

# **FISHERIES AND FISHERY STATISTICAL SYSTEM IN BANGLADESH**

by

***Rakhal Chandra Kangsa Banik***  
**Senior Scientific Officer, FRSS**  
**Department of Fisheries**  
**Ministry of Fisheries and Livestock**  
**Dhaka 100**  
**Bangladesh**

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## **1. INTRODUCTION**

Bangladesh has one of the richest fishery resources amongst the South East Asian countries and fish is the most important sources of animal protein for the rice eating people of Bangladesh. However, fish has become scarce recently while its price has increased tremendously, beyond the purchasing capacity of the common people.

Bangladesh with a total area of 147,570 square kilometers is a low lying country, relatively flat, comprising the deltaic plain of the Ganges, the Jumuna, the Brahmaputra and the Meghna systems. The country has numerous rivers and canals maintaining interconnecting channels. The contribution of fisheries to the economy of Bangladesh is substantial particularly with reference to food consumption, nutrition, employment and export. The fishery sector contributes nearly 5% to the GDP of the country. The total GNP at current market price is 1,361,632 million Taka (1 Taka = US\$0.025, 3 October 1997), and total GDP is 1,301,611 million Taka and GDP per head is Taka 10,660.

## **2. FISH POPULATION**

The fishery sector provides part-time and full-time employment in primary, secondary and tertiary fishery related activities. These activities include fishing, aquaculture, fish trade, fish processing, and manufacture of fishing gear and fishing implements. The fishery sector provides full-time employment to 1.2 million professional fishermen and 11 million part-time fisherfolk which is about 10% of the total population. The structure of the national fishing fleets and fleet classification employed in fishery statistics is very limited. Only two research vessels, namely, R.V. ANUSHANDHANI and R.V. MACHHRANGA, are collecting data for stock assessment of shrimps, fish and other research works. The structure of the vessels is shown in Table 1.

## **3. FISH PRODUCTION**

Historically, inland openwater was the major source of fish production in Bangladesh. It contributed about 90% of the country's fish production in the 1960s. Fish production is hampered due to natural and man-made causes, such as:

- a) unplanned flood control and irrigation projects for agricultural development avoiding fishery potentiality;

- b) continuous land erosion;
- c) water pollution;
- d) indiscriminate fishing by using harmful nets and equipment;
- e) lack of scientific and biological management of fisheries resources;
- f) over fishing to meet the demand of increased population;
- g) conversion of beel and flood plains into agricultural lands;
- h) damage of fish spawning and fishing grounds; and
- l) indiscriminate use of insecticides.

The country's fish production continued to drop to about 50% until late eighties, but it showed a very slow increasing trend since the 90s. The total fish production is shown in Table 2. Out of the total production of fish, about 97% is consumed locally while the balance is exported abroad. The annual local consumption of fish is shown in Table 3.

In Bangladesh, the amount of fish used for animal feed and other purposes is very negligible. The Bangladesh Fisheries Development Corporation (BFDC) is producing fish meal which requires about 1000 mt of trash fish annually. On the other hand, the Saudi Bangladesh Industrial and Agricultural Investment Company LTD. (SABINCO) is producing fish feed which requires about 2000 mt of trash fish.

The Fisheries Department did not import any fish for the past five years. But some private fishery farms imported about 500 million pieces of shrimp fry (*M. rosenberrgi* and *P. monodon*). On the other hand, about 3% of the total production of fish is exported abroad. The export of fish and fish products is shown in Table 4.

Total fish captured from inland water (rivers, beels, lake and flood lands) mainly by using nets (gear) - gill net, clap net, seine and drag net, lift net, cast net, longline, traps, set-bag net and others. In marine water the main gears used are - trawl net, gill net, seine net, set bag net, trammel net and other net and long line, etc. The share of the marine fish production using various fishing gear is shown in Table 5.

#### **4. FISHERY POLICY TOWARDS AD 2010**

The Government of Bangladesh recognizing the importance of the fishery sector, has the following objectives in its fishery program:

- a) to increase fish production and to improve nutritional standards;
- b) to expand employment opportunities in fisheries and ancillary industries;
- c) to improve the socio-economic condition of the fisherfolk, fish farmer and others engaged in this sector;

- d) to increase fish and shrimp exports;
- e) to improve environmental condition and public health;
- f) to increase the GDP of the country.

