1300	1300	1600
	<u>Benefit cost ratio</u>															
	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88								
	2.23	2.74	2.67	3.02	3.41	4.05	4.92	4.41								
Intensive under WBAIFP	5450	6288	6180	7812	7588	9040	11052	10764	2530	2501	2516	3498	3341	4069	5150	5123
	<u>Benefit cost ratio</u>															
	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88								
	2.15	2.51	2.46	2.23	2.27	1.86	2.15	2.10								

Sources: FFDA, Balurghat, W.D.

cultivation (other than WBAIFP). This may be due to the very low level of investment. Though intensive method under WBAIFP entails large expenditure, it yield higher income to the farmers. From the overall benefit point of view, intensive method under WBAIFP of fish cultivation due to its high income generating capacity per acre, offsets the higher benefit - cost ratio in the traditional system. The intensive culture of WBAIFP in the district is more attractive than the traditional culture ensuring higher income for the fish farmers. (NB. Cost per acre is only 'culture cost', excluding interest on loan, Marketing, lease rent etc.)

Fish Farmers Training

This programme aims at training for orienting the rural people belonging to scheduled castes and tribes towards pisciculture by disseminating improved technology of fish production in the district of West Dinajpur.

This programme was made only to train the prospective farmers belonging to SC and ST and was not to facilitate the farmers in general for which inefficients were sometimes awarded and efficient were discarded. There was lack of efficiency of the management for not making the arrangement of training for all the prospective farmers in the district irrespective of their castes.

Moreover there are many blocks where PFDA and DFO did not cover training for the farmers in the initial stage of the WBAIFP i.e. in 1980-81, 1981-82, 1982-83 and 1983-84. These blocks had been neglected by the management and the management were defending themselves on the basis of some flimsy grounds. The management was also found inefficient for not spending the

total sum allotted in full for this training programme.

(Vide Annexure - VII)

Balurghat block, Gangarampur block and Tapan block of Balurghat Sub-Division got maximum priority in respect of expenses incurred for this programme specially as the blocks of the head quarter. Islampur Sub-Division and blocks of Islampur Sub-Division were neglected much.

Lack of efficiency was found on the part of management for arrangement of training to the prospective farmers of the district of West Dinajpur as the total number of farmers connected with the fish culture were 7678 whereas only 3682 farmers got benefits of training i.e., only 47.96% of the total number of farmers (7678) were taken into consideration for this programme in the district of West Dinajpur i.e. 52.04% farmers were untrained who got the other facilities of WBAPF regarding pisciculture in the district but they were not given proper training for utilisation of resources to the optimum level. Maximum number of farmers who got training were from Balurghat block, Gangarampur block and Tapan block of Balurghat Sub-Division (41.74%) which was more than all the blocks of Raiganj Sub-Division and the farmers of Islampur Sub-Division got the minimum benefit of this training programme and were neglected. Therefore it was seen that blocks of Balurghat Sub-Division got more stress in this programme than the other blocks of the rest two sub-divisions i.e., Raiganj Sub-Division and Islampur Sub-Division.

This was a poor performance because the benefits of this programme were not distributed among the three Sub-Divisions rationally, considering their potentialities. Therefore the management efficiencies were lacking to bring the maximum number of farmers from all the Sub-Divisions and blocks of the district

of West Dinajpur in this programme in spite of having sufficient resources i.e., culturable and semi derelict water areas in different blocks of Raiganj and Islampur Sub-Divisions which are considered in the NBAIFP (Vide Annexure - VIII and XXIII).

Special Feature (NBAIFP)

Table - 4.XI

Change in yield of the Trained Fish Farmers

Year	Yield per acre (quintal)	Number of trained farmers
1984-85	5.40	10
1985-86	5.60	14
1986-87	5.68	19
1987-88	5.75	20
		Correlation Co-efficient = 0.98
		SE = 0.018
		PE = 0.012
		Hence, correlation is significant

Source : Field survey (Taking 1 acre of water area as sample under trained farmers)

Trained operators' field of information is superior. This superiority of information reduces the risk element in innovation and induces them to adopt new inputs. That is training enhances innovative and allocative ability of the farmers to decode information, to evaluate costs benefits and to quickly allocate resources in a cost-efficient manner. Again in a close knit village communities, fish farmers may have interactions with those farmers who have already received training. Training in

fish farming technology has inducted fish farmers and created employment.

The changes in yield, if any, in the water units of the district of West Dinajpur cultivated by the trained farmers are given in the Table 4.XI shown above.

It has been observed that the coverage of training is still not very extensive. Training programme has not taken its roots identifying the constraints and gaps in different programmes of fish cultivation of W.D. district. Another observation is that yield per acre has significantly increased in the water units of those operators who have received training, the extent to which yields have increased after receiving training may be due at least in part to the qualitative improvement in farmers' ability as entrepreneurs resulting from training programme. The co-efficient of correlation between yield and number of trained farmers is 0.90 i.e., highly positive related and leads to the strong presumption that the relationship between training and yield is quite satisfactory and the management could be said efficient for increasing the yield by arranging training to the farmers.

Rehabilitation

To rehabilitate the poorer section belonging to S.C. and S.T. who were also small and marginal farmers earning below Rs. 1500 p.a. who were willing to engage themselves in pisciculture, the fishery department arranged for providing them with huts at the pond site in different community development blocks of the district of West Dinajpur.

As the expenses in this programme increased the number of beneficiaries also increased from the year of its beginning 1983-84 but the increase in expenses and in the number of beneficiaries did not match in all the three Sub-Divisions of the district, it having slightly inclined to the blocks of Raiganj Sub-Division. Increase in expenses and number of beneficiaries did not match specially in Islampur Sub-Division.

It was also seen in respect of expenses incurred for rehabilitation Raiganj Sub-Division got the priority and Kushmandi block, Raiganj block of Raiganj Sub-Division got individual priority over Balurghat block and Gangarampur block of Balurghat Sub-Division. Islampur Sub-Division and the blocks of Islampur Sub-Division were neglected much. (Vide Annexure-IX)

From the Table 4.XII it is observed that the management could not spend the allotted sum in full for rehabilitation, hence the management was found inefficient for distributing the benefit of rehabilitation from 1983-84 to 1987-88. The expenses incurred for this programme increased, the number of families of the beneficiaries also increased as Co-efficient of correlation (r) was 0.88. Therefore the management was efficient to increase the number of families of the beneficiaries with the increase in expenses.

However out of the total number of beneficiaries who got the benefits of this programme maximum number of them (40.47%) were from Raiganj Sub-Division of which 18.52% were from Kushmandi block and Raiganj block alone. The Balurghat Sub-Division was placed second in this respect (30.86%) and the beneficiaries of Islampur Sub-Division got minimum benefit and so the benefit of this programme were not distributed rationally among the three

Table - 4.XIII

Distribution of Finance for Rehabilitation and Number of Beneficiaries (MNAJFP)

Year	Expenses Rs.	Number of family of the beneficiaries				Number of family Target	Allotted for the purpose Rs.	% of sanctioned against allotted amount
		S.C.	S.I.	Total				
1983-84	98,750	2	4	6	6	1,10,000	89.77	
1984-85	2,02,000	4	6	10	11	2,15,000	93.95	
1985-86	3,84,000	6	11	17	18	4,00,000	96	
1986-87	5,10,200	8	13	21	23	5,45,000	93.61	
1987-88	6,24,000	10	17	27	29	6,75,000	92.44	
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TOTAL	16,18,950	30	51	81	87	19,45,000	93.52	

SOURCE: FIDA, Balurghat, M.D.

r (Co-efficient of correlation) between expenses
and Number of beneficiaries = 0.88

SE = 0.1008

FE = 0.0680. Hence, correlation is significant.

Sub-Divisions and sixteen blocks keeping in mind their potentialities. Therefore the management efficiencies were lacking.

Rehabilitation facilities extending to the farmers in comparison with total number of farmers involved in culture of fish were negligible (1.13%). Though it was seen that maximum number of beneficiaries who got benefit of this programme were from Raiganj Sub-Division and blocks like Kushmandi, Raiganj of Raiganj Sub-Division and Balurghat, Gengarempur of Balurghat Sub-Division got individual priority in receiving the benefit of this programme. The management was found inefficient in distributing the benefits of rehabilitation to the fish farmers rationally within the district of West Dinajpur and was a failure to convince and bring the maximum number of fish farmers from all the Sub-Divisions, and blocks of the district in this programme considering their available culturable and semi-culturable water areas for the WBAPF. (Vide Annexure - IX and XXIII)

Leasing Operation

As the cost incurred for leasing increased, the water area also increased with a few exception in three sectors viz., long term lease for individual, long term lease for Co-operative and Fish Production Group (FPG) and short term lease for individual in the fish culture of the district of West Dinajpur, the yield did not always increase. The yield in different year in long term lease for individual sector (starting from 1982-83) for fish culture did not always match with the cost and water area (i.e. in 1982-83, 1984-85 and 1987-88), showing a poor average yield of 5.71 quintal. The project was not competent enough to increase the yield in 1982-83, 1984-85 and 1987-88. Only increasing the cost and water area for this programme should not be the criteria to spread the scientific pisciculture in the water areas

of different blocks of the district.

But in the year 1986-87 where the cost decreased in comparison with the year 1985-86 and the water area also decreased, the yield was the maximum (5.96 Quintal) which proves that the management was careful, even though the cost and water area decreased for this programme in the long term lease for individuals and indicating the project's efficiency.

In the long term lease for Co-operative and FPG Sector for fish culture (starting from 1984-85), it was also seen that there was an increase in cost (19.34% of 1986-87) with an increase of 55 acre of water area in 1987-88 and the yield in 1987-88 (5.39 quintal) made good result and the project was more competent than in the other years. But in the year 1984-85 the yield was poor and the district average yield (5.03 Quintal) was also poor and the project was not efficient enough to convince the farmers for optimum utilisation of resources.

In the short term lease for individual sector for fish culture (starting from 1983-84) the yield did not match with the cost incurred in this sector specially in 1983-84 and 1984-85. The management was not watchful in implementing the WBIAFP by active participation of the prospective farmers in this programme, hence, the lack of efficiency was observed. But from the year 1985-86 onward upto 1987-88 the yields were increasing and recovered the deficiencies that appeared in the previous years to some extent and the yield in 1986-87 (5.28 Quintal) increased even though the cost incurred in this year decreased in comparison with the year 1985-86. Therefore the project was best efficient in 1986-87. The schemes offered to the farmers in 1986-87 made good result.

By combining the three sectors mentioned in respect of fish culture it was seen that 33.61% of total cost under WBAIFP was made through leasing operation in the district of West Dinajpur covering 20% of total cultured water area under WBAIFP and were producing only 24.72% of the total production of fish under WBAIFP which disclosed that the cost for leasing operation of fish culture, the water area achieved and production of fish were extremely at a poor state (Vide Annexure - IV, X and XI).

Over and above in respect of the optimum production of fish for the schemes of WBAIFP i.e., 10 quintals per acre there was lack of efficiency of the project in the leasing operation. Therefore out of the three leasing sectors namely (i) long term lease for individual (ii) long term lease for Co-operative and FPG (iii) short term lease for individual; not one sector was able to produce the optimum production of fish in spite of receiving different benefits of WBAIFP and others in the district of West Dinajpur from various sources. Total utilisation of resources of pisciculture in the district of West Dinajpur in the leased water area was absent.

In case of net revenue of the fish produced from the combined three sectors, 1986-87 was the best year though the water area covered for this year was only 23.60% of the total leased out water area throughout the proposed period 1982-83 to 1987-88 that disclosed the efficiency of the project in this respect but there was lack of efficiency in the other years as the net revenues were not satisfactory.

The year 1987-88 stood next to 1986-87 in respect of making net revenue and the water area covered in this year was 27.82% throughout the proposed period 1982-83 to 1987-88 but the management of the WBAIFP was not found competent enough to spread the schemes, systems, benefits of pisciculture throughout the period 1982-83 to 1987-88 to raise net revenue to match with

the year 1986-87 and 1987-88.

In the long term lease for individual sector in the year 1986-87 net revenue was best in comparison with other years throughout the proposed period of the programme (i.e. 1982-83 to 1987-88) covering only 12.02% of the water area covered in this sector. The year 1987-88 stood next to 1986-87 covering water area 21.68% in respect of making net revenues. The management of WBAIFP was not found efficient enough to enhance net revenue in the other years as in the year 1986-87, 1987-88 by offering suitable schemes, procedures and benefits to the fish farmers.

The long term lease for Co-operative and FPO Sector in the year 1986-87 net revenue was the best covering 27.44% of water area of this sector followed by the year 1987-88 covering 29.93% of water area of this sector. Here also the management of the project was not found competent to make the total farmers (engaged) of all the blocks of the district of West Dinajpur in all the years from 1982-83 to 1987-88, efficient to raise the net revenue by offering them suitable schemes, procedures, benefits as in the year 1986-87 and 1987-88.

The short term lease for individual sector in the year 1986-87 made the highest net revenue covering only 13.58% water area of this sector followed by the year 1987-88 covering only 21.84% of water area of this sector disclosing the fact that the management of the project was not found efficient enough to make all the farmers (engaged) in the district of West Dinajpur in all years from 1982-83 to 1987-88, efficient to raise the net revenue of fish culture as in the year 1986-87 and 1987-88.

The long term lease for individual sector for fish culture from 1982-83 to 1987-88 made 40.74% of the net revenues made by the three sectors which was the highest with a minimum water area and cost and it was observed that the long term lease for co-operative and FPG sector (earning 20.98% net revenue) had been neglected more than the other two sectors and the project failed to boost up the co-operative and FPGs for the proper improvement of fish culture without exploitation of the farmers in the district of West Dinajpur.

(Vide Annexure - X and XII)

Special Features (MRAIFF)

Table - 4.XIII

Distribution of yield per acre by duration of lease period

Duration of lease period	Yield (per acre) quintal
On Annual basis	
1 years	2.02
2 years	2.15
3 years	2.40
4 years	2.75
7 years	2.88

Source: Field survey

(Taking 5 samples from 1983-84 to 1987-88)

Co-efficient of Correlation = 0.94

SE = 0.052

FE = 0.035

Hence, significant

It is observed from the Table 4.XIII that the longer the duration of lease period the higher the yield.

But in practice water area covered in the long term lease for individual sector was minimum (332.03 acre) which made better yield (8.71 quintal) than the other sectors like long term lease for Co-operative and FPG, short term lease for individual. It was due to lack of efficiency of the management and poor achievement of the project for not covering the maximum water area in the long term lease for individual sector (Vide Annexure - X).

Table - 4.XIV

% Distribution of number of water units and their water Area by their Types of possession

Type of possession	% of the number of Water units	% of the water area under the units
	<u>1985-86</u>	<u>1985-86</u>
Owned and operated	85	68
Leased in on annual basis	15	32
	<u>100</u>	<u>100</u>
	<u>1986-87</u>	<u>1986-87</u>
Owned and operated	90	70
Leased in on annual basis	10	30
	<u>100</u>	<u>100</u>
	<u>1987-88</u>	<u>1987-88</u>
Owned and operated	92	78
Leased in on annual basis	8	22
	<u>100</u>	<u>100</u>

Source: Field survey (Taking 20 samples in each year)

Ponds and tanks are owned by the operators or taken on short or long term lease basis from the owners of the water units. It is evident from the Table 4.XIV that the majority of the water units of the district of West Dinajpur are owner operated. Only a small fraction of total number of units is leased in by the operators, of course, the lease operated water areas are very small.

During the survey work, it was observed that the preponderance of the owner operators and relatively less importance attached to leasing out system may be accounted for by two reasons. Firstly, with the advent of the new technology of intensive fish culture, self cultivation is considered by the owners a more paying proposition and secondly because of a series of tenancy legislations in different years giving more rights to the tenants, the owners have become more apprehensive of losing the occupancy right in their leased out water units. But from the point of view of employment facilities in the district of West Dinajpur the leasing operation should be given more importance than they get at present. It could be a good machinery for solving rural unemployment if the management in connection with WBAIFP utilised this competently along with the owner operators.

Table - 4.XV**Distribution of Water Area and yield (under leasing Sectors)**

Water Area (Acres)	Yield (Quintal)
90.25	5.22
133.90	5.07
490.78	4.28
727.55	5.13
704.4	5.28
827.5	5.44

SOURCE: FFDA, Balurghat, W.D.

$$r = 0.29315$$

$$SE = 0.37391$$

$$PE = 0.25230$$

Hence, Correlation exists.

It is evident from the Table 4.XV above that yield increases as the water area increases but very slowly, coefficient of correlation is also very low (0.29315). This indicates improved scientific culture of WBALFF were not introduced properly in the leased out water area (comprising long term lease for individual, long term lease for co-operative and FPO and short term lease for individual) of the district of West Dinajpur.

Misikrit

Arrangements for distribution of fry, superphosphate among the small and marginal farmers earning below Rs. 3500 p.a., free of cost were made to boost up the pisciculture in the district of West Dinajpur.

As the expenses in this programme increased, the number of beneficiaries also increased from the year of its beginning 1985-86 with the exception of Islampur Sub-Division where the increase in expenses and number of beneficiaries did not match with other two Sub-Divisions i.e., Balurghat Sub-Division and Raiganj Sub-Division.

It was also seen that in respect of expenses incurred for minikit distribution, Balurghat Sub-Division got priority and Balurghat block, Gangarampur block and Tapan block of Balurghat Sub-Division got maximum individual priority specially as the blocks of the Balurghat Sub-Division fall in the head quarter of the district. Islampur Sub-Division and blocks of Islampur Sub-Division were neglected much.

(Vide Annexure - XIII)

From the Table 4.XVI it is observed that the management could not spend the allotted sum in full, hence the management was found inefficient for minikit distribution from 1985-86 to 1987-88.

As the expenses incurred for this programme was raised the number of beneficiaries was also raised as the co-efficient of correlation (r) was 0.98. The management was found efficient to raise the number of beneficiaries with the increase in expenses.

However out of the total number of beneficiaries who got the benefits of this programme maximum number of them (49.91%) were from Balurghat Sub-Division of which 42.99% was from Balurghat block, Gangarampur block and Tapan block alone; Raiganj Sub-Division was placed second in this respect (35.56%) and the beneficiaries of Islampur Sub-Division got minimum benefit and

Table - 4-XV

Distribution of Minikit and Number of beneficiaries (MMAFP)

Year	General Caste Number of bene- ficiaries	Scheduled Caste Number of beneficiaries	Scheduled Tribes Number of benefi- ciaries	Total	Expenses (Sanctioned) the purpose	Allotted for the purpose	% of Sanctioned expenses against the allotted amount
1905-06	157	262	106	525	2,32,200	2,65,000	87.62%
1906-07	150	265	107	530	2,85,500	3,00,000	95.17%
1907-08	185	310	125	620	4,45,500	4,82,000	92.43%
TOTAL	500	837	338	1675	9,63,200	10,47,000	92.00%

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SOURCE: BDO, Balurghat, M.D.

Co-efficient of correlation (r) between expenses incurred and number of beneficiaries = 0.98

SE = 0.018

FE = 0.012

Hence, correlation is significant.

the benefits of this programme were not distributed rationally among the three Sub-Divisions and sixteen blocks keeping in mind their potentialities. Therefore the managerial efficiencies were lacking.

Facilities of minikit extending to the farmers in comparison with the total number of farmers involved in culture of fish in the district were poor (21.82%). Though it was seen that maximum number of beneficiaries who got benefit of this programme were from Balurghat Sub-Division and blocks like Balurghat, Gangarempur and Tapan of Balurghat Sub-Division. They got individual priority in receiving the benefit of this programme.

The management was found inefficient in distributing the benefits of minikit rationally within the district of West Dinajpur and was a failure to convince and bring the maximum number of farmers of the blocks of Islampur Sub-Division and Raiganj Sub-Division compared with Balurghat Sub-Division in spite of having sufficient resources i.e., culturable and semi-derelict water areas in different blocks of these two Sub-Divisions which are considered in the WBAIFP (Vide Annexure - XIII and XXIII).

SERVICE PARTY GROUP

Arrangements for distribution of devices for catching fish among the service party group (not exceeding ten families) belonging to SC and ST small and marginal farmers earning below Rs. 3500 p.a. were made to accelerate the pisciculture in the district of West Dinajpur.

The number of beneficiaries increased as the expenses of this programme increased from the year of its beginning, 1983-

24, but increase in expenses and number of beneficiaries did not match in all the three Sub-Divisions of the district. Islampur Sub-Division was neglected much in this respect. It was also seen that in respect of expenses incurred for service party group Balurghat Sub-Division got the priority slightly over the Raiganj Sub-Division. The sanctioned expenses were distributed among the blocks of Balurghat Sub-Division and Raiganj Sub-Division almost uniformly but the blocks of Islampur Sub-Division and as a whole Islampur Sub-Division were neglected much.

(Vide Annexure - XIV)

From the Table 4.XVII it is observed that the management was found inefficient for not spending the allotted sum in full for this programme from 1983-84 to 1987-88.

As the expenses incurred for this programme were raised, the number of beneficiaries were also raised as the co-efficient of correlation (r) was 0.99. The management was efficient to raise the number of beneficiaries with the increase in expenses.

However out of the total number of beneficiaries who got the benefits of this programme, maximum number (36.40%) were from Balurghat Sub-Division. Of which 17.42% was from Balurghat block and Gangarampur block alone; the Raiganj Sub-Division was placed second in this respect (36.02%) and the beneficiaries of Islampur Sub-Division (27.58%) got minimum benefit of this programme and the benefits of this programme were not rationally distributed among the three Sub-Divisions and sixteen blocks considering their resources of pisciculture. Therefore the managerial efficiencies were lacking.

Table - 4, XVII

Distribution of Finance for Service Party Group and number of beneficiaries

Year	Number of family of the beneficiaries- ries belonging to SC having one farmer in one family.	Number of family of the beneficiaries belonging to ST having one farmer in one family	Total number of beneficiaries	Expenses party of beneficiaries	Service Target family for the purpose	Alotted amount	% of sanctioned against allotted amount
1983-84	24	25	49	26,200	6	43500	61.65%
1984-85	32	33	65	38,003	8	46000	82.62%
1985-86	47	52	99	58,800	12	66200	88.82%
1986-87	66	72	138	71,500	16	85000	84.12%
1987-88	88	94	182	98,520	24	112000	87.96%
TOTAL	257	276	533	2,93,023	68	351700	83.32%

Source: DFO, Balurghat, M.D.

Co-efficient of correlation (r) between expenses incurred and number of beneficiaries = 0.99

FE = 0.006

SE = 0.009

Hence, correlation is significant.

Facilities of Service Party Group extending to the farmers in comparison with the total number of farmers involved in culture, of fish were negligible (6.94%). Though it was seen that maximum number of beneficiaries who got benefit of this programme were from Balurghat Sub-Division and blocks like Balurghat and Gange-rampur of Balurghat Sub-Division. They got individual priority in receiving the benefit of this programme.

The management was found inefficient in distributing the benefit of Service Party Group rationally within the district and was failure to convince and bring the maximum number of farmers of the blocks of Islampur Sub-Division and Raiganj Sub-Division comparing with Balurghat Sub-Division in spite of having sufficient resources. (Vide Annexure - XIV)

Co-operative and Fish Production Group

In respect of supply of inputs to the remotest places of the district through different primary fishermen's co-operative societies and Fish Production Groups (FPG) it was observed that the co-operatives and the FPGs of Balurghat Sub-Division supplied maximum inputs. There was wide variation in the increase of cost for inputs supplied by different co-operatives and FPGs in different blocks and it was also seen that in the earlier year e.g. , 1982-83 there was minimum value of inputs supplied to farmers of some blocks due to want of prospective farmers. Therefore in the year 1987-88 where the number of prospective farmers increased to a considerable extent, the difference in the cost incurred for supplying inputs with the earlier year was maximum as it was seen in Karandighi block, Islampur block of Islampur Sub-Division and Kumarganj block, Balurghat block, Gangerampur block of Balurghat Sub-Division and Itahar block, Banshihari block of Raiganj Sub-Division which increased their cost for this programme sufficiently upto 1987-88 having a good number of prospective farmers. For supplying the inputs to the farmers in different blocks it was seen co-operative and FPG of blocks like

Balurghat, Gangarampur, Tapan, Hill of Balurghat Sub-Division, Banshihari of Raiganj Sub-Division got priority. The co-operatives and FPGs of these blocks supplied maximum value of inputs. There were some blocks where there was no co-operative and FPG activities. Therefore the management of the project was not found efficient enough to make wider scope for the prospective farmers to distribute the benefits of co-operative and FPG in each and every block of the district of West Dinajpur (Vide Annexure-XV).

From 1984-85 to 1987-88 Balurghat Sub-Division made highest yield (5.12 quintal) among 3 Sub-Divisions. The project was efficiently operating under the Co-operative and FPG sector in Balurghat Sub-Division as it made yield which was higher than the yields of the other two Sub-Divisions comparing with the district average yield (1984-85 to 1987-88) which was 5.03 quintal. Management of the project was to some extent successful in enhancing yield in some blocks like Balurghat, Tapan and Gangarampur of Balurghat Sub-Division; Banshihari, Raiganj of Raiganj Sub-Division. But the management was not found efficient to enhance the yield (even the district average yield) of other blocks and the project failed to extend the scope of this programme to each and every Sub-Division and block of the district and some blocks were totally or partially untouched in this respect.

Moreover the district average yield of 5.03 quintal (1984-85 to 1987-88) was also poor in comparison with the average yield as per scheme of WBAIFP (10 Quintal per acre). Therefore the management was not found efficient enough to convince the farmers for optimum utilisation of resources in each and every year throughout the period of the programme 1984-85 to 1987-88 (Vide Annexure - XVI and XVII).

It was also disclosed that 25.92% of cost and 20.76% of water area under WBAIFP had been taken into consideration in the

Co-operative and FPG sector producing only 18.08% of total production of fish under WBAIFP. Managerial efficiencies were lacking to raise production of fish by matching the cost with the water area. It was also observed that co-operative and FPG sector remained at poor state in the district.

It was also observed that Balurghat Sub-Division spent (43.72%) highest among the three Sub-Divisions in this sector getting maximum benefit of WBAIFP. It was proved that the management of the project was not able to enlighten the maximum number of farmers of the three Sub-Divisions and to distribute the different benefits/scopes of WBAIFP throughout the district of West Dinajpur (Vide Annexure - XVI).

In respect of number of beneficiaries engaged in culture of fish under this sector of the district it was observed that the fish farmers of Balurghat Sub-Division got priority in receiving different benefits of WBAIFP though there were other potential sub-divisions (Raiganj Sub-Division and Islampur Sub-Division) in the district.

