

## REVIEW ARTICLE

### **A Review on Fish Production Scenario of Cooch Behar District in West Bengal**

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#### **ABSTRACT**

Pisciculture is an important livelihood of the farmers of Cooch Behar district. Farmers of Cooch Behar district cultivated different type fish. Majority of the farmers cultivated fish in a small pond. The study was conducted in Cooch Behar district to know the fish production scenario and the role of different organization on livelihood improvement of fish farmer. The study was conducted during January 2017–April 2017. The study was conducted with the help of secondary source of information. It was found from the study that different government organization like State Department, Krishi Vigyan Kendra, and NGO actively work on pisciculture in Cooch Behar. Farmers were used different type indigenous technology. A strengths, weaknesses, opportunities, and threats analysis was shown for guiding the policymaker, scientist, and different government and non-government organization for implementation any pisciculture project or program.

**Key words:** Farmers, fish, indigenous, livelihood, organization, pisciculture, pond

#### **INTRODUCTION**

Fish has long been an important source food for people all over the world. The importance of fish as a source of high quality, balanced, and easily digestible proteins is well understood.<sup>[1]</sup> Fish production is an important livelihood of the farmers of Cooch Behar district (Map 1). Farmers of Cooch Behar district cultivated different type fish. They cultivated fish in a small pond. The study was conducted in Cooch Behar district to know the fish production scenario and the role of different organization on livelihood improvement of fish farmer. The study was conducted during January 2017–April 2017.

Secondary source of information was used. It was found from the study that different government organizations like State Department, Krishi Vigyan Kendra, and NGO actively work on pisciculture in Cooch Behar. A strengths, weaknesses, opportunities, and threats (SWOT) analysis was done for guiding the policymaker, scientist, and different government and non-government organization for implementation any project or program.

#### **RESEARCH METHODOLOGY**

The study was conducted during January 2017–April 2017. The secondary source of information was used as a reference of the study. The study covers all the blocks of the district. A SWOT analysis was shown with the help of the findings of the study.

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## RESULTS AND DISCUSSION

Cooch Behar district of West Bengal lying between 25°57'47" and 26°36'2" North latitude and between 89°05'43" and 88°47'44" East longitude is very unique in its topography and climatic characteristics bearing Terai agro-climatic characteristics and a total water stretch of more than 6121 ha including hill stream rivers, beels, and others aquaculture resources. The total riverine network includes some major rivers such as Torsa, Ghargharia, Kaljani, and Gadadhar which are the potential source of huge indigenous fish diversity along with a considerable number of ornamental fish population. Cooch Behar is an agriculture-based district in West Bengal with high rainfall intensity (more than 3200 mm). About 3200 ha of water bodies are under pisciculture, and nearly 28.5 thousand families are involved in this aquaculture operation. This is an essential food commodity with high demand and high market price, but production always remains short (about 5 tonnes/year) of its demand. Therefore, investment in this sector would be a viable proposition.<sup>[2]</sup> Cooch Behar is the farthest district of West Bengal from its capital Kolkata situated at a distance of about 700 Km and is a north-eastern district of Jalpaiguri division. Geographically, it is the part of the Himalayan Terai region of West Bengal. It is bordered by Jalpaiguri district in the north, Assam in the east, and Bangladesh in the east, south and west. The district is 3387 km<sup>2</sup> in area and triangular in shape. River Torsa flows beside the main town (headquarter) bearing the same name. The district consists of 5 sub-divisions, 12 blocks and 128 g Panchayat and total numbers of *mouzas* of the district is 1168. As per 2001 census, the total population is 24, 79,155, out of which 12, 72,094 are male and 12, 07,061 are female. The population of fishermen's community of the district is 1, 91,625 and most of the fishermen population belong to schedule caste and live in most poor condition below poverty line as they have lost their last scope to maintain their livelihood by capturing fish as well as they are not in a position to cultivate their own water bodies though six perineal rivers, namely, Tista, Jaldhaka, Torsa, Raidak, Gadadhar, and Kaljani flow through this district. Different on-going schemes of Fisheries Department for Cooch Behar district are such as training to the fish farmers, Development of Tank Fisheries, development of aquaculture through FFDA, promotion of integrated fish farming,

and reclamation of big water body, i.e., Chhara/Beel, infrastructure development, development of fishermen cooperative society, old-age pension, wetland day observation, demonstration center, Magur breeding with Hatchery along with indigenous species, development of aquaculture through short-term credit, fish farmers day observation, and construction of landing center. Total water areas of the district are about 6120 ha out of which about 2932 ha are under Beel fisheries, 2007 ha are under Tank Culture, and the rest of water areas are flowing rivers. It has one CFCS, 63 nos. of Primary Fisherman's Cooperative Society Ltd., (PFCS), 12 no. of Fish production groups (FPG), and 50 nos. of a self-help group (SHG) are promoting the fish production and employment generation in the district. 15 numbers of hatcheries in the district are producing fish seed (spawn) which were recorded near about 449.43 million during 2010–2011. Total water area under PFCS is about 3,588.09 ha in which culturable water area is about 2,081.72 ha and capturable water area is about 1,506.37 ha with a total fish production of about 18332 MT during 2010–2011.

Due to the topography and special condition of soil and water of the district, the main hurdle in fish production is a higher fluctuation of water depth in monsoon and the lean period. For this reason, most of the tanks or water bodies are seasonal in nature which badly effects fish production.

