

A REPORT ON THE PRELIMINARY SURVEY OF BRACKISHWATER IMPOUNDMENTS IN WEST BENGAL

By
B. B. PAKRASI



Survey Report No. 3
March, 1965.



CENTRAL INLAND FISHERIES RESEARCH INSTITUTE
BARRACKPORE, WEST BENGAL,
INDIA

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FOREWARD

The swampy deltaic region of the Hooghly river system situated at the southern extremity of the State of West Bengal and interspersed with innumerable rivulets, creeks, canals, etc. is known as Sunderbans. This area is considered to be highly potential in fishery resources. The peculiar practice of fish culture in this region is to embank tidal mudflats, swamps, creeks, etc. and to introduce into them young ones of brackishwater fishes which grow there to a size suitable for marketing. This type of brackishwater fishery goes by the local name of bheri. However, up till now, there is no precise information on the number, location, area covered, types of fish cultured, production rates, etc., of such bheris. In order to obtain information on aforesaid aspects, a small team of this Institute headed by Shri B.B. Pakrashi, Research Officer, was deputed to undertake a preliminary survey of the bheris during 1961-62 and the results are embodied in this report.

This report, can also be considered as a project report embodying details of the present status of the bheris and suggestions including a pilot project for the scientific development and commercial exploitation of fisheries in them.

B.S. BHIMACHAR
DIRECTOR

30th March, 1965
Central Inland Fisheries
Research Institute,
Barrackpore.



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1 INTRODUCTION

The young of brackishwater fishes are impounded and reared in embanked tidal mudflats, swamps, channels and paddy fields in the deltaic region of West Bengal till they grow to marketable size. The contribution from such impounded fisheries locally known as bheris, to the fishing industry in West Bengal is considerable. It is estimated that about 3000 tonnes of fish and prawns are produced annually from about 150 such bheris. In order to obtain preliminary information on production potential, location, existing farm practices including marketing and the future possibilities of development, a reconnaissance survey was undertaken, during the years 1961-'62. The results of the survey have been embodied in this report. The author was over-all-in-charge of the survey operations assisted by Shri S.C. Thakurta, Senior Research Assistant and Shri P.Das, Research Assistant.

About 3100 square miles of erstwhile forest area, south of the Dampier Hodge's Line of the deltaic West Bengal, known as the Sunderbans, is interspersed with innumerable creeks, canals and rivulets. The reclamation of the reserved forest has been in progress since 1829-'30 and about 1400 square miles have been embanked. Along with the process of reclamation, impounding of brackishwater fishes in embanked low lands is practised till the beds of such lands are raised by gradual deposition of silt to make it suitable for paddy cultivation. Sir K.G. Gupta in his report predicted the future prospect of indefinite expansion and development of such fish farms as early as 1908. Subsequently, fishery workers elucidated certain cultural practices and suggested some developmental measures. The portion of the delta within West Bengal has three major estuarine inlets, the Saptamukhi, the Thakuran and the Matlah and four minor estuaries viz., the Gosaba, the Muriganga, the Harinbhanga and the Raimangal with tributaries named as the Bidya, the Dansa, the Bidyadhari, the Kulti, the Karati, Haroa Khal, etc., in between the main estuaries of the rivers Hooghly in the West and the Ichhamati in the East. During the spring and rainy season, the tidal impact is felt into the upper reaches. The effect of tide is felt far inland even in silted up rivers, streams or canals which irrigate large number of bheris of all types. The tidal fluctuations remain fairly constant between 6 to 15 feet and vary only with the phases of the moon. The fish farmers take the full advantage of the tidal fluctuations for the ingrees of flood water carrying innumerable young ones of commercially important estuarine fishes like mullets, perches, threadfins, catfishes, prawns, carps, etc. The presence of large

schools of fish fry in the rivers, creeks and canals may be attributed to the huge quantity of detritus being washed out and enormous quantity of food supplied by the silt laden water brought down by up-land floods and the discharge of Calcutta sewage.

The bheris in West Bengal are reported to have first existed in the spill areas of the Bidyadhari river near Calcutta. But when the river gradually silted up due to the continuous discharge of Calcutta sewage, portions of the moribund river and the spill areas were embanked and converted into lucrative sewagefed fish farms. In recent years, construction of roads and other communications in the reclaimed areas of the Sunderbans have given impetus to further development of brackishwater fish farms. The bheris in 4 Sub-Divisions of the District 24-Parganas under different Police Stations are listed in Appendix I. (Location vide map enclosed).

As had already been stated that the fish catch from these brackishwater impoundments constitutes a considerable portion of the total fish production in West Bengal, further scope of its expansion by finding new resources in the unreclaimed areas of Sunderbans deserves special consideration to augment further production of fish in that State. The production figures of about 112 bheris and other details collected on the basis of the information furnished by fishermen during personal interview are given in Appendix II and the species of fish which are generally cultured in the bheris are mentioned in Appendix III.

2 THE PRESENT STATE OF FISH TRADE

The trade on fish grown in bheris is generally carried out by aratdars (wholesale fish merchants) who not only act as commission agents but also as money lenders. They auction the fish to retailers who ultimately sell it to consumers either directly or through fish mongers. Aratdars advance loans to the fish farmers who require it for managing the farms or to pay the lease amount on the understanding that the entire produce from their bheris must be marketed through their stalls. But due to the recent enforcement of the price control order, some unscrupulous traders are reported to collect fish from bheris through their men and sell them at prices higher than the controlled rate. The fish produced in bheris are generally sold through arats (wholesale fish stalls) at the following wholesale fish markets.

- a. Belgachhia and Sealdah markets in Calcutta,
 - b. Port Canning fish market,
 - c. Raidighi fish market,
 - d. Hasnabad fish market,
- and e. Namkhana and Kakdwip fish markets.

The fish from the areas under Basirhat, Haroa, Baraset, part of Canning and Raidighi Police Stations are marketed at the wholesale markets of Baraset, Basirhat and Calcutta. The landings from bheris in and around Canning Police Station are brought to the Canning market and the fish from Mathurapore and Jaynagar are marketed at Raidighi. The fish produced under Hasnabad and Sandeshkhali are marketed at Hasnabad. The catch from bheris under Kakdwip Police Station are mainly marketed at Namkhana. The catches from bheris are brought to wholesale markets by boats, shoulder slings, bullock carts, head-loads, service launches, buses, trains and lorries and then the fish are transported from mofussil markets to consuming centres by public buses, trains and lorries. Unfortunately there is no ice factory in any of the fish assembling centres and therefore the ice required for packing fish during transit and for further preservation is purchased at high price from the aratdars. The aratdars at assembling centres keep a stock of ice which are brought by their lorries while returning from Calcutta. The fish farmers keep a watch on the trend of the market price through vouchers of sale proceeds issued by the aratdars.

The amounts charged by aratdars on different accounts from the producers for undertaking marketing of their fish in Calcutta wholesale markets are as follows :

- a. Aratder's Commission @ 3 paise per rupee on the sale proceeds of fish.
- b. Rental of the wholesale fish market (Zamindery Khazana) - 1 paise per rupee on the sale proceeds at B.K. Pal market and 53 paise per maund of fish disposed at Sealdah wholesale fish market.
- c. Labour charges for loading, unloading, cleaning and weighing of fish @ Rs.1.50 for every 5 maunds of fish handled plus gift of $1\frac{1}{2}$ kg of fish at Sealdah market while in B.K. Pal market the rate is 50 to 75 paise per maund of fish plus 14 paise towards the rental of the weighing balance for each load of fish.

