Chapter — V

Fishing

5.0. Introduction

Sundarban creeks are excellent fishing areas for fresh water as well as different species marine fishes. All the aquatic organisms of the Sundarban mangrove ecosystem depend directly or indirectly on the mangroves for their food. Fishery includes a broad perspective. The term actually means culture and propagation of edible, marketable fishes. In a broader sense it includes the exploitation of many animals, other than fishes. Judicious exploitation of fishes, prawns, shrimps, crabs, sharks and various mollusks like oysters, dolphins etc. from their natural habitat, for the human consumption and benefit, comes under the domain of fishery. (Chapman, 2000)

5.1. Favorable Situation For Fishing

There are several ecological parameters, which determine the breeding and aquatic characteristics of the fishes. (Chapman, 2000)

5.1.1. Ideal Habitat

The natural water bodies cover an area of 1920 square kilometers within 9630 square kilometers of the entire Sundarban. Besides, there are 4514.26 square kilometers of low-lying land adjoining the water bodies, which is suitable for fishing. However, the major source of fishes of the Sundarban is the natural water bodies. Besides, there are several creeks serving as the ideal habitat for several types of saline water fishes. Moreover, the huge amount of detritus, nutritious organic material of mangrove ecosystem, provides the ideal nourishment of several species of fishes. In Sundarban
often it is found that the fish catch varies according to the seasonal rhythms. The annual fish catch is greatest during the rainy season and least during the summer. *(Hunter, 1875)*

**Table 5.1. Seasonal Fluctuations in the Fish Catch**

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Seasons</th>
<th>Percentage of Fish Catch</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Summer</td>
<td>5.3</td>
</tr>
<tr>
<td>2</td>
<td>Rainy</td>
<td>66.0</td>
</tr>
<tr>
<td>3</td>
<td>Winter</td>
<td>28.7</td>
</tr>
</tbody>
</table>

SOURCE: Saha, 2000

5.1.2 Socio-economic Forces

The fishing right in Sundarban has not yet been reserved, thus allowing a force for all activity. Metropolitan city of Kolkata provides the market facility. At present the export market has created an opportunity for quick returns from the ‘prawn industry’. While the Government of West Bengal and the local entreprenures are patronizing the fishing industry, big business houses are showing their interest in shrimp culture. *(De, 1991)*

5.1.3. Types of Fishing

Depending upon the habitat of fishes, fishery can be divided into two types:

a. Marine fishery.

b. Inland fishery. *(O'Malley, 1914)*

**Marine fishery**

Exploitation of the fish resources of the sea comes under the purview of marine fisheries.

For a long time, the chief aim of marine fishery was to capture the fish from the sea and to market the edible fishes. However, presently it has been realized that the overexploitation is outstripping the animal life of the sea to replenish itself. This demands
Plate 13: Conversion of agricultural land to fishing pond (*bheri*) for shrimp culture.

Plate 14: Lock gate assuring regulated supply of water from the creeks to the fishing pond.
a sound management and conservation of coastal fisheries. Marine fishes should be managed in a way that prevents both over and under utilization of fish stock. Harvesting should be made after evaluating the maximum sustainable yield.

Maximum sustainable yield is the optimum fish that can be taken on a sustained basis without diminishing the reproductive capacity of the species or adversely affecting associated or dependent species.

**Fresh water fishery**

The major importance of this fishery is to culture and exploit fish resources from the great river systems of the country and from the vast networks of irrigation canals, tanks, lakes and reservoirs.

**Brackish water fishing**

This fishery includes culture and exploitation of fishes from the different _brories_ in the coastal regions, estuaries, ponds and _jheels_ of the deltaic regions.

**The two Aspects of Inland Fishery**

Inland fishery revolves round two important aspects as:

a. Capture fishery

b. Culture fishery

The capture fishery aims at management and capture of fishes from the rivers, estuaries and lakes. This is done with due concern to conservation and rational exploitation of the fishes so that sustained productivity of the fishes is maintained. *(Naskar, 2000)*
Culture fishery includes the practice of rearing fishes in small impounded water such as pond, jheels etc. and capture and market the fishes when they attain the desired length and weight.