Considering cost (25.92%), water area (20.76%) and production (18.08%) of the total cost, total water area and total production of WBAIFP respectively the number of beneficiaries (23.12%) engaged in the culture of fish under the Co-operative and FPG sector in the district was satisfactory and the management of the project was efficient to engage the farmers in this activity under this sector in comparison with total number of farmers engaged in the culture of fish of WBAIFP in the district from 1980-81 to 1987-88.

(Vide Annexure-XVIII)

It was also observed that in no one year, in no one Sub-Division and in no one block the farmers were able to produce the

optimum production of fish (i.e., 10 quintal per acre) in spite of receiving different benefits of WBAIFP and others in respect of pisciculture in the district of West Dinajpur from various departments and sources. Optimum utilisation of resources of pisciculture in the district in the co-operative and FPG sector was absent.

The net revenue of fish produced from this sector (1984-85 to 1987-88) in this district was highest in the year 1986-87 and the project was efficient in this respect but was not competent enough on the other hand to raise net revenue in the other years of the period from 1984-85 to 1987-88. Management of the project was failure to offer those schemes and processes to the fish farmers which could be beneficial to them. As regard net revenue, 1987-88 stood next to 1986-87. But a lack of efficiency was found to raise the net revenue throughout the period 1984-85 to 1987-88 by distributing the benefits of WBAIFP in the district.

As a Sub-Division Raiganj Sub-Division made the highest net revenue i.e., 40.07% of the net revenues comprising of three Sub-Divisions followed by Islampur Sub-Division (30.39%) throughout the period 1984-85 to 1987-88 Islampur Sub-Division made a net revenue of Rs. 4,754.70 in 1986-87 and Karandighi block of Islampur Sub-Division made a net revenue of Rs. 6548 in 1986-87 which were the highest among all the Sub-Divisions and blocks respectively from 1984-85 (the year of starting of this programme) to 1987-88. Therefore it was seen that the project was efficiently operating in Raiganj Sub-Division and Islampur Sub-Division stood second in respect of making net revenue covering a minimum water area (7.53% of total water area covered under this sector for culture of fish) and the project was efficient to make better net revenue in Islampur Sub-Division and was more efficient in 1986-87. Moreover the project could not cover a satisfactory portion of water area in Islampur Sub-Division. There was lack of

efficiency of the project in Balurghat as this Sub-Division spent 43.72% of total cost covering maximum portion of water area (i.e. 51.93%) but made the lowest net revenue (29.54%). Therefore the management was not found efficient to enhance the net revenues in the three Sub-Divisions and all the sixteen blocks of the district matching with the covered water areas, costs and to keep net revenues stable in all the years [from 1984-85 to 1987-88) by offering suitable schemes, benefits like training, distribution of minikit, rehabilitation, service party group, subsidy, etc to the fish farmers.

(Wide Annexure-XVI
and XIX)

Special Feature

Table - 4. XVIII

Distribution of water Area and yield (under
Co-operative and FPG Sector)

Water Area Acre	Yield (Per acre) Quintal
360	3.97
580	5.07
605	5.22
660	5.39

Source: PFDA, Balurghat, W.D.

$$r = 0.99932$$

$$SE = 0.00995$$

$$PE = 0.00671$$

Hence, Significant.

It is evident from the Table 4.XVIII above that yield increases as the water area increases. This is because of improved scientific culture of WBAIFP introduced in the Co-operative and FPG sector for culture of fish.

Dovetailing activities for subsidy distribution

Typing up of the schemes of WBAIFP with IDDP, SCP, TSP and DRDA for scheduled caste, tribes and small and marginal farmers with the benefit of lucrative subsidy element of the dovetailed scheme which helped to alleviate the rural poverty. In the dovetailed scheme the small and marginal fish farmers get extra benefits of subsidy for their 'economic handicapped' condition but extra benefits of subsidies were also given to the farmers only when they belong to specific castes (e.g., SC and ST) without considering their actual economic condition and their efficiency for the culture of fish. Subsidies could be given to those farmers who actually economically backward 'irrespective of castes and of course on the basis of their efficiency. The prospective efficient farmers who did not belong to specific castes were deprived of obtaining extra benefits of subsidy for culture of fish and there was a big scope of rewarding inefficient and discarding the efficient. Management was failure to convince the prospective and efficient farmers of the district to bring them in this prospective profession by arranging proper incentives to the potential farmers which could be of immense help for the economic development of the district of West Dinajpur.

Moreover the dovetailed schemes were started from the year 1983-84 when the WBAIFP started their programme in the district from 1980-81. Therefore a time lag of three years was there to help the small and marginal farmers in the district.

The management was found inefficient to arrange the dovetailed schemes for the fish farmers in the district of West Dinajpur from the beginning of the WBAIFP, 1980-81.

Target Setting

Normally viability of the project, growth prospect based on past experience, volume of culture, semi-derelict and derelict water areas, enthusiasm of the local farmers etc are taken into consideration for setting the target water area of WBAPF in the district of West Dinajpur.

Table - I, XII

Target Water Area Vs. Water Area

Sub-Divisions	Total water area (acre)	Culturable and semi derelict water area (acre)	Total target (acre)	% of culturable and semi-derelict water area on total water area	% of Total target on total water area	% of Total target of culturable and semi-derelict water area
Balurghat	11,851.79	9,682.50	3,762.5	81.69	31.75	38.86
Raiganj	16,047.26	14,245	5,015	88.77	31.25	35.21
Islampur	7,011.38	5,347.99	1,497.5	76.27	21.36	28.00
TOTAL	34,910.43	29,275.49	10,275	83.86	29.43	35.10
SOURCE: P.F.D.A., Balurghat, W.D.						

From the Table 4.XIX it is observed that out of the total water area available in the district comprising of culturable, semi-derelict and derelict 83.80% of the total water areas were culturable and semi-derelict but the WBAIFP considered only 30.42% of the total water areas i.e. only 36.27% of the semi-derelict and culturable water areas came under the WBAIFP for the period 1980-81 to 1987-88. Among the three sub-divisions namely Balurghat, Raiganj and Islampur, Water area available for fish culture (i.e., culturable and semi derelict water area), Raiganj was the highest (i.e., 88.77%) and Islampur the lowest (i.e., 76.27%) but from the view point of total water area available in the district compared to the water area covered under financial assistance programmes of the world bank fishery project it becomes apparent that Balurghat Sub-Division was the thrust area as 31.72% of the total water area was covered under the target of assistance programmes. Compared to it Raiganj Sub-Division where largest semi derelict and culturable water area is available (88.77%) was considered the next thrust areas as the target water area to total area was only 31.22%.

Islampur Sub-Division was considered the lowest thrust area as 21.30% of the total water area (i.e., 28% of culturable and semi derelict water area) was covered under the target of assistance programmes. Although it is evident that three blocks namely Goalpokhar I, Goal Pokhar II and Islampur of Islampur Sub-Division had not been considered in this programme in the very first year 1980-81 of the WBAIFP.

In the selection of target water area in the respective blocks of the respective three sub-divisions it revealed that in Balurghat Sub-Division, Gangarampur block having 87.71% culturable and semi derelict water area of this block was considered the thrust area covering 46.38% of culturable and semi derelict water area or 40.68% of the total water area in the target water area for WBAIFP assistance for the period 1980-81 to 1987-88 having a

yield of 6.82 quintal of fish per acre. But Kumarganj block having the highest culturable and semi derelict water area (91.34% of total water area) was considered the next thrust area covering 38.83% of culturable and semiderelict water area or 35.47% of the total water area in the target for WBAIFP assistance having a yield of 5.86 quintal per acre.

In the Raiganj Sub-Division Kushmandi Block having 83.14% culturable and semi derelict water area was considered the thrust area in respect of target setting covering 39.12% of culturable and semi derelict water area or 32.53% of the total water area in the target water area for WBAIFP assistance having a yield of 5.34 quintal of fish per acre. Whereas Raiganj block having the highest culturable and semi derelict water area (95.40% of total water area) got less importance than that of Kushmandi block in respect of target setting covering only 28.94% of culturable and semi derelict water area or 27.61% of the total water area in the target water area having a yield of 5.93 quintal of fish per acre. Similar is the pattern with respect to Islampur Sub-Division where Goal Pokhar II having 86.04% culturable and semi derelict water area was considered the thrust area in respect of target fixing covering 37.14% of culturable and semi derelict water area or 31.90% of the total water area in the target water area for WBAIFP assistance programme having yield of 5.02 quintal of fish per acre.

Whereas Islampur block having the highest culturable and semi derelict water area (88.33% of total water area), was considered the next thrust area in respect of target setting covering only 35.75% of culturable and semi derelict water area or 31.58% of total water area in the target water area with a yield of 50.09 quintal of fish per acre.

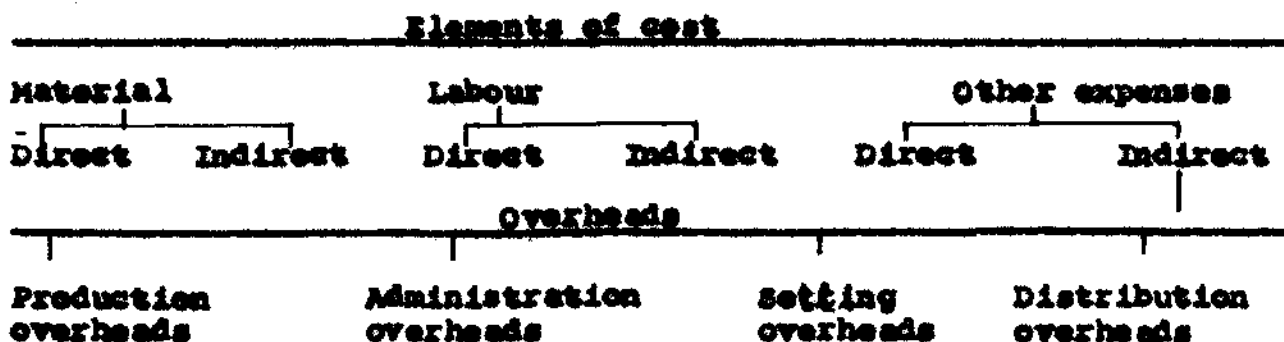
From the above it is clear that target setting activities were not always based on the factors like growth rate of fish production, water areas etc rather it was sometimes settled on some flimsy and arbitrary grounds and all the Sub-Divisions and blocks of the district of West Dinajpur have not been given proper weightage due to them for setting the target water areas. Moreover out of total culturable and semi derelict water areas in the district of West Dinajpur (29275.49 acre) WBAIFP considered only 35.10% water area for target setting in the period 1980-81 to 1987-88 and a big water area for target setting in the period 1980-81 to 1987-88 and a big water area 64.90% kept aside off the target setting for scientific pisciculture of WBAIFP in the district of West Dinajpur.

(Vide Annexure-XKIII)

Elements of cost and their classification

For proper control and managerial decisions management is to be provided with necessary data to analyse and classify costs. For this purpose, the total cost is analysed by elements of cost i.e., by the nature of expenses.

The elements of cost are three i.e., material, labour and other expenses. Each of three elements can be direct or indirect. The elements of cost are further analysed into different elements as illustrated in the following line chart.



In respect of fish production under WBAIFP of W.D. district the elements of cost are sub divided into material, labour and other expenses primarily and direct material (fry), direct labour, indirect expenses and indirect material or overheads secondarily. Overheads are classified into two categories like fixed overhead consisting of lease rent of water area, interest on Bank loan, portion of improvement cost charged and variable overhead consisting of lime, mohua oil cake, cowdung, manure (Superphosphate), feed used for the culture of fish.

(Vide Annexure - XX)

Types of culture:

There are, at the most four types of culture of fish such as water area taken by the farmers on long term lease and long term (10 years) loan taken; water area taken on short term lease and short term (1 year) loan taken; water area owned by the farmers and long term (10 years) loan taken; water area owned by the farmers and short term (1 year) loan taken. Two types of culture are present in each scheme of WBAIFP i.e., short term leased water area with short term loan and owned water area with short term loan for Scheme No. 1; and long term leased water area with long term loan and owned water area with long term loan for scheme No. 2, No. 3 and No. 4.

Of the schemes of WBAIFP adopted for fish culture in the district of West Dinajpur from 1980-81 to 1987-88 it was seen that scheme No. 4 was the most costly as it requires 83.32% of the total cost as improvement cost and the 'lowest cost scheme' was the scheme No. 1 where only 17.68% of the total cost was improvement cost (for unit water area of 1 hectare for each scheme). Full amount of improvement cost of scheme No. 1 is charged at the end of the year as the scheme is only for one year for intensive culture of fish. A portion of the improvement cost of Scheme No. 2, No. 3 and No. 4 is charged (as cost) at the end of the first year of culture, Input cost like direct materials

(fry), indirect material (Mohua Oil cake, lime, cowdung, feed, superphosphate) were the same in all four schemes in a particular year. The variable cost (marginal cost) in each type of culture of each scheme in a particular year was Rs. 6942.24 on average.

(Vide Annexure- XX)

The total cost (assuming no selling, distribution and administration expenses incurred) differs in each type and in each scheme only because of the difference in the amount of fixed overhead i.e. for lease rent, improvement cost charged in the total cost, interest on institutional loan.

It was also found that Type No. 1 of all the schemes of WBAIFP of fish culture was the costliest because of the amount of lease rent paid for the leased water area (Vide Annexure-XXI).

Expected Profit:

Computation of Expected Profit (E.P) is needed for the schemes of WBAIFP continued in the district of West Dinajpur from 1980-81 to 1987-88, to find out the amount of E.P., prospect of the scheme and for the selection of the best suitable scheme for the prospective ^{farmers} with their background like, leased water area, owned water area, long term loan and short term loan.

From the two types in each scheme (WBAIFP) of culture of fish it is observed from the Table 4,XX that the profitability in a particular year of culture for the schemes continued in that year, were the same as the profit volume ratios (PVR) were 80.51% in all types of the schemes (taking average sales proceeds for eight year (1980-81 to 1987-88) Rs. 1425 per quintal and variable costs were the same in each type of the schemes which continued in a particular year and Break even point (BEP) i.e. 'sales where no profit no loss condition achieved' in Type 2 of scheme No. 1 was Rs. 2454.18 for a base unit of water area 1 hectare, was the lowest among all the types of four schemes of

Table - 4. XX

Profit Volume Ratio, Break Even Point and Expected Profit (WBAIFP)

	Scheme No. 1		Scheme No. 2		Scheme No. 3		Scheme No. 4	
	Type 1	Type 2	Type 1	Type 2	Type 1	Type 2	Type 1	Type 2
FVR	80.51%	80.51%	80.51%	80.51%	80.51%	80.51%	80.51%	80.51%
BEP (Rs)	3323.64	2454.18	3391.13	2370.09	5627.49	5130.27	8234.15	7851.52
EP (Rs)	26006.90	26706.90	25952.56	26452.56	24152.38	24552.38	22061.50	22361.50
EP (Rs.)	21283.81	21983.67	24981.22	25481.22	22549.90	22949.90	19731.33	20031.33

Remaining after payment of loan instalment to Bank at the end of the 1st year of culture

Source: IFDA, Balurghat, M.D.

Presumptions: Unit water area 1 hectare; position at the end of 1st year of fish culture; average sales proceeds Rs. 1425 per quintal for 1980-81 to 1987-88; optimum production of fish per hectare 3500 kg.

Variable costs of all the schemes of WBAIFP were the same (i.e. Rs. 6942.24) on an average in a particular year; No administration, selling and distribution expenses incurred i.e., considering sales at site.

culture of fish introduced in the district of West Dinajpur from 1980-81 to 1987-88 and it indicates that Type 2 of scheme No. 1 gave big scope of making more profit (Rs. 26,706.90) than the other 'Types' of all the schemes; the reason of this was the minimum fixed overhead (i.e., for the absence of lease rent because of the owned water area and minimum interest on short term loan with a low rate of interest for the low 'scheme cost' of culture). Therefore if Type 2 of scheme No. 1 (intensive culture of fish) is introduced it will bring the farmers attractive profit considering it as a lucrative process.

Type 2 of scheme No. 2 will attract the farmers apparently with a considerable amount of profit (Rs. 25,481.22) after repayment of its first instalment of loan (long term) to the Bank at the end of first year of culture. In case of Type 2 of scheme No. 1 instalment of loan (short term) had been fully repaid at the end of first year of culture. Therefore Type 2 of scheme No. 1 was the best of all the types of four schemes in respect of making profit if the farmers have their own water area and takes short term loan from the Bank.

Questionnaire

Year 1987-88

Name of the farmer - Gopal Das

Caste-S.C.

Address: Khadimpur, Balurghat, Dist. West Dinajpur

Source of information of WBAIFP-PPDA, Balurghat, W.D.

To whom applied - D.F.O., Balurghat, W.D.

Amount of loan received (Short term 1 year)	Rs. 2,325
--	-----------

Subsidy	Rs. 2,325
---------	-----------

Water area	1 acre
------------	--------

Owned/Leased	Owned
--------------	-------

Difficulties in receiving loan: Cumbersome Office Procedures to have access to the benefits of the Policy offers to the farmer such as form filling, Co-ordinating etc.

Total cost yearly	Rs. 4,883
-------------------	-----------

Sales proceeds yearly	Rs. 10,548
-----------------------	------------

Volume of output (fish)	5.86 Quintal
-------------------------	--------------

Opinion regarding fishery as a profession - Good

Stock in the Pond - Nil

Economic benefit - Purchased 0.10 acre of new water area in 1989

Education of the children - Schooling of 3 sons and 1 daughter

Standard of living - Upgraded than earlier

Date of Interview 11.7.89, Balurghat.

From the sample questionnaire the elements of costs of fish culture are shown in the cost sheet placed below:

	Rs	Rs	Rs
Direct material	400		
Direct labour	<u>120</u>		
Prime cost			600
Overheads : <u>Fixed</u>			
Interest on bank loan @ 10% on Rs. 2325	233		
Improvement cost charged at the end of the year	<u>600</u>	833	
Overheads : <u>Variable</u>			
Indirect material e.g. Mahua oil cake, lime, cowdung, Superphosphate, feed		3450	4283
TOTAL COST			<u>4683</u>

sub-divided bar diagram on percentage basis
with reference to the sample questionnaire

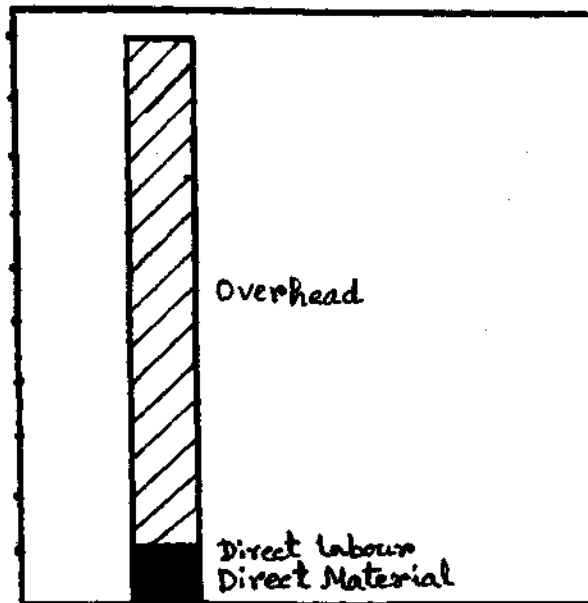


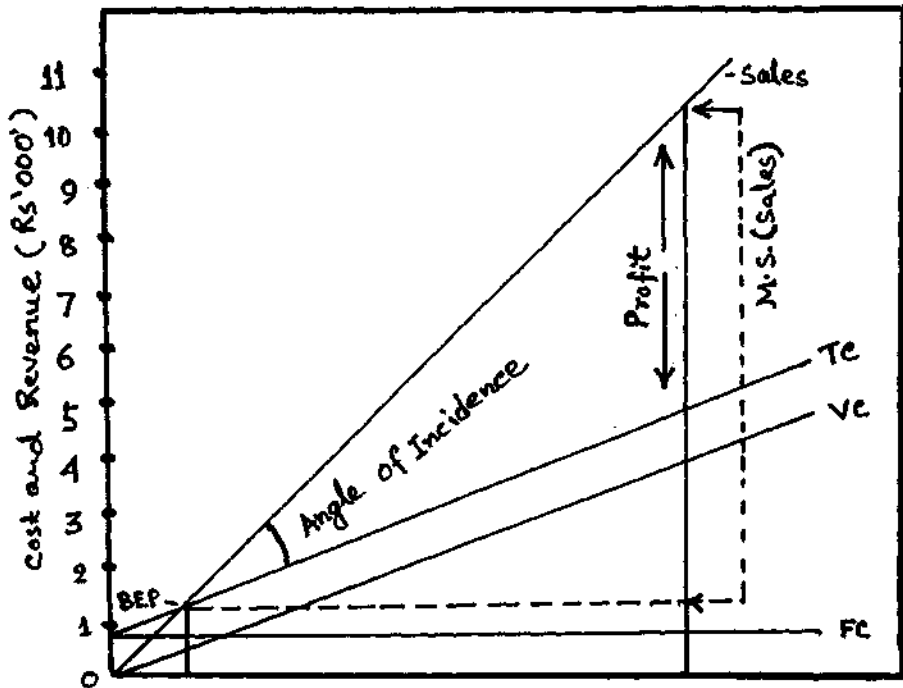
FIGURE - 4.1

<u>Elements of cost</u>	<u>% of total cost</u>	<u>Cumulative %</u>
Direct material	9.83	9.83
Direct labour	2.46	12.29
Overhead (F + V)	87.71	100

Table - 4.XXI
Statement of FVR, BEP and Profit

<u>Year</u>	<u>FVR</u>	<u>Sales at BEP</u>	<u>Profit</u>	<u>Profit remaining after repayment of instalment of loan to bank at the end of 1st years</u>
		<u>Rs</u>	<u>Rs</u>	<u>Rs</u>
1987-88	61.60%	1352.18	5665	3340
Fish produced		5.86 Quintal		
Sales proceeds		Rs. 10,548		
Fixed cost		Rs. 833		
Variable cost		Rs. 4,050		

Break Even Chart:



$$FC = \text{Rs. } 833$$

$$VC \text{ (at BEP)} = \text{Rs. } 519.18$$

$$\text{Sales} = \text{Rs. } 10,548; \text{BEP (Sales)} = \text{Rs. } 1,352.18$$

$$M.S. \text{ (Margin of safety)} = \text{Rs. } 10,548 - 1,352.18 = \text{Rs. } 9,195.82$$

$$\text{Profit} = \text{Rs. } 5665$$

From the Break Even chart it is observed that the sales at BEP where 'no profit no loss condition' is achieved is Rs. 1,352.18 and it is very minimum in comparison with the actual amount of sales Rs. 10,548 making a big margin of safety

Rs. 9195.82 prove this venture is operating well above the break even point FVR 61.60%, profit Rs. 5665 as shown in the Table 4.XXI, large angle of incidence and high margin of safety indicates here good profitability, safety, soundness of the venture and its favourable position.

Assumptions of B.E. analysis

1. FC remain constant at all levels of output
2. V.C. fluctuate in direct proportion to volume of output
3. Selling price do not change as volume changes.
4. Costs are segregated into fixed and variable components
5. There is only one product i.e., fish
6. There will be no change of operating efficiency
7. Productivity per worker will remain unchanged
8. There is synchronisation between production and sales i.e., whatever is produced is sold out.

Conclusion

With the intent to cover at least 35% water areas (culturable and semi derelict water areas) of the district of West Dinajpur under the WBAIFP during the eight years of the project i.e., 1980-81 to 1987-88 36.27% of the water areas (Culturable and semi derelict) of the district had been covered during 1980-81 to 1987-88 and 101.32% of the target water areas had been covered under this project during 1980-81 to 1987-88 and produced 31.60% of the total production of fish (culture and capture) of West Dinajpur district in 1987-88 indicates the importance of the project.

Table - 4.XXII

Achievement and Target Water Areas of WBAPZ

Year	Target		Achievement		Percentage of Achievement	
	Institutional	Non-Institutional	Institutional	Non-Institutional	against Target	against Target
	acre	acre	water area	total water area	Institutional achieved	Non-Institutional achieved
			Fish Culture	Fish Culture	water area	area against
			acre	acre	against Institutional Target	non-Institutional Target
1980-81	275	105	380	95	34.55	34.52
1981-82	425	200	625	148.425	34.92	36.15
1982-83	1000	250	1250	303.325	30.33	21.73
1983-84	1475	400	1875	1118.033	75.80	149.34
1984-85	1150	350	1500	1398.463	121.61	181.97
1985-86	975	275	1250	1669.585	171.24	124.73
1986-87	1012.5	257.5	1270	1415	139.75	184.95
1987-88	1725	400	2125	1675	97.10	144.89
TOTAL	8037.5	2237.5	10275	7822.831	97.33	124.98

Source: FFDA, Balurghat, W.D.

From the Table XXII it is disclosed that in the year 1980-81, 1981-82, 1982-83 the achievement of water area for culture of fish against the target water areas were poorer than the achievements in the other years. The year 1985-86 showed highest achievement of water area against the target water area fixed for the year in case of institutional sector (171.24%) and the year 1986-87 in case of non-institutional sector showed highest achievement against the target water area (184.95%) because the low cost schemes were accepted much by the farmers but the initial years like 1980-81, 1981-82, 1982-83 and 1983-84 (for institutional sector only) in both institutional and non-institutional sector the achievement against the target water areas was poor. Therefore the management was found inefficient to set the target water areas in different year considering the achievement of water areas in three Sub-Divisions and sixteen blocks of the district of west Dinajpur but the management was able to attain 97.33% of the target water areas fixed for institutional sector, 124.98% for non-institutional sector separately and 103.38% combinedly for the period 1980-81 to 1987-88.

The management was also found inefficient in respect of achieving volume of water area for culture of fish in the institutional sector in comparison with the volume of water area achieved in the non-institutional sector where the fish farmers achieved more water areas than in the institutional sector. The management could not convince the farmers to achieve more and more water area in spite of receiving maximum benefits of WBAIFP in the institutional sector.

Regeneration of the rural economy must necessarily depend upon an all-round development of agriculture and its allied activities, such as dairying, poultry farming, pisciculture etc. This is the common-sense view of the term 'rural development'

that has assumed a more specific implication. It is meant to refer to those programmes and schemes which make a direct attack on rural poverty, either by granting subsidy to the rural poor so that they can draw upon institutional finance to set-up viable projects or by allocating funds and foodgrains for rural works programmes. Viewed in this context Inland Fisheries Programmes (Including World Bank Assisted Inland Fisheries Project) can do a lot in the 'poverty amelioration programmes' such as IRDP, NREP, RLGP etc. The main objective of the MBAIFP is to extend scientific pisciculture among the owners of tanks, ponds and other water areas. On closer scrutiny it comes to light that the fishery development programmes confer many benefits on the target groups of rural development (small farmers, marginal farmers and agricultural labourer) both directly and indirectly.