The national fishery goals are in consistent with the development plans of the country. These will require expanded use of aquaculture technology, increased investment, efficient institutional support, proper management of resources, and policy reforms.

The key elements of the national fishery development strategy are as follows:

- a) Inland fisheries should be given highest priority for development, promotion, conservation and management programs;
- b) Public sector to provide infrastructure facilities to the private sector to stimulate private sector investment;
- c) Fisheries institutions should improve skills through education, training, and resources mobilization
- d) NGOs should be given opportunity and encouraged to organize fishermen associations, and to be provided access to fishery resources;
- e) Special credit programs should be set-up through the NGOs and the Grameen Bank to cater to the credit needs of fishermen;
- f) Shrimp culture area to be developed and quality seeds should be made available;
- g) Extension and training activities to be strengthened for the expansion of shrimp culture; and
- h) Credit programs for extensive and semi-intensive shrimp culture to be provided.

The fisheries resources of Bangladesh are among the richest in the world and inland fishery production still ranks fourth in the world only after China, Indonesia and India. The country has vast water resources in the form of rivers, canals, estuaries, floodplains, depression (beels), ox-bow lakes (reservoirs), ponds, shrimp farms, and marine waters in the Bay of Bengal with high potentials of fish production as shown in Table 2. Inland water is inhabited with 260 native fish species, 13 exotic species of fish and 20 species of shrimps. On the other hand, the marine water is inhabited with 475 species of fish and 36 species of shrimps.

The long term fish production potential, growth prospects, fish production projected area, and average yield for different types of fisheries by the year 2010 is shown in Table 6.

The strategies for development and management of inland openwater fisheries of Bangladesh, include:

- a) Conserve and protect the fish habitat from environmental and ecological degradation;
- b) Conserve the fishery resources through implementation of fish conservation and protection law;
- c) Conserve the fishery resources through maintaining fish sanctuaries in suitable areas;
- d) Enhance of fish production and replenish depleted stocks through stocking program;
- e) Establish link canal where fish can pass in flood control area;
- f) Implement biological management of the fisheries; and
- (g) Provide credit facilities to the fishermen for purchasing nets, boats, etc.

## **5. FISHERY STATISTICAL SYSTEM**

Before 1980, there was no statistical system for fisheries in Bangladesh. In 1980-81, the Government had taken up a program with the assistance of FAO/UNDP to assess the country's fishery resources and monitor the fish production of the country. Through the project "Fisheries Resources Survey System" (FRSS), the Government set up a Fishery Statistical System for data collection and processing. Actually, the existing "Fisheries Resources Survey System" is responsible for the assessment of the fishery resources of the country.

In the present statistical system, fishery statistics are collected according to the survey manual (survey methodology, sampling design, etc.). A catch assessment survey for each of the three sectors of fisheries viz. openwater, closedwater and marine, are undertaken. Each of the catch assessment survey is designed as a sample of one, two or three stage sampling for estimating total catches on the basis of data of sample units, which are collected by the Fishery Survey Officers (FSO). For example, the catch assessment survey of the riverine fisheries is designed to collect data on catch and for estimating the total catches by district, by month/period, by type of gear used and by species.

The Survey method makes use of three stage sampling, namely, primary, secondary and tertiary. In the first stage, sample villages will be selected; in the second stage, sample days will be selected and in the third stage, sample fishing units will be selected. For each sample village, two sample days are to be selected which will have an interval of 15 days between them. The number of sample units are to be recorded according to the number of fishing units for each type of gear, to be selected purposively or by random sampling as found suitable. The Survey Officer will record the catch data of the sampling unit in the survey form. While the FSO's are in the river to actually observe the fish catches.

The FSO thoroughly checks the recorded data in the forms, does the necessary editing and corrections, if any, and sends those to the headquarters every month by the 10th of the following month. In this way, each survey officer is collecting statistical data in 64 districts (sample location map enclosed as Annex 1) of Bangladesh. They are also collecting data from all habitats in their districts according to the survey manual.

The data collection program is supervised by Scientific Officers posted in divisional offices of Bangladesh. After the data are processed by computers at the headquarters, Senior Officers prepare the statistical year book a "Fish Catch Statistics of Bangladesh" published by the Department of Fisheries (DOF) every financial year. Fish statistics are classified according to the ISSCAAP group. DOF is regularly sending fishery statistics to FAO, Rome for publication in the FAO Year Book of Fishery Statistics.