However, pisciculture, in inland fishery is supported by two basic practices as collection of spawns and nourishing, rearing and stocking of fingerling. The fishes are noted mainly for migration, for the purpose of spawning. There are mainly two opposite trends of migration in fishing as:

a. Catadromous migration-The journey from the rivers to the seas and

b. Anadromous migration –This means the reverse movement of the fishes from the sea to the river system.

The marine fishes migrate to the river from the sea for spawning. The anadromous migration is observed in Hilsa. These fishes usually produce huge number of eggs to compensate the risk to which the eggs are subjected.

Fishes can be classified into several groups as pelagic, demersal and anadromous. However, simplified version of such classification or modification is made as marine fishes, fresh water fishes and marine fishes migrating towards the deltaic region. (Sinha, et al 1973)

- Marine fishes, preferring saline environment, often migrate upstream during breeding season but later return to their natural marine habitat. These fishes include Hilsa (Hilsa Ilisha), Topse (Polynemus paradoseus Linn), etc.

- Fresh water fishes, which find the middle course of the river Ganges to be the natural habitat, but migrate downstream to the saline water during the breeding
season. These include Pangus (Pangasuis pangasuis), prawn, both the Bagda (Penaeus monodon) and the Galda (Macrobrachium rosenbergi), etc.

- Pelagic (deep sea), Demersal (near shore), Anadromous (basically marine fishes which migrate towards river sources during breeding season).

5.1.3.1. Fresh water Fishing at Sundarban

Amongst the nineteen community development blocks of Sundarban, there are several ponds and canals, which spread over an area of several thousands of hectares. These are the ideal ground for fresh water fishes. With the sincere effort of the scientists of Agricultural Research Centre of Nimpith, the fish catch has increased since 1979. The volume of increase in fish catch has been given below:

<table>
<thead>
<tr>
<th>Type of Technology</th>
<th>Year</th>
<th>Average Production (Kg./Hectare)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional Method of Fishing</td>
<td>1987 - 1980</td>
<td>560</td>
</tr>
<tr>
<td>Scientific and Mixed Farming (6 Species)</td>
<td>1992 - 1994</td>
<td>2,500</td>
</tr>
</tbody>
</table>


5.1.3.2. Identification of Species

The fresh water fishes include major Indian Carps (Rohu, Katla, Mirgel etc.), Minor Carps (Chela, Puti, Dhere) and also Giol (Magur, Singi, Koi). Besides exotic carps (Silver carp, Grass carp, etc), mainly four types of common carp and other exotic fishes (Telapiya, Thailand Magur, etc.) are also available. (Ghosh, 1998)
Plate 15: A good catch of shrimp for commercial purpose at the cost of biodiversity.

Plate 16: Close up view of a shrimp at Namkhana.
5.1.3.3. Fishing In The Pond

Bagda culture is predominant in the ponds. The food of the Bagda is mainly water based Ultra Prawn Feed.

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Nutritional Composition</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Crude Protein</td>
<td>41 Minimum</td>
</tr>
<tr>
<td>2</td>
<td>Crude Fat</td>
<td>55 Minimum</td>
</tr>
<tr>
<td>3</td>
<td>Moisture</td>
<td>11 Minimum</td>
</tr>
<tr>
<td>4</td>
<td>Crude Fiber</td>
<td>03 Maximum</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>

**Table No. 5.3. Ultra Prawn Feed**

The ingredients include fish meal, fish lipid oil, fish solubles, squid oil, squid lever powder, lecithin, vitamin C, mineral premixes, wheat flour and soyameal. The food supply is mixed with disease preventive. The desirable pH of water is 7.5 to 8.0, below which liming is necessary.

5.1.3.3.1. The Threshold Limit

From the field study, it was evident that, the cost of fishing in one bigha (1/3 of an acre), where total number of prawns is eight thousand amounts to forty thousand rupees. The profit margin reaches a high of one lakh rupees. As soon as the Bagda weighs twenty grams, movement is necessary in Bheris (fishing pond), where the rapid growth occurs.