In addition, fish are taken as gift by the aratdars towards subscription for community worships but these fish are sold by them to add to their own profits. All expenses on account of transport of fish from the production centres to the markets, cost of ice, labour charges and incidentals are to be borne by the producer himself. If the fish is received late, the aratdars preserve it in ice till the next marketing time and realise the cost of ice at an exorbitantly high price. Petty poaching in transit and in markets is quite common. To counter these losses, marketing through organised co-operative societies or through government agencies should be encouraged.

3 MAN POWER

Producers engage a few regular fishermen to attend to all types of work connected with the management of farm, viz. watch and ward duty, desilting, repairing of bunds, mending and making of nets, fixing and fitting of appliances, netting, adjustment of ingress and egress of water, carrying fish to marketing centres, etc. These fishermen live in temporary shelters (huts) adjacent to the fish farm, leaving their families at village homes. There is no specified service conditions for them. They are generally paid at a low rate. During the peak of the fishing season, casual fishermen are employed, particularly in large bheris. Approximately 3500 fishermen are employed in different brackishwater fish farms of West Bengal. They dare all sorts of hazards like floods, storms, poachers and dacoits, snake-bite, unhygienic conditions and attacks from dreadful diseases. They live in wilderness without even having bare necessities of life. They are not only exploited of their labour but also of their technical knowledge, whereas the proprietors live in comfort in cities and towns and enjoy the maximum benefit from lucrative bheris. Although there are instances where the lessees themselves work as managers and live in huts with fishermen. But very few brackishwater fish farms are managed on co-operative basis. At present, impoundments which are not managed directly by the landlord, are reported, to be leased out at annual rentals varying from Rs.40/- to Rs.45/- per bigha (1/3 of an acre). This amount is three to four times higher than those prevalent only a few years back. Moreover, the system of annual renewal of lease hampers fish production as the lessees denude the farm before the expiry of the lease period and they do not want to incur expenditure for farm improvement. Thus the fish culturists should get encouragement by way of preventing the excessive rise in lease amount, the annual rental basis and getting loan by the Government on easy terms.

4 . LEGAL IMPLICATIONS

The forests of Basirhat Sub-Division having been declared as reserved forest in 1928 and those of Alipur and Daimond Harbour Sub-Divisions in 1943, Government is known to have absolute proprietary right of the fisheries within the forest area. With the reclamation of the forest, the impounded fisheries along with the land vested to the zeminders (land-holders) who owned the property. In 1949 Hora referred that the terms of lease of land in most promising places, (in Sunderbans) were such that the land could only be used for paddy cultivation but not for fish culture. He further mentioned that it was difficult to persuade the District Magistrate to relax the lease clauses and in the interest of grow more fish to allow the low lying unproductive area to be utilised for raising fish crop. But with the enforcement of the Estate Acquisition Act of 1953 in West Bengal, controversy arose over the proprietary rights on the impounded fisheries which are irrigated by state waters, with the result, a number of cases are still pending in the Court of Law. Since the 'Tank Fisheries' do not come under the purview of this Act, there is no ceiling fixed for the area covered under tank fisheries. Taking advantage of the position, a number of landowners encroached upon others land by flooding fields adjoining the bheri. This has caused a lot of trouble between the bheri owners and the cultivators whose lands are affected. Due to the injunction enforced by the court, a number of bheris are therefore lying idle, pending decision.

5 STATISTICS OF FISH CATCH

Appendix II gives the statistics of estimated annual fish catch from certain bheris in West Bengal covered during the survey and this information has been collected with a view to work out the economics for further development and better management of bheris in that area. The details have been collected on the basis of the information furnished by fishermen of the locality calculated according to their own estimates. The proprietors and their agents decline to give out any information for fear of taxation. As can be seen from the appendix, the maximum catch of 1699 tonnes is from 13 bheris under Haroa P.S. and next comes the production figure from bheris under Canning P.S. with 1267 tonnes of fish from 17 bheris. In one years' survey covering about 150 bheris spread over an wide area of difficult approach, it was not possible to work out the causes of fluctuations in the yield from the bheris of different localities. From the environmental conditions it may be said that the discharge of Calcutta

sewage in the Kulti river may be a factor responsible for the non-availability of sufficient quantity of fish fry of cultivable species in the creeks, canals and rivers in the vicinity of the discharge point. The nutrients present in the soil and the flood water are to a great extent responsible for fish production in bheris, but the presence of fish seed in feeder creeks and canals are of primary importance. Large number of mullet fry are found in the marine zone of the Hooghly estuary during winter, spring and monsoon months. It is therefore expected that the bheris in the lower reaches of the tidal zone shall get more of fish fry than those in the upper zone. But the sluices in bheris situated by the side of big rivers or rivulets can not be operated freely for the ingress of water during peak flood tides when large quantities of fish fry are drifted along with the current, as the strong flood-tide may erode the protective dykes. This may be a reason for the scarce distribution of bheris along the bank of river Hooghly.

6 CONSTRUCTION OF BHERIS AND APPLIANCES USED

The bheris are constructed on low lying areas embanked with low earthen dykes after these are cleared of weeds, shrubs and mangrove plants and then the actual operations start. While selecting the site, special care should be taken to note that trees with deeper roots are not present in large numbers in that area, and the soil has water holding capacity. The bottom soil of bheri is generally of silty clayey loam and the bed-level has a low gradient slope towards the inlet where the sluice is fixed. The inlet channel ('goi') is dug in a place so that maximum quantity of fry may find easy entry into the bheri along with the flood tide. The ingress and egress and flood water are controlled with the help of either sluice gates or sluice boxes or hollow trunks of palm trees, or hume pipes. These are fitted at the mouth of the inlet channel connecting the bheri with the feeder riverine sources of seed. Water is sometimes taken by cutting open a portion of the dyke known as 'payan'. Contrivances are used inside the inlet channel to prevent escape of the captured fish and fish fry. Split bamboo gratings or screens ('pata') are fitted vertically in a zig-zag form of V, W or WV, cage-traps being fitted at the apex or apices. The cage-traps of different sizes ('bitti', 'awoa', and 'atol') are made of bamboo-sticks having inward opening guarded by spiked valve to prevent escape of trapped fish. The fish while swimming against the current gets into it and trapped. The tiny fry of brackishwater fishes drifts along with flood-tide and enters through the slit in between the bamboo gratings. Within a few days they grow in size and are unable to pass out through the same space. Thus

the fish fry are stocked from time to time with the ingress of flood water. Two or three sets of screens are placed parallel to each other. To increase the productivity, amelioration of the bottom soil by exposing it to the sun is regularly practiced by fish farmers. It not only improves the hygienic condition but increases the fertility of the soil considerably. Tilling is reported to have increased the yield considerably, specially of prawns. The ingress of flood-water starts from the end of February or beginning of March. By then the dykes are repaired and the surface layer of the bottom is scraped off or tilled after dewatering the bheris in January-February. It has been reported that the maximum quantity of fry are available in tidal waters during the quarter round the full and the new moon. 'Payans' are cut in many places to admit directly excess fry from the river canals etc. Transplantation of fry, selective stocking with compatible species and rearing of fry in nurseries are rarely practiced in this region. Mainly three types of brackishwater impoundments are found in West Bengal :

- a. Impounded tidal mud flats, swamps, and marshes in the estuarine zone of rivers,
- b. Impounded paddy fields used for fish culture (irrigated by tidal water), and
- c. Tidal creeks disconnected by embankment from the main stream, known as khals.