The district is bestowed with a large number of water bodies which are utilized for pisciculture activities. Some of the water bodies have been restored and renovated to make them useful for irrigation purposes also. This water bodies can be more effectively utilized for pisciculture activities which can really supplement the income of the rural poor to a considerable level. There is large water area in the district which can be exploited for inland fisheries and can also be used as source of irrigation water. Aquaculture plays a great role in human nutrition and upliftment of rural poor people and considering immense production possibilities and export potential. There is considerable scope for inland fisheries due to eating habits of the populace. Besides imbibed with low lying areas under Government Khas land and seasonal water areas along highways, there are many numbers of tanks and ponds which at present are used for community fishing/leasing out to cooperatives and can be managed suitably. The total water available in the district is as under.

### Statistical data of the fish production in Cooch Behar district

Different types of fishes were cultivated in Cooch Behar District. A large numbers of farmers of Cooch Behar District were depends on pisciculture. But it was location specific. The following Tables 1-6 reflect the details fish production scenario of Cooch Behar district in a nutshell.<sup>[3]</sup>

### Pisciculture in Cooch Behar district

The district is bestowed with a large number of water bodies which are utilized for pisciculture activities. Some of the water bodies have been restored and renovated to make them useful for irrigation purposes also. This water bodies can be more effectively utilized for pisciculture activities which can really supplement the income of the rural poor to a considerable level. There is large water area in the district which can be exploited for inland fisheries and can also be used as a source of irrigation water. Besides imbibed with low lying areas and seasonal water areas along highways, there are tanks and ponds which at present are used for community fishing/leasing out to cooperatives and can be managed suitably. Setting up of more hatcheries will meet the local demand and also leave good scope to market the surplus seeds to the adjoining states. The private sector should invest as there is a great possibility.

### Strengths

- Considerable scope for inland fisheries.
- Fishery lends a great deal to rural economy.
- A number of ponds, tanks existing in the district.
- Good potential for capture fisheries/culture fisheries in the open water and aquaculture in the periphery of the water bodies.
- The production is 8120 MT while demand is 34200 MT thereby showing great potential in this sector.

### Weakness

- Fish farmers do not practice fish farming in scientific/recommended line and have developed an intermediate area specific technology of their own, which is neither traditional nor composite.

- Lack of modern techniques of pisciculture among the farmers.
- Large water bodies are still fallow or are being cultured below the desired level due to multi-ownership, financial problem, non-availability of technical support on time, non-availability of inputs as to fingerling, fish feed, etc.
- No adherence of fish breeding protocol by the carp fish seed producers, resulting in breeding regression in the carp progeny which ultimately cause slow and lesser growth thereby effecting low yield.
- Lack of availability of timely credit assistance resulting in encroachment of moneylenders.

### Opportunity

- Through excavation of silted river bed and ponds, fish production can be increased substantially.
- Short duration pisciculture to revive indigenous varieties such as magur, chitol, and pabda.
- Scope for production of value-added products from low-cost fish.
- Thrust to be given for polyculture to maximum utilization of resources.
- Proper initiatives can be taken up for the awareness about advanced technology.
- Huge scope for inland fishery activities.
- Value addition can be done through processing and achieve higher incomes.
- Conduct soil testing and based on the characteristics of the soil construct preferably perennial ponds.

### Threat

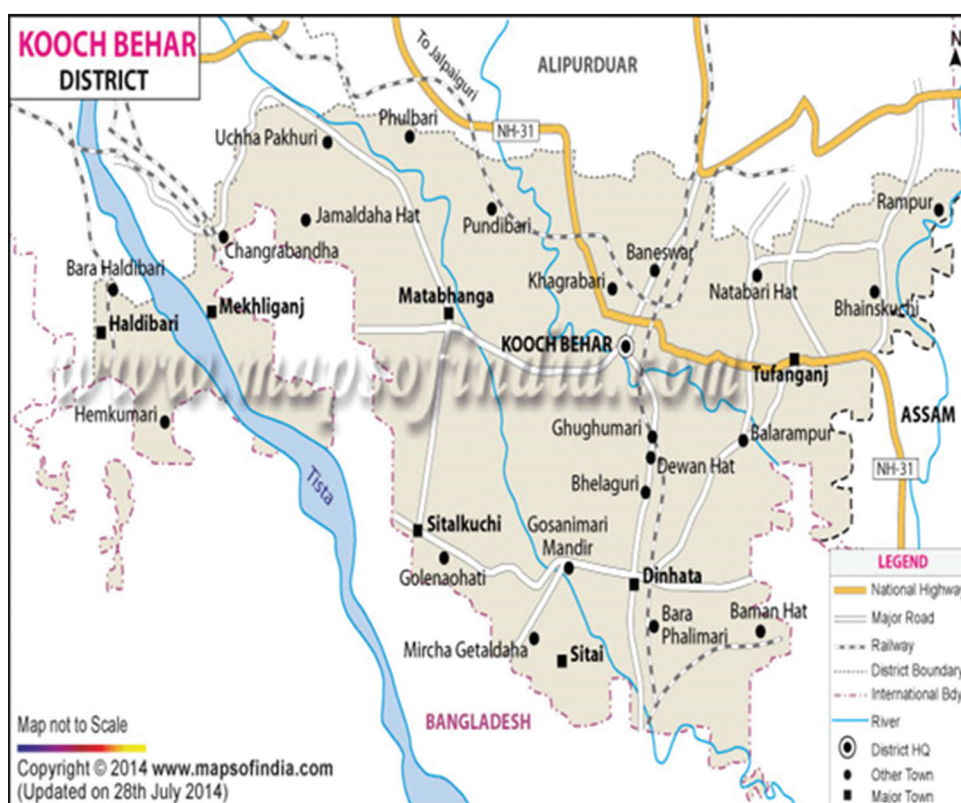
- Natural disaster (flood and earth quick).
- Availability of market.
- Availability of good quality spawn.