5.1.3.4. Pisciculture In The Bheris (Fishing Pond)

The Bheris are large water bodies for pisciculture. Often paddy fields are converted into Bheris. Here the spawns grow to a particular size in a controlled aquatic habitat. They
are, thus, given special feeds. Bagda, the shrimp attains marketable size within 120 to 140 days. Processing occurs (cleaning, freezing, packing) and then they are sent to far away markets. Bagda trade has developed a parallel economy in the Sundarban. This has provided a new source of income to a number of families in Sundarban. (Mukherjee, 1994)

5.1.3.5. Marine Fishing

About 130 varieties of fishes can be found in the saline water of Sundarban. In estuaries of Sundarban, there is predominance of marine fish species.

5.1.3.5.1. Identification of Marine Fishes

These include Parse (Liza parsia), Bhetki (Lates calcarifer), Bhangor (Nugli tade), Phesa (Setipinna phasa), Bhola (Otolithes maculates), Hilsa (Hilsa ilisha), Kharsula (Rhinomugli corsula). Pomphrets (Pompus argentus), etc. Hilsa is a delicacy to the Bengali population and all other fishes fetch good price in the market. (Das, 1994)

5.1.3.5.2. Types of Marine Fishing

The deep and shallow water fishing are the two broad divisions of fishing. Deep sea fishing occurs mainly at south-western portion of Sundarban, especially in Gangasagar, Kakdwip, Namkhana, Fraserganj and Bakkhali. At Kakdwip, deep sea fishing actually. The trawlers ply upto Millitary Dock, covering 125 kilometers at a speed of 15 kilometers per hour with 14 to 15 laborers. For fish preservation, 70 to 90 blocks of ice is required (each block weighs 120 kilogram). The main catch includes Hilsa, Pomfret, Mackerel, Metka, etc. (Das, 2000)

Besides the main catch, sharks are also found during the summer season, mainly in the months of April and May. However, the ideal habitat for Hilsa is turbid water. Time
taken for the fishermen to go to the military dock from Frazerganj is much less, only about nine hours. From here, the trawlers move upto the western limit of Paradeep and eastern limit of Bangladesh. Most of the fishermen rely more on the weather forecast of Bangladesh in preference to that broadcasted from All India Radio, Kolkata. Often their personal experience helps them to predict storm or cyclone.

Trawlers have the capacity of carrying on an average 750 kilograms of fish. However, the fish catch may increase to the volume 2625 kilograms, if the trawler roam on the sea for 7 to 8 days. Maximum fish catch occurs during the rainy season, when the amount rises to 18750 kilograms.

Table 5.4. Expenditure Per Trip In A Trawler

<table>
<thead>
<tr>
<th>Serial No.</th>
<th>Categories of Expenditure</th>
<th>Prices in Rs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Cost of 6 Barrels of Oil</td>
<td>18,000</td>
</tr>
<tr>
<td>2</td>
<td>The Cost of Ice</td>
<td>(80x70) = 5,600</td>
</tr>
<tr>
<td>3</td>
<td>The Cost off Food Stored for 14 to 15 Persons</td>
<td>4,000</td>
</tr>
<tr>
<td>4</td>
<td>Change of Labours</td>
<td>5,000</td>
</tr>
<tr>
<td></td>
<td>Total Cost</td>
<td>32,600</td>
</tr>
</tbody>
</table>

PRIMARY DATA SOURCE: Collected at Kakdwip.

However, the capital investment amounts for a trawler amounts to Rs. 12 lakh.

5.1.3.5.3. Types of Nets

The cost of preparing a synthetic net amounts to nearly Rupees 3 lakh. Mainly, two types of nets are used:

a) Lot net and

b) Monofilm net
The use of monofilm net is advantageous, because it is very fine and fishes varying between 2 to 3 inches are trapped quite easily. Most of the fishermen get their wood supply mainly from Kolkata and Jhargram.

5.1.3.5.4. Problems of Marine Fishing

There are several problems associated with marine fishing, which require immediate redressal.

1. The fishermen of Sundarban has to face the problem of confrontation with the dacoits. These pirates reportedly take shelter in the islands of Jambudwip, Kendo, Jharkhari, Haludbari and other impenetrable forest clad areas. Either they rob the fishermen of their entire catch or they seize the trawler and demand ransom. Often they befool the security men by crossing the international boundary.