The Ministry of Fisheries and Livestock is the key organization that controls the overall activities of the Department of Fisheries (DOF), Bangladesh Fisheries Development Corporation (BFDC), Fisheries Research Institute (FRI), etc. But none of these organizations/institutions conducts any census or statistical survey systems. The DOF also never conducts any fishery census. The Bangladesh Bureau of Statistics (BBS), also does not collect any fishery statistics, but they publish some fishery statistics in their Statistical Year Book which are compiled from the Department of Fisheries.

In many developing countries like Bangladesh, there is a problem in collecting catch and effort statistics, because fishermen dispose their catch in fishing spots. Sometimes fishermen may also use part of the gross catch for their own consumption. For this reason, international fishery bodies require catch data in the form of nominal catch. Catch and effort statistics vary from one fishery to another. For example, for riverine fisheries, collection and estimation procedure differs from beel (floodplain) fisheries. In the estimation of the daily catch total, the figure is multiplied by a daily raising factor. Catch per unit effort is defined as the amount of fish (total fish) caught by a fishing unit within 24 hours time. The sampling design, method of data collection, and estimation procedure are as stated in detail in the survey manual.

Bangladesh has developed a very impressive sea food processing and freezing industry during the last 15 years. The fish processing plants are mainly engaged in processing and freezing exportable shrimps and fish. Out of 97 processing plants in the country, only five are being operated by the public sector. Most of the plants however operate below capacity for lack of raw materials. In shrimp/fish trawl fisheries, the low value catch is usually thrown away. Some mother vessels may process fish and shrimp on board, making it difficult to get the actual statistics. In coastal aquaculture, shrimp processing plants also do not maintain proper record of fish processing statistics.

Unreliability of data due to shortcomings of the sampling procedure may be attributed to the following reason:

- a) Random or probability sampling of village (clusters) and random sampling of one day in a month are lacking (for subsistence fishing), when this is needed for valid analysis;
- b) Use of purposive sampling means that geographical extrapolation is not valid;

- c) Sample size is very inadequate for district and national estimate;
- d) Since sampling is not random (for flood land), standard errors of the estimates can not be computed;
- e) Inadequate supervision of the field staff;
- f) Insufficient manpower to collect, process and analyze data; and
- g) The frame survey (conducted in 1981) is out of date although its basic foundation may still be valid.

## **6. PROPOSALS TO IMPROVE NATIONAL FISHERY STATISTICS SYSTEM**

In order to improve the quality of statistical output as well as the national fishery statistical system, a new Frame Survey, preferably a full Fishery Census and Data Bank was deemed necessary. However, for each of the district of Bangladesh there is only one Survey Officer who may not be able to collect data at thana basis. It is important to collect fishery statistics by thana in Bangladesh because, data user agencies and the Government needs data by thana to be able to get district wise statistics by all type of fisheries.

For this purpose, the Government submitted a project "Strengthening of Fisheries Resources Survey System" to the Planning Commission. The project, now being considered, has the following main objectives:

- a) to establish a data base for monitoring the fishery resources assessment of the country;
- b) to conduct a frame survey/fishery census for inland fisheries of Bangladesh; and
- c) to evaluate the effectiveness of the program and introduce a statistical model for fishery data collection in eight different types of water bodies at thana level.

## **7. MARINE FISHERY**

Marine fishery includes both industrial and artisanal fisheries. Bangladesh has a coast line of 480 km, the length and territorial limit is 12 nautical miles measured seaward from the coast line. The continental shelf is under 50 m. depth zone, having good resources of fish. Bangladesh has an exclusive economic zone (EEZ) of 14,200 km<sup>2</sup> which extends 320 km (200 n mi) from base line.

Standing stock of marine resources estimated from time to time, indicated that the stock of shrimp is 4,000 mt whereas demersal and pelagic fish are 150,000 mt and 90,000 mt, respectively. Industrial fisheries consist of trawler fishing beyond 40 m depth. Artisanal fishery by mechanized and non-mechanized boat is undertaken in the coastal waters of up to 40 m depth.

At present, 56 trawlers (45 shrimp trawlers and 11 fish trawlers) are operating in the marine water capturing 4-5 thousand tons of shrimp, 10-15 thousand mt fish of commercial importance and 35-40 thousand mt trash fish. However, trash fish is usually discarded at sea.