### Different fishery scheme in Cooch Behar district

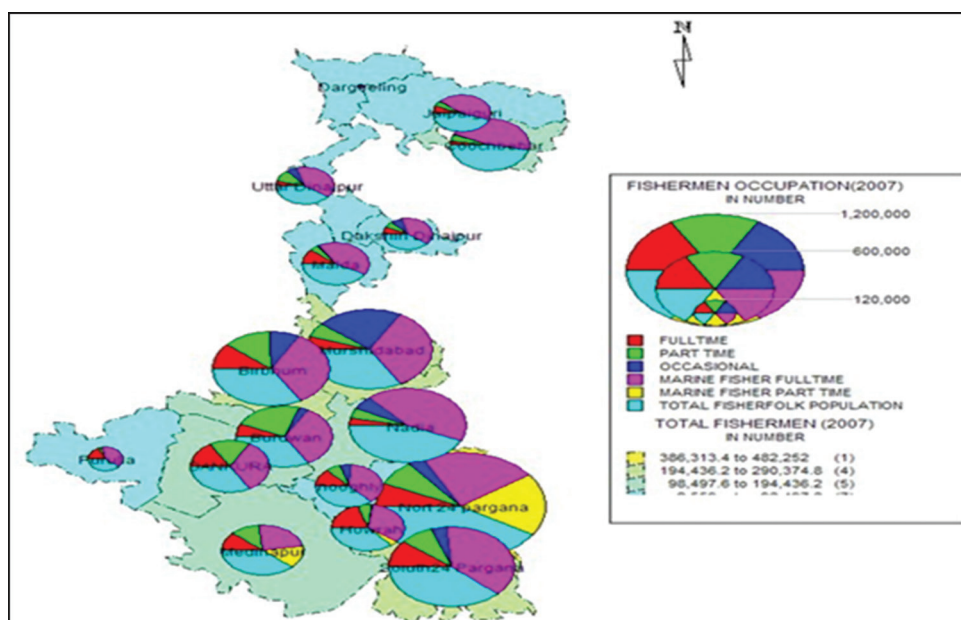
#### *Government sponsored different fishery schemes Integrated fish farming*

Under this scheme, fish farming was carried out with duck, poultry bird, pig, domestic animal (cattle/cow), horticulture, sericulture, floriculture, paddy culture, etc. To initiate integrated fish farming a minimum area of 0.2 ha or 1.5 Bigha or





Map 1: Cooch Behar district<sup>[7]</sup>



Map 2: Geospatial mapping of fisheries<sup>[8]</sup>

50 Satak is required. Farmers those who are doing fish culture in lease waterbody could also take this opportunity of this scheme.

*Old age pension*

Old and aged poor infirmed fishermen (60 years above), who have no other source of income and helping hand, are selected for the scheme. The selection was done as per recommendation and approval of Panchayat Samiti and Zilla Parishad.

*Training for fish farmers' and fishermen's*

There are several categories of trainings starting from 1 day to 15 days. Trainings were generally conducted at block level/district level. Residential training at state level in details with more elaborately is also conducted at different time with separate course module ranging from 15 days to 30 days or more.

*Social fishery schemes*

This is partial or full subsidized schemes. Under

**Table 1:** Fish production in Cooch Behar district<sup>71</sup>

1.	Impounded water area (tank/ponds) [in hac.]	2006.89
2.	Total water area of Beel/Boar [in hac.]	2932.28
3.	River water area [in hac.]	1181.66
4.	Total water area [in hac]	6120.83
5.	Total no. of Beel/Chhara	270
6.	Total no. of active Beel/Chhara	95
7.	Total no. of seed [Spawn] production, 2010-2011 [million]	449.43
8.	Total production of table fish, 2010-2011 [M. tons.]	18332.00
9.	Total production of table fish of PFCS Ltd., 2010-2011 [M. tons.]	7510.00
10.	Total requirement of table fish per year [M. tons.], IMC, exotic and riverine	34200.00
11.	Total no. Fisherman Identity Card Issued, 2010-2011	18672
12.	Total no. of wholesale fish dealer licensee [only municipal area]	71
13.	Total no. of wholesale fish market	56
14.	Total no. of retail fish market	148
15.	Total no. of retailer for fish market	2470
16.	Total no. of fish seed hatchery [IMC and exotic]	15
17.	Total no. of PFCS Ltd.	60
18.	Total no. of members of PFCS Ltd.	12918
19.	Total no. fisherman: (1) Male: 75085, (2) female: 68824	143909
20.	Total no. of fisherman family	30619
21.	Total no. of fishing village	643
22.	Total no. of women's ornamental PFCS Ltd.	3
23.	Total no. of women trained by net fabrication training	300
24.	Total no. of CFCS Ltd.	1
25.	Total no. of SHG	113
26.	Total no. of members of SHG	986
27.	Total no. of FPG	91
28.	Total no. of members of FPG	957
29.	Total no. of active FPG	20
30.	Total no. of sub-division	5
31.	Total no. of block	12
32.	Total no. of gram Panchayat	128
33.	Total no. of mouza/village	1168
34.	Total nos. of municipality	6
35.	Total no. of old age pensioners [12 blocks]	355
36.	Total no. of lab-cum-training center	8
37.	Total effective water area on pisciculture [in hac.]	3155.40

PFCS: Primary Fisherman's Cooperative Society Ltd., SHG: Self-help group, FPG: Fish production groups

this schemes 5000 nos. fingerling/ha with other inputs such as lime and feed were provided to the farmers.