Since most of the cultivable species of brackishwater fishes are reported to breed during spring, monsoon and winter months, the bed-level of bheris should be elevated at such a height that they may be filled up or drained out during high and low tides respectively particularly during those months to maintain the optimum depth of water. The breeding season of mullets is still a controversial issue and requires confirmation by length-frequency and fecundity studies. The breeding season of the commercially important perch bhetki (Lates calcarifer) is reported to be from May to July.

Fish from bheris are caught by drag nets, traps of different kinds, cast nets, ring nets, small drag nets with cross bars, 'pollo' and they are also entrapped in narrow drains dug beside inlet channells locally known as 'Jo-kal' or 'Jhori-kal'.

7 FOOD OF THE CULTIVATED SPECIES

The young mullets prefer zooplankton but as they grow bigger they feed mainly on myxophycean benthic algae, detritus, and other

benthic organisms. The prawns also are reported to thrive on detritus and other organisms. Thus brackishwater fish farmers enhance the growth of benthic flora and fauna by adjusting water level so as to allow sufficient penetration of light to the bottom and increasing salinity by the intake of tidal water. The antagonism between the blue green algae which form the bulk of the benthic flora and the filamentous algae which float on surface and column are observed in the impoundments. For better growth of benthic algae, the water level is generally maintained below 3 feet as filamentous algae thrive well in deeper water. Excessive growth of filamentous algae does not help in the growth of fish, rather, they form thick mats and restrict their movement and sometimes chokes them to death. Tilapia mossambica when introduced in affected bheris has eradicated filamentous algae. Bhetki (Lates calcarifer), another important cultivable species is a predator throughout its life and therefore mullets, bhetkis and prawns should not be cultured in same impoundments. If sufficient numbers of forage fish is not provided for bhetkis they will prey upon other stocked fish. As they grow faster than others they prey upon mullets and prawns. But the fish culturists do not seem to pay any heed to this aspect. Selective stocking of ponds with bhetki fry with arrangements for regular supply of forage fish or young of Tilapia, may prove to be a profitable proposition. Collection grounds for bhetki fry are yet to be located in Sunderbans. For intensive stocking of bheris for better profit artificial food should also be supplied. Manuring should be done with easily available green leaves of common mangrove plants even though the soil of bheri is generally rich in nutrients due to the presence of silt mixed with decomposed organic matter.

8 PROBLEMS OF BRACKISHWATER FISH CULTURE

The existing common problems connected with the management of brackishwater fish farms are given below:

- a) Inundation of fish farms due to breach of embankments,
- b) draughts affecting the hydrological conditions and breeding of fish,
- c) silting up of feeder channels and bheris,
- d) percolation of water and nutrients through bunds and porous soil or holes made by burrowing animals like crabs, eels, rats, snakes etc.,
- e) excessive growth of algae, other weeds and their decomposition,
- f) excessive discharge of sewage causing pollution in rivers and creeks and thus affecting fish migration,
- g) poaching of fish and expenses on watch and ward,
- h) illiteracy and economic distress of fishermen,
- i) lack of amenities of life to the workers in the field,
- j) want of cold storage, ice plants, quick transport facilities etc.,
- k) non-existence of regular trade of commercially important brackishwater fish seed,

l) want of sufficient information about the techniques based and scientific research on brackishwater fish culture, m) lack of knowledge about the intensity of occurrence of fish seed in different tides of different seasons and causes of their fluctuation, and n) want of information about the optimum conditions for induced breeding of brackishwater fishes suitable for culture.

9 PROGRAMME FOR IMMEDIATE IMPLEMENTATION

Two partly embanked plots of low-land measuring together about 450 acres in area known to vest to the Government of West Bengal are available for immediate implementation of the programme of development of brackishwater fish farms in Sundarbans. The tail end of a tributary of the River Guman ends in a vast tract of land measuring approximately 400 acres. The plot is embanked on all sides by fairly high dykes excepting a portion through which tidal water flows inside the embanked area. The plot of land is in Hamiltonabad in the south Sundarbans bordering the northern part of the existing reserved forest in Basirhat Sub-Division. This was originally an impounded brackishwater fish farm (bheri) known as "Banikhali Fishery", but it is now lying abandoned. The entire area vested to the Government of West Bengal after the abolition of the Zemindary system. Another partly embanked plot of land covering an approximate area of 50 acres about 8 miles east of Banikhali Fishery (vide map) is also lying abandoned due to breach of portions of the dyke. This was also an impounded brackishwater fish farm owned by intermediaries. It is now reported to vest to the Government. These two impoundments may profitably be utilised to produce a good quantity of fish after necessary repairs. An approximate amount of Rs.1,00,000/- will be required to repair the embankments properly and fix up sluice gates to regulate ingress and egress of water. A rough estimate of expenditure and expected income, based on the casual survey, is given in subsequent paras.

9.1 Non-recurring expenditure

The bund to be built at Banikhali Fish farm is expected to be about 300 feet long and about 40 feet high. If a slope of 2 to 1 is given on both the sides of the bund, the width of the base is expected to be 170 feet and the top of 10 feet width. Hence the total quantity of earth required for 300 feet long bund = 10,80,000 cft.

(a)	Cost of earth work @ Rs.65/- per 1000 cft for 10,80,000 cft	= Rs. 70,200/-
	Cost of a sluice gate	= Rs. 10,000/-
	Cost of brick pitching of about 6000 sft @ Rs.107/- per 100 sft	= Rs. 6,420/-
	(only on the outside where the pressure of tidal water may be very great during some months of the year)	
	Cost of toe wall @ Rs.3/- per rft for 300 ft	= Rs. 900/-
	Removal of excess silt and clearing the bush	= Rs. 5,000/-
	Total -	<u>Rs. 92,520/-</u>
	Or say -	<u>Rs. 93,000/-</u>

(b)	Cost of repair of the breach, fitting up of a sluice box and other minor repairs of the bund of the fish farm at lot No.8 (about 8 miles away from Bani- Khali fish farm)	= Rs. 7,000/-
	Total for 2 projects	<u>Rs. 1,00,000/-</u>

9.2 Recurring expenditure

Staff :-

Manager - 1	(400-20-600)= 400 x 12	= Rs. 4,800/-
Head fishermen - 2	(150-10-300)= 150 x 2 x 12	= Rs. 3,600/-
Head watchman - 2	(130-5-250)= 130 x 3 x 12	= Rs. 3,120/-
Fishermen and watchmen - 20	(125-3-225)= 125 x 20 x 12	= Rs. 30,000/-
	Total -	<u>Rs. 41,520/-</u>

C/O.