Annual catch from artisanal fisheries is 18 thousand mt of shrimp and 235 thousand mt of fish. Based on the available information, the stock in the Bay of Bengal is being exploited almost at the maximum sustainable level. Information about the resources in the Bay particularly about the pelagic fish is however inadequate.

With proper assessment of the pelagic resources in the Bay of Bengal, production could be increased. The Marine Fisheries Section of the DOF has submitted a project proposal to strengthen the data collection and processing of statistics from artisanal and marine fisheries, where all types of artisanal marine fishery statistics will be collected and analyzed using computers.

#### **8. FOLLOW UP OF THE NATIONAL RECOMMENDATIONS FROM THE 1994 WORKSHOP**

For the strengthening of the "Fisheries Resources Survey System," the Department of Fisheries submitted in 1997 a new project proposal on the "Strengthening of Fisheries Resources Survey System", which could be an answer to the need to conduct a frame survey. A fishery census may be conducted for the collection of all types of information. This new project will benefit the country which intends to set up an appropriate statistical system for data collection up to thana level as well as establish data base for monitoring the fishery resource of the country.

**Table 1. Structure of national fishing fleet**

| R/V ANUSANDHANI      |             |               |                      | R/V MACHHRANGA       |             |             |                      |
|----------------------|-------------|---------------|----------------------|----------------------|-------------|-------------|----------------------|
| Principal Dimensions |             | Capacity      |                      | Principal Dimensions |             | Capacity    |                      |
| Length overall       | 32.40 m     | Fish hold     | 73.67 m <sup>3</sup> | Length overall       | 22.50 m     | Fish hold   | 10.00 m <sup>3</sup> |
| Length b.p.          | 28.00 m     | Fuel oil      | 88.22 m <sup>3</sup> | Length b.p.          | 19.80 m     | Fuel oil    | 13.00 m <sup>3</sup> |
| Breadth mid.         | 7.50 m      | Fresh water   | 34.53 m <sup>3</sup> | Breadth mid.         | 6.00 m      | Fresh water | 6.0 m <sup>3</sup>   |
| Depth mid.           | 3.30 m      | Freezing room | 11.17 m <sup>3</sup> | Depth mid.           | 2.80 m      |             |                      |
| Gross tonnage        | 221.16 tons |               |                      | Gross tonnage        | 100.00 tons |             |                      |
| Main engine          | 900 HP      |               |                      | Main engine          | 2x235 HP    |             |                      |
| Max. trial speed     | 12.44 Kn    |               |                      | Max. trial speed     | 12.00 Kn    |             |                      |



**Table 2: Fish production of Bangladesh**

| Source                          | Year-Wise Production in M.T. |                |                |                  |                  |                  |
|---------------------------------|------------------------------|----------------|----------------|------------------|------------------|------------------|
|                                 | 1989-90                      | 1990-91        | 1991-92        | 1992-93          | 1993-94          | 1994-95          |
| <b>A. INLAND WATER</b>          | <b>616,464</b>               | <b>654,397</b> | <b>706,605</b> | <b>770,162</b>   | <b>837,566</b>   | <b>908,218</b>   |
| (a) Inland Openwater (Capture)  | <b>423,872</b>               | <b>443,404</b> | <b>479,742</b> | <b>532,419</b>   | <b>573,376</b>   | <b>591,145</b>   |
| (1) River & Estuaries           | 173,410                      | 135,355        | 124,843        | 138,746          | 143,425          | 152,782          |
| (2) Sundarban                   | 6,393                        | 6,651          | 6,297          | 6,939            | 7,127            | 6,951            |
| (3) Depression (Beels)          | 46,594                       | 47,923         | 49,201         | 53,019           | 55,592           | 58,298           |
| (4) Kaptai Lake                 | 3,713                        | 4,392          | 4,216          | 4,142            | 6,635            | 5,556            |
| (5) Flood Land                  | 193,762                      | 249,083        | 295,185        | 329,573          | 360,597          | 367,558          |
| (b) Inland Closewater (Culture) | <b>192,592</b>               | <b>210,993</b> | <b>226,863</b> | <b>237,743</b>   | <b>264,190</b>   | <b>317,073</b>   |
| (1) Ponds                       | 163,730                      | 181,018        | 195,034        | 202,167          | 222,542          | 267,282          |
| (2) Ox-bow Lake (Baors)         | 1,357                        | 1,544          | 1,682          | 1,803            | 2,201            | 2,460            |
| (3) Shrimp Farm                 | 27,505                       | 28,431         | 30,147         | 33,773           | 39,447           | 47,331           |
| <b>B. MARINE FISHERIES</b>      | <b>239,063</b>               | <b>241,538</b> | <b>245,474</b> | <b>250,492</b>   | <b>253,044</b>   | <b>264,650</b>   |
| (b) Industrial                  | 227,684                      | 232,778        | 235,851        | 238,265          | 240,590          | 252,935          |
| (a) Artisanal                   | 11,379                       | 8,760          | 9,623          | 12,227           | 12,454           | 11,715           |
| <b>COUNTRY TOTAL</b>            | <b>855,527</b>               | <b>895,935</b> | <b>952,079</b> | <b>1,020,654</b> | <b>1,090,610</b> | <b>1,172,868</b> |