#### *Fish farming for SC/ST community people*

The SC/ST category fish farmers were benefited under this scheme. They are provided training for fish culture. All inputs including fish seed, feed was provided to them in full subsidy.

#### *Minikit distribution*

Minikit was distributed from State Government or Zilla Parishad fund time to time to the PFCS/FPG/SHGs/poor marginal fish farmers and fishermen's.

#### *Fishermen accidental insurance*

Government of West Bengal with the help of Government of India supports one time accidental benefit of an amount of Rs. 50,000 in case of death of fishers during fishing to the deceased family. This scheme covers all fishermen cooperative society

**Table 2:** Block-wise water areas in Cooch Behar district (in ha.)<sup>[7]</sup>

Name of block	Chhara/Beel	Pond/Tank	River area	Total area	Culturable area	Fisherman family
Cooch Behar-I	437.80	270.37	150.00	858.17	410.88	3332
Cooch Behar-II	205.56	180.65	75.00	461.21	290.50	3672
Dinhata-I	309.60	102.55	75.00	625.55	392.82	2892
Dinhata-II	485.80	240.95	122.00	828.35	451.55	2369
Sitai	264.65	220.55	75.00	442.20	175.50	1429
Tufanganj-I	261.81	165.55	100.00	527.36	295.06	3662
Tufanganj-II	178.52	100.03	100.00	378.55	182.49	1923
Mathabhanga-I	252.44	220.70	100.00	573.14	295.00	3681
Mathabhanga-II	356.00	290.40	150.00	796.40	335.50	2526
Sitalkuchi	106.11	73.04	84.66	263.81	120.55	2275
Mekhliganj	27.17	26.60	50.00	103.77	60.00	1325
Haldibari	46.82	115.50	100.00	262.32	145.55	1533
Total	2932.28	2006.89	1181.66	6120.83	3155.40	30619

**Table 3:** Project undertaken by RKVY<sup>[7]</sup>

A	Cage culture
1	Satmile Matshyajibi Samabay Samity Ltd., Vill: Chhat Elajaner Kuthi, P.O: Alajanerkuthi, Block: Cooch Behar-I
2	Nakarkhana FCS Ltd., Vill and P.O: Nakarkhana, block: Tufanganj-II
B	Brood stock management Paku
1	Matalhat FPG, Vill:-Bhalka, P.O.: Matalhat, Dinhata-I Dev. block
2	Maruganj FPG, Vill. and P.O.: Maruganj, Tufanganj-I Dev. block
C	Paddle boat
1	Gitaldaha Anchalik PFCS Ltd., block: Dinhata-II
2	Rakhalmari PFCS Ltd., Block: Dinhata-II
D	Semi intensive culture of Chital
1	Arapur FCS Ltd., P.O: Balaierhat, block: Tufanganj-I
2	Horibolhat Janapriya Mahila Gosthi, Vill.-Petla Adabari, P.O.- Kismat Adabari, block: Sitai
3	Rampur Anchal FCS Ltd., P.O: Rampur, block: Tufanganj-II
4	Guriahati FPG, Block: Cooch Behar-I
5	Ankur Swaimbhar Gosthi, Vill and P.O: Hatiduba, block: Cooch Behar-II
6	Bamanhat FPG, Vill and P.O: Bamanhat, block: Dinhata-II
7	Ashokbari FCS Ltd., Vill and P.O: Ashokbari, block: Mathabhanga-I
8	Nishiganj FCS Ltd., P.O: Nishiganj, block: Mathabhanga-II
9	Balasi Yuba Sangrami Swaimbhar Gosthi, Vill: Dari bosh Fulbari, P.O: Singimari, block: Mathabhanga-II

PFCS: Primary Fisherman's Cooperative Society Ltd., FPG: Fish production groups

members. Under this scheme fishers from Cooch Behar District have benefited during the year 2012.

#### *Bi-lingual fishermen identity card*

The PFCS Ltd., members of the district will be covered under such scheme. This will not only give them an identity but will also help them to move freely in border area during fishing time.

**Table 4:** Status report of fish cooperative society in Cooch Behar district<sup>[7]</sup>

Sl. no.	Block name/municipality	Total no. of cooperative society
1.	Cooch Behar-I Dev. block	05
2.	Cooch Behar-II Dev. block	05
3.	Dinhata-I Dev. block	14
4.	Dinhata-II Dev. block	06
5.	Tufanganj-I Dev. block	09
6.	Tufanganj-II Dev. block	05
7.	Mathabhanga-I Dev. block	04
8.	Mathabhanga-II Dev. block	04
9.	Sitalkuchi Dev. block	04
10.	Mekhliganj Dev. block	03
11.	Haldibari Dev. block	01
12.	Sitai Dev. block	02
13.	Sadar Municipality, Cooch Behar	01
14.	Cooch Behar CFCS Ltd., (at district level)	01
Total		64

#### *Infrastructure development for fishers community*

The Government of West Bengal helps the fishers by supporting financial assistance in terms of construction fishermen hut, community hall, road, drinking water facilities, and electrical works.