Fishermen derived benefits of the programme directly from 'Fish Farmers Development Agency (FFDA) during the period of 1980-81 to 1987-88 under the 'World Bank Assisted Inland Fisheries Project'. A vast amount of money have been invested in this field and subsidies are given from FFDA and other rural development departments as dovetailing services for the target groups.

Indirectly intensive and scientific pisciculture in the inland water areas has expanded the employment opportunities and augmented the income of not only the fish pond owners but also of the fishermen who work in them and most of the later groups belong to the scheduled castes and scheduled tribes and were living below the poverty line.

The district of West Dinajpur is mainly a rural area having a total area of 5,340 sq. km of which 5,297.40 sq. Km are rural area with a total population of 24,04,947 out of which 21,36,221 are rural people⁽²⁾. The district of West Dinajpur is full of dighis, ponds and other water areas. But till 1980 most

of the water areas were derelict and semi derelict due to years of neglect. It is then that the World Bank Assisted Inland Fisheries Project was put into operation. The launching of WBAIFP in the district in 1980-81 was synchronised with the kaleidoscopic changes in the Fisheries arena. Pisciculture, apart from being recognised as an important economic activity, has streamlined the major constraints of carp farming in the district and has given a fillip to take pisciculture as a gainful avocation in the rural areas of West Dinajpur district.

The key to this success can be attributed mainly to the massive training programme at the grass root level launched by the Fisheries Department with smooth flow of the fundamental input, the huge finance from the financing institution, technological innovation, decentralisation policy and tying up of the schemes with IRDP, SCP, TSP, DRDA has evoked much response from the small and marginal farmers as well as general farmers because of the lucrative subsidy element and other benefits of the dovetailed scheme. It has also enrooted the scheme in the alleviation of rural poverty which is a primary constraint of the district of West Dinajpur.

In contributing towards the economic development of the district through pisciculture it is observed from the Table 4.XXIII that 55.03% of total tank water area of the district had been covered through different governmental schemes and the schemes of the WBAIFP and others from 1951 to 1988. It is also observed that 30.42% water area had been covered by the WBAIFP, besides these 22393 acre river, khari, beels are now extensively used for capture fishery mainly. About 12% of the total working population of the district are directly and indirectly involved with the fishery profession⁽³⁾. In total 19440 farmers got loan facilities since 1951 upto 1988 out of which 7678 farmers are under the WBAIFP from 1980 to 1988 and 5881 farmers who belong to scheduled castes and scheduled tribes took pisciculture as a profession for their livelihood who are mainly poor, small and

Table - 4.XXIII
Progress of Fisheries in the district of W.D.

Schemes	% of cultured water area against total water area	No. of farmers got loan facilities	No. of poor SC, ST farmers took pisciculture as profession	No. of farmers got training	No. of farmers got fry fertilizers, minikit	No. of farmers got assistance for purchasing nets, fishing implements	No. of fishermen/farmers got rehabilitation facilities	No. of farmers got rearing facilities	Production of fish in total (quintal) from 1980-81 to 1987-88
	1951-88	1951-88	1980-88	1951-88	1951-88	1951-88	1951-88	1951-88	
Govt. Schemes, WBAIFP Schemes and others	85.03	19440	9542	7925	6185	4502	87	455	11,06,897.70
WBAIFP 1980-81 to 1987-88	30.42	7678	5881	3682	1675	533	87	192	1,81,414.96

Source: D.F.O., Balurghat, W.D.

marginal farmers. Out of total production of fish 1106897.76 quintal for the period 1980-88, 1,81,414.96 quintal (i.e., 16.39%) production comes from WBAIFP, reducing the deficit in fish production against the requirement from 1,62,793.70 quintal in 1980-81 to 1,09,143.58 quintal in 1987-88.

Out of total 6185 poor farmers living below the poverty line who got fry, fertilisers, seeds free of cost, 1675 farmers of WBAIFP got benefit of this programme which could gear up the pisciculture activities in the district.

Out of total 7925 trained farmers in the district 3682 farmers got training for WBAIFP which helped them to take pisciculture as a gainful profession. The number of farmers who got financial assistance for purchasing and repairing nets, fishing implements etc was in total 4502 out of which 533 farmers were from the WBAIFP which assists the pisciculture to contribute towards the economic development of the district.

Out of the total number of farmers (455) who got the rearing facilities in the district, 192 farmers were from the WBAIFP, assuring the pisciculture in the district to supply fish seed in the near future.

By covering 20.76% through Co-operative and Fish Production Group (FPG) sector of total cultured water area under WBAIFP it proves there is big scope of improving economy of the district by pisciculture through Co-operative and FPG with the assurance of protection from the 'exploitation of the farmers' of various types.

In case of repayment of Bank loan taken for the fish culture (for the schemes of WBAIFP) in the district a few samples are taken from different nationalised branches of banks from which

the position of repayment of loan considered upto 1987-88 against the amount of loan (long term and short term) disbursed from 1980-81 to 1986-87 could be observed.

Table - 4.XXIV

Repayment of loan by the Farmers for 1980-81 to 1987-88

Long and short term loan	Short term loan	Long term loan
38.75%	89.62%	18.90%

Source: Sample Survey

From the Table 4.XXIV it is observed that 38.75% loan (short term and long term) had been repaid by the farmers (where long term loans were given for 10 years and the farmers will get time of 10 years to repay their long term loan) for the period 1980-81 to 1987-88. It is also observed that 89.62% of the short term loan had been repaid by the farmers but only 18.90% of the long term loan had been repaid by the farmers within the period 1980-81 to 1987-88, the reason being that the time for repayment of long term loans (10 years) had not been yet over and there was enough time to repay by the fish farmers remained due.

(Vide Annexure - XXII)

However, in total 55.03% of total water area (out of which 30.42% achieved through WBAIFP) means a significant progress which helped to increase production of fish and to solve the mass rural unemployment problem in the district of W.D. Fishery Programmes are not content with the activities for augmenting fish production alone, the programmes are particularly careful about upliftment of the poor fishermen. Of late fisheries programmes have started their work for rural employment as well as for meeting the protein need of this district.

Inland pisciculture in West Dinajpur district is now facing 'constraints' for the following reasons. Some of them are summarised as follows:

Productive areas gone in dereliction:

The district of West Dinajpur has 34,910.43 acres⁽⁴⁾ inland waters comprising mainly of small, medium and large size tanks and beels out of which culturable water area are only 23,907.28 acres⁽⁵⁾ i.e., 68.48% of total inland waters, the semi derelict water area are 5368.21⁽⁶⁾ acres i.e., 15.38% of the total inland waters and the derelict water area are 5634.94⁽⁷⁾ acres i.e. 16.14% of total inland waters.

From the above it is clear that 31.52% of the total inland water area are either semi-derelict or derelict which are mostly unfit for easy culture of fish necessitating thereby a large capital outlay which in certain cases is not likely to commensurate with the ultimate return.

Siltation of connecting links:

The beels and baors being in most cases old beds of defunct river courses, had their natural or artificial connecting links with the nearby perennial rivers or canals, facilitating thereby easy periodical flushing, highly essential for removal of accumulated bottom silt and debris and for ingress of spawm, fry or fish from natural sources. But due to years' negligence such links have been badly silted up converting the water areas into derelict and closed swamps, infested with dense aquatic weeds.

Pollution of Inland waters:

Injudicious use of toxic insecticides and pesticides on agricultural lands has considerably added to inland water pollutions of this district causing mortality in fish population.

Co-sharership retarded progress

In the inland sector, co-sharership complications have stood as a stumbling block in making headway towards development in the district. Out of a total inland water area of 34910.43 acre, 29,990.67⁽⁸⁾ acre are under private ownership and only 4919.76⁽⁹⁾ acre are under Government ownership and out of total 58,108 units⁽¹⁰⁾, 53,177 Units⁽¹¹⁾ were under private ownership and 4931 units⁽¹²⁾ were under Government ownership.

Major portion of Inland waters in the district is still under private ownership and their development and exploitation are to a large extent depend on the owners' sweet will.

Preference to Agriculture:

Water logged areas have been reclaimed mainly for paddy cultivation which could have otherwise been used for increasing internal fish production.

There are 15,24,490 acre⁽¹³⁾ gross cropped area and 989960 acre⁽¹⁴⁾ net cropped area in the district whereas only 34,910.43 acre water area exists in the district in 1985-86 which shows more importance is given to the agriculture than the exploitation of fish from the water resources.

Industrial water destroying aquatic life:

There are thirty registered factories⁽¹⁵⁾ and 3653 cottage and small scale industries in the district⁽¹⁶⁾. With the

growth of industries under different plan activities, more and more industrial wastes are now being thrown into flowing rivers destroying thereby the aquatic life including fish population by their toxic hazards. The rivers like Atrayee, the Kulik, the Chiramatī, the Punarbhaba, the Yamuna have been severely affected by such pollution.

Poaching, deliberate poisonings:

Poaching and deliberate poisoning are considered the major inhibiting factors in the district of West Dinajpur. poaching or deliberate poisoning due to rivalry, enmity or jealousy is widespread. There are also instances that villagers sometimes do not care to understand the proprietary rights or ownership of a pond where they have free access for different purposes. This leads to temptation for poaching where the water units have a good stock of fish.

Economic handicap of the Fishing Community:

Fish production is inextricably connected with the fishing community of a place. The production of fish of a place can be said to be directly proportionate to the efficiency of fishing community there. The more the efficiency, the more is the production. The more the incentive in the forms of cash, equipments and other amenities, the greater is the output.

A total of 13710 farmers ⁽¹⁷⁾ got direct benefit for the culture of fish in different schemes from 1980-81 to 1987-88 out of which 9542 belong to scheduled caste and scheduled tribes (7678) farmers got benefit under WBAIFP of which 5981 farmers belong to SC and ST) ⁽¹⁸⁾ who are mainly either small or marginal farmers and were haunted by the spectre of poverty, illiteracy, superstition and all the vices of an undeveloped society under the yoke of caste supremacy.

Fish cultivators are in the business of making a living rather than trying to maximise fish production, regardless of cost. Being poor the small fish farmers tend to be risk adverse. Their predominant goal is economic survival. They do not accept lower risk against higher profit or the disutility of increasing risk.

Monopolistic control of Fish Trade:

Production of any essential food commodity like fish must be followed by proper system of distribution for making the production available to the consuming public at fair and reasonable prices. But fish trade in West Dinajpur district is at present entirely under the control of a handful of vested interests who manipulate the supplies and price structure both to their best advantage. Fishermen as fisheryless labours do the business mainly as hireling both in the capture and culture fisheries. They have no say in the matters of production, supplies and price structure of their produce and their naked poverty have subjected them to a vicious circle.

Influx of refugee fishermen:

Thousands of fishermen have come over to West Bengal leaving their hearth and home due to partition and subsequent rioting and religious fanaticism perpetrated in East Bengal where the fisheries are extensive and potential, resulting in the over crowding in the trade and a heavy pressure on the fisheries in the State of West Bengal. The West Dinajpur district is not an exception to this type of adverse condition. Hundreds of fishermen have been compelled to abandon their age-old profession and take to agriculture as landless labourer throwing out their skill and ingenuity, craftsmanship and acumen in fishing profession, acquired through generations. This is a colossal wastage of national talents that warrants the national prosperity in the sphere of food production.

Difficulties in operational pattern of financial disbursement:

The present operational pattern of linking of subsidy with the loan has resulted in unscrupulous elements taking advantage of the subsidy rather than the real purpose of improving the productivity. Money borrowed for fish farming has been diverted to other purposes sometimes. Cases of pocketing subsidy by the persons with vested interest are not infrequent. It is also observed that the present system of issuing the delivery orders to the authorised agents for the supply of necessary inputs to the beneficiaries some times leads to improper practices like false reporting with regard to fish feed use, fertilisers application etc. which is an instance of corruption however the cumbersome loaning procedure causes delays and difficulties in sanction of loan. A large proportion of the rural client in general being illiterate, the requirements of complex form filling and documentation have itself limited their access to the bank facilities.

Target Orientation:

Fishery programmes in the district of West Dinajpur which have yielded good results apparently in many respects are target oriented. Being target oriented and in the race to reach the target, benefits are passed on to the ineligible. A big portion of the staff of the development administration are obsessed with the idea of target achievement and are overburdened with too much paper work. Sometimes, banks are found reactive instead of proactive.

Lack of Co-ordination among the organisations:

There has been a proliferation of organisations dealing with development activities like FFDA, DRDA, TSP, SCP etc at the grass root level. This sometimes creates the problem of

Co-ordination in the district because they emerge as parallel ladders, each operating in its own style and jurisdiction. Rural poor are made to go from pillar to post to have access to the benefits that adopted policy offers to them and the development agencies sometimes operate at cross-purposes neutralising the development efforts.

Untrained Farmers:

In the district of West Dinajpur the number of farmers getting financial benefits under different schemes of pisciculture is much higher than the number of farmers getting training. There are only 5008 trained farmers⁽¹⁹⁾. Out of total 13710 farmers who get financial benefit under different schemes from 1980-81 to 1987-88. This type of feature will create problem to achieve optimal utilisation of both financial and human resources. This fact is also disclosed in the WBAIFP where 3682 farmers get training out of total 7678 who got financial benefits of WBAIFP⁽²⁰⁾.

Weak Fishery Co-operatives:

Co-operative societies are handicapped by socio-economic limitations in the district of West Dinajpur. In fact no care has been taken to help improve the working of the co-operatives. Most of the members of fishery co-operatives are illiterate and they have lack of management ability. As a result non-fishermen enter the society as sympathiser members and control the working of the societies. Sometimes these persons exploit the societies and the members for their own interest.

The fishery co-operatives produce fish. But most of the societies do not get proper price in absence of proper marketing and processing arrangements. There is hardly a society in the

district which is in a position to work independent of the middlemen^{exploiters. They are being compelled by the middlemen.} to sell their produce in advance at a very low price in exchange of the supply of their domestic and production requirements and other credit accommodation which they need. They buy dear and sell cheap. Persons at the helm of affairs have persistently thought of improving the lot of fishermen and to eliminate the middlemen's exploitation through formation of co-operatives without attaching due importance to the handicaps and limitations properly. Co-operation makes very little effective appeal to the poor because they are too weak to successfully evoke any measure of self-help.

The main organisation work in production, storage, transport, marketing and distribution with which the co-operatives are mainly concerned is still in a nebulous state in this district.

There is a deficit in supply of fish amounting to 1,09,143.58 quintals in 1987-88 considering the figure of requirement calculated on the basis of 1981 Census in spite of 118.4% increase in production from 1980-81⁽²¹⁾. The resources remain less distributed by flood, siltation, construction of roads, bridges, railway tracks, homesteads etc. at a time when the density of population is much more than at present shown in 1981 Census, and are incapable in supplying the demand for fish with the limitations for their development.

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8. I p. 21.
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15. I Planning Committee, Balurghat, W.D.
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17. I
17. I
18. I 'Report on IFP Coverage-FFDA, Balurghat, W.D., 1988
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CHAPTER - 5

A STUDY OF DEMAND AND SUPPLY CONSTRAINTS:

- 1. DEMAND, SUPPLY AND DEFICIT OF FISH; THEIR
RELATIONSHIP WITH PRICE, INCOME AND SAVINGS.**
- 11. PRICE AND ELASTICITY OF DEMAND FOR FISH.**
- 111. SUPPLY RESPONSE OF PRICE, SUPPLY ELASTICITY.**

5.1. DEMAND, SUPPLY AND DEFICIT OF FISH; THEIR RELATIONSHIP WITH PRICE, INCOME AND SAVINGS:

The study of demand and supply is to examine whether demand is a prime factor to the production and cultivation of fish or it is the supply, whether the market is a sellers' market or it is a buyers' one, how market behave in case of any gap existed between demand and supply of fish, whether fish cultivation is in need of any protection, whether there is need for market promotion of fish.

The above elements are discussed in details in the following paragraphs. For a meaningful and systematic study the following hypotheses have been considered -

- i) Demand is not a constraint to the production of fish.
- ii) No need for market promotion.
- iii) Market is neither for sellers nor for buyers.
- iv) Needs supply regulation.

The above hypotheses may be tested whether they may be either accepted or rejected.

For analysing the position of demand, supply and deficit in supply of fish in the district of West Dinajpur this study considers the population of the district (as in 1981 census) and considers the proportionate growth of population in the nine years i.e., from 1980-81 to 1988-89 also considering the fact that 20% of the population in the district are vegetarian⁽¹⁾.

The Table 5.I shows the total demand (including potential demand) for fish of the 'fish consuming population', supply and the deficit in supply of fish in the district of West Dinajpur for the period 1980-81 to 1988-89.

Table - 5.I

Demand, supply and Deficit of fish

Year	Total demand (Quintals)	Total supply (Quintals)	Deficit (Quintals)	% of increase or decrease of deficit
1980-81	2,51,760	88,966.30	1,62,793.70	
1981-82	2,59,225	95,450.44	1,63,774.56	(+) 0.60
1982-83	2,66,604	1,07,802.86	1,58,801.14	(-) 3.04
1983-84	2,73,893	1,35,560.80	1,38,422.20	(-)12.83
1984-85	2,81,362	1,47,691.94	1,33,670.06	(-) 3.43
1985-86	2,88,742	1,67,346.00	1,21,396.00	(-) 9.18
1986-87	2,96,121	1,69,723.00	1,26,398.00	(+) 4.12
1987-88	3,03,500	1,94,356.42	1,09,143.58	(-)13.65
1988-89	3,12,900	2,27,485.00	85,415	(-)21.74

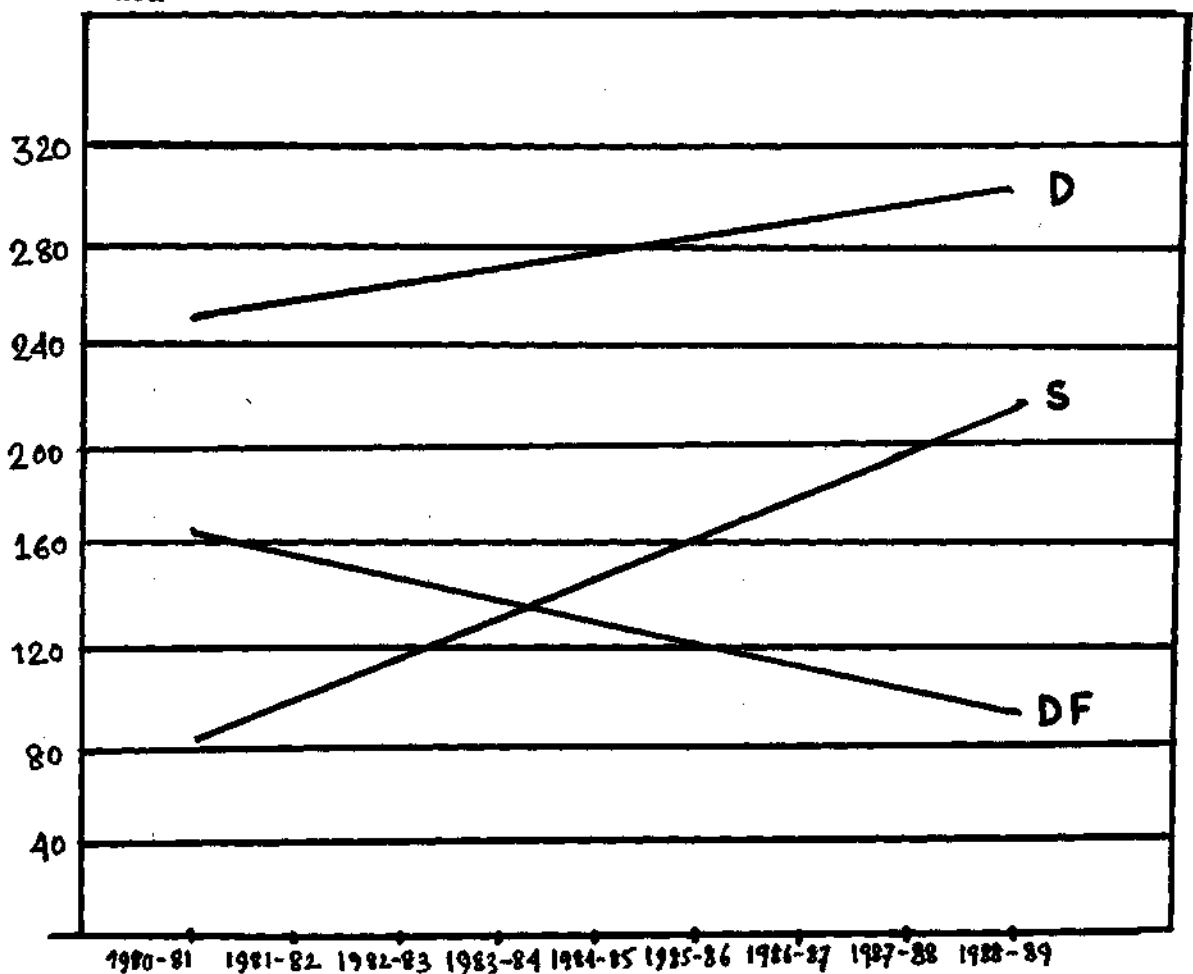
Source: FFDA, Balurghat, W.D.

From the Table 5.1 it is observed that in 1981-82 and 1986-87 only the deficit increased and in the other years the deficit decreased with the corresponding increase in demand and supply of fish. The rate of increase in demand and supply were different; causing different patterns (increase or decrease) of the deficit. Deficit increased in 1981-82 and 1986-87 only, where the rate of increase in demand for fish was more than the rate of increase in supply of fish.

Graph 5.1

Demand, Supply and Deficit Trend of fish

Thousand



D- Demand , S- Supply, DF - Deficit

Graph 5.1 shows the demand, supply and deficit trend ($Y = A + BT$) of fish for the period 1980-81 to 1988-89 made by the least square method of time series; where it is found that the annual average rate of growth (8000 Qtl) of demand was less than the annual average rate of growth (17000 Qtl) of supply of fish in the district of W.D. resulting in a negative growth trend (-9000 Qtl) of the deficit.

Again by considering growth of population and supply of fish, the annual per capita availability of fish of the district in 1987-88 (the last year of the proposed study) was 7.77 kg and the annual per capita demand for fish was 12.14 kg. which indicate that 64% of the per capita supply of fish was available against the per capita demand in 1987-88 leaving a deficit of 36% (2).

From the above analysis it is found that the total supply of fish did not match with the total demand for fish of the increased population in the district.

This analysis has been made after considering the following assumptions:

- i) Being perishable in nature the total production of fish in the district had been supplied in the market for sell.
- ii) Majority of the fish eating population of the district were financially able to take off the fish for their consumption at various prices settled in the market.
- iii) The total demand for fish is made of actual and potential demand both combinedly.

Table 5.IIDemand, Supply and Price relationship

Year	Total Demand (Quintal)	Total supply (Quintal)	Price per (Quintal) Rs.
1980-81	2,51,760	88,966.30	1,000
1981-82	2,59,225	95,450.44	1,200
1982-83	2,66,604	1,07,802.86	1,200
1983-84	2,73,893	1,35,560.80	1,400
1984-85	2,81,362	1,47,691.94	1,400
1985-86	2,88,742	1,67,346.00	1,600
1986-87	2,96,121	1,69,723.00	1,800
1987-88	3,03,500	1,94,356.42	1,800

Source: PFDA, Balurghat, W.D.

It is observed from the Table 5.II that even if the annual average rate of increase in the supply of fish was more than the rate of increase in the demand for fish of the people of the district of W.D., the prices of two successive years in three cases (i.e., 1981-82 and 1982-83; 1983-84 and 1984-85; 1986-87 and 1987-88) were the same.

It was because of this reason that a portion of the fish had gone out of the district for marketing to be sold at a higher price, the presence of 'middlemen' in the distribution channel of marketing and the rate of increase in fish eating population, where a major portion of fish had gone out of the district for marketing along with the steady growth of population and for the presence of middlemen and wholesalers.

ring, the price of fish is found to have increased (i.e. in 1981-82, 1983-84, 1985-86 and 1986-87) in spite of 118% increase in supply of fish during the period 1980-81 to 1987-88; assuming the price of fish settled on an average of sales at site.

Demand forecasting and demand function:

Keeping in view for planning of cultivation and catching of fish the following regression equation is worked out by the least square method of time series for forecasting and estimating the future demand of fish for a particular year in W.D. district -

$$y = 2,82,000 + 8000 T \text{ (Figures shown in Quintals and } T \text{ stands for period or year)}$$

From the Table 5, II the estimated demand parameter can be calculated with the help of the following normal equations:

$$(a) \sum y = b \sum x + na$$

$$(b) \sum xy = b \sum x^2 + a \sum x$$

Substituting the figures of total demand (y) and Price (x) of fish (as is shown in Table 5, II) and by solving the above normal equations the values of the parameters 'a' and 'b' are found.

Therefore the Demand function will be $y = a + bx$

$$y = 1,91,000 + 61 x \text{ (where, } y = \text{Quantity of demand and } x = \text{price)}$$

The following assumptions have been made in the calculation of parameters:

- (1) Parameters are constant.
- (2) The errors are randomly and independently distributed.

A demand function states the dependence relationship between the demand for a commodity (fish) or service and the factors or variables affecting it. Thus the demand function for commodity x can, symbolically, be stated as follows:

$$D_x = f(I, P_x, P_s, P_c, T, u)$$

Where, D_x = demand for x

I = consumers' income

P_x = price of x

P_s = prices of substitutes of x

P_c = prices of complements of x
(P_s and P_c are vectors)

T = measures of consumers' tastes and preferences

u = "other" determinants of demand for x

f = unspecified function, to be read as
"function of" or "depends on".

In the above demand function demand determinants such as population and its distribution, and consumers' expectations are included in variable ' u ', for their individual effect on demand may be insignificant. Advertisement is included in T , for it affects demand through consumers' tastes and preference.