**Table 3. Fish consumption statistics**

| Year    | Consumption (M. Ton) |
|---------|----------------------|
| 1989-90 | 832188               |
| 1990-91 | 869826               |
| 1991-92 | 929999               |
| 1992-93 | 994047               |
| 1993-94 | 1058775              |
| 1994-95 | 1131182              |

**Table 4. Export of fish and fish products from Bangladesh**

*Quantity in Tons*  
*Value in Crore*  
*Taka*

| Year    | Frozen Shrimp |         | Frozen Frogleg |       | Frozen Fish |        | Dry Fish |       | Salted & Dehydrated Fish |       | Turtles/Tortoises/ Crab |       | Shark Fin & Fish Maws |       | Total   |         | % of Total Export Earning |
|---------|---------------|---------|----------------|-------|-------------|--------|----------|-------|--------------------------|-------|-------------------------|-------|-----------------------|-------|---------|---------|---------------------------|
|         | Quan          | Value   | Quan           | Value | Quan        | Value  | Quan     | Value | Quan                     | Value | Quan                    | Value | Quan                  | Value | Quan    | Value   |                           |
| 1989-90 | 17505         | 414.31  | 730            | 10.29 | 3484        | 25.58  | 1278     | 23.40 | 161                      | 1.44  | 146                     | 0.95  | 35                    | 2.80  | 23339   | 478.77  | 9.62                      |
| 1990-91 | 17985         | 451.22  | 318            | 7.36  | 5702        | 41.40  | 427      | 5.75  | 1194                     | 13.95 | 405                     | 3.22  | 78                    | 3.72  | 26109   | 526.62  | 8.64                      |
| 1991-92 | 16730         | 455.73  | 771            | 11.09 | 2604        | 30.10  | 892      | 14.11 | 80                       | 1.39  | 938                     | 6.52  | 65                    | 5.41  | 22080   | 524.35  | 6.91                      |
| 1992-93 | 19224         | 604.03  | -              | -     | 2704        | 38.31  | 1042     | 12.26 | 599                      | 9.84  | 2800                    | 21.60 | 238                   | 14.25 | 26607.3 | 700.29  | 7.57                      |
| 1993-94 | 22054         | 787.73  | -              | -     | 3125        | 51.18  | 2473     | 41.83 | 50                       | 1.06  | 4088                    | 36.37 | 45                    | 2.79  | 31835   | 920.96  | 9.12                      |
| 1994-95 | 26277         | 1045.67 | -              | -     | 9267        | 180.26 | 521      | 8.39  | 649                      | 15.35 | 4760                    | 40.67 | 212                   | 16.60 | 41686   | 1306.94 | 9.38                      |