B/F. Rs.41,520/-

Equipment etc. (first year) :

Dinghis (country boat), nets, patta, hitti, atol and other appliances etc.	= Rs. 3,500/-
Depreciation per year	= Rs. 500/-
Total	= Rs. 4,000/-
Grand total	= <u>Rs.45,520/-</u>

9.3 Income

The two bheris when repaired and reconstructed will make available an effective water area of 300 acres suitable for stocking purposes. Expected yield after the first stocking at a moderately low rate of 100 kg per acre per annum will be 30 tonnes. This production will bring a sale proceeds of Rs.45,000/-, the average selling price being Rs.1.50 per kg of fish of all kinds.

10 A PILOT PROJECT

It has been estimated that the bheris in West Bengal at present produces about 3000 tonnes of fish annually and have employment potential for nearly 3500 fishermen. But the scope of development of impounded brackishwater fish farms in the unreclaimed areas of the lower Sunderbans is enormous. If only 12 square miles of suitable low lying land (7680 acres) in that area which is irrigated throughout the year by tidal waters during high tides and drains out during low tide, is made available by the Government of West Bengal, free of cost, for the construction of improved types of bheris, about 100 such bheris each of about 50 acres in area may be constructed in 4 phases after clearing the jungles, levelling the land and connecting them with feeder channels wherever necessary, leaving a margin of about 2680 acres of unusable land, existing creeks, canals, etc.

The approximate range of salinity in the rivers in that area may be summarised as follows :

Average maximum salinity	- 10.1‰
Average minimum salinity	- Traces
Annual mean salinity	- 4.1‰

(In summer the maximum salinity goes upto 22.2‰ and the minimum to traces and the mean is 8.4‰. During rainy season, the maximum is 14.2‰, the minimum is traces and the mean is 1.5‰. During the winter, the maximum is 10.4‰, the minimum is traces and the mean salinity is 1.4‰).

10.1 Approximate cost of construction and management

Approximate cost of earth work at the existing rate in one bheri in excavation, in all kinds of soil and banking in 9" layers including breaking clods, watering, ramming and dressing up for the purpose of making embankments or filling up grounds depressions average leads 3 chains and average lift 5 to 10 feet @ Rs.50/- per 1000 cft and fitting cost of sluice boxes etc., is about Rs.60,000/- provided the area is not infested with jungles of big trees. If so, the clearing cost will go up according to the intensity of infestation. Therefore approximately Rs.60 lakhs will be required to do only the earth work (provided the land to be embanked is not too low or too high). It may again be stressed that the cost will go up considerably if the area is required to be cleared of jungles having big trees.

10.1.1 Non-recurring expenditure in 4 phases

Cost of earthwork for the construction of embankment around a bheri of 50 acres in area having a rectangular shape, (the proportion of length of sides being 2:1) is equivalent to 6261 rft in length with 8 ft high embankment with 2 to 1 slope.

@ Rs.50/- per 1000 cft	= Rs.50,000/-
Clearing of jungles, tree stumps and fitting of sluice box	= Rs. 5,000/-
Digging up of feeder channels, if required	= Rs. 5,000/-
	Total	= <u>Rs.60,000/-</u>

For 100 such bheris, the approximate cost of construction is estimated to be 100 x 60,000

.....	= Rs.60,00,000/-
Cost of one motor launch with insulated fish hold having a capacity of 3 to 4 tons of fish, to carry fish to the market = Rs. 70,000/-
Grand Total	= <u>Rs.60,70,000/-</u>

10.1.2 Recurring expenditure in 4 phases

Four regular fishermen for each bheri and 1 head fisherman for 2 bheris will be required for management and so 400 and 50 fishermen and head fishermen respectively will be necessary for working 100 bheris. Netting operation in the bheris will be done jointly by fishermen of 3 to 4 farms combined together. One manager with experience in management and marketing of fish, is required to be appointed for each block of 25 fish farms. Thus 4 managers are required to look after 100 fishermen. 15 watchman will supervise the watch and ward duties in addition to the regular fishermen. Since all the fish farms are likely to be continuous to each other, poaching by outside elements seems to be limited to outskirts of the outer fish farms only. Approximate expenditure on account of staff, appliances, fuel charges for launch etc. after the completion of construction of all the bheris will be as follows :

Staff: Manager	Rs.400 x 4 x 12	=	Rs. 19,200/-
Head Fisherman	Rs.150 x 50 x 12	=	Rs. 90,000/-
Head Watchman	Rs.130 x 15 x 12	=	Rs. 23,400/-
Fishermen cum Watchmen	Rs.125 x 400 x 12	=	Rs.6,00,000/-
			<hr/>
			Rs.7,32,600/-
Cost of appliances and yearly depreciation	=	Rs. 10,000/-
Fuel charges for the launch		=	Rs. 5,000/-
			<hr/>
	Total	=	<u>Rs.7,47,600/-</u>

10.2 Income

The fish production will be low for the first 2-3 years after construction of the bheris, as it will take some time to grow sufficient food for the stocked fish. On an average, in the beginning the expected production will be 100 kg of fish per acre per year. Thus the total annual production of 100 bheris of 50 acres area each will be 50 x 100 x 100 kg or 500 tonnes. This quantity when sold at the average price of Rs.1.50 per kg will yield an income of Rs.7,50,000/-.

But with improved techniques, the production of fish per acre is likely to go up gradually and then it will be possible not only to meet the recurring cost of production but also to earn a profit to pay up the principal amount in due course.

By minimising the marketing cost with the erection of ice plants and cold storages, further profit may be accrued from the same quantity of fish thus produced.

10.3 Further suggestions

The jungles may be cleared on contract basis. The cost of fuel and other wood will form a part of the payments towards the clearing charges.

50% of the total number of bheris (that is about 50 bheris) may be leased out to the Fishermen's Co-operative Societies at reasonable rates and the rest 50% of the bheris may be managed directly by the Central Fisheries corporation proposed to be formed.

The problems of fish culture in brackishwater impoundments are to be referred to the Research laboratories concerned with this type of work particularly to the Research Centre of the Central Inland Fisheries Research Institute at Kakdwip so that the latest techniques of fish culture developed in these laboratories may be utilised for better yield of fish.

10.4 Subsidiary industries

10.4.1 Fish seed trade

The trade on young fry of brackishwater fishes is not well established as the present practice of culturing the young of brackishwater fishes in bheris is of impounding the fry drifted alongwith the high tide water in whatever quantity and composition they occur in nature, i.e., in adjoining feeder channels or creeks. This indiscriminate ingress of all sorts of fry into bheris results in the mortality of a large quantity of cultivable fish seed due to predation by fishes like Lates calcarifer (Bhetki), Eleutheronema tetradactylum (Threadfins), catfishes, gobiids etc. and due to over stocking. If the seed of cultivable species of fish are segregated and sold in large quantities at reasonable rate, there will be a great demand for them for selective stocking in brackishwater ponds. The yield of fish will thus undoubtedly go up and it will be easy to grow them on scientific lines by giving them proper food and other favourable environmental conditions.