#### *National fisheries development board (NFDB) schemes*

The objective of this scheme is to provide necessary stocking material like fish fingerling to the big water body @ 2000/ha. So far three no. of big water bodies, namely, Dharala Nadir Chhara (Nakkati Beel) under Sakdal PFCS Ltd., Dinhata-I Dev. block and another two under at Dinhata-II Dev. block, namely, NayarChhara under Sahebganj PFCS Ltd., and Dashiar Chhara under Bamanhat

**Table 5:** Basic information about the fish farmers in Cooch Behar district<sup>[4]</sup>

Sl. no.	Particulars	Estimated information
1.	Average size of holding (ha)	0.26
2.	Average size of water body (ha)	0.10
3.	Leased-in water body (ha)	Negligible
4.	Age of fish farmers (years)	18–60
5.	Educational level	Primary to higher secondary
6.	Fishery as primary occupation (No.)	27.5%
7.	Other economic activities	Crop, livestock, and business
8.	Employment of hired labor (ha)	67%
9.	Active participation in fishery operations (No.)	80%
10.	Training received on fishery (No.)	51 65%
11.	Types of fish reared	Small, big, and indigenous fishes
12.	Place of marketing	Local and town market
13.	Income from fishery for a single operation (Rs'/ha)	20,500–27,600

PFCS Ltd., benefited under this scheme.

#### *Rashtriya Krishi Vikas Yojana (RKVY) scheme*

##### RKVY - 2008-2009

Under the RKVY scheme 2008-2009 two no. of hatchery was modified to breed the endanger fishes. This was implemented in Gadadhar FPG under Tufanganj-I block and Kalakata FPG at Kalakata under Dinhat-I Dev. block.

##### RKVY - 2009-2010

Under the RKVY Scheme 2008-2009, one unit for construction of block-level lab-cum-training center was sanctioned and it was implemented in Dinhat-I Dev. block.

##### RKVY - 2010-2011

Under the RKVY scheme 2010-2011, several projects were undertaken by the district, of which the cultural schemes are cage culture (2 unit), intensive culture of Chital (9 unit), and culture of Paku (2 unit); infrastructure and other projects such as construction of a new hatchery (1 unit) and supply of fiber paddle boat (2 unit) are also implemented.

##### RKVY - 2011-2012

Under the RKVY scheme 2011-2012, a number of different types of projects were assigned to the district which includes:

1. Culture of indigenous small fish in backyard ponds.
2. Development of integrated fishery for A category PFCS Ltd.
3. Seed Mahotsav on wetland day/fish farmers' day, distribution of endangered along IMC fish seed.
4. Pisciculture with local indigenous species in North Bengal.
5. Project proposal for Matshyajana (mobile, insulated fish vending unit).
6. Liberation of fish fingerlings in the ponds excavated under MGNREGS.
7. Distribution of hygienic insulated box to fish vendors/collectors.
8. Construction and commissioning of lab-cum-training center.
9. Training on inland fish farming to district level beneficiaries/fish farming communities.
10. Imparting training on inland fish farming to block level beneficiaries/fish farming communities.

#### *Cooch Behar KVK activity*

Cooch Behar KVK organized so many skills-based training, demonstration and awareness program on scientific method of fishery production in a different block of Cooch Behar district from 2005 to 2016 [Figure 1].

#### *Status report of fish cooperative society in Cooch Behar district*

Present status of fish cooperative society of different block of Cooch Behar district found from the district official website.<sup>[3]</sup>

#### *Geospatial mapping of fisheries in West Bengal*

Geospatial mapping is a location based study and is a part of intelligence GIS which is expected to be useful tool for fisheries scientists, aquatic resource managers and policy planners in developing and planning strategies for fisheries resources of the country. A Geospatial mapping of west Bengal was shown in MAP2 which was found from the study of anonymous<sup>[8]</sup>.