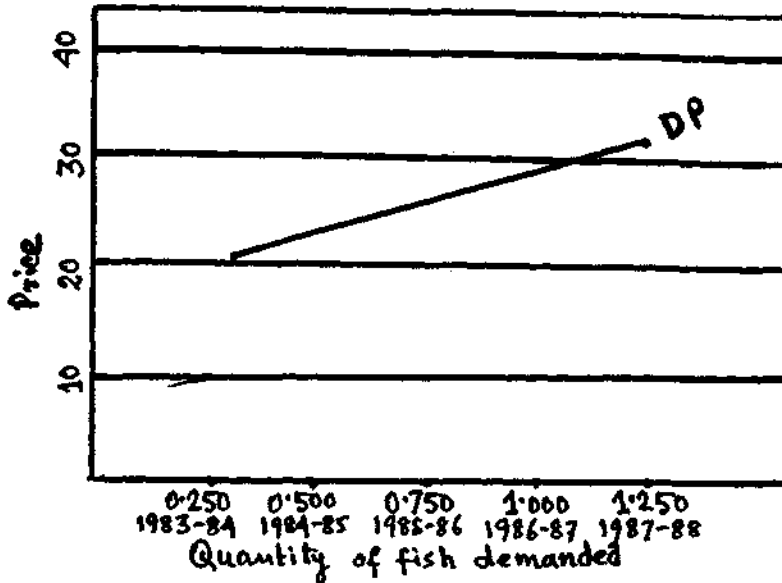
Table 5.III**Average Demand and Price relationship**

Year	Average price per kg. of fish Rs.	Average purchase per day Kg.
1983-84	20	0.500
1984-85	24	0.500
1985-86	26	0.700
1986-87	30	1.000
1987-88	32	1.200

Source : Field Survey (20 families)

From the Table 5.III it is observed that the actual demand increased continuously in spite of rise in price of fish in the district.

If the statistical data relating to the price and demand of fish are plotted on a graph by means of a linear trend ($y = A + Bx$) through the least square method of time series the demand-price linear relationship shows an upward trend; which shifted to the right like the graph 5.2 .

Graph 5.2Demand-Price linear relationship

The families (under survey) got their economic condition uplifted from what it was earlier. They took loan and other assistance from different departments of the Government and financial institutions to cultivate their land and a few members engaged themselves in weaving and handloom activities since 1984-85 and raised their demand for fish with their increased income even if the prices of fish increased. The reason for increase in demand in spite of rise in price of fish was also caused by hoarding and manipulative stocking, increased number of middlemen in the marketing-distribution channel and fish going out of the local market. These created crisis for fish and excess demand for fish in the markets of the district of W.D, sometimes. On the other side the rise in price of fish was due to excess demand and increased cost of modern fishery schemes. That is price rise was caused by the demand pull and cost push elements.



The demand for fish also depended upon the income of the people. The greater the income of the people, the greater would be their demand for fish. When as a result of the rise in the income, the demand increased, the whole of the demand curve shifted upward. The greater income means the greater purchasing power and the people can afford to buy more. It is because of this reason that the increase in income had a positive effect on the demand for fish.

During the planning period the income of the people of the rural area like the district of W.D. has increased owing to the large investment expenditure on the development schemes by the Government and the Private Sector. The income-demand curve (D_x) or Engel curve for fish will be like as shown below.

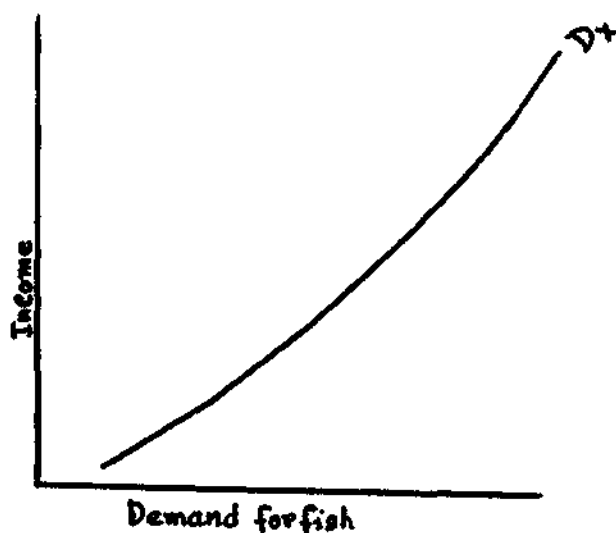


Table 5.IVAverage Income and Savings relationship

Year	Average Income P. a. K.	Average Savings P. a. K.	% of savings against income
1984-85	12,000	1,000	8.33
1985-86	16,000	1,200	7.50
1986-87	18,000	1,250	6.94
1987-88	20,000	1,300	6.50

Source : Field Survey (of 20 families)

From the Table 5.IV it is also observed that the propensity of the people (under survey) for saving money was decreasing every year and they were able to spend more of their income on the food stuff like fish with the result that the demand for fish increased.

The changes in prices of factors or resources of the recent fishery schemes also cause a change in cost of production and consequently bring about a change in supply. Sometimes with a higher unit cost of production, less were supplied than before at various given prices and the supply curve shifted to the left. But with the adoption of new technology through the "World Bank Assisted Inland Fisheries Project" there occurs an improvement in production and the unit cost of production of fish in the district came down and the supply of fish increased at various given prices. But since it is subjected to diminishing returns which is generally the rule, the supply curve shifted ultimately to the right.

In practice the demand for fish in the district of West Dinajpur is closely related with the factors like income of the people, changes in propensity of the consumer to consume and save, tastes and preference of the consumers and the number of consumers in the market.

It is also seen that the supply of fish is short in comparison with the minimum requirement of fish in the district due to the following constraints:

1. Lack of technological know how of the farmers and fishermen.
2. Poverty, illiteracy of the farmers and fishermen.
3. Lack of capital for improved technology
4. Lack of research and development activities in the fisheries sector.

5.II PRICE AND ELASTICITY OF DEMAND FOR FISH:

A change in price of fish is always followed by a change in the quantity demanded. For a small change of price, the change of demand may be small or large according to perishable nature of the fish and the consumption pattern of the demanders. The rate at which the demand changes in response to change of price of fish is called the elasticity of demand for fish. The greater the responsiveness of quantity of fish demanded to the changes in its price, the greater its elasticity of demand.

The concept of elasticity of demand plays a crucial role in the pricing decisions of the fish seller. This is because change in price of fish will bring about a change in the quantity demanded depending upon the co-efficient of

elasticity. This change in quantity demanded as a result of changes in price will affect the total consumers expenditure and will therefore affect the earning of the fish seller.

In order to understand this, it is necessary to explain the relationship between marginal revenue and price elasticity of demand. Let TR denote total revenue, MR the marginal revenue, P the price, X the quantity of fish demanded and e the price elasticity of demand for fish. Then-

$$TR = PX$$

$$\begin{aligned} MR &= P + X \frac{dP}{dX} \\ &= P \left(1 + \frac{X}{P} \frac{dP}{dX} \right) \end{aligned}$$

$$\text{or} \quad MR = P \left(1 + \frac{1}{e} \right)$$

The equation indicates that

$$(a) \text{ if } e = -1, MR = 0$$

$$(b) \text{ if } e > 1, MR > 0$$

$$(c) \text{ if } e < 1, MR < 0$$

[NB: It should be remembered that price elasticity of demand (e) is negative while price (P) is non-negative].

Therefore, for fixing an optimum or profit maximising price, the fish seller cannot ignore the elasticity of demand for fish. The sellers often fail to take elasticity into account while taking decisions regarding prices. The main reason for this is that they don't have the means to calculate elasticity for fish, since sufficient data regarding past prices and quantity demanded of those prices are seldom available to them. Even if such data are available there are difficulties of interpretation of it because it is not easy

to isolate the price effect on the quantity demanded from the effects of other factors determining the demand.

The concept of elasticity of demand for fish refers to the degree of responsiveness of quantity demanded of fish to a change in its price and income of the consumers mainly.

The price elasticity of demand for fish and the total outlay (expenditure) made on the fish are greatly related of each other. Considering the changes in the total outlay or expenditure made on the fish as a result of changes in its price, the price elasticity of demand for fish can be found.

Table 5.V

Price, Demand, Total outlay and Elasticity relationship

Year	Price per kg. Rs.	Fish purchased (kg)	Total outlay Rs.
1980-81	12	0.250	3
1981-82	15	0.300	4.50
1982-83	18	0.400	7.20
1983-84	22	0.400	8.80
1984-85	24	0.500	12.00
1985-86	26	0.700	18.20
1986-87	30	1.000	30.00
1987-88	32	1.200	38.40

Source: Field Survey (of 20 families)

It is observed from the Table 5.V that with the rise in price of fish in different years of the district of W.D. the quantity of fish purchased also increased resulting in a corresponding increase in the total outlay. Therefore the demand for fish was inelastic and the demand curve shifted upward to the right. That is, the price elasticity of demand for fish was less than unity ($e_d < 1$). This indicates an extraordinary attraction for fish as one of the main food stuff of the people of the district of W.D.

Demand tends to be inelastic also because of the want of substitution of fish and the consumers preferred to purchase more fish with their additional income which they earned during the period 1980-81 to 1987-88 in spite of rise in price of fish.

(Assumptions : The figures of prices and purchase of fish were obtained from ten selected retail markets on an average).

In the short period a different picture was observed sometimes, where with the fall in price of fish the total outlay decreased. The quantity demanded increased very little with a considerable fall in price of fish which ultimately reduced the total outlay.

Most consumers were sticky in their consumption habits for a short period.

Hence the demand for fish was inelastic (i.e., $e_d < 1$) as is shown in Table 5.VI.

Table - 5.VI**Price, Demand, Total outlay and Elasticity relationship**

Month	Average price per kg. (Rs.)		Average purchase kg		Total outlay Rs.	
	1986	1987	1986	1987	1986	1987
January	32	35	1	1	32	35
March	25	28	1,200	1,10	30	30.80

Elasticity (e_d) 1986 - Inelastic $e < 1$

Elasticity (e_d) 1987 - Inelastic $e < 1$

Source: Field Survey (of 20 families)

Income elasticity of demand refers to the sensitiveness of quantity demanded to the change in income.

Table 5.VII**Income, Demand and Elasticity relationship**

Year	Average Income per day	Average purchase per day
	Rs.	Kg
1986	50	0.500
1987	58	0.600

Elasticity (e_y) - Elastic $e > 1$

Source: Field Survey (of 20 families)

Foot Note: The above type of seasonal variation in price, income and quantity of fish demanded (shown in Table 5.VI and 5.VII) is almost a regular phenomena in every year.

From the Table 5.VII it is observed that proportionate change in quantity of fish demanded was more than the proportionate change in income. The maximum number of the consumers spent more on the fish than they did in earlier period from their additional income. Hence, the income elasticity of demand was greater than unity (i.e., $e_y > 1$).

From the above discussion it is seen that in the long period of fish market in the district of West Dinajpur the price of fish and the demand for fish increased simultaneously. The proportionate increase in quantity of fish demanded was more than the proportionate change (i.e., rise) in the price. As a result of which the total outlay increased. Therefore the demand for fish was inelastic.

On the other side in the short period, a different picture was found as fish production in a particular period (as in January) of a year was poor causing a higher price. From the period of increase in price of fish upto the period when price fallen (say in March) the demand was inelastic. The reason was that the customers did not like to increase much their consumption of fish with the fall in price of fish and total outlay reduced. Therefore the demand was inelastic. On the other side i.e., from the period when price of fish had fallen and upto the period when price increased, the demand for fish generally disclosed inelastic because the proportionate rise in price of fish was more than the proportionate change (i.e., fall) in the quantity demanded. As a result total outlay also increased. Price rise did not prompt the consumers much to purchase a considerably lesser quantity of fish.

It is also found that in case income of the people increased they did like to purchase fish proportionately more than the proportionate change in income. Therefore the demand was elastic.

5. III SUPPLY RESPONSE OF PRICE, SUPPLY ELASTICITY:

Supply of fish refers to a schedule of quantity of fish that are offered for sale at different prices. It depicts sellers' quantity reactions to various prices. Supply of fish is functionally related to its price. The law of supply relates to this functional relationship between price of fish and its supply. The quantity supplied generally varies directly with price. That is the higher the price, the greater the incentive for the producers to produce and supply fish in the market.

To produce more fish the producers have to mobilise more resources to its production. When production of fish is expanded by using more resources, diminishing returns occur. Due to diminishing returns average and marginal cost of production increase. This implies that a greater quantity of fish would be produced and supplied in the market only at a higher price so as to cover higher cost of production.

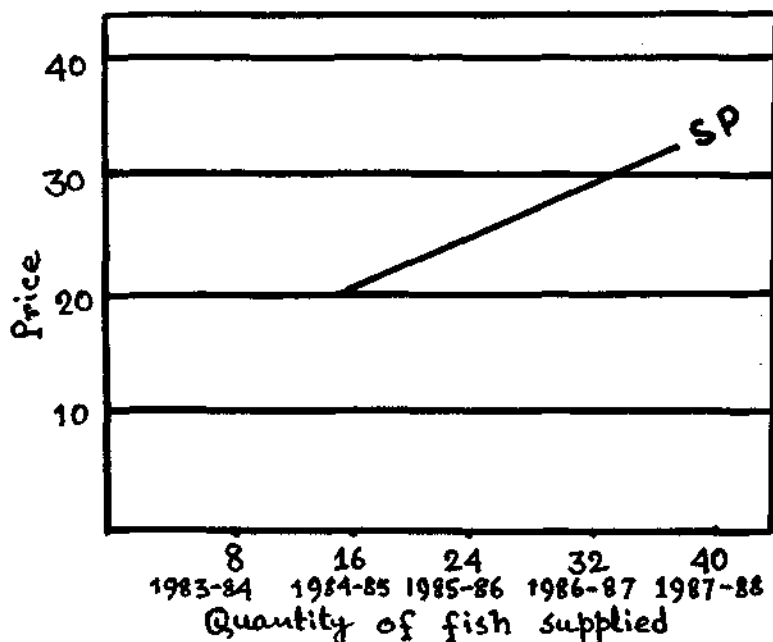
With the technological advancement in the fisheries, expansion of output of the fish lowered the unit cost of production of fish in the district of M.D. This implies that the supply of fish increased at any given prices. But since it is subjected to diminishing returns, the supply curve shifted upward to the right.

Table - 5.VIII**Average Supply and Price relationship**

Year	Average price per quintal Rs. "00"	Average supply per market in quintal "00" %
1983-84	20	16
1984-85	25	22
1985-86	28	28
1986-87	30	32
1987-88	32	38

Source: Field Survey (of 10 markets)

The Table 5.VIII indicates that as the price of fish rose in the district, quantity of fish supplied also increased and vice versa. If the above supply-price relationship are shown by means of linear trend ($y = A + BT$) it shows an upward trend; which shifted to the right like the Graph 5.3.

Graph 5.3SUPPLY-PRICE linear relationship

It may also be noted that in case of price of fish fallen too much (specially during a few particular days of a year) supply also 'dries up'. The seller buys his own stock as it were at the reserve price (i.e., the price below which the seller refused to sell). The reserve price was very low (say, Rs. 600 per quintal of fish for a few days in 1984) considering the perishability of the fish. The reserve price of fish also depended on the future costs, carrying costs, period of holding the stock of fish in the cold storage and sellers liquidity-preference. But above the reserve price, supply curve rose upward showing that, at higher prices of fish more were supplied. This was because as production of fish in the district expanded to increase its supply in the market, unit cost of production

rose due to the operation of diminishing returns. Since cost per unit of fish raised, when its production was expanded, only at a higher price more were produced and supplied. But since the production of fish is subjected to diminishing returns, the supply curve shifted upward to the right ultimately. It is true that the quantity of fish supplied varies directly with price of fish. The supply of fish is function of its price. However, the supply of fish in the district of West Dinajpur depended not only on the price of fish but also on several other factors like the modern production technology, price of factors or resources (e.g., labour, fertilisers etc.), number of producers, future price expectations, period of holding the stocks.

The elasticity of supply of fish is the degree of responsiveness of supply of fish to the changes in its price. It is a relative change in quantity of fish supplied in response to a relative change in price of fish. It also occupies an important place in price theory. The greater the responsiveness of quantity of fish supplied to the changes in its price, the greater its elasticity of supply.

Table - 5.IX
Price, Supply and Elasticity relationship

Year	Average price per quintal Rs. '00'	Average supply per market in quintal '00'
1980-81	12	4
1981-82	15	7
1982-83	16	10
1983-84	18	12
1984-85	22	17
1985-86	25	22
1986-87	28	26
1987-88	30	30

Source: Field Survey (of 10 markets)

From the Table 5.IX it is observed that supply of fish rises considerably with a comparatively small rise in price of fish in the district. Hence, the supply of fish was elastic and the elasticity was greater than unity (i.e. $e_s > 1$). This was because the consumers spent their additional income on the fish and also for want of suitable substitution of fish. Therefore the supply of fish got an acceleration in spite of rise in price of fish.

Table - 5.XPrice, Supply and Elasticity relationship

Month	<u>Price Rs. (00)</u>		<u>Supply Quintal (00)</u>	
	1986	1987	1986	1987
March	22	25	15	18
April	28	30	18	20

Elasticity (e_s) - Inelastic $e < 1$

Source: Field Survey (of 10 selected markets)

Foot Note: The above type of seasonal variation in price and quantity of fish supplied (shown in Table 5.X) is almost a regular phenomena in every year.

From the Table 5.X it is observed that with a considerable increase in price of fish in the short period the supply of fish got a rather small extension. Hence, the supply of fish in the short period was inelastic in the district. The elasticity was less than unity (i.e. $e_s < 1$). This was because the consumers were generally sticky in their consumption habits for a short period. Their income also did not rise within a short period. Therefore the supply of fish got no acceleration with the rise in price of fish.

Supply elasticity (e_s) of fish can also be measured for the period from 1980-81 to 1988-89 in the district of West Dinajpur as follows -

$$e_s = \frac{\Delta Q}{Q} \div \frac{\Delta P}{P}$$

Where ΔQ = change in the quantity demanded

ΔP = change in the price of fish

P = price of fish before change of price

Q = Demand before change of price

$$\Delta Q = 2,27,485 \text{ Quintal} - 88,966.30 \text{ Quintal} = 1,38,518.7 \text{ Quintal}$$

$$Q = 88,966.30 \text{ Quintal}$$

$$\Delta P = \text{Rs. } 2000 - \text{Rs. } 1000 = \text{Rs. } 1,000$$

$$P = \text{Rs. } 1000$$

$$\text{Therefore } e_s = \frac{1,38,518.7}{88,966.30} \div \frac{1000}{1000} = 1.56$$

It follows from the above analysis that supply is not so responsive with a hike in price of fish in the short period. But in the long period as it appears from the above (where co-efficient of supply elasticity is 1.56) supply of fish increase more proportionately than the increase in price which indicate its responsiveness.

To conclude the present analysis it could be said that in West Dinajpur district deficit in supply of fish was decreasing. This indicates that the production of fish was continuously increasing. The price of fish sometimes remained constant and sometimes increased in spite of increase in supply of fish by more than a hundred percent during the period 1980-81 to 1987-88. This was due to the manipulative stocking by the businessmen, the presence of middlemen in the marketing distribution channel, the outgoing of fish from the district for marketing at a higher price.

The demand for fish in the long period was also continuously increasing with the corresponding increase in price of fish. This 'increased demand' was caused mainly by the increased income owing to the large investment expenditure on different development schemes during the planning period and also for want of suitable substitution of fish.

The elasticity of demand for fish in the long period was also less than unity as the demand increased with the increase in price of fish resulting in an increase in the total outlay made on fish.

The demand for fish in the short period was also seen inelastic as the demand increased less than proportionately with the fall in price of fish; which resulted in a decrease in total outlay. Therefore the elasticity of demand for fish in the short period was less than unity.

It is also seen that as the people saved 'less', they spent more on fish from their income. The proportionate change in quantity demanded was more than the proportionate change in their income. Hence, the income elasticity of demand was greater than unity.

On the other side it is observed that in the long period, the supply of fish increased considerably with a small increase in price. Hence, the supply of fish was elastic.

In the short period the supply of fish got a small extension with a considerable increase in price of fish. Hence, the supply was inelastic.

In the long period it is seen that the consumers spent their additional income on fish for want of suitable substitution. In the short period the consumers were sticky in their consumption of fish and their income did not also rise within a short period.

It is also observed that in the pricing of fish in the district of West Dinajpur sellers had more control over the market in the long period than in the short period. The consumers in the long period were developing a habit of purchasing more fish from their increased income in spite of rise in price of fish, whereas the consumers in the short period could not do so.

After all the demand for fish in the district of West Dinajpur is closely related with the factors like income of the people, changes in propensity of the consumers to consume and save, tastes and preferences of the consumers and the number of consumers in the market. And the supply of fish depended not only on the price of fish but on several other factors like the modern production technology, price of factors or resources (e.g. labour, fertilisers etc), number of producers, future price expectations and period of holding the stocks.

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CHAPTER - 6

MARKETING ASPECT :

I. CONSTRAINTS AND MARKETING CHAIN

6.1. CONSTRAINTS AND MARKETING CHAIN:

Prior to the 'Industrial Revolution' (i.e. prior to the middle of the eighteenth century) direct sale by the producer to the consumer was the normal method of distribution for marketing in most of the cases. In the modern economic system, production is carried on, on a large scale. It also goes ahead of demand and is very much specialised. So it is very difficult task for the producer to attend to every minute detail of production and distribution for marketing. They failed to create place utilities of the goods for distribution over a wide area and also failed to create time utilities by stocking the goods. The producers are not always in a position to make the goods suitable for marketing by assembling, grading, sampling and rendering other services relating to the marketing of goods. Fish (being perishable in nature) requires a timely distribution, for want of which the producers might suffer a heavy financial loss. Marketing finance is also an important element by which storing, advertising, transporting and sales promotion services are made. These complicated services require not only specialised knowledge but also require sufficient finance to execute. The producers generally are not able to procure finance for marketing of goods.

After all it is very much difficult for producer to be acquainted with the managerial functions of marketing such as-

- i) Market segmentation
- ii) Buyer behaviour
- iii) Gradation and classification
- iv) Pricing of product
- v) Distribution of product.

Specially under the present system of large scale production and distribution, the need for one or more middlemen is being felt and as such, goods from the producer pass through several hands to reach the ultimate consumer. Market mechanism acts like a bridge between the producers and distributors on the one side and consumers on the other. Marketing in its broadest sense, is the social instrumentality through which the material goods and culture of a society are transmitted to its members. The channel of distribution provides necessary link between the producer, distributor and the consumer. A wide variety of methods of distribution is practised but all of them are not necessarily available and essential to every producer. With regard to the fish supplies from sources, major portion of the produce first comes to whole salers, commission agent or agents in their turn sell the fish, by auction, to the retailers. The retailers thus purchase the fish and sell the same to the consumers.

The defects of Fish marketing in W.D. district

The farmers could get better price for their products if it could be sold in the organised market instead of selling their produce in the unorganised market. The middlemen took advantage of the differential price of the village market at site and organised market generally situated at towns. The farmers are sometimes indebted to the wholesalers, commission agents, Agents and these middlemen deprive the farmers or fishermen producers by compelling them to sell their produce at a cheaper rate.

The farmers do not get reasonable price of their product for poor transportation or communication facilities for which they cannot send their produce to the organised market for being sold at a reasonable price.

Moreover the selling system is not always good in the organised market because of the presence of wholesalers, commission agents and arstdars. These middlemen fix the price of product adjusting it themselves for their own interest; they also charge a commission on the selling price of the produce. The district fish trade is controlled virtually by a handful of vested interests. These interests not only control the prices but also the day to day supplies to their best advantages.

There is no standard or uniform weight in different markets of the district for which the farmers do not get the reasonable price of their produce. The middlemen often cheat the illiterate and innocent farmers by giving them a too low price and counting too short a weight of their produce.

The farmers do not get proper price not being able to create place utilities of their produce by distributing them over a wide area and time utilities by stocking them in warehouse. For these the middlemen charge commission or rent for making the arrangement of stocking and distributing the product (fish) over a wide area.

There is no co-operative stall in the district through which the producers (farmers and fishermen) can get the reasonable price of their products. Some influential members of the co-operative societies do more harm than good for the society by taking undue advantages of the illiteracy and simplicity of the majority members.

Moreover the middlemen do some dis-service to the society. They

a) Prevent direct or close touch between the producer and the consumer.

b) ignore the actual trend of the market by manipulative devices.

c) bring about mal-adjustment between demand and supply with a profit motive by hoarding and other means.

d) cause the price to rise at the expense of the consumers who are to bear the added costs of distribution and at the same time the producers receive low prices for their produce.

e) control the supply by their clever methods of cornering and by other sly means and thus create an unhealthy atmosphere in the business by creating artificial scarcity, rocketing prices, black markets etc.

The present condition of the producer (fishermen/farmers) in the district of West Binaipur is very deplorable and it requires immediate and serious consideration. The poor producers are the actual toilers in the field and form the basic unit or the very back bone of the fishery. They are always indebted either to town/city merchant or the local zaminder of his own village. They pay the capitalists interest as high a rate as even at 40 to 80 percent at times. They also become bound to sell their produce (fish) only to the particular wholesaler, commission agent or araddar appointed by the capitalists who generally pay much less than the market rate.

Economics of wholesaling fish:

Whole saler:

In case of whole sale fish market, there are about 20 whole salers in Balurghat, Raiganj and Gangarampur markets on average, who deal with 6 quintal of fish daily on an average. This means that a whole saler gets the scope to deal with about 30 kg of fish per day earning thereby a sale proceeds of Rs. 900 (i.e., @ Rs. 30 per kg). So even if the whole salers charge their commission at 15%, the average total daily gross income of a whole saler through fair deal comes to Rs. 135 only as against his per day obligatory expenses Rs. 133 on an average worked out on the following details:

Trade license	R. 10
Landlords Rent R 12	
per box of 1.5 quintal	R. 40
per box	
Cooli charges	R. 10
Office Rent	R. 10
Establishment Expenses	R. 5
Family expenses-	R. 50
(average family size as found from survey of 7 families is 6, R. 1500 p.m. approximately)	

TOTAL

R. 133Source: Field Survey, 1988Table 6.IDaily Balance remain of wholesaler

Sales proceeds	Commission @ 1%	Daily obligatory expenses	Balance (Surplus)
R.	R.	R.	R.
900	135	133	2

Source: Field Survey, 1988

From the Table 6.I it is observed that the whole saler gets a balance of R. 2 per day after meeting his obligatory expenses.

N.B. Payment/charges for weighing, charities, water-man, cook, sweeper etc. are not included in the "daily obligatory expenses" as these are not regular elements.