10.4.2 Canned and frozen prawns and fish

Like Kerala, the prawns from bheris may be frozen for export and canned and dried for home consumption as well. This trade may be

linked up with the capture of fish from the Sunderbans estuary to get the supply of sufficient quantity of quality prawns suitable for export. The eight varieties of prawns available in Sunderbans area suitable for canning and freezing purposes are :

<u>Scientific names</u>	<u>Local names</u>
<u>Penaeus semisulcatus</u>	Bagda chingri
<u>Penaeus indicus</u>	Chapda chingri
<u>Metapenaeus monoceros</u>	Honye chingri
<u>Metapenaeus brevicornis</u>	Chamne chingri
<u>Parapeneopsis sculptilis</u>	Lal chingri
<u>Palaemon carcinus</u>	Golda chingri
<u>Leander styliferus</u>	Ghora chingri
<u>Palaemon rudis</u>	Goda chingri

Young of mullets may also be canned and exported as they do not fetch a fair price when sold fresh in local markets. The grown up mullets only have good market in Bengal. Scylla serrata (none Kakra) the big crabs may be cultured on big scale in bheris as there is a demand for it both in our country and abroad.

10.4.3 Ice plants

There is scope for installing ice plants at Canning, Hasnabad and Raidighi centres both for bheri and river catches particularly during the winter months, when the landings go up high. With further development of bheris in the southern sector more of ice plants may be installed at Kakdwip, Gosaba and other places as and when required.

10.5 Conclusions

The initial cost of the pilot project is to be met out of the money to be advanced by the Government on the basis of long term loan at a nominal rate of interest. Since there will be no profit during the first three years in each phase of the pilot project, some sort of grant-in-aid is required to be sanctioned to compensate the loss.

11 SUMMARY

A brief account of one years' reconnaissance survey undertaken with a view to assess the distribution, location, existing condition including production, the present practices and future scope of development of fish culture in brackishwater impoundments in West Bengal has been given in this preliminary report. It is observed that the production of brackishwater fishes may be increased considerably if the brackishwater impoundments or bheris are developed on scientific methods and certain areas in the reserved forests of Sunderabans are reclaimed and utilised as fish farms. The initial cost of construction of such bheris is mainly on putting up embankments fitted with sluice box, and making the bed-level uniform, provided the area is not infested with jungles of big trees. Subsequent recurring expenditure is on account of maintenance of bund and the personnel required for proper management. Till a regular brackishwater fish seed trade is established the farms are to be stocked with fish fry that are drifted alongwith the tidal water. Some of the salient features of the existing cultural practices, their problems and suggestions for improvement have been mentioned briefly in the report.

Further, a pilot project for the construction of 100 bheris in 4 phases and a project proposed to be implemented immediately have been included in this report with rough estimates on broad items only for favour of consideration, provided the areas in the reserved forest and the money required for the purpose are made available.

APPENDIX - ILIST OF BRACKISHWATER IMPOUNDMENTS IN 4 SUB-DIVISIONS
OF THE DISTRICT OF 24-PARGANASI. BASIRHAT SUB-DIVISION(A) P.S. Basirhat.

- * 1. Nalkhara fishery
- @ 2. Beelpakre fishery
- 3. Haderbeel fishery
- 4. Kathaltala ghari
- * 5. Dhaltita (Nos. 1 & 2)
- * 6. Badaltala (Nos. 1 & 2)
- 7. Tapar char
- 8. Bahir Bijay Kale
- 9. Golpukur
- * 10. Biswa's Gheri
- 11. Naldi Gheri
- * 12. Chaura Gheri
- * 13. Bhattachary's Gheri
- * 14. Amar Kati Fishery
- * 15. Dwipchar Gheri
- * 16. Sangrampore fishery
- * 17. Khurda Gheri

(B) P.S. Baduria

- * 18. Kankrasuti
- * 19. Mudia fishery

(C) P.S. Haroa

- 20. Ramchakirgheri
- 21. Goberia fishery
- 22. Munshi Gheri
- 23. Ramjoy Gheri
- 24. Batagachi fishery
- 25. Tentulia abad (Nos. 1 & 2)
- 26. Nebutala fishery (Nos. 1 & 2)
- 27. Muchikhola fishery (Nos. 1 & 2)
- 28. Boalmeri fishery
- * 29. Saraberia Gheri
- * 30. Media Gheri

(D) P.S. Hasnabad

- 31. Chekapatli fishery
- 32. Sulkuni abad fishery
- 33. Laskarnagar fishery (Nos. 1 & 2)
- 34. Mohanpur abad fishery
- 35. Bhabanipur fishery
- 36. Ichapur fishery
- 37. Ghosalati fishery
- * 38. Chimta fishery
- @ 39. Bainara fishery
- 40. Durgapur Bailani fishery
- @ 41. Kakaria fishery
- 42. Hingalgunj fishery
- * 43. Simena Gheri
- 43. (a) Bholakhali fishery

(E) P.S. Sandeshkhali

- 44. Dwarir jungal fishery (Nos. 1 to 4)
- 45. Dhamakhali fishery (Nos. 1 & 2)
- 46. Atapur fishery (Nos. 1 to 5)
- 47. Bholakhali fishery
- 48. Bhangatoshkhali fishery
- 49. Amlamethi fishery
- @ 50. Gabberia fishery
- @ 51. Daksin Radhanagar
- 52. Dadpur fishery
- * 53. Harishpur fishery
- @ 54. Putimari fishery
- @ 55. Daksin Akratala
- @ 56. Hamiltonabad fishery
- 57. Mathurakanda fishery
- 58. Pathankhali fishery
- @ 59. Manmathanagar fishery
- @ 60. Durgamandap fishery

II. BARASET SUB-DIVISION(F) P.S. Baraset

- 61. Kazir Bheri
- 62. Poder Bheri
- 63. Bamuner Bheri
- 64. Biswaser Bheri
- * 65. Sanberia abad fishery
- 66. Bhubanpur fishery

(F) P.S. Baraset (Contd.)

- 67. Media fishery
- 68. Gardhapa Bheri
- 69. Koler Bheri
- 70.. Kankrasuti Bheri
- 71. Bilbauchandi fishery
- 72. Bajeapti fishery
- 73. Tapulir Bheri
- 74. Jadaber Bheri
- * 75. Sarkarer math fishery
- 76. Koarir dhapa fishery
- @ 77. Putar beel fishery
- 78. Bilbantra's jalkar fishery
- @ 79. Nalban fishery
- @ 80. Baredikle fishery
- @ 81. Beelvelly fishery
- * 82. Hizardhapa fisheries

(G) P.S. Deganga

- 83. Chuchuria fishery
- * 84. Tentulia fishery
- * 85. Chakkulia fishery
- * 86. Gobar-dhanpur fishery

III. ALIPUR SUB-DIVISION(H) P.S. Canning

- 87. Jibantala fishery (Nos. 1 & 2)
- 88. Sarengabad fishery (Nos. 1 & 2)
- 89. Srinagar fishery
- 90. Sastakhali fishery
- 91. Howramari fishery
- 92. Gheekhali fishery (Nos. 1 & 2)
- 93. Moukhali fishery (Nos. 1 & 2)
- 94. Kulerkhoj fishery (Nos. 1 to 3)
- 95. Bibirabad fishery
- 96. Gangacheri fishery
- 97. Khagra fishery
- 98. Basra fishery
- 99. Khunkhali fishery
- 100. Tamuldaha fishery (Nos. 1 to 3)
- 101. Homrapatta fishery (Nos. 1 to 3)
- 102. Beliagachia fishery
- 103. Rajpur fishery

(H) P.S. Canning (Contd.)