**Table 6:** Status of indigenous ornamental fishes in Cooch Behar district<sup>[5]</sup>

S. no.	Local name	Scientific name	Cons status	Order	Family	Number/ collection	Relative abundance	Category of use
1.	Chapila	<i>Gudusia chapra</i>	VU	Clupeiformes	Clupeidae	50	+++	Fo
2.	Koi	<i>Anabas testudineus</i>	VU	Anabantiformes	Anabantidae	02	+	Fo
3.	Loach	<i>Nemacheilus botia</i>	LRnt	Cypriniformes	Balitoridae	03	+	Po
4.	Gang magur	<i>Amblyceps mangois</i>	EN	Siluriformes	Amblycipitidae	01	+	Ho
5.	Beth Rongi	<i>Botia dario</i>	VU	Cypriniformes	Cobitidae	02	+	Ho
6.	Panchax	<i>Aplocheilus panchax</i>	LRlc	Cyprinodontiformes	Aplocheilidae	04	+	Ho
7.	Lohachata	<i>Botia lohachata</i>	EN	Cypriniformes	Cobitidae	01	+	Ho
8.	Ghutum	<i>Noemacheilus arunachalensis</i>	LRlc	Cypriniformes	Balitoridae	32	++	Po
9.	Kukurbotia	<i>Somileptes gongota</i>	VU	Cypriniformes	Cobitidae	05	+	Ho
10.	Mowa	<i>Amblypharyngodon mola</i>	LRlc	Cypriniformes	Cobitidae	44	+++	Fo
11.	Boroli	<i>Barilus barna</i>	VU	Cypriniformes	Cyprinidae	04	+	Fo
12.	Devario puthi	<i>Danio devario</i>	LRnt	Cypriniformes	Cyprinidae	08	+	Po
13.	Darikana	<i>Esomus danricus</i>	LRlc	Cypriniformes	Cyprinidae	63	+++	Ho
14.	Puti	<i>Puntius sophore</i>	LRnt	Cypriniformes	Cyprinidae	47	+++	Po
15.	Puti	<i>Puntius sarana</i>	VU	Cypriniformes	Cyprinidae	43	+++	Fo
16.	Puti	<i>Puntius ticto</i>	LRnt	Cypriniformes	Cyprinidae	64	+++	Po
17.	Puti	<i>Oreochthys cosuatis</i>	LRlc	Cypriniformes	Cyprinidae	02	+	Ho
18.	Chala	<i>Salmostoma bacaila</i>	LRlc	Cypriniformes	Cyprinidae	23	++	Fo
19.	Puti	<i>Oreochthys crenuchoides</i>	DD	Cypriniformes	Cyprinidae	01	+	Ho
20.	Balitora	<i>Psilorhynchus balitora</i>	VU	Cypriniformes	Psilorhynchidae	01	+	Fo
21.	Chang	<i>Ophiocephalus gachua</i>	LRlc	Channiformes	Channidae	03	+	Fo
22.	Lata	<i>Ophiocephalus punctatus</i>	LRnt	Channiformes	Channidae	18	+	Fo
23.	Shoal	<i>Ophiocephalus striatus</i>	LRlc	Channiformes	Channidae	15	+	Fo
24.	Khosla	<i>Colisa fasciatus</i>	LRlc	Cyprinodontiformes	Belontiidae	27	++	Po
25.	Khosla	<i>Colisa lalia</i>	LRlc	Cyprinodontiformes	Belontiidae	14	+	Ho
26.	Kakila	<i>Xenentodon cancila</i>	LRnt	Beloniformes	Belonidae	36	++	Fo
27.	Meni	<i>Nandus nandus</i>	LRnt	Perciformes	Nandidae	12	+	Po
28.	Chanda	<i>Chanda nama</i>	LRlc	Perciformes	Chandidae	15	+	Po
29.	Chanda	<i>Chanda ranga</i>	LRnt	Perciformes	Chandidae	02	+	Ho
30.	Balia	<i>Glossogobius guris</i>	LRnt	Perciformes	Gobiidae	14	+	Fo
31.	Gochi	<i>Macrognaathus aculeatus</i>	LRlc	Persiformes	Mastacembelidae	42	+++	Po
32.	Gota	<i>Mastacembelus pancalus</i>	LRlc	Persiformes	Mastacembelidae	60	+++	Po
33.	Tangra	<i>Mystus vittatus</i>	LRnt	Siluriformes	Bagridae	59	+++	Ho
34.	Tangra	<i>Mystus gulio</i>	LRlc	Siluriformes	Bagridae	28	++	Fo
35.	Tarkata	<i>Conta pectinata</i>	LRlc	Siluriformes	Sisoridae	08	+	Ho
36.	Batasi	<i>Pseudotropius atherinoides</i>	LRlc	Siluriformes	Schilbeidae	45	+++	Fo
37.	Tangra	<i>Mystus tengara</i>	LRlc	Siluriformes	Bagridae	38	++	Ho
38.	Tarkata	<i>Hara hara</i>	LRlc	Siluriformes	Sisoridae	02	+	Ho
39.	Pipe fish	<i>Microphis deocata</i>	VU	Syngnathiformes	Syngnathidae	09	+	Ho
40.	Pholi	<i>Notopterus notopterus</i>	EN	Osteoglossiformes	Notopteridae	46	+++	Fo

(contd...)



**Table 6: (Continued)**

S. no.	Local name	Scientific name	Cons status	Order	Family	Number/ collection	Relative abundance	Category of use
41.	Tarkata	<i>Hara jerdoni</i>	LRlc	Siluriformes	Sisoridae	02	+	Ho
42.	Cutcutia	<i>Tetraodon cutcutia</i>	LRnt	Tetraodontiformes	Tetraodontidae	04	+	Ho
43.	Tangra	<i>Mystus cavasius</i>	VU	Siluriformes	Bagridae	32	++	Ho
44.	Tarkata	<i>Hara koladynensis</i>	LRlc	Siluriformes	Sisoridae	06	+	Ho
45.	Pabda	<i>Ompok pabda</i>	VU	Siluriformes	Siluridae	10	+	Fo
46.	Pabda	<i>Ompok pabo</i>	EN	Siluriformes	Siluridae	20	+	Fo

Ho: Ornamental, Po: Potential ornamental, Fo: Food ornamental, EN: Endangered, VU: Vulnerable, DD: Data deficient, LRnt: Low risk near threatened, LRlc: Low risk least concern

#### Basic information about the fish farmers in Cooch Behar district of West Bengal

Anonymous<sup>[4]</sup> found the following basic information of the fish farmers of Cooch Behar district.

#### Status of indigenous ornamental fishes in Cooch Behar district

Anonymous<sup>[5]</sup> found the following indigenous fishes and their status in Cooch Behar District, West Bengal.

#### Fishing gears operated in Cooch Behar district

Anonymous<sup>[6]</sup> found the following fishing gear used by the fish farmers of Cooch Behar district.

#### Net fishing gears

- Cast net (Chhabi Jal): Cast net or Chhabi Jal [Figure 2a] is the main fishing gear of Cooch Behar district. Cast net is a small bell-shaped net with weights on the periphery and having a string. The principle is to throw the net in a circle for trapping the fishes of a water body. Cast net is operated in rivers, Beels, and ponds throughout the year. Fishes such as Indian major carp, *Labeo bata*, *Hypophthalmichthys molitrix*, *Ctenopharyngodon idella*, *Puntius* spp., *Mystus* sp., and others are caught.
- Gill net (Phansi Jal): Gill net locally called Phansi Jal [Figure 2b] is commonly used to catch fishes by gilling. Fishes which try to pass through it get gilled. Mesh size of the gill net varies from 0.6 cm to 7.5 cm for different sized target fishes. It is wall netting, rectangular in shape and is provided with a head rope of polypropylene carrying floats and a foot rope with or without sinkers. Gill nets are made up of polyamide monofilament. Fishes such as *Mystus* sp., *Heteropneustes fossilis*, *Clarias batrachus*, *Channa* spp., *Anabas* sp.,



**Figure 1:** Training on fish production by Cooch Behar Krishi Vigyan Kendra

*Puntius* spp., *Mastacembelus* sp., *Wallago attu*, *Labeo rohita* and so on are caught. It is also a major fishing gear operated in rivers and beels throughout the year.