Aretdar:

There are about 18 aretdars in Salurghat, Kaliyaganj and Raiganj markets on average, who are to deal with 4 quintals of fish daily on an average. This means that an aretdar gets the scope to deal with about 22 Kg of fish per day and give the producer fishermen Rs. 660 (i.e., @ Rs. 30 per kg) as the sales proceeds of the fish. The aretdar charges a commission at 18% on average on sales proceeds (i.e., Rs. 99) and an aretdar makes a profit of Rs. 220 by selling the fish to the consumer at Rs. 40 per kg of fish acting as a retailer. Therefore the average total daily gross income of an aretdar through fair deal comes to Rs. 319 (i.e., commission = Rs. 99 + profit by selling = Rs. 220) as against his per day obligatory expenses Rs. 310 worked out on the following details:

Trade License	Rs. 10
Stall charges	Rs. 3
Landlords rent	Rs. 36
Cooli charges	Rs. 20
Ice, Ice breakers	Rs. 15
Establishment Expenses	Rs. 34
Office Rent	Rs. 10
Salesmen's Commission (@ 18% on average)	Rs. 132
Family expenses	Rs. 50
Total	Rs. 310

Source : Field Survey, 1988

Table 6.II
Daily Balance remain of an Aratdar

Cost price	Sales Proceeds	Profit	Commission @ 1%	Total Earnings	Daily obligatory expenses	Balance (Surplus)
Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
660	880	220	99	319	310	9

Source: Field Survey, 1988

From the Table 6.II it is observed that the aratdar gets a balance of Rs. 9 per day after meeting his obligatory expenses.

N.B. Payment/charges for weighing, charities, water-man, cook, sweeper etc are not included in the "daily obligatory expenses" as these are not regular elements.

Economics of retail selling of fish:

Retailer:

There are about 109 retailers in Balurghat, Raiganj and Gangarampur markets on average, who are to deal with 6 quintals of fish daily on an average. This means a retailer is able to get 5.5 kg of fish per day to cater for earning his livelihood. If they earn Rs. 100 per kg (i.e. $33\frac{1}{3}\%$ on cost price Rs. 30) as normal and reasonable profit, in that case he could earn Rs. 55 (i.e., $5.5 \text{ kg} \times \text{Rs. } 10 - 5.5 \text{ kg} \times \text{Rs. } 30$) through fair means as against his per day obligatory expenses Rs. 54 on an average worked out on the following details:

Stall charges	Rs. 3
Cooli charges	Rs. 5
Ice, Ice breakers charges	Rs. 8
Establishment Expenses	Rs. 3
Family Expenses	Rs. 35
(Average family size as found from 10 families is 6; Rs. 1100 approximately P.M.)	
TOTAL	<u>Rs. 54</u>

Source: Field Survey, 1988

Table 6.III

Daily Balance remain of a Retailer

Cost price	Sales proceeds	Profit	Daily obligatory Expenses	Balance (Surplus)
Rs.	Rs.	Rs.	Rs.	Rs.
165	220	55	54	1

Source: Field Survey, 1988

From the Table 6.III it is observed that the retailer gets a balance of Rs. 1 per day after meeting his obligatory expenses.

(N.B. Payment/charges for weighing, charities, water-man, cook, sweeper etc are not included in the "daily obligatory expenses" as these are not regular elements).

From the details of trade expenses shown above both for whole sale and retail markets it is apparent that due to poor balance left for their future contingencies, the traders

are forced to adopt various mal-practices and boost up prices to earn whatever is possible towards their obligatory expenses from the consumers' end. The whole salers and the retailers try to enhance the balance in their favour after meeting the obligatory expenses and with this impact the producers are also to give a very high rate of premium both in case of weight and rate. This is a contributory cause as to why fishing trade is gradually becoming a non-paying proposition to primary producers.

The unhealthy competition both in the wholesale and retail fish trade is increasing due to the increase in number of wholesalers and retailers.

The "Fish Dealers Licensing orders" of 1963 did not prescribe any qualification for a trader to get a license and thus there was hardly any scope for screening the existing number of traders. On the contrary, since promulgation of the order in July 1963, the number of traders both in wholesale and retail markets has increased manifold adding thereby more unwanted effect and endless sufferings to the consuming public.

Prior to introduction of licensing, attempts were made by Government on two successive occasions, once in 1948 and again in 1962 to fix the upper ceiling rates for different categories of fish on mutual understanding between the traders and Government which were known as "Gentlemen's Agreement". But the results of such attempts were most unsatisfactory in the district as very few of the traders tried to honour the ceiling prices so fixed and it ultimately failed.

The State Government under the West Bengal Anti Profiteering Act of 1958 had enforced, in November 1963, the upper ceiling rates for different varieties of fish. But such a step, without having any control over the sources of supplies made the markets of the district dry for days together as a result of underhand manipulation of the whole salers who virtually control such supplies. In the meantime, well organised black-market was created in the outskirts of the town where some of the traders had even set up their selling "arats" in order to by-pass Government measures. The retailers again, in their turn, started home delivery of fishes at fabulous rates offered by the well-to-do section of the consuming public and a section of the retailers who cared to cater within the ceiling rates from their respective stalls, took full advantage of the so called acute scarcity. Government was thus forced by situation and circumstances to vacate the price fixation orders in June 1966, when it was found that revision of the ceiling rates in favour of the traders failed to satisfy them.

Wholesalers made cash advance to the tune of several thousand to the fishermen and farmers to make their boats, nets and other preparatory arrangements to catch the fish or culture of fish, without having any security or executing any formal agreement except some sort of verbal understanding. The cash advance popularly known as "dadan" is then repaid normally from the value of fish. Government cannot take such risk of insecure cash advance.

The whole salers of the district are fully aware about the helpless position of the fishermen and farmers and vis-a-vis the limit of taking such financial risks and responsibilities on the part of the Government, and thus, they have virtually monopolised the trade to their best advantage.

At the retail end again sometimes there are generous credit system in vogue. So the retailers have very little say in the matter of their choice in regard to type, quantity and price of fish. Here law of supply and demand is not the only determining factor for high prices of fish in the district markets. Auctioning and sub-auctioning of fish at wholesale and retail ends are closed financial operation where the normal competition is not at free play.

Production and distribution (marketing) are two most outstanding functions associated with the business of fish. If the middlemen are eliminated from the channel of distribution, the producers (fishermen, fish farmers) will be required to undertake both the functions of production and distribution. But in modern times, it is really a complicated affair to combine the work of whole selling and retailing with the production operation, because the consumers, as a rule, are generally scattered in different parts of the district with different tastes and choices. In such a situation, it means a good deal of expense and trouble to set up the necessary machinery for such whole selling and retailing in order to create a circle of adequate number of customers for successful and profitable selling. But it is really an impossible task to plan for production and distribution with an equilibrium of supply and demand unless the distributor (trader) is a monopolist. So in order to minimise trouble and risk, it is desirable that these tasks should be handed over to some agency best fitted for the purpose. The existence of middlemen in the fish market of the district comes out from this idea. They are indispensable not only in production, but also in marketing to an equal extent. So the existence of maximum number of middlemen, in spite of producers' and consumers' anxiety to eliminate them, lends support to this view of marketing specialisation. The elimination of middlemen does not always mean low marketing costs and prices of fish. Because the alternative machinery is not a simple affair, rather it is also a

costly affair. Moreover, in a competitive economy, no businessman can stay for a long period in the market without rendering some useful services to the community and that the middlemen have not been eliminated as yet from the marketing operations is sufficient proof of their valuable services. These services will continue as long as there is freedom of choice of consumers and it is not regimented as in authoritarian economy. It is desired to keep them wherever necessary by purging them of their abuses in the fish marketing set-up of the district of West Dinajpur.

Marketing chain

The most popular channel involved in reaching fish from the producers (fishermen/farmers) to the consumer in the district of West Dinajpur is like this: producer → whole saler → Retailer → Consumer; the next important channel being producer → commission agents/Aratdar → retailer → consumer.

Channel flows in fish supply

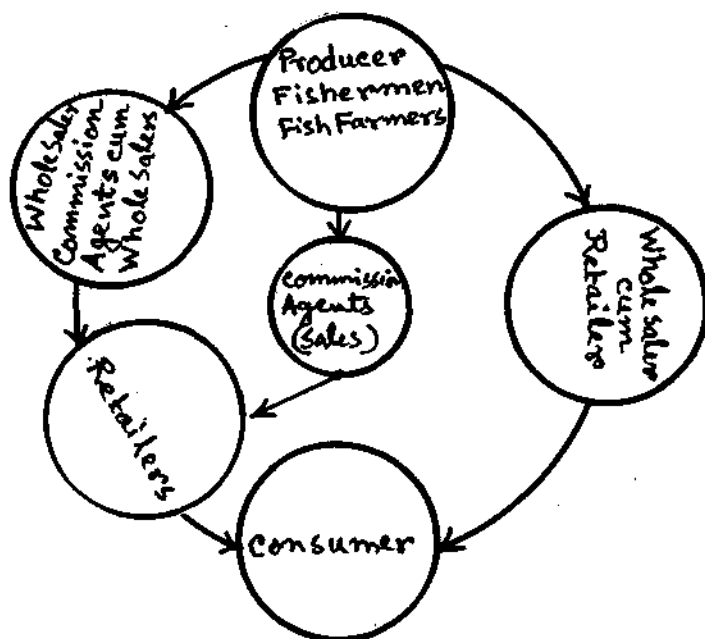


FIGURE - 6, 1

FIGURE - 6.1 shows a general view of channel flow of fresh water fish in the district. The channel flows of fresh water fish in the district were by and large similar across the system. Fishermen/Fish farmers sold to whole salers directly or through commission agents (Sales) at their own risk and retail intermediaries. Wholesale intermediaries sold to retail intermediaries either through commission agents or directly.

The channels can also be analysed in terms of flow of information, money, and physical movement of fish.

Market flows of Fish, information and cash

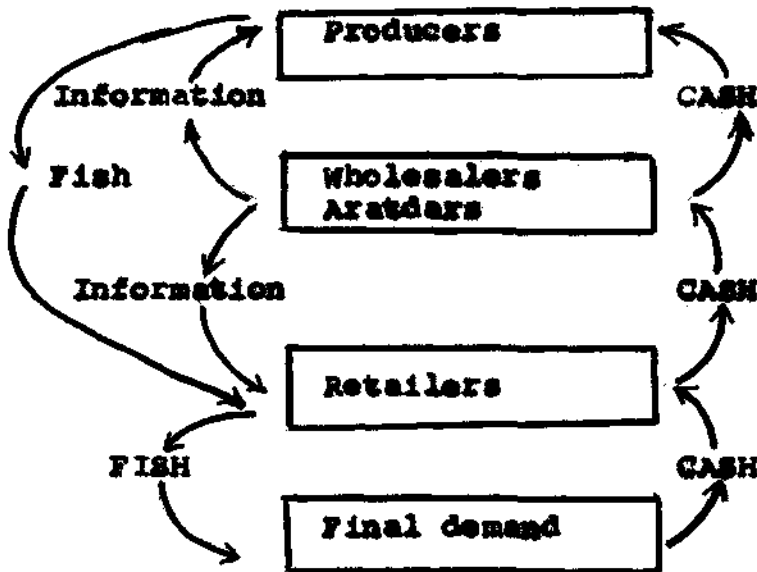


FIGURE 6.2

In FIGURE 6.2 information flows in both directions from the wholesaler; and, while the fish flow downstream in the channel to the consumer, the cash, as payment for the fish flows upstream to the producer. Fish, information, and cash, as well as other things, flow in both directions from all positions.

The middleman relieve producers of their worries about the disposal of their products (being perishable in nature), create place utilities of the product by distributing them over a wide area and time utilities by stocking them in warehouses and make the product suitable for marketing by assembling, grading, sampling and rendering other ancillary services and also bring to the very door of the consumer the products desired by them and thus smooth the work of distribution from the producer to the consumer. So the services of the middlemen rendered to the producers and the consumers are sometimes indispensable in a competitive field where the question is one of "the survival of the fittest".

Marketing and distribution is an important aspect for the development of pisciculture. In the district of West Binajpur it was observed that on an average 25 percent of the total production of fish, or catch from the water units, like ponds, tanks etc. was consumed by the producers themselves and 60 percent of the catch was sent to the market for disposal. A part of the production was also used as wages generally.

A major part of the fish sold was disposed of at the sites of catch itself. The following Table 6, IV gives the percentage distribution of total fish sold by place of sale.

Table 6.IV**Percentage Distribution of total fish sold by place**

Place of sale	Percentage of catch of fish sold from water units.
1. At site	60
2. Local market	25
3. Outside local market (sub-Divisional or district)	12
4. Outside the district market	3

Source: Field Survey, 1988

Apart from sale at sites, 37 percent of production sold were disposed in the organised market at towns. An insignificant proportion of total production (3 percent) was sent outside the district by some agents for disposal.

Table 6.V**Percentage Distribution of fish sold by different agencies**

Agency to which sold	Percentage of production sold (out of total disposable production)
1. Hawkers (Aratdar)	25
2. Retailers	60
3. Wholesalers, Commission agents etc.	15

Source: Field Survey, 1988

It is found from the Table 6.V that fish farmers sold their produce to different types of customers. The retailers dominated such purchases, having bought 60 percent. The other buyers in the district are hawkers, commission agents and whole salers. It is obvious from the above Table 6.V that a significant portion of production was sent to the selling points or organized selling agents for sale. The markets were found to be important, because harvests in general were in small quantity at a given point of time, in a given point of place and were scattered all over the district. A large percentage of the production was sold in the local markets and at site of catch because of lack of efficient marketing infrastructural facilities. All this points to the fact that markets should be a catalyst in the process of development of pisciculture and fishing activities.

The Price differential or spread i.e., the gap between what the consumer paid and what the producer received as perceived was found to be high. It stood at the range from 25 percent to 60 percent of the price realized from the final consumer on average. The price spread was accounted for by the profit margin and costs incurred by the market intermediaries. The middlemen who are doing the whole sale and retail trade activities combinedly, earned the maximum rate of profit. The higher the spread of channel, the higher the price differential.

Table 6.VI**Marketing margins and producers share**

Shares	% of realized value
Producers share	40
Wholesalers Margin	20
Retailers margin	15
Cost of marketing	25
Consumers price	100

Source: Field Survey, 1988

From the Table 6.VI it is observed that in the distribution channel of fish marketing in the district of West Dinajpur producers get 40% of the realized value and wholesalers get 20% while the retailers get 15% of the realized value of fish with 25% cost incurred indicating that 60% of the realized value goes to the "share of the middlemen's end and cost incurred by them" which added cost has to be borne by the consumer. Producers are compelled to sacrifice 35% of the realized value of fish to the wholesalers and retailers of the fish market which they could have earned if there were no middlemen like wholesalers, retailers within the distribution channel of fish marketing in the district of West Dinajpur.

In this connection it should be stated that the private owners of water resources (particularly small) can not invest in ponds' development. They are lacking in resources and they do not have access to the organised money market. It has been observed that many fish cultivators in this district are compelled to borrow money for meeting consumption requirements and working capital for fish farming. They are sometimes found

highly indebted to private financiers like commission agents, araddars etc. Again, to secure their access to the fish landings, the commission agents or araddars advance loans against the stipulation that the catch should be disposed off through them. These agents act simultaneously as a lender and an auctioneer. The financial dependency of the fish producers on the middlemen robs them of initiative, investment and planning. This inter-penetration of the credit sphere with the producer marketing sphere illustrates the cause of inter linkage of product and credit markets.

The extent and way, the market reacts to the use of marketing instruments can be found out by the 'Response Model'. The general structure of the Response model can be represented by :-

$$R_1 = f(P_{11}, P_{12}, \dots, P_{1k}, A_{11}, A_{12}, \dots, A_{1l}, D_{11}, D_{12}, \dots, D_{1m}, Q_{11}, Q_{12}, \dots, Q_{1n}, AS_{11}, AS_{12}, \dots, AS_{1x}, E)$$

Where R_1 = a response measure of product 1 or brand 1

$P_{11}, P_{12}, \dots, P_{1k}$ = the elements of the class of instruments: Price

$A_{11}, A_{12}, \dots, A_{1l}$ = the elements of the class of instruments: promotion

$D_{11}, D_{12}, \dots, D_{1m}$ = the elements of the class of instruments: distribution

$Q_{11}, Q_{12}, \dots, Q_{1n}$ = the elements of the class of instruments: Product.

$AS_{i1}, AS_{i2}, \dots, AS_{ix}$ = the elements of the class of instruments: assortment/product line, where the subscript i denotes that the instrument variables are related to products or brands and

Z = all exogenous variables over which the venture has no control. An important subset of these 'State variables' are the instrument variables of the competitors of i .

In the model which is considered here often only one or two of the elements of the classes of instruments (of the marketing mix) can be met as explanatory variables.

Again there are many seller competitors in the fish markets having difference in prices of fish. From this background a basic marketing model can be set up for price determination. The model is -

$$P_{c,t+1} = (1-K)P_{c,t} + K_{\max} \left[P_{a,t+1}, \frac{P_g}{Q_{c,t}} + V_c \right]$$

for cases where $P_{c,t} = P_{a,t} \geq \frac{P_g}{Q_{c,t}} + V_c$

Where t = current week (Months, etc)

$t + 1$ = Next week

P_a = a seller's price

P_c = Competitor's price

Q_c = Competitor's sales (in units)

P_g = Competitor's fixed costs

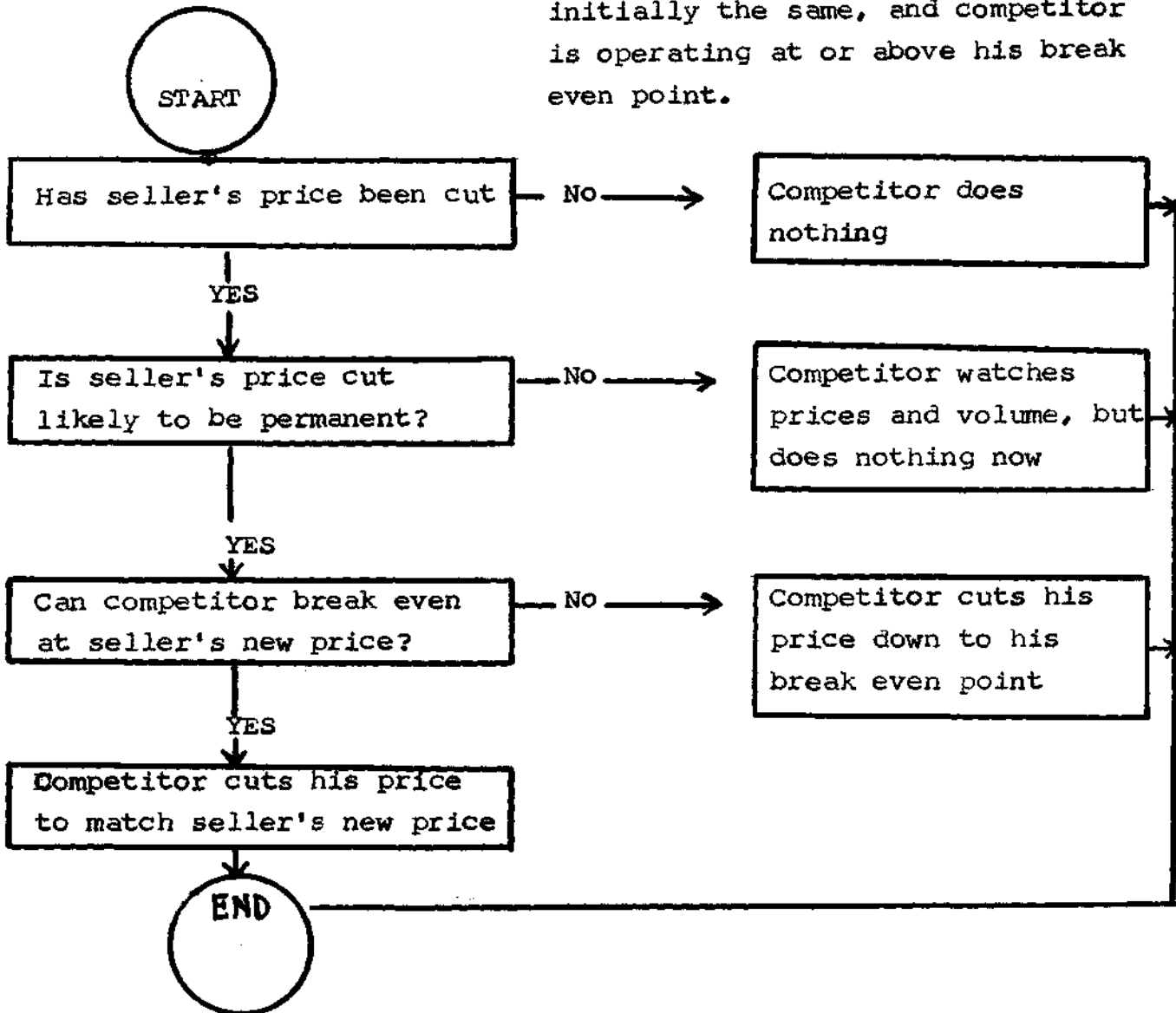
V_c = Competitor's variable costs per unit.

K = a "dummy" variable, taking value 0 if seller's price is not cut in a "Permanent" way; 1 if seller's price is cut in a "permanent" way.

The term " $\max(x, y)$ " is read "the larger of x and y ".

The above model can also be plotted logically as under:

For cases where prices are initially the same, and competitor is operating at or above his break even point.



In conclusion it is observed from the present analysis that the fish producers (i.e., fish farmers and fishermen) of the district of West Dinajpur have to face many difficulties in disposing the fish directly to the consumers in the market. With this background a significant portion of the fish produced mainly in the rural areas of the district comes to wholesalers, commission agents or araidars from the producers. These middlemen take the responsibility of selling the fish in the market through the retailers.

But in spite of all these middlemen's activities a major portion of fish is sold in the rural markets or at site of catch at cheaper rate for want of proper marketing infrastructure.

Moreover when the produce (fish) comes to organised markets in the hands of middlemen for disposal, the middlemen take the advantage of the differential price of unorganised market and organised market. Sometimes the middlemen deprive the fish farmers and fishermen producers by compelling them to sell the fish at cheaper rate for their (Producers) indebtedness to the middlemen, controlling the price and weight of fish in the market for their vested interest, taking the advantage of poor transportation or communication between the rural and urban areas, giving warehousing facilities and for want of Co-operative stall.

It is also observed that the whole selling and retailing of fish through fair deal is not a paying business if they are to pay their different obligatory expenses. For this, these traders adopt malpractices and boost up prices of the fish artificially for which the consumers have to suffer directly and the producers do not get the advantage of high price of their produce in the market. Producers are becoming disinterested in 'fish producing' because of this unhealthy marketing of fish.

The middlemen of the fish market of West Dinajpur district create mal-adjustment between demand and supply of fish by hoarding and other means which result in high price of fish in the market and they create artificial scarcity, black-markets and preventing direct and close touch between the producer and consumer.

To remove the defect of authoritarian economy and to give importance to the freedom of choice of the consumer in the fish markets of West Dinajpur district it would be wise to allow the middlemen to stay wherever necessary, by eliminating their abuses in the fish markets of the district. In doing so some co-operative stall for disposal of fish may be opened to give the proper price to the producers and sell the fish to the consumers at reasonable price, rural roads and transport communication may be improved, legislative measures may be adopted by the Government to check the mass malpractices of the middlemen in the fish markets, liberal institutional credit system should be introduced in the sphere of fish farming and catching activities and illiterate fish farmers and fishermen should be educated properly to eliminate "deprivation".

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CHAPTER - 7

**SOCIO-ECONOMIC STUDY OF THE FISHERMEN,
OWNERS AND FARMERS OF WEST DINAJPUR DISTRICT :**

1. DIFFERENT FEATURES.

7.1 DIFFERENT FEATURES:

The total fishermen population of West Dinajpur district is 17,500, representing about 0.73 percent of the total population of the district⁽¹⁾. Besides fishing, fishermen also carry out other avocation, such as agriculture and ancillary fishery activities like net making, fish feed making, fish selling etc. The fishermen of the district have a distinct tradition of their own. They belong to the major religions, namely Hindu and Muslim and to several communities like Male, Rajbanshi, Dhibar, Jalia, Kaibarta and Mallah. The sanctity of a profession was recognised in earlier days in the district of West Dinajpur as each community had its distinct place and function in the society to do. The beneficial effect of the caste system to which the fishermen became victims in the social structure was a later innovation. It appears that they functioned, under a feudal system, as social labourers without having any right of ownership on the fisheries and the same is equally true to-day. Like landless labourers, this community has mainly become 'fisheryless' labourers in a lingering feudal system. This social anachronism has still its firm grip on them and in spite of our willings and pious wishes for social reforms and talks of the socialistic pattern of society for their uplift and rehabilitation in the social, cultural, economic and educational fields, the situation has not only deteriorated, but brought them to a state of virtual extinction. In the society, fishing occupies a low status. Majority of the fishermen belong to an economically weaker section and follow traditional methods of fishing employing indigenous crafts and gears. The average size of a fishermen family varies between 4 and 8. By and large, the fishermen, of the district of West Dinajpur are perennially indebted to the middlemen who often advance financial help to them in times of need in return to their entire catch assessed at a low price. The middlemen also control the sale and marketing of fish.

The fishermen who are undisputedly the primary producers of fish and are the life blood of this very essential social service, are also deprived mercilessly to the maximum extent under a virulent system still eating into the vitals of our society. As "Fisheryless Labourers", they do the business mainly as hirelings. In fact they have no control even over the production of fish and their naked poverty has subjected them to a vicious circle of deprivation, indebtedness and threat of extinction as a class.

The fishermen are still in the darkest cavity of a so called civilised society which we boast of and it is a matter of shame that these people - a part and parcel of our society-doing such a useful function for generations should remain as such. Poverty and illiteracy, superstition and conservatism, a low social status and the humiliating dominance of the caste Hindus, and above all, the primitive fishing equipments they are provided with, have jointly contributed to their present plight from which they never had had any occasion to rise and assert themselves in the past. Several factors such as low social status, poor economic condition, illiteracy, heavy dependence on the middlemen, traditional fishing equipment and methods of fishing, low production rate and the consequent lower income influence the socio-economic conditions of fishermen. Prior to independence, this sector received little social or governmental attention. Schemes with specific objectives to improve the socio-economic conditions of fishermen were only initiated right from the beginning of the 'First Five Year Plan'. It has been further backed by the 'World Bank Assisted Inland Fisheries Project', 1960 through the establishment of the 'Fish Farmers Development Agency' (FFDA).

Some of the important programmes taken up by the Government to ameliorate the various problems encountered by the sector were arrangements of institutional finance, training of the fish farmers, formation of Co-operative societies and Fish Production

Group (FPG), leasing, target setting, giving benefits of subsidy rehabilitation, benefits of service party Group, minikit distribution and dovetailing activities which were made for proper exploitation of the water resources of the district.

Generally ponds and tanks are usually operated by different agencies, like individuals, either singly or jointly, Co-operatives, Government or local bodies etc.