- 104. Chalikati fishery
- 105. Netra fishery
- 106. Anandabad fishery
- 107. Banera fishery
- 108. Patikhali fishery
- 109. Nafarganj fishery
- 110. Sealfeli fishery
- 111. Parbatipur fishery (Nos. 1 & 2)
- 112. Laskarpur fishery (Nos. 1 & 2)
- 113. Hiranmayour fishery
- 114. Kripakhali fishery
- @ 115. Birinchibari fishery
- @ 116. Purandar fishery
- 117. Golabari fishery

(I) P.S. Joynagar

- 118. Madhusudanpur fishery or Shankijahan fishery
- 119. Jalaberia fishery
- 120. Purbagabtala fishery
- 121. Shyamnagar fishery (Nos. 1 & 2)
- 122. Baishata fishery
- @ 123. Daksin Durgapur fishery
- * 124. Kaikhali fishery
- * 125. Layekjungal bahir
- * 126. Layekjungal Vitar
- @ 127. Kilee Durganagar fishery
- 128. Madhabpur fishery
- 129. Katamari fishery
- * 130. Madhyagurguria fishery

(J) P.S. Sonarpur

- @ 131. Khadhati fishery

(K) P.S. Baruipur

- * 132. Dhanyakhola fishery
- * 133. Moutala fishery
- 134. Belgachhi or Taldi fishery
- 135. Atniramish fishery

IV. DIAMOND HARBOUR SUB-DIVISION(L) P.S. Kakdwip

136. Dwariknagar fishery
 137. Maisani fishery

(M) P.S. Sagar

138. Kashtala fishery

(N) P.S. Mathurapur

139. Paschim Jaterdeul fishery
 * 140. Digambarpur fishery
 141. Kumarapara fishery
 142. Kankandighi fishery (Nos. 1 & 2)
 143. Daksin Kashinagar fishery
 144. Nelua fishery
 145. Surjapur fishery (Nos. 1 & 2)
 146. Narayanpur fishery (Nos. 1 & 2)
 147. Narendrapur fishery (Nos. 1 to 3)
 148. Maipith fishery
 149. Kuemari fishery (Nos. 1 & 2)
 150. Daksin Joykrishnapur
 151. Sethrajar Gheri

* Paddy-cum fish farms.

@ Fallow or derelict fish farms.

APPENDIX - II.

BRACKISHWATER IMPOUNDMENTS IN WEST BENGAL WITH DETAILS
OF LOCATION, ACERAGE AND ESTIMATED ANNUAL PRODUCTIONP.S. - HAROA
DISTRICT 24-PARGANAS

Sl. No.	Name of the fish farm	Village where located	Area (acres)	Source of water and fish seed	Fishermen employed	Approx. annual yield per acre (kg.)				Approx. total yield per acre (kg.)	Remarks
						Lates calcarifer	Mulletts	Other including cat fishes	Prawns		
1	2	3	4	5	6	7	8	9	10	11	12
1.	Ramchakir Gheri	Ramchakir Gheri	233	Vidya river branch	60	110	225	110	225	670	Profuse growth of algae
2.	Batagachi Gheri	Batagachi	180	-do-	70	111	226	102	300	739	-do-
3.	Boalmari Gheri	Munshi Gheri	365	Vidyadhari	70	123	213	112	336	784	-do-
4.	Nebutala Gheri No.1	Nebutala	30	Kurunia	20	109	258	112	167	646	-
5.	Nebutala Gheri No.3	-do-	45	-do-	30	110	234	103	292	739	-
6.	Nebutala Gheri No.2	-do-	30	-do-	20	102	189	90	257	638	-
7.	Nebutala Gheri No.4	-do-	301	-do-	80	110	258	109	309	786	Excessive growth of algae
8.	Tentuliabad Gheri No.1	Tentuliabad	400	Vidya river branch	60	123	258	123	313	817	-do-
9.	Tentuliabad Gheri No.2	-do-	150	-do-	40	111	267	144	297	819	-do-

1	2	3	4	5	6	7	8	9	10	11	12
10.	Muchikhola Fishery No.1	Muchikhola	50	Vidya river brahch	30	123	259	110	359	851	-
11.	Muchikhola Fishery No.2	-do-	27	-do-	25	110	266	145	265	786	-
12.	Munshi Gheri	Munshi Gheri	735	Canal of Bidyadhari	50	-	-	-	-	203	Excessive growth of algae and weed.
13.	Goberia Gheri	Vikarhati	2500	Kurunia river & Bidyadhari	150	C A T C H D A T A N O T K N O W N					Excess algal growth.
14.	Ramjoy Gheri	Ramjoy Gheri	660	-do-	-	-	-	-	-	221	Submarged weed.
P.S. - HASNABAD DISTRICT 24-PARGANAS											
1.	Sulkuniabad	Sulkunia	12	Dasta river	10	60	137	89	130	416	Excessive growth of algae.
2.	Chakpatli Gheri	Chakpatli	49	-do-	9	48	118	70	41	277	-do- + silting up.
3.	Ichapur Fishery	Ichapur	80	-do-	21	70	185	144	230	629	Excessive growth of algae.
4.	Bhowanipur Fishery	Bhabanipur	70	-do-	12	41	74	59	100	274	-do-
5.	Ghosalati Fishery	Ghosalati	50	Bidyadhari river	16	92	133	200	111	537	-do-
6.	Mohanpur Abad Fishery	Mohanpur	27	Katakhali river	6	89	185	115	130	519	-

1	2	3	4	5	6	7	8	9	10	11	12
7.	Chimta Fishery	Chimta	15	Katakhal river	3	133	189	148	141	611	-
8.	Bholakhali Fishery	Bholakhali	100	-do-	8	23	21	151	566	769	-
9.	Laskarnagar Fishery	Laskarnagar	14	-do-	5	33	156	48	63	300	-
10.	Bailari Fishery	Bailari	60	-do-	6	30	35	12	268 + 120	465	-

P.S. - BADURIA
DISTRICT 24-PARGANAS

1.	Kakrasuti Fishery	Kakrasuti	150	Ichamati river	6	N	O	T	K	N	O	W	N	-
2.	Mudiar Gheri	-do-	167	-do-	10	-	-	-	-	-	-	-	-	-

P.S. - JOYNAGAR
DISTRICT 24-PARGANAS

1.	Nager Fishery	Shamnagar	25	Thakuran river	10	149	251	124	76	600	Excessive growth of shrub.
2.	Guhar Fishery	-do-	166	-do-	20	71	100	37	13	221	-do-
3.	Madhusudanpur Fishery	Madhusudanpur	400	Matla and Thakuran	90	-	-	-	-	447	Leakage through holes.
4.	Madhabpur Fishery	Madhabpur	165	Thakuran river	70	-	-	-	-	890	-
5.	Katamari Fishery	Katamari	130	Matla and Thakuran	50	-	-	-	-	679	-