2. Fishing is disturbed during the storm of cyclones. Thus need of the hour is reliable weather forecasting system within Indian territory. The weather forecast of Bangladesh is considered to be more reliable to the Indian fishermen than the Indian source. In course of field investigation several fishermen recorded complaint regarding belated broadcasting of weather warning.

3. Fish is a perishable material and require adequate ice blocks for preservation. Dearth in the supply of ice is a matter of serious concern of the fishermen who are operation in the tropical coastal environment. Limited number of ice factories are operating in Kakdwip, Namkhana, Frazerganj and Bakkhali with their low installed capacity.
4. Acute shortage of power is a major problem due to which production of ice suffers. Entrepreneurs hesitate to invest in cold storages because of power crisis, which ultimately led to storage crisis.

5. High pace of the carrier vehicle is a precondition for the successful marketing of the marine products, which are susceptible to decomposition. Inaccessibility and poor transportation facility are the major constraints of the fishing trade in Sundarban.

6. Marine fishing is a costly economic activity. It is becoming increasingly difficult for the fishermen to get the required loans from the banks. In case of any loss out of natural hazard, the loanees do not get sympathy through easy or delayed installment. Often in such case the next installment of loan is never released. The advantages snatched by the private money lenders. For release of loan they demand higher rate of interest and make conditions of repayment more difficult.

7. Cost of skilled labour is escalating day by day. Labourers also are haunted by problems of irregular job opportunity, high risk factor, absence of insurance facility and insecure retired life.

8. Even the labourers and navigators of the trawlers reported about destruction of non-target aquatic creatures like turtles and dolphins due to collision with the trawlers. They painfully observe how the superfine fishing nets and oil spill from the tankers were causing immense damage to the aquatic life.
Plate 17: Mechanized fishing boat — effective enough in narrow creeks amidst the mangrove forest.

Plate 18: Construction of the fishing trawlers at Kakdwip fishing port.
5.2. Fish cum Paddy Culture

A very interesting observation is that paddy and fish are produced in the same field in Sundarban. After paddy is harvested in the month of December, the sites are inundated with saline tide water thus allowing entry of fishes. Particularly prawn is cultivated in these plots till the month of June when saline water is drained off and land is engaged for paddy cultivation.

In the low and moderate saline areas, a system of alternating agriculture with brackish water aquaculture during dry months is practiced in selected areas only. A system of fish-cum-paddy culture is practiced in Sundarban, which seems to be a better method. They release spawns in paddy fields during the monsoon, which grow in size and prolifer amidst the standing water of the plots. Couple of weeks before the harvest, they release water and collect the fishes. Stored rain water nourishes both the paddy and the fishes thus having no negative impact on the soil.

5.2.1. Lacunae in the Fish cum Paddy Culture

No doubt this is an innovative method, but of course cannot be certified as a hazard free practice.

1. In areas where the local people allow the entry of brackish water into the paddy field, it enhances salinity of the soil and consecutively yield of paddy is affected.

2. Whenever pesticide is applied on the paddy field, it leaves residue on the soil. Following the entry of brackish water during the post harvest period, the toxic chemicals are diluted in the water. In a chain reaction contamination affects phytoplankton, zooplankton and the fishes of such seasonal Bheris.
5.3. Problems of Fishing at Large

In view of gradual decrease in the volume of fish catch, several problems can be identified.

1. The cumulative effect of degradation of the Sundarban, unscientific aquaculture and genetic obstruction created by the construction of the Farakka Barrage, upstream near Malda, has had an adverse effect on the Hilsa fish. The construction of the Farakka Barrage has created an obstacle in their migratory path and is preventing Hilsa shoals with their young ones to move backward in the upstream. However, some of the fish shoals of Bhagirathi escape down the channel once stopped at Farakka, but since they are unable to complete their whole journey cycle, which coincides with their coming of age, the catch along Hugli has been considerably reduced. In pre-Farakka days, Hilsa catch used to be 32.5 tonnes per year, which has been reduced to 0.3 tonnes per year in the 1990s. There is another possible explanation of such reduction in Hilsa catch. Supply of 40,000 cusecs of water during the period of drought was never assured. Due to feeble supply of fresh water, salinity of the water has been increased in the estuaries of Sundarban with incursion of strong tidal currents. Consequently, the Hilsa shoals are avoiding Bhagirathi in preference to Padma in Bangladesh.