To analyse the importance of different agencies of operation for water units of the district the following Table 7.1 is given below:

Table - 7.1

Percentage Distribution of the Number of Units and Their Area of operation during the year 1985-86

Agency of operation	Percentage of the number of water units (approximately)	Percentage of the water area under the units (Approximately)
Private:		
Singly operated	34	30
Jointly operated	61	58
Co-operative, FPG and local bodies	5	12
Overall	100	100
1986-87		
Private:		
Singly operated	29	25
Jointly operated	64	60
Co-operative, FPG and local bodies	7	15
Overall	100	100

Contd..

Table - 7.1 (Contd..)

Agency of operation	Percentage of the number of water units (approximately)	Percentage of the water area under the units (Approximately)
1987-88		
Private:		
Singly operated	22	19
Jointly operated	60	60
Co-operative, PFC and local bodies	18	21
Overall	100	100

Source: Field survey (taking 20 samples in each year).

It is clear from the Table 7.1 for the years 1985-86, 1986-87 and 1987-88 that joint Private operations and individual private operations (i.e. singly operated) are the major agencies of operation. Private individuals (i.e. singly and jointly) operate 92% of the total number of water units and 80% of the total water area. Joint private operations are carried on in about 61% of the units covering 50% of the water area; whereas, individual private operations are carried on in about 34% of the units covering about 30% of the water area for the year 1985-86.

Private individuals operate 93% of the total number of water units and 82% of total water area. Joint private operations are carried on in 64% of the units covering 60% of the water area whereas individual private operations are carried on in about 29% of the units covering about 22% of the water area for the year 1986-87.

Private individuals operate 90% of the total number of water units and 79% of total water area. Joint Private operations are carried on in 68% of the total number of units, covering 60% of the water area, whereas individual private operations are carried on in about 32% of the units covering 19% of the water area for the year 1987-88.

It is also observed that co-operative and FPG activities have not been given much importance so as to use it as a measure of eradication of rural poverty and to improve the socio-economic condition of the fish farmers and for a systematic and scientific Culture of fish in the district of West Dinajpur through Co-operatives and FPGs.

It is important to study the distribution of owner-operated water units by the size of the units. It is shown in the following Table 7.II that 86.50 percent of the water units are less than 0.50 acre in size. Big units of the size of 5 acres and above and owner operated, constituted only 0.50 percent of the total owner operated water units. But these units, though small in number, are accounting for 16.50 percent of the total operated water area.

Table - 7.II

Percentage Distribution of the Number of water units and their Area by different size-classes of the Units operated by the owners of the Units:

Size Class of Water Units (Acres)	Percentage of the number of Units	Percentage of the area under the water units
Upto 0.09	16	6.50
0.10-0.19	33	22.00
0.20-0.49	37.50	20.50
0.50-4.99	13	34.50
5.00 and above	0.50	16.50
Overall	100	100

Source : Field Survey, 1988

Table - 7.III

Percentage Distribution of Water Units by Means of Acquisition

Means of acquisition	Percentage of the number of water Units
Inheritance	75
Purchase	6
Construction	14.40
Lease	4.60
Overall	100

Source: Field Survey, 1988

The figures in the Table 7.III bring out the fact that most of the water units (75 percent) were acquired through inheritance and only 6 percent of water units were purchased. The share of construction in the total number of water units was 14.40 percent; whereas, 4.60 percent of total units were acquired through leasing arrangements. It should be stated that it is inheritance factor which is mainly responsible for fragmentation of ownership (that is, multi-ownership). A large number of water units (ponds and tanks) under multi-ownership are found to be weed infested and silted. Because of recurring deposition of silt, the bottoms of these water units often dry up during the summer and the water units overflow during the monsoon.

Table - 7.IV

Percentage Distribution of the Number of Units and Area operated by individual Private Agency by size class of water Units

Size class of water units (Acre)	Percentage of the number of water units	Percentage of the area under the water units
Up to 0.09	40.50	9.50
0.10-0.19	32.50	12.40
0.20-0.49	20.60	23.60
0.50-4.99	6.20	41.00
5.00 and above	0.20	13.50
Overall	100	100

Source : Field Survey, 1988

It is observed from the Table 7.IV that more than 90 percent of individual private operations are generally carried on in the small water units whose water area does not exceed 2 acres and most of the water area are under the small units. The fish farmers and fishermen depend mainly on the small units for their fishery activities and also for their livelihood.

Table - 7.V

Percentage Distribution of the Number of water Units and their area by size-class with Number of operators per water unit for joint private operations

Size-class of water units (Acres)	Percentage of the number of Units	Percentage of the area under the water units	Number of operators per water units
Upto 0.90	22.5	10.50	4
0.10-0.19	8.40	11.80	8
0.20-0.49	23.50	26.20	7
0.50-4.99	34.10	30.00	10
5.00 and above	11.50	21.50	30
Overall	100	100	

Sources: Field Survey, 1988

From the Table 7.V it is evident that in case of joint private operation the size of the units increases generally with the increase in the number of operators. Of course there are some exceptions. The average number of operators is not more than 7 for the water units below 2 acres; but the average number of operators (Per Unit) increases even to 30 when the unit size becomes 5 acres and more.

Table - 7.VI

Comparative productivity and revenue of rice cultivation and fish farming of W.D. district during 1987-88

Crop	Production per hectare (Kg.)	Revenue from Sales proceeds (Rs.)	Total Cost (Rs.)	Net Revenue (Rs.)
Rice	1103	5,515	1500	4015
Fish	420	7,560	2400	5160

Source: Field Survey, 1988

From the Table 7.VI it is apparent that in West Dinajpur district the net revenue coming from the principal agricultural crop (Rice) is less than the net revenue from fish farming; yet the agricultural occupation (mainly rice cultivation) has been considered here the principal occupation leaving the fishery occupation as a secondary one because of the high risk factor due to biological and environmental hazards, envisaged often in the fisher sector⁽²⁾.

The net revenue shown in Table 7.VI is considered when the land or water area is owned by the cultivators or fish farmers. If the land for cultivation of rice and water area for fish farming are taken on lease then the amount of net revenue will reduce to the extent of Rs. 1000 on average for both the crop.

There is another type of fish farming found in the district where a farmer is doing his activities as fisheryless labour and receives Rs. 30 as remuneration per day for his days work. Here the maximum benefit goes in favour of the owner of the water area and the owner of the water area controls the whole production and marketing procedures and exploit the farmer's potentiality for his own interest.

Sometimes ponds and tanks are owned by the farmers or taken on short or long-term lease basis from the owners of the water units. The majority of the water units are owner operated. A small number of units is leased in by the farmers. For this, the leased operated water areas are comparatively smaller than the owner operated water area.

The reasons for giving extra weight on the owner-operated water units than on leased water units are like the following: (i) self cultivation is considered by the owner a more paying proposition with the advent of new technology of intensive fish culture. (ii) A series of tenancy legislations have been passed in different years which give more rights to the tenants that lead the owner towards becoming more apprehensive of losing the occupancy right in their leased out water units⁽³⁾.

It is undeniable that the FYDA Programmes have helped to increase the production level and benefited the farmers by promoting and intensifying fish culture in the district under consideration i.e., West Dinajpur. But till the recipients of technology or other assistance can be circumscribed by some factors which may impede, to some extent, the further growth of production. The non-FYDA beneficiaries are also facing some socio-economic constraints.

In view of the above considerations, we purposively selected two villages where both FYDA and non-FYDA beneficiaries co-existed.

There were 7 FYDA beneficiaries who received assistance of some kind and 24 operators who did not receive any assistance from any source. The objective here is to examine their perception of the factor hindering higher yield.

The operators were asked through an open ended questionnaire to indicate the factors which, according to them, were responsible for unsatisfactory yield and rank these factors according to their degree of importance. The factors ranked 1,2,3,4,5,6,7,8,9,10 were given weights 10,9,8,7,6,5,4,3,2,1 respectively. The total rank score for each factor, obtained by multiplying the frequency of the factors was ranked 1st, 2nd, 3rd and so on with the respective weightage and adding them up. The factors were then arranged in the ascending order of importance on the basis of total rank score and finally ranked. The total rank score has been given in the parentheses against each item in the following Table 7.VII.

Table - 7.VII

Comparative statement of FFDA and Non-FFDA Beneficiaries

Problem Areas	FFDA Beneficiaries	Non-FFDA Beneficiaries
1. Lack of easily available sufficient finance in time	2 (65)	1 (179)
2. Plurality of ownership: absentee ownership	5 (52)	2 (174)
3. Erratic supply/inadequate availability of quality fish seeds by fry fingerling in time.	1 (75)	5 (144)
4. High cost of inputs	4 (58)	4 (153)
5. Adulteration in inputs	6 (52)	6 (138)
6. Lack of technical knowledge, training and supervision	9 (20)	7 (124)
7. Lack of contact with extension personnel	10 (19)	9 (99)

Contd..

Table - 7.VII (Contd..)

Problem Areas	FFDA Beneficiaries	Non-FFDA Beneficiaries
8. Lack of arrangement for soil and water testing at farm level, netting facilities	7 (30)	10 (87)
9. High Price Spread	8 (29)	8 (105)
10. Poaching, theft by unauthorised persons	3 (59)	3 (160)

It is evident from the Table 7.VII that lack of finance was recognised as the most important deterrent factor by all operators (Rank 2 by FFDA beneficiaries and Rank 1 by non-FFDA beneficiaries). They were also concerned with the sufficient amount of credit to be released on time and available easily. The operators also perceived the assured supply of quality fish seed at reasonable prices at the time of rearing as an important problem (Rank 1 by FFDA beneficiaries; Rank 5 by non-FFDA beneficiaries). Multiple ownership also emerged as a problem. The non-FFDA operators ranked it second; while, FFDA beneficiaries fifth. Adulteration in inputs was recognised by both categories of operators and ranked sixth by both FFDA and non-FFDA beneficiaries.

Table - 7.VIII

Percentage Distribution of different Types of operators adopting Modern Cultural Practices during the years 1983 and 1988 by size-classes

Size-class of water units (acre)	Percentage of the sample farmers (trained and received financial assistance) adopted practices		Percentage of the sample farmers (trained, but not received financial assistance) adopted practices	
	1983	1988	1983	1988
Upto 0.09	10	18	11	15
0.10-0.39	5	27	10	8
0.40-0.99	13	32	9	15
1.00-4.99	12	30	2	17
5.00 and above	9	17	4	16
Overall	12	28	7	17

Size-class of water units (acre)	Percentage of the sample farmers (untrained but received financial assistance) adopted practices		Percentage of the sample farmers (untrained and not received financial assistance) adopted Practices	
	1983	1988	1983	1988
Upto 0.09	15	19	1.50	8
0.10-0.39	7	15	0.50	10
0.40-0.99	11	12	1.50	13
1.00-4.99	6	10	0.50	7
5 and above	4	8	1.00	6
Overall	9	15	2.10	8

Source: Field Survey

The Table 7.VIII provides an overview of the trend with regard to adoption of practices in the district of W.D. by size-classes of operators, trained and untrained and receiving and not receiving Government assistance (including assistance of the 'World Bank Project'). The first impression obtained from these data is of significant differences between the trends over time by the trained who received government assistance and those untrained who did not receive government assistance. In the former case, the percentage of operators of the water units of different size-classes adopting the package comes to 12 percent and 28 percent in 1983 and 1988 respectively indicating thereby that the pace of adoption is not satisfactory. As against this, only 2.10 percent and 8 percent of the operators (untrained and who did not receive government assistance) have so far used package of practices in 1983 and 1988 respectively. Another interesting feature that emerges is that as against 17 percent of the total number of operators (trained but not receiving Government assistance) under the package, the overall percentage of the number of operators (untrained but received assistance) under the package is as high as 15 percent in 1985. It can safely be asserted that the package of practices has appealed to some extent only to those operators who are trained and backed by sufficient financial assistance by way of loan with or without provision for subsidy.

The Table 7.VIII also makes an interesting reading as far as a comparison of the level of adoption by size-classes is concerned. In the cases of all types of operators, it will be noted that adoption of modern cultural practices is the highest in the size-classes 0.40-0.99 acre and 1.00-4.99 acres and there has been no change in the situation over the years. It is clear that the package of practices does not have the same appeal to

operators with very small and large water units.

The new technology is scale neutral, no doubt; but two problems arise with the farmers in this context, one as a proposition involving ^{higher cost per acre and second, as a proposition involving} more working capital than usual. In this context, there arises the question of financial support necessary to internalise the external economies. The Government of West Bengal through 'Fish Farmers Development Agency' has made arrangements for the schemes of "WBAIFP" for giving loans and subsidies to adopt modern intensive fish culture.

The following Table 7.IX gives the distribution of operators for whom assistance is needed by type of assistance needed.

Table - 7.IX

Percentage Distribution of the Number of operators for which Assistance is needed by type of Assistance.

Type of Assistance	Percentage of the number of Operators	
	1985	1988
Finance	86.00	84.00
Technical advice or services	12.50	16.00
Supply of spawn/Fry and other materials	5	10

Source: Field Survey

From the Table 7.IX it is clear that finance is the most important type of assistance needed in the years. Technical advice or services is another type of assistance which 12.50 percent and 16 percent of the operators desired to obtain in 1985 and 1988 respectively. The other types of assistance which the operators desired to obtain, though in a very small proportion, are supply of inputs and arrangements for different infrastructural facilities.

But unfortunately it is revealed from the following Table 7.X that only a small portion of operators have received government assistance (including assistance of the World Bank Project). That is, only 5 percent and 10 percent of all the operators have enjoyed the benefits of government assistance in 1985 and 1988 respectively.

Table - 7.X

Percentage Distribution of the Number of operators according to Government Assistance Received

	Percentage of the number of operators	
	1985	1988
Government Assistance Received	5	10
Government Assistance not received	95	90

Source: Field Survey

The FFDA programme aims at making a two prolonged attack on the problem : renovation of the semi-derelict/derelict water areas to make them suitable for fish farming and increase in yield rate through introduction of modern scientific fish farming technology. One implicit purpose of the programme is to assist the socially and economically backward communities by helping them in increasing fish production in their existing culturable tanks or in renovated tanks through adoption of modern fish farming technology. Average water areas (acres) operated by SC, ST and Non-SC/ST farmers of four districts namely Bankura, Burdwan, Nadia and West Dinajpur district under FFDA programme are as follows:

Table - 7.XI

Average water Area operation (in acre)

District	SC	ST	Non-SC/ST
Bankura	1.86	0.41	1.14
Burdwan	2.33	0.97	1.39
Nadia	0.70	N.A.	2.09
West Dinajpur	0.94	0.71	0.78

Source: Survey, Indian Statistical Institute, Calcutta, 1990.

Comparing the figures, that appear in Table 7.XI with overall average water area operated by all farmers in the four districts, 1.62, 1.68, 0.72 and 0.77, it is to be noted that in all districts small fish farmers belonging to the ST community have received assistance under the FYDA programme⁽⁴⁾. In all other cases, the average water area under the programme is close to or higher than the overall average. Therefore, in the absence of the distribution of fish farmers by operated water area, it cannot be concluded whether small fish farmers or fish farmers of any particular social group have received preferential assistance under the programme and increase their operated water area.

Table - 7.XII

Percentage of farmers with monthly per capita expenditure

≤ Rs. 250

District	SC	ST	Non-SC/ST
Bankura	98.50	100	88.22
Burdwan	87.90	100	78.70
Nadia	83.59	NA	68.53
West Dinajpur	91.24	95.70	74.97

Source: Survey, Indian Statistical Institute, Calcutta, 1990.

These figures, which appear in Table 7.XII clearly indicate that economically poorer sections from all social groups have received assistance under the programme. In addition to this it is to be noted from the Table 7.XII that the average number of farmer is almost the same for all the four districts. Thus distribution-wise also, the benefits of the programme have been quite uniform.

If the level of education is considered, it is found that a large portion of the SC farmers are literate, ST farmers are slightly less so and almost all the non SC/ST farmers are literate ⁽⁵⁾.

Considering occupationwise, most of the poor beneficiaries have as their principal occupation agricultural activities (whereas a small percentage have their principal occupation in fishing/ fishery and educationally the former occupational group is more advanced than the latter ⁽⁶⁾).

The occupation-wise distribution of farmers demonstrate that the water areas operated by the farmers are not large enough to generate major share of the farmer's income ⁽⁷⁾.

It would be interesting to explore the reasons why the operators have not received Government assistance. The Table 7.XIII gives the percentage distribution of such water units by the reasons why they did not receive any assistance.

Table - 7.XIII

Percentage Distribution of the Number of operators not receiving Financial Assistance (Govt.) by Reasons in 1987-88

Reasons for not receiving Government Assistance	Percentage of the number of operators	Water area acre
1. Did not require	5	1.50
2. Did not know	50	8.00
3. Did not try	40	9.50
4. Tried but did not get	5	1.00
TOTAL	100	20

Source: Field Survey

It is clear from the Table 7.XIII that 40% of the operators did not try to get assistance; 50% of the operators did not know, which cover the maximum water area of 17.50 acre i.e. 87.5% of the total area (20 acres) considered for sample water area and only small portion of operators (5%) did not require and 5% tried but did not get which cover only 12.5% of the total water area.

From this, it is proved that one of the important deterrent factors i.e., 'lack of assistance' in fish farming does not always solely depend on the Government department and its agencies, as it is seen from the Table 7.XIII that 40% of the operators did not try to obtain the advantage and 50% of the operators did not know-how to obtain the facility; for which the Government is partially responsible i.e., for the lack of publicity of the 'technical know how' of modern fish farming methods along with disbursement of financial assistance made by the Government. But most operators of the district of West Dinajpur who did not obtain the Government assistance, the main reasons being that are unconsciousness, unawareness and illiteracy of the operators, these being inheritance factors.

In conclusion, it is found that the fishermen of West Dinajpur district are economically very poor and are deprived of by the local zamindars, owners of the water units and middlemen of the fish markets. They became the victim of the society in an anachronistic way. Since the 'First Five Year Plan' 1951, the fishery got an importance in view of the contribution it can make towards the rural economy of the district, and, so get a thrust from 1980-81, with the arrival of 'World Bank Assisted Inland Fisheries Project'.

It is observed that individual private operation and joint private operation are the major operations for pisciculture which cover the maximum water areas of the district, whereas the

Co-operatives and Fish Production Groups (FPG) are not doing so well with operating a minimum water area of the district. The Co-operatives and FPGs have been given less importance in the process of eradication of rural poverty.

Maximum number of owner-operated water units are small in size (less than 0.50 acre) and covers 4% of the total operated water area and large number of water units are acquired by the operators through inheritance which leads eventually to multi ownership of the units and the water units are converted into derelict and become weed infected. It is also found that in joint private operation the size of the water unit increases with the increase in the number of operators. The principal occupation of this district has been considered the agricultural occupation in spite of potentiality of having better net revenue from the fish farming, taking into consideration the risk factor of this occupation (fish farming). Another characteristic is that the owner operated water area is bigger than that of the lease operated water area which is mainly due to the apprehension of the owner for losing the occupancy right of the owner in the leased out water units.

Operators have to face problems like lack of finance, inadequate supply of fish seed, high cost of inputs, peaching etc. The trained operators get advantage of adopting the modern fish farming method. Though finance is the most important factor for this package of practice yet only a small portion of operators are lucky enough to get the financial assistance.

In spite of having better scope of assistance of the S.T. farmers, the farmers belonging to S.T. communities operate a minimum water area for the purpose of pisciculture. Although the average number of poor farmers with monthly per capita expenditure \leq Rs. 250 belonging to all social groups is almost uniform, with a

minimum operated water area of the S.T. farmers and the uniformity
 → in the number of fish farmers belonging to all social groups (SC/ST and non-SC/ST). ST farmers have to face the problem of multioverownership of unit water area more than the farmers of other communities. It is a fact that maximum number of the farmers do not obtain the assistance of the Government for the pisciculture (for which they are also responsible, as most of them are illiterate, unconscious and unaware of the fishery programme) and the operated water areas are not sufficient to contribute a major share towards their total income.

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CHAPTER - 8

CONCLUSION AND SUGGESTIONS

To conclude and sum up this thesis, it can be mentioned that Japan, USA, China, Canada, Russia, Norway, Peru, South Korea and India dominate the fish production (mainly marine) of the world. USA, EEC Countries, Canada, Korea Republic and Iceland dominate the export of fish in the world and EEC Countries, Japan, USA dominate the import of fish.

To the inland fish production of the world India contributes 40% of its total catch which demonstrates the importance of inland fish culture in India's economy. In India average growth rate in marine fisheries is higher than that in the inland fisheries. Inland fisheries need more capital investment and mechanisation than what it gets at present. The States of West Bengal, Kerala, Andhra Pradesh, Tamil Nadu, Karnataka, Maharashtra and Gujarat produce the major portion of fish (marine and inland) in India and West Bengal produces the highest portion of fish in the country with the highest average growth rate in respect of inland fisheries.

The 'World Bank Assisted Inland Fisheries Project' (WBAIFP) was sanctioned by the 'International Development Authority' and was introduced in the States of West Bengal, Bihar, Orissa, Uttar Pradesh and Madhya Pradesh since 1980 to gear up the inland pisciculture in India.

Fishery sector of India contributes 2.40% to the GDP originating from agriculture, forestry, logging, fishing, mining and quarrying and it serves as a developmental agent towards the country's economy by —

- a) increasing food production and raising the nutritional standard of the population.

- b) ensuring welfare of the fishermen community.
- c) generating income and employment.
- d) maximising foreign exchange earnings through export of fish and fish products.
- e) increasing the commercial activities within the country.

In Bengal, since 1794, the then Government initiated measures for the development of pisciculture though the fishery activities got not much emphasis before the launching of 'Five Year Plans' of the country on and from 1951. The "WBIAIF" started in West Bengal in 1960 to continue for a period of eight years with the intent to utilise the resources for pisciculture in an intensive way. About 15.03% of total culturable water area had been covered for pisciculture under the "WBIAIF" during the period 1960-61 to 1967-68; 40% of total culturable water area of West Bengal had been covered for pisciculture under different schemes during the period 1951 to 1968.

Major portion of fish produced in West Bengal comes from "South Bengal districts" and the yield (i.e., production per acre of water area) of fish in that part of the State is also higher than the yield made by the "North Bengal districts". The West Dinajpur district (N.D.) of "North Bengal" also has a good prospect of pisciculture even taking into consideration the better scope and prospect in "South Bengal districts".

The pisciculture in N.D. district served as a measure for rural development through technological innovation, decentralisation policy and tying up of the fishery schemes with IDDP, SCP and TSP and evoked much response from the small and marginal farmers as well as general farmers because of the lucrative subsidy element. It has also helped in the alleviation of rural

poverty which is a primary constraint of this district.

Pisciculture activities of the district of M.D. started officially by the Government since 1951 through the introduction of the "First Five Year Plan" of the country. Fishery activities got a thrust with the introduction of the "WBAIFP" in 1966. Under the WBAIFP, during the eight years i.e., from 1966-67 to 1973-74, 36.27% of the water areas (Culturable and semi derelict) of the district had been covered and 103.35% of the target water areas had been achieved. The management was found inefficient in respect of achieving the volume of water area for culture of fish in the institutional sector. The management could not convince the fish farmers of the district about the importance of achieving more and more water areas in spite of receiving benefits of "WBAIFP" in the institutional sector mainly. Selection of beneficiaries of "WBAIFP" was also made arbitrarily, with little reference to objective conditions. The allotted sum for the culture of fish in the district had not been distributed among the beneficiaries in full and in time, which also disclosed the inefficiency of the management. However, repayment of loan (specially short term loan) by the farmers of the "WBAIFP" was satisfactory.

The unsatisfactory performance in the pisciculture of the district of M.D. is attributed mainly to absence of rational management, Judicious exploitation and utilisation of resources. Besides there are other developmental problems.

It has also been observed that the demand for fish in the long period and short period was inelastic. But the supply of fish in the long period in the district was elastic. Whereas in the short period the supply was inelastic.

In the long period consumers spent their additional income on fish for want of suitable substitutes. In the short period the consumers were sticky in their consumption of fish. The fish sellers had more control over the fish market of the district in the long period than in the short period.

In the district of W.D. marketing of fish is done mainly by the middlemen in the organised markets at towns and a major portion of fish is sold in the rural markets or at site of catch at cheaper rates for want of proper marketing infrastructure. The middlemen create artificial scarcity leading to black marketing and they also prevent direct and close touch between the producer and the consumer.

Several factors such as their low social status, poor economic condition, illiteracy, heavy dependence on the middlemen, traditional fishing equipment and methods of fishing influence the socio-economic conditions of fishermen of the district of W.D. Schemes with specific objectives to improve the socio-economic conditions of fishermen were initiated only right from the beginning of the "First Five Year Plan", 1951. It has been further backed by the "NSAIFP", 1960 and the fishery (including pisciculture) got an importance in view of the contribution it can make towards the development of the rural economy of the district of W.D.

One potent fact cannot be overlooked at this stage. As an administrative measure, taking into account various considerations, the district of West Dinajpur was bifurcated in 1992 leading to the emergence of two separate districts, namely, Uttar Dinajpur and Dakshin Dinajpur. But this fact does in no way affect the value of this thesis or the applicability of its findings, opinions or suggestions. What applied to the achievement of pisciculture in West Dinajpur, applies, regarding the achievement in pisciculture activities in Uttar and Dakshin Dinajpur

districts, considered block by block. Placing the two new districts vis-a-vis with the original one, i.e., West Dinajpur, it will be seen that Uttar Dinajpur consists of 9 blocks, namely, Raiganj, Kaliyaganj, Hantabad, Itahar, Karandighi, Goal Pokhar-I, Goal Pokhar-II, Islampur and Chypa and Dakshin Dinajpur consists of 7 blocks, namely, Balurghat, Kumarganj, Hili, Gangarampur, Tapan, Banshihari and Kushmandi which belonged to the erstwhile West Dinajpur district.

It is observed from the assessment of the thesis that the achievement of pisciculture activities of the blocks of 'Dakshin Dinajpur district (created in 1992) as a whole was better and more result oriented than in the blocks of 'Uttar Dinajpur district (created in 1992). The achievement in almost all the blocks of Islampur Sub-Division (now within the 'Uttar Dinajpur district') was very poor. And the blocks like Balurghat, Kumarganj, Gangarampur, Tapan of Balurghat Sub-Division (now within the 'Dakshin Dinajpur district') and Raiganj, Hantabad, Kaliyaganj of Raiganj Sub-Division (now within the 'Uttar Dinajpur district') performed better than the other blocks of the two districts.

Suggestions to improve the Pisciculture of the district of West Dinajpur (W.D.)

Some measures may be suggested to solve the various problems faced by pisciculture in the district of West Dinajpur.

A 'close season' from March to May, the breeding season of fish, should be observed for all fish or any particular kind of fish for protection of breeders.