1	2	3	4	5	6	7	8	9	10	11	12
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P.S. MATHURAPUR
DISTRICT 24-PARGANAS

1.	Narayanpur Fishery No.1	Narayanpur	100	Chhatra river	10	26	20	-	66	112	Excessive growth of weed and leakage through holes.			
2.	Narayanpur Fishery No.2	-do-	86.5	-do-	12	56	112	27	74	269	-do-			
3.	Narendrapur Fishery	Narendrapur	61	-do-	15	84	195	70	130	479	-do-			
4.	Kuemari Fishery No.1	Kuemari	65	Raidighi river	N	0	T	K	N	0	W	N	-	-
5.	Kuemari Fishery No.2	-do-	100	-do-	N	0	T	K	N	0	W	N	-	-
6.	Dakshin Fasihnagar	-	-	-	N	0	T	K	N	0	W	N	-	-
7.	Singher Gheri	Daskhin Joy Krishnapur	280	-	N	0	T	K	N	0	W	N	-	-
8.	Boser Fishery	Kumrapara	150	Chatra river	N	0	T	K	N	0	W	N	-	-
9.	Halder Fishery	Narayanpur	250	-do-	N	0	T	K	N	0	W	N	-	-
10.	Surjapore	Surjapore	-	-do-	-	8	4	24	24	60	-	-	-	-

1	2	3	4	5	6	7	8	9	10	11	12
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P.S. - SANDESHKHALI
DISTRICT 24-PARGANAS

1.	Daudpur Fishery	Daudpur	60	Bidya river	30	-	-	-	-	17	Excessive growth of submerged weed.		
2.	Manmatha Nagar Fishery	Manmathanagar	15	-do-	N	O	T	K	N	O	W	N	-
3.	Dwarijanganl Fishery No.2	Dwarijanganl	333	Ghatiara river	6	48	88	18	88	242	Excessive growth of algae and their decomposition.		
4.	Dwarijanganl Fishery No.4	-do-	400	-do-	10	44	111	44	122	321	-do-		
5.	Dwarijanganl Fishery No.5	-do-	233	-do-	3	44	78	11	85	218	-do-		
6.	Dwarijanganl Fishery No.6	-do-	170	-do-	3	56	122	86	118	382	-		
7.	Bholakhali Fishery	Bholakhali	81.3	Dasha river	7	33	90	48	48	219	Profuse growth of weed.		
8.	Dhamakhali Fishery No.1	Dhamakhali	70	Kalagachi river	10	25	48	44	25	142	Silting.		
9.	Dhamakhali Fishery No.2	-do-	67	-do-	10	19	55	44	50	168	Profuse growth of algae.		
10.	Atapur Fishery No.1	Atapur	80	-do-	10	18	37	56	20	131	Silting.		

1	2	3	4	5	6	7	8	9	10	11	12
11.	Atapur Fishery No.2	Atapur	67	Kalagachi river	11	20	56	61	22	159	Silting
12.	Atapur Fishery No.3	-do-	50	-do-	8	53	85	56	29	223	-do-
13.	Atapur Fishery No.4	-do-	8	-do-	2	37	87	73	38	235	-
14.	Atapur Fishery No.5	-do-	16	-do-	6	39	48	92	53	232	Profuse growth of weed.
15.	Bhangatosh-khali Fishery	Bhangatosh-khali	40	Sandeshkhali river	10	44	74	44	60	222	-do-
16.	Amlamethi Fishery	Amlamethi	800	Bidya river	30	24	37	22	111	194	-

P.S. - CANNING
DISTRICT 24-PARGANAS

1.	Swarnakarer Gheri	Parbatipur	366	Matla river	40	N	O	T	K	N	O	W	N	Growth of weed and shrubs and silting up.
2.	Bager Gheri	-do-	330	-do-	50	37	65	56	14	172	-do-			
3.	Parbatipur Fishery	-do-	116	-do-	-	19	46	37	18	120	-do-			
4.	Laskarpur Fishery	Laskarpur	243	-do-	30	56	120	84	110	370	-			
5.	Nafarganj Fishery	Nafarganj	222	-do-	40	20	35	20	56	131	Silting.			

1	2	3	4	5	6	7	8	9	10	11	12			
6.	Sealfeli Gheri	Laskarpur	274	Matla river	30	50	80	20	85	235	Excessive growth of weed.			
7.	Kripakhali Fishery No.1	Kripakhali	90	-do-	70	-	-	-	-	844	-			
8.	Kripakhali Fishery No.2	-do-	750	Karati river off Matla	50	-	-	-	-	893	-			
9.	Kripakhali Fishery No.3	-do-	10	-do-	30	N	O	T	K	N	O	W	N	-
10.	Sajnakhali Fishery	Kripakhali	67	Karati river off Matla	40	-	-	-	-	940	-			
11.	Hiranmaypur Fishery	Hiranmaypur	100	-do-	50	-	-	-	-	890	-			
12.	Budhokhali Fishery	Budhokhali	40	-do-	30	-	-	-	-	890	-			
13.(a)	Golabari Fishery No.1	Golabari	83	-do-	50	-	-	-	-	341	-			
13.(b)	Golabari Fishery No.2	-do-	50	-do-	20	7	32	14	47	100	-			
14.	Rolamin Sahab Fishery	Tamulda	250	Bidhyadhari	17	N	O	T	K	N	O	W	N	-
15.	Samad Mia's Fishery	Khagra	500	-do-	-	N	O	T	K	N	O	W	N	-
16.	Prasad Kayal's Fishery	Jibantala	200	-do-	-	N	O	T	K	N	O	W	N	-
17.	Adhar Naskar's Fishery	Khagra	40	Karati river	5	11	9	-	4	24	-			

1	2	3	4	5	6	7	8	9	10	11	12			
18.	Sajad Molla's Fishery	Tamulda	96	Bidyadhari river	15	19.3	14.7	-	10	44	-			
19.	Kinu Mandal's Fishery	Gheekhali	200	-do-	25	N	O	T	K	N	O	W	N	-
20.	Nibaran Bag's Fishery	Howramari	1000	-do-	65	N	O	T	K	N	O	W	N	-
21.	Akbar Molla's Fishery	Gheekhali	100	-do-	33	N	O	T	K	N	O	W	N	-
22.	Nibaran Bag's Fishery	Poyna	500	Karati river	87	N	O	T	K	N	O	W	N	-
23.	Sarengabad Fishery	Sarengabad	330	-do-	45	N	O	T	K	N	O	W	N	-
24.	Biswas's Fishery No.2	Moukhali	50	-do-	10	20	14	-	11	45	-	-	-	
25.	Biswas's Fishery No.1	-do-	100	-do-	16	22	15	-	11	48	-	-	-	
26.	Nibaran Bag's Fishery	Moukhali Kumrakhali	160	-do-	30	27	16	-	16	59	-	-	-	
27.	Jogesh Patra's Fishery	Baintala	650	Vidyadhari	-	20	17	-	10	47	-	-	-	
28.	Hazir Fishery	Tamulda	300	-do-	53	-	N	O	T	K	N	O	W	N
29.	Maniker Fishery	Chalikali	150	-do-	31	-	N	O	T	K	N	O	W	N
30.	Bager Fishery	Bibirabad	100	-do-	41	-	N	O	T	K	N	O	W	N
31.	Kayaler Fishery	Homrapalta	400	-do-	50	-	N	O	T	K	N	O	W	N