2. Depletion of the forest cover (mangroves) has affected the food chain of this estuary. Gradual loss in amount of detritus, decreased amount of zooplankton and phytoplankton has reduced the carrying capacity of the estuaries thus leading to reduction in number of fishes. (Kanjilal, 2000)
3. Water pollution has affected the ecosystem of this area. Untreated waste water of Hugli industrial belt has raised the BOD level in the rivers and creeks of Sundarban. Obviously seasonal influx of the various marine fishes has been reduced and reproduction of the local fishes is also affected.

4. Indiscriminate and unscientific exploitation of fishes has led to their drastic reduction in quantity and diversity. In order to catch prawn larvae, very fine net (mosquito net type) is used and in the process seeds of hilsa, parshrey, bhangar and other varieties of fish along with plankton are brought out of water. After this the prawn seed is gathered from this lot and the rest of it is discarded on the sand beach. As per estimates, at least 5 kg. of such living materials are destroyed from the catch of each net. Total destruction of such living materials in the Indian Sundarban itself amount to 1.25 tonnes daily. This not only destroys the young ones of commercially valuable fish species but also affects the entire marine food chain. Reduction in quantity of small size prey population ultimately imposes restriction on the proliferation of medium and big size predators in the marine ecosystem.

5. Pressure of human population has affected this aquatic ecosystem in a negative manner. In order to cater the increasing demand for protein, fishing in inland water, rivers, creeks and sea has been intensified heading to overexploitation of aquatic resources over these years and thus affecting the marine, estuarine and fresh water ecosystem.
Plate 19: Small scale fishing with individual effort of the poor people at Ganga Sagar.

Plate 20: Interaction with fisherwomen at Ganga Sagar.
6. Field studies have revealed that continuous trampling of river and creek banks by fishermen and prawn seed collectors is aggravating the problem of bank erosion with devastating effects on the estuarine ecosystem.

7. The large scale exploitation of molluscan shells for lime manufacturing has also affected the ecological balance as it prevented calcium recycling into the system.

5.4. Problems of Shrimp Culture

It is for about nearly two decades totally unplanned and unregulated exploitation of spawn is going on. This is having an adverse effect on the ecology and marine life of the Sundarban.

The rich investors and the middlemen (biosphere people) are earning millions by exploiting the people and the natural resources of the area with very little concern to the irreversible damage they are inflicting on the people and ecology of the area. They are the real beneficiaries of the entire business. They are in no way concerned with the long-term economic security of the ecosystem people of the area where they operate.

Overemphasis on shrimp culture has reduced the importance of other fishes. Aquatic fish combination in the estuaries of Sundarban has been threatened. Local poor people, who collect the spawns ignoring the risk of reptiles and other ferocious aquatic creatures, get a paltry amount for their subsistence. The shrimp is mainly an export item. Local people cannot afford its cost. But its monoculture disallows them to get the supply of protein from other fishes of lower price level.
The use of superfine nets with the help of boats and buoys covering almost the entire width of the rivers is affecting the natural siltation process on the riverbeds.

The greed and indiscriminate catching of spawns has led to the decrease in the supply of spawns.

5.5. Conclusion

During the past centuries the forest area under Sundarban was gradually reduced and region has now become overpopulated due to high rate of growth in human population; thanks to migration of refugees from Bangladesh and fortune seekers from the neighbouring districts. However, this Sundarban is a treasure house of rich aquatic biodiversity. There are some basic threats towards sustainable fishing, the most important of which are pollution, over exploitation and deforestation. Pollution includes discharge from the industries and factories, agricultural pesticides, garbage and sewage thrown into the aquatic system, hydrocarbon spillage from the local and foreign trawlers thus disturbing the natal habitat of aquatic life.

Reference