Kind of nets and size of mesh to be used by the fishermen and their mode of operation should be prescribed by the experts to protect the destruction of breed and immature fishes in all water areas.

The capture and sale of spawn for consumption should be prohibited.

Damming of any flowing river and canal without providing for suitable types of fish passes should be prohibited.

To prevent harmful effect of insecticides and pesticides, detrimental to fish life, use of these crop protection measures in the agriculture fields should be forbidden from June to September, if required, through a suitable legislative measure.

Jute-retting should be restricted within the areas specified for the purpose.

Over fishing should be prohibited.

Legislative measures should be taken to prevent pollution of water through industrial wastes.

Long term lease arrangements in pisciculture should be given much importance not only to increase production but also to provide a full time avocation or employment to the unemployed rural youth.

In case of disturbed multi owned pond it should be leased out to a person/persons among the share-holders who will guarantee the production of the targetted quantum, other share-holders will get their shares according to the target. Excess production will be accounted as profits by the person/persons who will take the responsibility for its management as entrepreneurial reward and loss, if any, will be borne by them as a guarantee against negligence.

If a tank or pond is found wholly or partly, unutilised for a certain period due to multi ownership problems, the Government may take it over and give it to a cultivator who intends to cultivate it.

Attempt should be made to build up pituitary banks with quality control machinery necessary for breeding both Indian and exotic carps.

An organised way of exploitation, transportation and marketing should be evolved so that fishes are harvested at regular intervals and earn an "optimal" revenue by sale of fish throughout the year. Bulk landings of fish at a time should be discouraged.

The fishery programmes should be area or community specific taking into account the different development potentials as well as constraints of each area or community.

Many operators of the water units are not aware of the assistance under various schemes. Macro level policy decisions do not percolate to the micro-level units. There is need for publicising the various benefits available to the fish farmers.

A constant watch and evaluation of the physical and financial benefits accruing to the beneficiaries will help to protect the unutilisation of funds and other resources of pisciculture. The subsidy amount may be deposited as fixed deposits in the beneficiaries account and this could be adjusted after the completion of the repayment by the borrowers. However, the benefit of subsidy should be linked with the timely repayment.

Closer supervision and follow-up action are needed, to ensure proper end-use of credit.

Real investment should be backed by adequate infrastructural facilities so that potential income can be translated into the actual one.

The asset acquired with credit should generate incremental income which is sufficient to pay back the loan along with interest and still leave adequate surplus.

The number of staff to administer the fishery programmes should be adequate as the extension service system plays a significant role in the increase of production of fish.

Mixed farming i.e. fish culture and other allied activities like mulberry plantations, animal husbandry, poultry farming, dairy husbandry, piggery etc on the embankment of the tank may be considered for better viability of the pisciculture scheme. These will provide basic nutrients to water which also help in maintaining the food chain of the fish.

Basically loan should be granted to trained farmers and there should be a 'crash programme' to train the remaining farmers to receive the benefits of loan. This will help to achieve optimal utilisation of both financial and human resources.

More village-based co-operatives and Fish production groups should be set up and existing ones should be reformed. Co-operative stall should be made in the blocks to sell the fish (produce of the farmers) to the general customers at reasonable prices. Educationists are needed to educate most of the illiterate members of the co-operative and FPGs.

Free style urbanisation should be stopped by taking legislative measure.

Every block and sub-division should be given proper weightage for reaching the benefits of 'WBAIFP' to the farmers

according to the potentiality or resources of the very block and sub-division.

Short term lease arrangement with short term loan should be discouraged wherever possible because the farmers often do not make themselves sufficiently responsible for this type of arrangement and also it does not provide the farmers for long time employment.

Research and development activities should be started to improve the condition of pisciculture in the district.

However, traditional fishery (both culture and capture) should continue along with the improved methods of pisciculture through the 'WBAIFP' in the district of M.D. and some sort of technical know-how and training for culture and capture fishery for the farmers and fishermen in the traditional fishery may be arranged in the district of M.D. with a view to increase the ultimate production of fish and to engage huge numbers of unemployed Youth as means of the development of the district of M.D. It is believed that if the suggested measures are accepted by different sections like bureaucrats, farmers, Government, common people and bankers, this district may produce unique result in respect of pisciculture for the benefit of its people.

The study attempts within its limited scope to present an integrated and comprehensive analysis of the pisciculture activities in the M.D. district. Just one study can not be sufficient to fill all the gaps in our knowledge about the pisciculture. It constitutes an important element in the rural economy in spite of the various problems faced by the pisciculture in the recent times.

At the same time, it faces a number of problems. Justice will be done to it, if only further research to examine its other dimensions is carried on. The present work hints at the field that requires further in-depth treatment. Some aspect of the pisciculture of the district of W.D. covered in the present study may provide basis for further research. In conclusion, the pisciculture face multidimensional problems and play crucial role in the economy of a backward area. The solution of this problem may help to develop the economy of this backward region in a meaningful way.

: **ANNEXURES:**

Appendure - I

**Impounded W/A cultured in different districts with
respective production and yield (IFP and Others)**

Name of the District	Total fish cultured water area	Production of fish	Yield
	Acre	Quintal	Quintal per Acre
Cooch Behar	4,587	10,871.19	2.37
Darjeeling and Jalpaiguri	20,187	47,237.58	2.34
West Dinajpur	14,004	33,889.68	2.42
Malda	9,486	25,991.64	2.74
North Bengal (Total)	48,264	1,18,246.80	2.45
Murshidabad	16,886	35,798.32	2.12
Nadia	7,136	12,559.36	1.76
24 Parganas (North)	34,294	1,35,804.24	3.96
24 Parganas (South)	20,453	81,812	4.00
Howrah	5,608	16,487.52	2.94
Hooghly	16,153	32,306	2.00
Burdwan	30,861	74,066.40	2.40
Birbhum	17,063	36,856.08	2.16
Bankura	22,425	87,906	3.92
Purulia	51,273	95,367.78	1.86
Midnapur	36,793	1,45,700.28	3.96
South Bengal (Total)	2,58,945	7,54,663.98	2.91
Grand Total	3,07,209	8,72,910.78	2.84

Source: Directorate of Fisheries, Govt. of W.B. (1984-85)

ANNEXURE - II

Impounded W/A cultured under World Bank Assisted Inland Fisheries Project with their respective production and yield (Figures for 1987-88)

Districts	Fish cultured W/A under WBAIFP Acre	Production of Fish Quintal	Yield Quintal per Acre
Cooch Behar	402.70	2015.50	5.00
Jalpaiguri	90	447.12	4.97
Darjeeling	NA	NA	NA
West Dinajpur	2254.58	13476.07	5.98
Malda	1191.20	7313.97	6.14
North Bengal (Total)	3938.48	23252.66	5.90
Murshidabad	NA	NA	NA
Birbhum	1274.10	6306.79	4.95
Nadia	653.85	3203.87	4.90
Burdwan	5396.20	33726.25	6.25
Howrah	708.80	4309.50	6.08
Midnapur	6836.92	43893.03	6.42
Bankura	3409.90	21141.38	6.20
Purulia	NA	NA	NA
Hooghly	1026.30	4946.77	4.82
24 Parganas (North)	1900.80	12355.20	6.50
24 Parganas (South)	2561.35	16776.84	6.55
South Bengal (Total)	23768.22	146659.63	6.17
Grand Total	27706.70	169912.29	6.13

Source: Directorate of Fisheries, Govt. of W.B.

Annexure-III

Distribution of Production (WBAIFP)

Year	Balurghat Sub-Division				Raiganj Sub-Division			
	Water area achieved acre	Production	Yield per acre	Sales Proceeds	Water Area achieved acre	Production	Yield per acre	Sales Proceeds
		Qtl.	Qtl.	Rs.		Qtl.	Qtl.	Rs.
1980-81	57.50	327.17	5.69	3,27,170	61.25	330.48	5.40	3,30,480
1981-82	97.30	547.38	5.63	6,56,856	87.50	451.60	5.16	5,41,920
1982-83	147.50	811.89	5.50	9,74,268	161.65	796.15	4.93	9,55,380
1983-84	727.50	4227.36	5.81	59,18,304	732.90	3916.50	5.34	54,83,100
1984-85	878.463	4848.64	5.52	67,88,096	880	4793.02	5.45	67,10,228
1985-86	882.50	5499.69	6.23	87,99,504	898.09	4895.22	5.45	78,32,352
1986-87	855	6393.31	7.48	1,15,07,958	786.25	4470.60	5.69	80,47,080
1987-88	1035	6476.75	6.26	1,16,58,150	923.58	5509.33	5.97	99,16,794
1980-88	4680.763	29132.19	6.22	4,66,303,06	4531.22	25162.90	5.55	3,98,17,334

Year	Telampur Sub-Division				West Dinajpur District			
	Water Area achieved acre	Production Qtl.	Yield Per acre Qtl.	Sales Proceeds Rs.	Water area achieved acre	Production Qtl.	Yield Per acre Qtl.	Sales Proceeds Rs.
1980-81	12.50	57.78	4.62	57,780	131.25	715.43	5.45	7,15,480
1981-82	35.93	156.83	4.36	1,88,196	220.73	1158.42	5.24	13,85,977
1982-83	48.50	244.29	5.04	2,93,143	357.65	1852.33	5.19	22,22,796
1983-84	255	1424.35	5.59	19,94,090	1715.40	9568.21	5.58	1,33,95,494
1984-85	276.90	1388.26	5.01	19,43,564	2035.363	11029.92	5.42	1,54,41,888
1985-86	232.50	1124.80	4.75	17,67,680	2013.09	11499.71	5.71	1,83,99,536
1986-87	250	1253.57	4.18	22,56,426	1891.25	12,117.48	6.41	2,18,11,464
1987-88	296	1489.99	5.03	26,81,982	2254.58	13,476.07	5.98	2,42,56,926
1980-88	1407.33	7119.87	4.89	1,11,82,866	10619.313	61,414.96	5.78	9,76,30,506

Source: FFA, Balurghat, W.D.

Source of finance for culture of Fish (WBAIFF)

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Balurghat Sub-Division						Raiganj Sub-Division				
Year	W/A. achieved acre	Total cost Rs.	Bank credit & Indiv. Inv. Rs.	Subsidies FFDA, DRDA, SEP, TSP Rs.	Cost Per acre Rs.	W/A. achieved acre	Total cost Rs.	Bank Credit & Indiv. Inv. Rs.	Subsidies FFDA, DRDA, SEP, TSP Rs.	Cost per acre Rs.
1980-81	57.5	1,58,865	1,22,166	36,699	2762.87	61.250	1,44,180	1,12,069	32,111	2353.96
1981-82	97.3	2,48,267	2,31,740	55,427	2551.56	87.500	2,17,255	1,71,899	45,356	2482.91
1982-83	147.5	3,84,495	2,93,220	91,275	2606.75	161.650	4,07,155	3,09,777	97,378	2518.74
1983-84	727.5	28,61,441	19,99,221	8,62,220	3933.25	732.913	23,90,182	17,77,723	6,12,459	3261.21
1984-85	878.463	30,72,766	19,31,915	11,40,851	3497.89	880	29,15,164	20,09,103	9,06,061	3312.69
1985-86	882.5	46,06,899	28,59,739	17,47,160	5220.28	898.085	42,14,000	26,77,525	15,36,475	4692.21
1986-87	855	49,71,462	28,74,692	20,96,770	5814.58	786.250	36,00,263	21,77,943	14,22,320	4579.83
1987-88	1035	57,87,365	34,01,215	23,86,150	5591.66	923.575	43,90,620	26,22,672	17,67,948	4753.94
1980-88	4680.763	2,20,91,560	1,36,75,008	84,16,552	4719.65	4531.223	1,82,78,819	1,18,58,711	64,20,108	4033.97

Islampur Sub-Division						West Dinajpur District				
Year	W/A. achieved acre	Total Cost Rs.	Bank Credit & Indiv. Inv. Rs.	Subsidies FFDA, DRDA, SEP, TSP Rs.	Cost per acre Rs.	W/A. Achieved acre	Total cost Rs.	Bank Credit & Indiv. Inv. Rs.	Subsidies FFDA, DRDA, SEP, TSP Rs.	Cost per acre Rs.
1980-81	12.50	28,955	22,665	6,290	2316.4	131.25	3,32,000	2,56,900	75,100	2529.52
1981-82	35.925	86,478	69,361	17,117	2407.18	220.725	5,52,000	4,34,100	1,17,900	2500.84
1982-83	48.50	1,08,350	83,951	24,399	2234.02	357.65	9,00,000	6,86,948	2,13,052	2516.43
1983-84	255.001	7,48,377	5,75,256	1,73,121	2934.80	1715.414	60,00,000	43,52,200	16,47,800	3497.70
1984-85	276.90	8,12,270	6,10,032	2,02,238	2933.44	2035.363	68,00,200	45,51,050	22,49,150	3341.02
1985-86	232.50	9,81,390	6,42,690	3,38,700	4221.03	2013.085	98,02,289	61,79,994	36,22,335	4869.29
1986-87	250	11,69,150	7,26,800	4,42,350	4676.60	1891.25	97,40,875	57,79,435	39,61,440	5150.50
1987-88	296	13,73,315	8,11,413	5,61,902	4639.58	2254.575	1,15,51,300	68,35,300	47,16,000	5123.49
1980-88	1407.326	53,08,285	35,42,168	17,66,117	3771.89	10619.312	4,56,78,664	2,90,75,887	1,66,02,777	4301.47

Source : FFDA, Balurghat W.D.

N.B.: Total Cost = Total cost of culture of Scheme of WBAIFF

Net Revenue of Culture of Fish (WBAIFP)

Year	Balurghat Sub-Divn.	Raiganj Sub-Divn.	Islampur Sub-Divn.	W. D. Dist- ict	Balurghat	Kumarganj	Hili	Gangarampur	Tapan	Banghihari
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1980-81	2927.04	3041.63	2306	2921.37	3369.60	2212.27	2322.29	4056.73	2232.87	3157.60
1981-82	4199.27	3710.46	2831	3782.78	4689	3851.50	3188.47	4621.93	4087.26	4385.94
1982-83	3998.46	3391.43	3810.22	3698.58	3439.60	3903.47	3685.84	4816.80	3846.46	3825.89
1983-84	4201.87	4220.11	4885.15	4311.21	2958.07	3762.07	4210.93	4681.04	4852.98	3402.70
1984-85	4229.35	4312.57	4085.57	4245.77	4193.13	4918.80	4899.98	4670.59	3276.79	3828.72
1985-86	4750.83	4028.94	3381.89	4270.67	4321.49	4529.82	4787.08	4997.36	5005.81	3683.52
1986-87	7645.02	5655.73	4349.10	6382.33	5690.53	5959.71	5289.34	9232.85	9127.70	5723.45
1987-88	5672.26	5983.43	4421.17	5635.47	5587.76	5244.59	5884.33	6578.39	4505.64	5110.56
1980-88	5242.47	4753.36	4174.27	4892.20	4619.32	4893.61	4874.80	6027.83	5124.75	4234.65

Year	Kushman- di	Kaliyag- anj	Hemtabad	Itahar	Raiganj	Karandighi	C. P. I	C. P. II	Islampur	Chopra
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
1980-81	3670.90	3625.33	2886.40	2419.68	2533.14	2915.43	-	-	-	884.00
1981-82	4749.73	4040.80	3470.50	2212.40	3068.17	2815.20	2683.80	3303.73	3024	2330.57
1982-83	3101.17	2919.76	3643.30	3298.93	3471.63	4279.20	2734.91	4146.60	4323.60	3629.33
1983-84	4860.81	4187.82	5153.10	4499.68	4035.53	5914.42	4375.71	4848.80	4883.10	4041.84
1984-85	4082.36	4865.28	3305.47	4713.65	4815.58	5543.70	4610.78	2877.29	3732.08	3513.80
1985-86	3366.36	4848.14	3453.68	5011.75	3996.46	3611.61	3396.49	3794.55	3091.30	2437.93
1986-87	4955.28	7316.29	3439.41	5254.29	6552.28	3129.19	5442.02	5287.70	4855.10	3440.75
1987-88	4689.56	6984.95	5863.10	4918.76	8231.02	3796.44	3156.11	5192.64	4621.36	5508.28
1980-88	4301.64	5449.29	4254.48	4773.16	5487.05	4282.19	4055.33	4337.11	4275.31	3829.86

Source :- FFDA, Balurghat, W. D.

N. B. In the computation of Net Revenue, Total cost does not include interest on loan, lease rent, marketing cost etc. It is (Total cost) only the culture cost of fish of the schemes of WBAIFP comprising the improvement cost, input cost of materials and labour.

Annexure-VI**Distribution of Number of beneficiaries (WBAIFP)**

Year	Balurghat Sub-Divn.	Raiganj Sub-Divn.	Islampur Sub-Divn.	West Dinajpur District
1980-81	45	33	6	84
1981-82	50	47	19	116
1982-83	210	243	71	524
1983-84	324	329	130	783
1984-85	673	683	212	1568
1985-86	602	632	165	1399
1986-87	634	619	203	1456
1987-88	770	736	242	1748
1980-88	3308	3322	1048	7678

Source: PFDA, Balurghat, W.D.

Distribution of SC and ST beneficiaries (WBAIFP)

Year	Balurghat Sub-Divn.		Raiganj Sub-Divn.		Islampur Sub-Divn.		West Dinajpur District	
	SC	ST	SC	ST	SC	ST	SC	ST
1980-81	24	8	15	8	3	1	42	17
1981-82	30	8	24	9	10	3	64	20
1982-83	129	27	182	36	43	11	324	74
1983-84	166	79	191	59	87	17	44	155
1984-85	465	78	426	103	130	24	1011	205
1985-86	372	95	374	93	101	23	847	211
1986-87	386	100	403	61	136	23	925	184
1987-88	457	151	467	100	161	22	1065	273
1980-88	2029	546	2042	469	671	124	4742	1139

Source: PFDA, Balurghat, W.D.

ANNEXURE - VII**Sanction and Allotment of Funds for Training**

Year	Stipend allotted for training Rs.	Sanctioned (exps) (DFO + FFDA) Rs.	FFDA Rs.	% of sanctioned against allotment
1984-85	1,15,000	1,06,110	45,000	92.27
1985-86	1,22,000	1,06,245	52,000	87.09
1986-87	1,38,000	1,30,005	70,000	94.21
1987-88	1,75,000	1,68,210	88,000	96.12
TOTAL	5,50,000	5,10,570	2,55,000	92.83

SOURCE: FFDA, Balurghat, W.D.

Annexure- VIII

Progress of Training to the Farmers (WBAIFP)

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Blocks	1980-81 No. of Trainees	1981-82 No. of Trainees	1982-83 No. of Trainees	1983-84 No. of Trainees	1984-85 No. of Trainees	1985-86 No. of Trainees	1986-87 No. of Trainees	1987-88 No. of Trainees				
Balurghat Sub-Div: Balurghat	4	5	25	45	16875	97	15120	92	18630	108	22950	138
Kumarganj	3	3	15	20	29970	22	4185	31	6885	41	13500	88
Hili				5	4050	30	2430	18	2430	14	7155	45
Gangarampur	3	5	30	48	20925	125	17280	110	19980	118	24705	148
Tapan			4	7	16200	110	19035	130	13905	88	13905	97
Total	10	13	74	125	61020	284	58050	381	61830	369	82215	516
Raiganj Sub-Div: Banshihari					11340	79	12420	92	12960	85	13365	85
Kushmandi					6480	48	8775	55	10395	70	12555	75
Kaliyaganj		2	8	10	5670	42	4050	30	7155	45	10260	66
Hentabad	2	2	10	15	3240	24	1620	12	7425	55	8910	58
Itahar			3	5	4725	35	4320	32	9180	60	9855	68
Raiganj	2	3	8	25	5400	40	9450	55	9855	65	12960	85
Total	4	7	29	55	36855	268	40635	276	56970	380	67905	437
Islampur Sub-Div: Karandighi		2	5	8	2025	15	3375	21	4050	30	3915	29
Goal Pokhar-I					1350	10	1080	8	2430	18	3780	28
Goal Pokhar-II					1620	12	1350	10	2430	18	4590	30
Islampur			5	8	1890	14	1080	8	1215	9	3375	25
Chopra					1350	10	675	5	1080	8	2430	18
Total	NIL	2	10	16	8235	61	7560	52	11205	83	18090	130
Grand Total	14	22	113	196	106110	713	106245	709	130005	832	168210	1083

Source : FYDA and D.F.O. Balurghat, W.D.

Annexure-IX

Distribution of Finance for Rehabilitation and Number of beneficiaries (WBAIFP)

	1983-84	1984-85	1985-86	1986-87	1987-88	1983-84 to 87-88	
Blocks	K.	No. of family of the beneficiaries	K.	No. of family of the beneficiaries	K.	No. of family of the beneficiaries	No. of family of the beneficiaries
Balurghat	17975	1	19500	1	44600	2	1,52,875
(umarganj		1	21200	1			71,700
Billi		1	20475				68675
Changaranpur	18200	1		2	49300	2	1,88,800
Chaan	21175	1	45400	2			90,675
Chota Lal	57350	3	1,35,100	6	1,48000	6	5,69,725
Chandshihari		1	20500	2			1,14,100
Chandmandi		1	20225		50600	2	1,59,575
Chaliyaganj		1	20350		48150	2	91,700
Chandabadi		1	19975		49600	2	1,14,275
Chahar				2	24950	1	93,075
Chalganj	21300	1		2	45,550	2	1,80,775
Chota Lal	21300	1	81050	6	2,18,850	9	7,53,500
Chandighi		1	19825	2	49,925	2	1,10,150
Chal Pokhar - I	20100	2		1	47,825	2	92,625
Chal Pokhar - II		1	19475	1			67,300
Chal Pokhar - III		1	20475	1	22575	1	1,11,850
Chopra		3	59775	5	22375	2	1,13,800
Chota Lal	20100	2		1	1,12,450	6	4,65,725
GRAND TOTAL	98750	6	202000	17	5,10,200	21	18,18,950

Source: FIDA Balurghat, V.D.

ANNEXURE - X

Water area and yield for leased out sector (WBAITP)

Year	Long term lease for individual	Yield	Long term lease for co-operative and FPO	Yield	Short term lease for individual	Yield	Total	Yield
	Acre	Qtl.	Acre	Qtl.	Acre	Qtl.	Acre	Acre
1982-83	38.25	4.42	-	-	52.00	5.80	90.25	5.22
1983-84	55.30	5.82	-	-	78.60	4.55	133.90	5.07
1984-85	60.28	5.80	360	3.97	70.50	4.58	490.78	4.28
1985-86	66.20	5.94	580	5.07	81.35	4.93	727.55	5.13
1986-87	40.00	5.96	605	5.22	59.40	5.40	704.40	5.28
1987-88	72.00	5.90	660	5.39	95.50	5.42	827.50	5.44
TOTAL	332.03	5.71	2205	5.03	437.35	5.08	2974.38	5.11

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Source: DFO, Balurghat, W.D. Yield : Production (Quintal)
per acre of water area.

ANNEXURE - XI

Total cost incurred for fish culture for water area achieved by three sectors for implementation of WSAJFP

Year	Total cost long term lease for individual sector ₹	Total cost long term lease for co-operative and PFG sector ₹	Total cost short term lease for individual sector ₹	Total lease cost ₹
1982-83	1,34,500	-	1,29,480	2,63,980
1983-84	2,42,300	-	2,84,532	5,26,832
1984-85	3,02,428	12,34,180	2,15,400	17,52,008
1985-86	3,57,400	35,67,028	4,07,685	43,32,113
1986-87	1,97,200	32,08,912	3,08,890	37,15,002
1987-88	3,75,200	38,29,676	5,44,600	47,49,476
TOTAL	16,29,028	1,18,39,796	18,90,587	1,53,59,411

Source: PFDA, Balurghat, W.D.

ADDENDUM - XII

Net Revenue for fish culture by three sectors for implementation of WBAIFP

Year	Net Revenue long term lease for individual sector	Net Revenue long term lease for co-operative and FPO sector	Net Revenue short term lease for individual sector	Total
Rs	Rs	Rs	Rs	Rs
1982-83	1264.78	-	4470	5734.78
1983-84	3766.44	-	2750	6516.44
1984-85	3102.95	2127.93	3356.68	8587.56
1985-86	4105.21	1962.89	2876.51	8944.61
1986-87	5798	4087.34	4519.83	14405.17
1987-88	5408.89	3899.46	4053.38	13361.73

SOURCE: FYDA, Balurghat, W.D.

N.B. : In computation of net revenue, total cost does not include interest on loan, lease rent, marketing cost etc. it is only the culture cost of fish under 'WBAIFP' comprising the improvement cost and input cost of material and labour.

Annexure - XIII

Distribution of Minikit (in Rs.) and Number of beneficiaries (MBATFP)

Blocks	1985-86: Rs.	No. of beneficiaries	1986-87: Rs.	No. of beneficiaries	1987-88: Rs.	No. of beneficiaries	1985 to 1988: Rs.	No. of beneficiaries.
Balurghat	32,440	75	55,780	90	62,600	82	50,820	247
Kumarganj	7,360	18	19,530	16	30,100	41	56,990	75
Hill	5,200	12	2,425	7	14,200	22	21,825	41
Gangarampur	36,650	88	65,400	90	70,525	79	1,72,575	257
Tapen	28,870	81	33,270	73	50,200	62	1,12,340	216
Total	1,10,520	274	1,76,405	276	2,27,625	286	5,14,550	836
Banshihari	26,230	52	24,865	55	29,300	35	80,395	142
Kushmandi	19,900	25	11,345	18	35,350	39	66,595	82
Kaliyaganj	11,350	22	14,600	26	24,100	34	50,050	82
Hemtabad	6,100	18	8,550	24	22,300	40	36,950	82
Itahar	10,720	20	11,700	22	25,100	45	47,520	87
Raiganj	34,300	82	23,950	75	32,800	42	91,050	199
Total	1,08,600	219	95,010	220	1,68,950	235	3,72,560	674
Karandighi	4,280	10	5,175	12	13,060	30	22,515	52
Goal Pokhar-I	2,160	6	2,525	10	9,050	20	13,735	36
Goal Pokhar-II	3,400	8	2,200	5	7,740	12	13,340	28
Islampur	2,160	6	2,685	5	11,100	19	15,945	30
Chopra	1,080	2	1,500	2	7,975	18	10,555	22
Total	13,080	32	14,085	34	48,925	99	76,090	165
Grand Total	2,32,200	525	2,85,500	530	4,45,500	620	9,63,200	1,675

Source: FFDA, Balurghat, W.B.