- Lift net (Sitki Jal): The Lift net or Sitki Jal [Figure 2c] is a square net. The four corners of which are tied to the tip of two crossed flexible bamboos. A bamboo is attached to the point of crossing, and the whole arrangement may or may not have a rope. Lift net is usually operated in the monsoon months. The major catch composition includes *Puntius* spp., *Amblypharyngodon mola*, and *Barilius* sp.
- Dragnet (Masari Jal and Bed Jal): Drag net [Figure 2d] locally called as Masari Jal and Bed Jal. This net, which is widely used, is structurally rectangular in shape and has a head rope carrying floats and a foot rope with or without sinkers. The net is usually operated throughout the year. The mesh size is <0.12 cm. Most of the pond fishes such as Indian major carp, exotic carp, *L. bata*, *Puntius* spp., *Mystus* sp., *Notopterus* sp., and air-breathing fishes are caught by dragnet.
- Cloth net (Tana Jal): The cloth net is a fine-



**Figure 2:** (a-n) Fishing gears operated in Cooch Behar district. (a) Cast net, (b) gill net, (c) lift net, (d) drag net, (e) push net, (f) stationary lift net, (g) Koncha or Teta, (h) Shuli, (i) Zakoi, (j) Pala, (k) Jhoka, (l) Chalk, (m) Tapai, (n) Burung

meshed mosquito net. It is locally called Tana Jal. During fishing by cloth net, two persons hold the net at opposite ends and lift it from the water when sufficient numbers of fishes are trapped. Cloth net is implemented throughout the year except for monsoon months in ponds of Cooch Behar district. The fishes usually caught by cloth net are *Puntius* spp., *A. mola*, and *Esomus denricus*.

- f. Push net (Thela Jal): Push net or Thela Jal is a very common net used by local fishermen to catch fishes in the lentic and lotic water bodies of Cooch Behar district. It is made up of a triangular bamboo frame fitted with a mosquito netting cloth [Figure 2e]. Fishermen operate it by pushing it into the water body and are used throughout the year. Fishes such as *Trichogaster* sp., spawn and fry of *Murrels*, *Puntius* spp., *A. mola*, and *E. denricus* are usually caught by the push net.
- g. Stationary Lift net (Khora Jal): This is also a popular fishing gear operated in different rivers of Cooch Behar district throughout the year [Figure 2f]. In stationary lift net or Khora Jal, some bamboo poles are fixed in the water body. Two bamboos are then attached at one end and tied up with ropes so that they are widely separated at opposite ends. To these ends, a triangular net is attached. A fisherman can periodically submerge

and lift this net with the help of bamboo and capture the fishes. Major catch compositions are Indian major carp, *Puntius* spp., *Barilius* sp., *Mystus* sp., and *L. bata*.

- h. Seine net (Haath Jal): Seine net is a rectangular net similar to that of dragnet having a head rope carrying floats and foot rope without any sinkers. Seine net is locally called a Haath Jal. The mesh size of seine net is larger than dragnet and is operated in the monsoon months. Mode of operation of seine net is similar to that of dragnet. Fishes such as Indian and exotic carps are usually caught.

#### Tackles

- a. Hook and line (*Barshi*): An iron hook is usually attached at the end of a line (nylon cord). This line with attached hook is then fixed to the end of a bamboo stick. Additional arrangement includes a sinker to sink the hook in water and a reel for casting the line. The hooks are provided with baits such as earthworm, nymph of beetle, and small frog. The hook and line fishing method is operated throughout the year. A large number of fishes such as *L. rohita*, *Puntius* spp., *Mystus* sp. *W. attu*, and air breathers are caught by this method.
- b. Barsha: A Barsha consists of a long line. It is set vertically down into the water with baited hooks having a weight at the bottom and a float at the top. The Barsha with baited hooks is kept in the water body in the evening and collected the next morning. This fishing gear is generally observed to be operated during monsoon months in beels and ponds. Catfishes and murrels are usually caught by this fishing gear.

#### Miscellaneous gears

- a. Spearfishing (*Koncha/Teta* and *Shuli*): Koncha/Teta and Shuli are two types of indigenous spears used in Cooch Behar district. Koncha or Teta [Figure 2g] has a long handle made of split bamboo shaft of about 2–3 m fitted with many conical iron rods or projecting bamboo sticks equipped with hooks. It is thrown at the larger fishes by a fisherman standing by the side of a water body or in a boat. The spear (Koncha or Teta) is used to catch *L. rohita*, *C. idella*, *Catla catla*, *W. attu*, *Channa* spp., and *C. batrachus*. On the other hand, *Shuli*