1	2	3	4	5	6	7	8	9	10	11	12				
32.	Mani Paler Fishery	Basra	150	Vidyadhari	37	-	N	O	T	K	N	O	W	N	-
33.	Laskarer Fishery	Kulurkhoj	12	-do-	12	-	N	O	T	K	N	O	W	N	-
34.	Sardarer Fishery	-do-	30	-do-	25	-	N	O	T	K	N	O	W	N	-
35.	Alam Mollar Fishery	Kulerkhoj	30	-do-	22	-	N	O	T	K	N	O	W	N	-
36.	Mollar Fishery	Rajpur	100	-do-	45	-	N	O	T	K	N	O	W	N	-
37.	Laskarer Fishery	Basra	500	-do-	55	-	N	O	T	K	N	O	W	N	-
38.	Kayaler Fishery	Netra	350	-do-	43	-	N	O	T	K	N	O	W	N	-
39.	Sardarer Fishery	Jaldhaka	200	-do-	29	-	N	O	T	K	N	O	W	N	-
40.	Ebadater Fishery	Jaldhaka Bakultala	250	-do-	33	-	N	O	T	K	N	O	W	N	-
41.	Mollar Fishery	Kaparpuri	215	-do-	29	-	N	O	T	K	N	O	W	N	-
42.	Jagannather Fishery	Chunpuri	350	-do-	41	-	N	O	T	K	N	O	W	N	-
43.	Mandaler Fishery No.1	Sarengabad	300	-do-	36	-	N	O	T	K	N	O	W	N	-
44.	Mandaler Fishery No.2	-do-	200	-do-	32	-	N	O	T	K	N	O	W	N	-

1	2	3	4	5	6	7	8	9	10	11	12				
45.	Bager Fisher y	Bibirabad	100	Vidyadhari	32	-	N	O	T	K	N	O	W	N	-
46.	Boser Fishery	Patikhali	50	-do-	14	-	N	O	T	K	N	O	W	N	-

P.S. - DEGANGA
DISTRICT 24-PARGANAS

1.	Chakkulia (Channel) in paddy fields (partly paddy culture)	Chakkulia	40	Beleghata khal and Bidyadhari river branch	7									25	Calcutta sewage causes fish mortality.
2.	Sholakuri Channel in paddy field (65% paddy field)	Gobardhanpur	65.5	-do-	10					-do-				21	-do-
3.	Chowhan Molla's Fishery (Channel in paddy fields)	-do-	60	Beleghata Khal	9					-do-				17	-do-

P.S. - BARASET
DISTRICT 24-PARGANAS

1	2	3	4	5	6	7	8	9	10	11	12
1.	Bamuner Gheri	Khamar Rameswarpur	67	Noai or Haroa Khal and Paskhali Canal (off Bidyadhari)	9	Annual production is restricted to only 6 months from August to January.				60	<ol style="list-style-type: none"> Excessive discharge of Calcutta sewage. Bed silting up, Flood in 1958-59, Draught in 1954, Poaching, Fish is cultivated only for 6 months.
2.	Baherdhapa	Mudia	27	Paskhali river	3	NOT AVAILABLE					Noai or Haroa Khal & Paskhali Canal (off Bidyadhari)
3.	Kakrasuti	Noabad Khakar	250	-do-	14	NOT AVAILABLE					-do-
4.	Kazir Bheri	Khamar Noabad	366	Paskhali (Baraset of Bidyadhari)	38	NOT AVAILABLE					<ol style="list-style-type: none"> Source of seed affected by the discharge of sewage, Multipurpose, ownership, Silting of the bed.

1	2	3	4	5	6	7	8	9	10	11	12
5.	Bhulanpur Fishery	Sanberia Abad	250	Noaikhal (branch of Vidyadhari)	30	-	-	-	-	30	1. Source of seed affected by the discharge of sewage, 2. Multipurpose, ownership, 3. Silting of the bed.
6.	Bardesia Kaliprasanna Jantha Samabaye Krishi Samity Ltd.	Bardesia	133	Paskhali river	12	N O T A V A I L A B L E					1. Source of seed affected by the discharge of sewage, 2. Multipurpose ownership, 3. Silting of bed, 4. Mostly occupied by paddy field.
7.	Biswaser Fishery	Bardesia	67	Paskhali Canal	9					188	1. Excessive growth of algae, 2. Silting, 3. Sewage affecting seed.

1	2	3	4	5	6	7	8	9	10	11	12
8.	Koarir Dhapa	Par Khariberia	72	Paskhali Canal	8		N O T	A V A I L A B L E			1.Excessive growth of gastropoda, 2.Silted feeder Canal.
9.	Pulian Beel	-do-	-	Now converted to paddy field.							
10.	Sarkarer Math	Kamdhenu	66	Surti river	15			Converted to freshwater fishery.			Flow of feeder channel stopped due to silting.
11.	Bilbauchandi Fishery	Bilbauchandi	300	Surti river	24			Converted to partly freshwater and partly brackishwater fishery.			Flow in feeder channel stopped due to silting.
12.	Taplir bheri	Nabapur	30	-do-	-			Converted to partly freshwater and partly brackishwater fishery.			-do-
13.	Muder bheri	Mudia	150	Paskhali	8		N O T	A V A I L A B L E			-
14.	Orakure	Mal Rameswarpur	-	Recently abandoned.							
15.	Baisbiga Fishery	Baisbiga	38	Paskhali	6		N O T	A V A I L A B L E			-

APPENDIX - IIILIST OF FISHES, PRAWNS AND CRABS GENERALLY CULTURED
IN BRACKISHWATER IMPOUNDMENTSFishes

<u>Scientific name</u>	<u>Local name</u>
1. <u>Lates calcarifer</u>	Bhetki
2. <u>Mugil parsia</u>	Parse
3. <u>Mugil tade</u>	Bhangon
4. <u>Mugil speigleri</u>	Parse
5. <u>Mugil corsula</u>	Khorsula
6. <u>Mystus gulio</u>	Nona tengra
7. <u>Eleutheronema tetradactylum</u>	Gurjaoli
8. <u>Anguilla bengalensis</u>	Ban
9. <u>Scetophagus argus</u>	Paira chanda
10. <u>Odontoblyopos rubicundus</u>	Chengo
11. <u>Glossogobius giuris</u>	Bele
12. <u>Setipinna phasa</u>	Phasa

Prawns

1. <u>Penaeus carinatus</u>	Bagda Chingri
2. <u>Penaeus indicus</u>	Chapra Chingri
3. <u>Metapenaeus monoceros</u>	Honye Chingri
4. <u>Metapenaeus brevicornis</u>	Chamme Chingri
5. <u>Macrobrachum rosenbergii</u>	Golda or mocha Chingri
6. <u>Palaemon rudis</u>	Goda Chingri
7. <u>Leander styliferus</u>	Ghora Chingri
8. <u>Acetes spp.</u>	Ghuso Chingri
9. <u>Parapenaeopsis spp.</u>	Nona Chingri

Crab

1. <u>Scylla serrata</u>	Nona kankra
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