Annexure X.IV

Distribution of Finance for Service party Group and Number of Beneficiaries

Blocks	1983-84		1984-85		1985-86		1986-87		1987-88		1983 to 1988	
	Rs.	Number of family of the beneficiaries	Rs.	Number of family of the beneficiaries	Rs.	Number of family of the beneficiaries	Rs.	Number of family of the beneficiaries	Rs.	Number of family of the beneficiaries	Number of family of the beneficiaries	Number of family of the beneficiaries
Balurchat	2250	4	2470	5	6220	8	6490	13	11700	18	29130	48
Kumarganj	2010	4	2325	4	3235	6	4860	11	9472	16	21902	41
Hill	1090	2	2250	3	2970	5	3250	8	5660	11	15220	29
Gangarampur	2025	4	3280	5	4015	7	7390	12	9518	17	26228	45
Tapan	1625	3	2815	4	3305	6	4025	8	4720	10	16490	31
TOTAL	9000	17	13140	21	19745	32	26015	52	41070	72	108970	194
Bhusabari	1530	2	1760	3	2840	7	4700	8	6200	10	19080	30
Kushmudi	1775	4	2335	4	2875	6	4775	7	5500	13	17260	34
Kaliyaganj	1050	2	2210	3	2155	4	4010	6	5890	10	15315	27
Hemtabad	2120	4	2920	5	3960	7	4020	9	7350	10	20370	37
Itahar	1090	2	2790	5	4410	6	3300	7	4440	9	16030	29
Balganj	2050	4	2100	5	5405	8	4980	10	4875	10	19410	37
TOTAL	9665	18	14115	25	23045	38	25785	49	34255	62	107465	192
Karandighi	1675	4	2600	5	3405	6	4750	8	3870	9	16500	32
Goal Pokhar-I	1025	2	1675	3	3200	5	3200	7	5500	11	14600	28
Goal Pokhar-II	1130	2	2130	3	2265	5	4660	8	5865	10	16050	28
Isiamur	2175	4	2328	5	3350	7	4250	7	4100	9	16203	32
Chopra	1330	2	2015	3	3190	6	2840	7	3860	9	13235	27
TOTAL	7535	14	10748	19	15410	29	19700	37	23195	48	76938	147
GRAND TOTAL	26200	49	36003	65	58800	99	71500	138	98520	182	295022	533

Source : DFO, Balurchat, M.D.

Annexure- XV

Value of Inputs supplied by Co-operatives and FPGs (WBAIFP)

Blocks	1982-83	1983-84	1984-85	1985-86	1986-87	1987-88	Total
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Balurghat	12,824	62,896	92,442	1,28,626	1,60,915	3,75,542	8,33,245
Hili	64,055	110,600	87,406	1,63,874	28,890	2,12,500	6,67,325
Kumarganj	2,089	5,006	63,092	78,224	1,40,300	1,68,166	4,56,877
Tapan	27,612	55,181	83,088	1,63,518	2,35,953	89,295	6,54,647
Gangarampur	18,856	57,385	78,492	1,46,578	1,82,670	3,21,671	8,05,652
Balurghat Sub-Divn. I	25,436	2,91,068	4,04,520	6,80,820	7,48,728	11,57,174	34,17,746
Raiganj	5,646	17,960	31,697	51,017	46,270	56,052	2,08,642
Hemtabad	3,465	13,487	23,388	19,622	17,660	91,391	1,69,018
Kaliyaganj	4,251	36,177	51,571	42,893	43,220	65,790	2,43,902
Itanar	7,227	35,898	56,632	68,980	76,200	2,02,386	4,47,323
Kushmandi							
Banshihari	14,089	41,615	52,157	76,032	1,24,475	2,35,869	5,44,237
Raiganj Sub-Divn.	34,678	1,45,137	2,15,445	2,58,544	3,07,825	6,51,488	16,13,117
Islampur	1,466	9,636	10,819	21,786	16,480	41,929	1,02,116
Karandighi	294	13,218	23,568	27,674	30,820	75,500	1,71,074
Goal Pokhar-I							
Goal Pokhar-II							
Chopra							
Islampur							
Sub-Division	1,760	22,854	34,387	49,460	47,300	1,17,429	2,73,190
GRAND TOTAL	1,61,874	4,59,059	6,54,352	9,88,824	11,03,853	19,36,091	53,04,053

Source : DFO, Balurghat, W.D.

N.B. : Inputs content:lime, Mohua, Superphosphate, Fishseed.

W/A Covered, Total cost and productivity under Co-operative and FPG Sector

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Blocks	1984-85			1985-86			1986-87			1987-88		
	Water area acre	Total cost Rs.	Production per acre (Qntls)	Water area acre	Total Rs.	Production per acre (Qntls)	Water area acre	Total Rs.	Production per acre (Qntls)	Water area acre	Total Rs.	Production per acre (Qntls)
Salurghat	52	2,09,970	4.01	86	5,49,250	5.59	88	6,60,230	5.27	90	6,07,680	5.89
Hili	10	31,500	3.20	15	80,503	3.58	25	1,26,225	4.97	28	1,51,536	4.31
Umarganj	20	39,800	3.85	25	1,71,400	4.85	28	1,57,350	5.54	32	1,70,464	4.83
Tapan	35	1,37,600	3.95	78	5,84,500	5.17	70	2,97,920	4.94	80	3,98,800	5.64
Langarapur	53	1,95,780	4.28	95	6,22,750	5.37	110	5,85,310	5.10	125	10,23,314	5.61
Total	170	6,14,650	4.02	299	2,00,84.03	5.25	321	18,27,035	5.14	355	23,51,794	5.51
Banshihari	37	1,36,400	4.15	68	2,83,200	5.45	65	3,38,845	5.17	70	3,56,610	5.02
Kaliyaganj	29	81,500	3.48	45	2,21,535	4.34	40	2,04,480	5.69	45	2,32,535	5.46
Hemtabad	20	67,790	4.23	22	1,21,780	4.13	30	1,45,680	4.92	32	1,34,569	5.06
Baiganj	38	1,06,450	4.15	62	3,20,375	5.65	58	2,83,968	5.77	60	2,87,082	6.05
Itahar	30	1,05,900	3.97	45	2,91,900	4.90	48	2,23,296	5.11	50	2,42,800	4.85
Total	154	4,98,080	3.99	242	13,38,790	5.07	241	11,96,269	5.36	257	12,53,596	5.31
Karandighi	22	79,560	3.59	24	1,31,650	3.57	25	1,05,400	3.98	26	1,22,136	4.86
Talampur	14	41,890	3.65	15	88,185	3.85	18	80,208	3.73	22	1,02,150	4.97
Total	36	1,21,450	3.61	39	2,19,835	3.65	43	1,85,608	5.04	48	2,24,286	4.91
GRAND TOTAL	360	12,34,180	3.97	580	35,67,028	5.07	605	32,08,912	5.22	660	38,29,676	5.39

Source : FFDA, Balurghat, W.D.

N.B. Total cost means the Total culture cost of fish for the Schemes of WBAIFP

Annexure - XVII

Statement of yield of Co-operative and FPO sector (WBAINFP)

Block	Water area	Yield
	1984-85 to 1987-88 Acre	1984-85 to 1987-88 Qtl. (Per Acre)
Balurghat	316	5.33
Hili	88	3.76
Kumarganj	105	4.84
Tapen	263	5.09
Gangarampur	383	5.22
Balurghat S.D.	1145	5.12
Banahihari	240	5.05
Kaliyaganj	156	4.93
Hemtabad	104	4.66
Raiganj	218	5.53
Itahar	173	4.78
Raiganj S.D.	891	5.05
Karandighi	98	4.54
Islampur	69	4.13
Islampur S.D.	166	4.37
Total (W.D.)	2202	5.03

Source: FFDA, Balurghat, W.D.

ANNEXURE - XVIII

Statement of Number of beneficiaries of Co-operative and FPG sector (WBIAIFP)

Sub-Division	1984-85	1985-86	1986-87	1987-88	1988-89
Balurghat	138	220	252	280	890
Raiganj	131	174	198	220	723
Islampur	35	38	45	44	163
W.D. District	304	432	495	544	1776

Source: PFDA, Balurghat, W.D.

Distribution of Net Revenues of Co-operative and FPG Sector (WBAIFP)

Block/Sub-Division/ W.D. District	1984-85	1985-86	1986-87	1987-88	1984-85 to 1987-88
	Rs.	Rs.	Rs.	Rs.	Rs.
Balurghat	1578.81	2561.28	1981.14	3845	9966.23
Hili	1330	361.13	3893.40	2353.07	7937.60
Kumarganj	3400	900.80	4351.07	3363.06	12014.93
Tapan	1598.57	782.31	4628.29	5167	12176.17
Gangarampur	2299.62	2040.11	3852.45	1914.80	10106.98
A. Balurghat Sub-Divn.	2004.28	1682.40	3555.31	3302.15	10544.14
Banshihari	2123.73	3088.47	4084.69	3941.57	13238.46
Kaliyaganj	2061.66	2022.07	5130	4652.56	13866.29
Hemtabad	2532.50	1068.18	4006	4895.41	12502.09
Raiganj	3006.58	3873.95	5484.41	6097.80	18462.74
Itahar	2027.33	1360.44	4544.88	3871.48	11804.13
B. Raiganj Sub-Divn.	2364.71	2586.42	4676.91	4674.59	14302.63
Karandighi	1409.64	224.25	6548	4057.38	12236.27
Islampur	2117.86	281	2264	4296.27	8959.13
C. Islampur Sub-Divn.	1685.06	244.23	4754.70	4166.88	10850.87
W.D. Districts	6054.05	4513.05	12986.92	12143.62	35697.64
TOTAL (A+B+C)					

Source : FFDA, Balurghat, W.D.

N.B. Net Revenue calculated excluding marketing cost, lease rent, interest on loan etc from the Total cost. Total cost here means only the Total cost of culture of fish of the scheme of "WBAIFP " comprising the improvement cost, input cost of material and labour.

Annexure - X.IX

Annexure - XXMBAIFFAverage Scheme No. 1 (1980-81 to 1987-88)Culturable tanks for intensive pisciculture:

Unit water area - 1 hectare

For an optimum production
of 25 quintal per hectare
for all the Schemes No. 1, 2, 3
and 4

A. Improvement cost		R. 1,381.25
(Tools for repairing embankment, levelling, Deseeding)		
B. Input cost:	R. 631.25	
Direct material-		
(Fish seed i.e., Fry)		
Indirect material	R. 5594.00	
(Mehua oil cake, lime, cowdung, superphosphate, feed)		R. 6,225.25
Direct labour	..	R. 202.75
Total cost (A + B)		<u>R. 7,809.25</u>

Subject to average price increase @ 8% of T.C.

Average Scheme No. 2 (1980-81 to 1987-88)Semi derelict pond requiring 1 feet
excavation

A. Improvement cost	..	R. 9,632.50
(Tools for repairing embankment, levelling, Deseeding)		
B. Input cost:	R. 631.25	
Direct material-		
(Fish seed i.e., Fry)		
Indirect material	R. 5594.00	
(Mehua oil cake, lime, cowdung, superphosphate, feed)		R. 6,225.25
Direct labour	..	R. 202.75
Total Cost (A+B)		<u>R. 16,060.50</u>

Subject to average price increase @ 8% of T.C.

Source: FFDA, Balurghat, W.D.

Annexure - XX (Contd....)Average Scheme No. 3 (1980-81 to 1987-88)Semi derelict pond requiring 2 feet excavation and culture

A. Improvement cost:		Rs. 20,068.00
(Tools for repairing embankment, levelling, deseeding)		
B. Input cost:	Rs. 631.25	
Direct material-		
(Fish seeds, Fry)		
Indirect material-		
(Mahua oil cake, lime, cowdung, superphosphate feed)		
		Rs. 5594.00
		Rs. 6,225.25
Direct Labour	..	Rs. 202.75
Total cost (A + B)		Rs. 26,496.00

Subject to price increase @ 8% of T.C.

Average Scheme No. 4 (1980-81 to 1987-88)Semi derelict pond requiring 1 metre excavation

A. Improvement cost :	..	Rs. 32,100.00
(Tools for repairing embankment, levelling, deseeding)		
B. Input cost:	Rs. 631.25	
Direct material-		
(Fish seed i.e. fry)		
Indirect material-		
(Mahua oil cake, lime, cowdung, superphosphate, feed)		
		Rs. 5594.00
		Rs. 6,225.25
Direct Labour	..	Rs. 202.75
Total Cost (A + B) ..		Rs. 38,528.00

Subject to price increase @ 8% of T.C.

Source: FYDA, Balurghat, W.D.

Annexure - XXIElements of CostScheme 1 Type 1

In case water area taken on lease (short term) and short term (1 year) loan taken.

Direct material (fry)	Rs. 681.75	Rs.	Rs.
Direct labour	<u>Rs. 218.97</u>		900.72
Prime cost -			
Overheads: Fixed			
Interest on Bank loan @ 10.25% on Rs. 4728.72	Rs. 484.11		
Lease rent of water area average p.a.	Rs. 700.00		
Improvement cost charged at the end of the year	<u>Rs. 1491.75</u>	2675.86	
Overheads: variable (indirect materials e.g., Muhua oil cake, lime, cowdung, superphosphate, feed)		6041.52	
		<hr/>	8717.38
	T.C.		<hr/>
			<u>9618.10</u>

Type 2. In case water area is owned by the farmers and short term (1 year) loan taken.

Direct material (fry)	Rs. 681.75		
Direct labour	<u>Rs. 218.97</u>		900.72
Prime cost-			
Overheads : Fixed			
Interest on Bank loan @ 10.25% on Rs. 4728.72	Rs. 484.11		
Improvement cost charged at the end of the year	<u>Rs. 1491.75</u>	Rs. 1975.86	
Overheads: variable indirect materials e.g., muhua oil cake, lime cowdung . Superphosphate (feed)	Rs.	<u>Rs. 6041.52</u>	8017.38
			<hr/>
	T.C.		<u>8918.10</u>

ANNEXURE - XXI (Contd...)Elements of CostScheme 2 Type 1

In case water area taken on lease (long term) and long term (10 years) loan taken

	R.	R.	R.
Direct material (fry)	681.75		
Direct labour	<u>218.97</u>		900.72
Prime cost-			
Overheads: Fixed interest on Bank loan @ 12.25% on R. 9735.00	1189.89		
Lease rent of water area average p.a.	500.00		
Improvement cost charged at the end of the year	<u>1040.31</u>	2730.20	
Overheads: Variable (indirect materials e.g., Mahua oil cake, lime, cowdung, superphosphate, feed)		<u>6041.52</u>	8771.72
T.C.			<u>9672.44</u>

Type 2. In case water area is owned by the farmers and long term (10 years) loan taken

Direct material (fry)	681.75		
Direct labour	<u>218.97</u>		900.72
Prime cost-			
Overheads: Fixed Interest on Bank loan @ 12.25% on R. 9735.00	1189.89		
Improvement cost charged at the end of the year	<u>1040.31</u>	2230.20	
Overheads: Variable (indirect materials e.g., Mahua oil cake, lime, cowdung, superphosphate, feed)		<u>6041.52</u>	8271.72
T.C.			<u>9172.44</u>

Annexure - XXI
Elements of Cost

Scheme 3 Type 1

In case water area taken on lease (long term) and long term (10 years) loan taken

	Rs.	Rs.	Rs.
Direct material (fry)	681.75		
Direct labour	<u>218.97</u>		900.72
Prime cost-			
Overheads: Fixed interest on Bank loan @ 12.25% on Rs. 16024.78	1963.04		
Lease rent of water area average p.a.	400.00		
Improvement cost charged at the end of the year	<u>2167.34</u>	4530.38	
Overheads: Variable (Indirect materials e.g., Mohua oil cake, lime, cowdung, superphosphate, feed)		<u>6041.52</u>	10571.90
			<u>11472.62</u>
	T.C.		

Type 2. In case water area is owned by the farmers and long term (10 years) loan taken

	Rs.	Rs.	Rs.
Direct material (fry)	681.75		
Direct labour	<u>218.97</u>		900.72
Prime cost-			
Overheads: Fixed interest on Bank loan @ 12.25% on Rs. 16024.78	1963.04		
Improvement cost charged at the end of the year	<u>2167.34</u>	4130.38	
Overheads: Variable indirect materials e.g., Mohua oil cake, lime, cowdung, superphosphate, feed)		<u>6041.52</u>	10171.90
			<u>11072.62</u>
	T.C.		

Annexure - XXI (Contd...)Elements of CostScheme 4 Type 1

In case of water area taken on lease (long term) and long term (10 years) loan taken.

	R.	R.	R.
Direct material (fry)	681.75		
Direct labour	<u>218.97</u>		900.72
Prime cost -			
Overheads : Fixed			
Interest on Bank loan, @ 12.25% on R. 2330.73	2854.46		
Lease rent of water area average p.a.	300.00		
Improvement cost charged at the end of the year	<u>3466.80</u>	6621.26	
Overheads: Variable (Indirect materials, e.g., Mehna oil cake, lime, cowdung, feed, superphosphate)		<u>6041.52</u>	12662.78

T.C.

13563.50

Type 2. In case of water area is owned by the farmers and long term (10 years) loan taken

	R.	R.	R.
Direct material (fry)	681.75		
Direct labour	<u>218.97</u>		900.72
Prime cost-			
Overheads: Fixed			
Interest on bank loan, @ 12.25% on R. 23301.73	2854.46		
Improvement cost charged at the end of the year	<u>3466.80</u>	6321.26	
Overheads: Variable (indirect materials e.g., Mehna oil cake, lime, cowdung, feed, super- phosphate)		<u>6041.52</u>	12362.78

T.C.

13263.50

Presumptions for computation of T.C. in the
ANNEXURE - XXI

No selling, distribution and administration overheads incurred and considering sales at site.

For short term (1 year) loan, average rate of interest on Bank loan @ 10.25% p.a.

For long term (10 years) loan, average rate of interest on Bank loan @ 12.25% p.a.

Average rate of subsidy for fish culture 40%.

Average rate of price increase for Scheme No. 1, 2, 3 and 4 of fish culture of NMAIFP 8% was considered.

T.C. computed at the end of 1st year of culture of fish on the basis of average Scheme No. 1, 2, 3 and No. 4.

Annexure-XXII

Repayment of loan by the Farmers to the Banks

Bank branches	Credit disbursed			Repayment													
	Credit 1980-81			1981-82		1982-83		1983-84		1984-85		1985-86		1986-87		1987-88	
	Total Credit Rs.	Longterm (L) Rs.	Shortterm (S) Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.
U.B.I. (Balurghat)	8775	8775	-	495	-	540	-	678	-	665	-	685	-	710	-	742	-
U.B.I. (Gangarampur)	11680	7605	4075	415	3928	525	-	680	-	688	-	712	-	725	-	728	-
TOTAL	20455	16380	4075	910	3928	1165	-	1358	-	1353	-	1397	-	1435	-	1470	-
	Total Credit Rs.	1981-82		1982-83		1983-84		1984-85		1985-86		1986-87		1987-88			
		L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.		
U.B.I. (Balurghat)	17250	12425	4825	710	4200	785	-	850	-	990	-	1100	-	1080	-		
SBI (Balurghat)	4980	-	4980	-	4600	-	-	-	-	-	-	-	-	-	-		
TOTAL	22230	12425	9805	710	8800	785	-	850	-	990	-	1100	-	1080	-		
	Total Credit Rs.	1982-83		1983-84		1984-85		1985-86		1986-87		1987-88					
		L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.		
UBI (Balurghat)	25765	16325	9440	725	8850	840	-	880	-	1020	-	1130	-				
CBI (Balurghat)	9950	-	9950	-	8875	-	-	-	-	-	-	-	-				
TOTAL	35715	16325	19390	725	17725	840	-	880	-	1020	-	1130	-				
	Total Credit Rs.	1983-84		1984-85		1985-86		1986-87		1987-88							
		L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.		
CBI (Balurghat)	11715	-	11715	-	12886	-	-	-	-	-	-	-	-				
SBI (Balurghat)	24390	18430	5960	995	5100	1180	-	1450	-	1595	-						
SBI (Balurghat)	20650	14550	6100	890	6000	970	-	1180	-	1295	-						
UBI (Raiganj)	14140	8430	5650	450	6215	585	-	690	-	710	-						
TOTAL	70895	41470	29425	2285	30201	2735	-	3320	-	3600	-						
	Total Credit Rs.	1984-85		1985-86		1986-87		1987-88									
		L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.		
UBI (Balurghat)	46815	34465	12350	1930	13585	2775	-	3150	-								
SBI (Balurghat)	3740	27530	10210	2020	8100	2360	-	2605	-								
CBI (Balurghat)	14000	14000	-	970	1090	1230	-										
UBI (Raiganj)	27055	22255	5600	1460	5160	1885	-	2050	-								
TOTAL	124410	98250	28160	6410	26845	8130	-	9035	-								
	Total Credit Rs.	1985-86		1986-87		1987-88											
		L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.		
UBI (Balurghat)	81660	56410	25250	3980	21200	4155	-										
SBI (Balurghat)	72150	56050	16100	3400	12240	4708	-										
SBI (Balurghat)	66800	51475	15325	4050	14100	4370	-										
SBI (Itanar)	91460	71190	20270	5720	17565	6300	-										
TOTAL	413470	256225	76945	17870	58765	19533	-										
	Total Credit Rs.	1986-87		1987-88													
		L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.	L Rs.	S Rs.		
UBI (Balurghat)	62010	45640	16370	3160	13250	-	-										
SBI (Balurghat)	60005	38735	21220	2200	17130	-	-										
CBI (Balurghat)	37140	30150	6990	1870	2680	-	-										
SBI (Islampur)	27180	20050	7150	1525	6080	-	-										
TOTAL	186335	134605	51730	8755	44149	-	-										

Source : SBI, SBI, CBI, Balurghat, Gangarampur, Kaliyaganj, Raiganj, Itanar, Karandighi, Islampur.

Distribution of Water Area in W.D District

Block	Total Area sq. k.m. population (1981)	Total water area acre	Available culturable and semi derelict water area in acre.	Total Derelict water area acre	% of culturable and semi derelict W/A on total W/A.	% of derelict W/A. on total W/A.	% of culturable and semi derelict W/A on total W/A of W.D.
Balughat-Sub- Divn. Balughat	372.20 sq. km 257417	2741.06	1975	766.06	72.05	27.95	6.74
Hill	88.10 50516	1151.29	977.50	173.79	84.90	15.10	3.34
Kumarganj	286.90 104627	1494.34	1365	129.34	91.34	8.66	4.66
Gangarampur	328.40 153406	2912.85	2555	357.85	87.71	12.29	8.73
Tapas	641.10 147633	3552.25	2810	742.25	79.10	10.90	9.60
Total	1516.70 713599	11851.79	9682.50	2169.29	81.69	18.31	33.07
Balighat-Sub-Divn.	482.80						
Balganj	271532	2,528.08	2410	116.08	95.40	4.60	8.23
Hemtabad	192.60 77881	1,774.90	1567.50	207.40	88.31	11.69	5.35
Kaliyaganj	311 153769	2,344.79	2280	114.79	95.10	4.90	7.62
Itabar	427 181977	3,126	2605	521	83.33	16.67	8.90
Kushnadi.	31050 120300	3,427.98	2850	577.98	83.14	16.86	9.74
Bansilhari	347.3 130173	2,847.51	2582.50	265.01	90.69	9.31	8.82
Total	269170 (946432)	16,047.26	14245	1802.26	88.77	11.23	48.66
Islampur Sub-Div.	345.2 171780	897.72	792.99	104.73	88.33	11.67	2.71
Karnadighi	389.00 (169171)	2426.51	1550	867.51	63.88	36.12	5.29
Geal Pokhar-I	266 (114530)	1016.91	875	141.91	86.04	13.96	2.99
Geal Pokhar-II	372.80 (170736)	1165.70	827.50	338.20	70.99	29.01	2.83
Chepra	376.4 (128699)	1504.54	1302.50	202.04	86.57	13.43	4.45
Total	1751.80 (954916)	7011.38	5347.99	1663.39	76.27	23.73	18.27
GRAND TOTAL	5340.20 sq. km. 24,04,947	34910.43	29275.49	5634.94	83.86	16.14	100

Source : (i) Census of India 1981, Series-23 District Census Hand Book Part XIII B, W.D.-Ghosh, S.N. P-10
(ii) Pokalpa Charnasuchi, FYDA, Balughat, W.D. (1983) P-21

Appendix - XXIVQUESTIONNAIRE

1. Location:

Village/Town	Block	P.S.
--------------	-------	------
2. Distance from :

Town	Market
------	--------
3. Age of workers/Farmers/Fishermen:
4. Literacy:

Yes	No
-----	----
5. Source of Skill acquired:

Parents	Formal	Training
---------	--------	----------
6. Time taken:
7. No. of family members, earnings, dependents:
8. Other source of earning:

Agr.	Poultry	Agr. Labour	Others
------	---------	-------------	--------
9. Time spent on production:
10. Finance:

Amount	Source	Time
--------	--------	------
11. Purpose of Loan:

Production	Consumption
------------	-------------
12. Monthly Expenditure Total:

Feed	-
Cloth	-
Fuel	-
Entertainment	-
Savings	-
13. Source of raw materials:

Own	Purchase
-----	----------

Appendure - XXIV (Contd...)

14. Nature of water area:

Pond

Khari

Dighi

15. Size of water area:

Small

Medium

Large

16. Ownership of water area:

Private

Government

17. Type of operation :

Singly Jointly Co-Opt. FPG Govt. or
local bodies

Private Individuals

18. Financial assistance :

Received

Not Received

Reason

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: ABBREVIATIONS :

ABBREVIATIONS

BEF	Break Even Point
BRDA	District Rural Development Agency
DFO	District Fishery Office
EEZ	Exclusive Economic Zone
EP	Expected Profit
EEC	European Economic Community
FPG	Fish Production Group
FFDA	Fish Farmers Development Agency
FC	Fixed Cost
FDC	Fishery Development Corporation
GDP	Gross Domestic Product
IFP	Inland Fisheries Project
IRDP	Integrated Rural Development Programme
IDA	International Development Authority
MS	Margin of Safety
NABARD	National Bank for Agriculture and Rural Development
NCA	National Commission on Agriculture
NREP	National Rural Employment Programme
PVR	Profit Volume Ratio
PE	Probable Error
QTL	Quintal
RLEGP	Rural landless Employment Guarantee Programme
SE	Standard Error
SCP	Special Component Plan
SC & ST	Scheduled Caste & Scheduled Tribe
TC	Total Cost
TSP	Tribal Sub-plan
VC	Variable Cost
W.D.	West Dinajpur
WBAIFP	World Bank Assisted Inland Fisheries Project
W/A	Water Area