- [Figure 2h] is made of 1.5–2.0 m long iron rod, the end of which is angular in shape. It is repeatedly insert in and around the holes of marginal embankments by the fishermen until vibration is felt on the handle indicating, the presence of *Monopterusuchia* in the holes and the fish is caught by digging.
- b. **Electrofishing:** In Cooch Behar district, electrofishing is a common practice in some rivers. Here, fishes are caught by passing an electric current through electrodes (anode and cathode) from a 12V portable battery placed on a boat into the river water. The electric current stuns the fishes, and erratic movement occurs by either jumping out of water or coming to the water surface to be easily captured by hand or scoop net. Electrofishing is operated in the shallow water areas of the river.
  - c. **Khatal (fish aggregating device):** In some areas of rivers where water current is low, a temporary fencing is prepared by bamboo, *Eichhornia*, *Pistia*, banana leaves, and twigs. After a few days, these areas are covered by mosquito nets and the fishes are caught by cast net. This method is applied throughout the year except monsoon. Fishes such as Indian major carp and exotic carp are caught by this method.
  - d. **Bamboo piece immersion:** Small-sized mature bamboo pieces are having both sides open and a node in the middle are submerged in the ponds for a few days. The bamboo pieces are then taken out of the ponds by covering the holes with palm or fingers. The fishes entering the bamboo pieces are caught. By this method of fishing catfishes such as *H. fossilis* and *C. batrachus* are generally harvested.
  - e. **Harkka or Tapa:** It is a triangular bamboo frame attached with a sheet made up of bamboo. *Harkka* or *Tapa* with straw or plant parts is submerged in water. After a couple of days, these are taken out of the water body with the help of a rope attached to the *harkka* or *tapa*, and the trapped fishes are caught. Major fish catch compositions are freshwater loach, *Lepidocephalichthys guntea*, *Mastacembelus* sp., and *Channa* spp.
  - f. **Zakoi:** Zakoi is an indigenous fishing gear made by local fishermen of the Cooch Behar district with the help of bamboo. It has an upper and a lower side. The upper side is made up of a triangular bamboo frame, whereas, the lower side which is closed below has a sieve made of bamboo attached to the triangular frame. This structure thus results in a central space being formed and opens through this frame. The gear has a handle made up of bamboo attached at one angle of the triangular bamboo frame, and a rope is tied at the base of the frame [Figure 2i]. *Zakoi* can be operated by a fisherman in rivers and ponds of this district. Fishes such as *Puntius* sp., *Trichogaster* sp., *A. mola*, and *Channa* spp. can be caught. Fishing by *Zakoi* is also employed by women.
  - g. **Pala:** An indigenous fishing gear too, of the district, has ring-like appearance with a wide opening at the lower side and a narrow opening on the upper side made up of bamboo sticks [Figure 2j]. In summer and winter when the level of water decreases, *Pala* is kept at the bottom of the water body trapping some amount of water where fishes are expected. The trapped fishes in the *Pala* are handpicked. Small and medium-sized fishes are caught by this device in turbid and muddy water.
  - h. **Jhoka:** Jhoka, an indigenous fishing basket, is cylindrical in shape made of bamboo sticks having two openings [Figure 2k]. Mode of operation is similar to that of *Pala*. Only difference with *Pala* is that small fishes can be caught in it. Jhoka is operated in the monsoon months of the year in different rivers of this district.
  - i. **Chalk:** Another indigenous fishing gear of the district, has a wide opening at the lower side surrounded by a rounded bamboo frame attached to a net [Figure 2l]. The upper side is conically narrowed with four bamboo sticks tied with a net.
  - j. **Tapai:** Tapai is a rectangular fish trap made of bamboo stick interwoven by nylon threads [Figure 2m]. The trap fishing works on the principle of allowing fishes to enter the trap and then preventing their escape from the trap. The dimension of the *Tapai* varies as per the need. However, the standard size is 0.50–1.5 m in length, 0.30–0.40 m width and 0.10–0.2 m height. The gear having two sides has 2–7 doors on each side. The entrance or doors are of very specialized structure and works as a one-way valve. Due to this valve, fishes entering the box cannot escape. The diameter of the door



is 0.25 m wide so that fish of large size can be caught. The trap is set at a water depth of 0.15 m keeping the water level just above the door with the help of rope, mud, and branches of trees. Fishes moving along with water enter through the doors. By this gear, live fishes can be caught without any physical injury. *Tapai* is very common in Cooch Behar district as no guarding of the trap is required. The trap is placed in a specific location and taken out after some time or some days. *Tapai* is operated in monsoon months of a year in rivers and beels. The major catch composition is *Mystus* sp., *Mastacembelus* sp., *Puntius* spp., *Channa* spp., *Lepidocephalichthys* sp., and prawns.

- k. **Burung:** Burung is an oval-shaped indigenous fishing trap made of bamboo sticks interwoven by nylon threads [Figure 2n]. Working principle of Burung is similar to that of Tapai. Unlike Tapai it has only one entrance and is operated in monsoon months in rivers and beels. Burung is used to catch small fishes such as *Puntius* spp., *Channa* spp., *A. mola* and so on.

### Fisheries intervention plan

To gear up the developmental activities of fishery sector in Cooch Behar district, the following activities and program are initiated.

1. CFCS of the district should be assisted by special dose with special emphasis to come under modern scientific pisciculture for augmentation of fish production.
2. Poor performance of PFCS of the district should be re-organized by complaining cooperative attitude and rendering financial assistance to all the societies for development of fish production commercially under culturable scheme. And awareness campaign should maintain regularly.
3. Special emphasis should be given to culture for utilizing the seasonal tanks of the district.
4. Promoting the ideas of air-breathing fish culture and setting up of air-breathing fish seed hatcheries.



**Figure 3:** Fish production activity photograph. (a) Catching Fish at Chaitarchhara, Sahebganj, Dinhat-II Dev. Block, (b) “Chital” fish sampling under RKVY, 2010-11 scheme, (c) Gadadhar fish seed farm, Tufanganj, (d) Cage culture under RKVY, 2010-11 at Chadga Beel, Nakarkhana, Tufanganj

5. More popularization and easy institutional financing require in a short-term credit program of the district by taking latest technology for enhancement of fish production [Figure 3].

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