**Source: Export Promotion Bureau**

**Table 5. Marine fish captured by different gears**

| Type of Fishing               | Number of Craft<br>(Trawler/Boat)             | Number of Unit<br>(Gear/Net)  | Catch in Metric Tons |                |                |
|-------------------------------|---|---|----------------------|----------------|----------------|
|                               |   |   | Shrimp               | Fish           | Total          |
| <b>A. Industrial</b>          |   |   |                      |                |                |
| (1) Trawl Fishing             |   |   |                      |                |                |
| a) Shrimp Trawler             | 41  | -   | 2,391                | 4,856          | 7,247          |
| b) Fish Trawler               | 12  | -   | 25                   | 4,443          | 4,468          |
| <b>TOTAL Industrial</b>       | <b>53</b>                                     | <b>-</b>  | <b>2,416</b>         | <b>9,299</b>   | <b>11,715</b>  |
| <b>B. Artisanal</b>           |   |   |                      |                |                |
| (1) Gill Net Fishing          |   |   |                      |                |                |
| a) Mechanised                 | 2,880   | 2,880   | -                    | 134,308        | 134,308        |
| b) Non-mechanised             | 3,509   | 3,509   | -                    | 19,602         | 19,602         |
| <b>SUB-TOTAL</b>              | <b>6,389</b>                                  | <b>6,389</b>  | <b>-</b>             | <b>153,910</b> | <b>153,910</b> |
| (2) Set Bag Net Fishing       |   |   |                      |                |                |
| a) Seasonal (M.B.)            | 182   | 5,400   | 5,130                | 46,115         | 51,245         |
| (N.M.B.)                      | 2,680   |   |                      |                |                |
| b) All Season (N.M.B.)        | 4,590   | 7,215   | 11,102               | 13,563         | 24,665         |
| <b>SUB-TOTAL</b>              | <b>7,452</b>                                  | <b>12,615</b>   | <b>16,232</b>        | <b>59,678</b>  | <b>75,910</b>  |
| (3) Long Line Fishing         |   |   |                      |                |                |
| Jew fish Long Line            |   |   |                      |                |                |
| a) Mechanised                 | 255   | 1,121   | -                    | 7,965          | 7,965          |
| b) Non-mechanised             | 127   |   |                      |                |                |
| c) Other Long Line            | 1,000   | 963   | -                    | 2,403          | 2,403          |
| <b>SUB-TOTAL</b>              | <b>1,382</b>                                  | <b>2,084</b>  | <b>-</b>             | <b>10,368</b>  | <b>10,368</b>  |
| (4) Trammel Net Fishing       | 500   | 500   | 522                  | 4,790          | 5,312          |
| (5) Other Gears Fishing       | 1,608   | 2,222   | 1,193                | 6,242          | 7,435          |
| <b>TOTAL Artisanal (M.B.)</b> | <b>3,317</b>                                  | <b>23,810</b>   | <b>17,947</b>        | <b>234,988</b> | <b>252,935</b> |
| (N.M.B.)                      | 14,014  |   |                      |                |                |
| <b>GRAND TOTAL</b>            |   |   |                      |                |                |
| (Industrial + Artisanal)      | Trawler 53<br>(M.B.) 3,317<br>(N.M.B.) 14,014 | Gill 6,389<br>SBN 12,615<br>Long Line 2,084<br>Other 2,222<br>Trammel 500 | <b>20,636</b>        | <b>244,287</b> | <b>264,650</b> |

M.B. - Mechanised Boat <> N.M.B. - Non-Mechanised Boat <> SBN - Set Bag Net

**Table 6. Long-term production potential and growth prospects for different**

| Type of Fishery     | Production<br>in 1987-88 | Production in 2010 |                         | Incremental Production |            | Annual Growth Rate/a |            |
|---------------------|--------------------------|--------------------|-------------------------|------------------------|------------|----------------------|------------|
|                     |                          | Scenario A         | Scenario B<br>(‘000 mt) | Scenario A             | Scenario B | Scenario A<br>(%)    | Scenario B |
| Food Plains Fishery | 424.9                    | 1,087.7            | 1,412.1                 | 662.8                  | 987.2      | 4.4                  | 5.6        |
| Pond Fishery        | 149.4                    | 296.0              | 335.5                   | 146.6                  | 186.1      | 3.2                  | 3.7        |
| Coastal Aquaculture | 25.2                     | 78.8               | 105.0                   | 53.6                   | 79.8       | 5.3                  | 6.7        |
| Marine Fishery      | 227.6                    | 300.0              | 325.0                   | 72.4                   | 97.4       | 1.3                  | 1.6        |
| Total =             | 827.1                    | 1,762.5            | 2,177.6                 | 935.4                  | 1,350.5    | 3.5                  | 4.5        |

< a - Annual compound growth rate in fish production from 1987-1988 to 2009-2010.

Source: Bangladesh Fisheries Sector Review Document of the World Bank (March, 1991)