ANNUAL REPORT 2020-21

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Department of Fisheries
Ministry of Fisheries and Livestock

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Editor

Bani

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ABBREVIATIONS AND ACRONYMS

BARC	Bangladesh Agricultural Research Council
BBS	Bangladesh Bureau of Statistics
BFRI	Bangladesh Fisheries Research Institute
BFD	Bangladesh Forest Department
BFDC	Bangladesh Fisheries Development Corporation
CEGIS	Center for Environment and Geographic Information Services
CWB	Cultured Water Body
DoF	Department of Fisheries
FAO	Food and Agriculture Organization
FD	Forest Department
FY	Fiscal Year
FRSS	Fisheries Resources Survey System
GAP	Good Aquaculture Practice
GDP	Gross Domestic Products
GI	Geographical Indicator
GO	Government Organization
GoB	Government of Bangladesh
Ha	Hectare
HACCP	Hazard Analysis Critical Control Point
MoFL	Ministry of Fisheries and Livestock
MPA	Marine Protected Area
NFS	National Fisheries Strategy
NFP	National Fisheries Policy
NGO	Non Government Organization
NOC	No Objection Certificate
MT	Metric Ton
Kg	Kilogram
PL	Post Larvae
SPARRSO	Space Research and Remote Sensing Organization
SDG	Sustainable Development Goal

Chapter 1

Introduction

From the time immemorial, the Bengalis have been bearing the adage "Maache Bhate Bangali" which translates to "Fish and Rice makes the Bengali". Fish is a popular complement to rice in our national diet. The favorable geographical position of Bangladesh comes with a large number of aquatic species and provides plenty of resources to support fisheries potentials. The scope of production of fish has unfurled because of vast area of water. Bangladesh is named the 'land of rivers' with criss-crossed rivers and ponds, beels, haors, baors, lakes, ditches, flood plains and vast marine areas are the blessings of Bangladesh in fisheries resources. That's why, the father of the nation and a visionary leader Bangabandhu Sheikh Mujibur Rahman predicted that fish would be the second major foreign currency earning resource of Bangladesh.

The water resources have driven Bangladesh one of the world's leading fish producing countries. In 2020-2021, her production 46.21 lakh MT fish whereas the set target was 45.52 lakh MT. Through this remarkable achievement, Bangladesh became self sufficient country in fish production since 2016-17. The fisheries sector plays an important role of animal protein consumption, employment opportunity, foreign earnings, maintaining aquatic diversity and uplifting socio-economic development of Bangladesh. It contributes 3.57% of national GDP and 26.50% to agricultural GDP. Now, per capita fish consumption attains 63 grams/day against the set target of 60 grams/day. This sector provides about 195 lakh people that is 12% employment opportunity of the total population directly or indirectly.

This contribution of fisheries sector comes from three broad areas: inland capture fisheries (38,60,466 ha), inland aquaculture (8,43,729 ha) and vast marine fisheries, of which inland aquaculture sub-sector is contributing more than 57%, capture 28% and marine 15% of the total production. According the FAO report The state of world fisheries and aquaculture 2020, Bangladesh ranked 3rd in inland open water capture production, 5th in world aquaculture production, 4th around the globe and 3rd within Asia in tilapia production. Bangladesh ranked 1st in 11 vital Hilsa consuming countries.

Although, aquaculture industry has grown significantly over these years, Shrimp industry of Bangladesh is one of the most important contributors for its economic development. In Bangladesh the main cultured shrimp is Tiger shrimp (locally known as "Bagda Shrimp"). It is a marine shrimp. There are two production zones for shrimp in Bangladesh, the southern region and the Chittagong region. Shrimp farming is having a positive impact on the livelihood of many people especially in the coastal region.

Bangladesh is a role model for Hilsa production in the whole world. Hilsa is our national fish and it got GI (Geographical Indicator) certificate. For this prestigious GI certification, our national fish Hilsa is named as 'Bangladesh Ilish'. Bangladesh produces over two-thirds of

total production of Hilsa in the world. We are known as Hilsa's country. In 2020-2021, the production of Hilsa is 5.65 lakh MT which contributes 12.23% of total fish production that is the highest as a single species. This contribution is estimated 1% percent to the country's GDP. Hilsa production is increased here about 89% during last 12 years.

In 2020-21 fiscal year, Bangladesh earns 4088.96 crore taka against 76591.69 MT fish and fisheries products. Here only shrimp (Galda+Bagda) earns 2730.56 crore taka against 30615.14MT. Frozen shrimp/ prawn, life fish, frozen fish, chilled fish, dry fish, salted/dehydrated fish, crab, sharp fin/fish maws and others were the export items of fish and fisheries product.

Promoting aquaculture and shrimp farming through extension services, management of wetlands, conservation of the freshwater and marine water fisheries, application of information technology in aquaculture and open water fisheries, optimization of fish inspection and quality control programs and acceleration of farm mechanization have been adopted to reach the target. Well-equipped DoF personnel has been rendering e-extension services through different apps to the root-level farmers in remote areas. Laws and acts have been formulated and amended for quality fish and shrimp production.

Bangladesh has achieved the visionary target of being middle income country in 2021 which is the golden jubilee year of our independence. The strategies and policies adopted and amended by the Department of Fisheries (DoF) targeted the 'Sustainable Development Goals (SDGs)' under the guidance and dynamic leadership of the honorable Prime Minister Sheikh Hasina. And also the 'Vision 2041'has been adopted in line of 'Vision 2021' to provide stimulant to the development dream of the nation.

1.1 History of the Department of Fisheries

Department of Fisheries, Bangladesh was first established in the undivided Bengal of the British India in 1908 and since then it has experienced many changes. In 1910, the DoF was merged with the Department of Agriculture, but as per the recommendations of Mr. T. Southwell, the DoF regained its status as an independent organization in 1917. The DoF was abolished again in 1923. However, after a long gap, following the recommendations of Dr. M. Ramswami Naidu, the DoF was revived in May, 1942. Since the inception of the then East Pakistan, the activities of DoF had been continued. After the independence of Bangladesh in 1971, the organization renamed as Department of Fisheries (DoF) instead of the Central Fisheries Department in April 1975 later on in 1984, the Central Marine Fisheries Department merged with the DoF as Marine Fisheries wing.

1.2 Vision, Mission and Mandate

Vision: Meet the demand of animal protein, poverty alleviation and promote foreign earnings.

Mission: Support sustainable growth in fish and shrimp production with other aquatic

resources for domestic consumption, exports and management of open-water fisheries resources through community participation leading to equitable distribution of the benefits for optimal economic and social growth in Bangladesh.

Mandate

- Dissemination of improved aquaculture technologies through training and demonstration and to extend advisory services to the farmers;
- Enhancing fisheries resources through facilitating conservation and management measures;
- Assisting the administrative ministry in formulation of policies, acts etc;
- Enforcing quality control measures and issuance of health certificates for exportable fish and fish products;
- Conducting fisheries resources survey and assessment of stock to develop fisheries data base for proper planning;
- Facilitating arrangement for institutional credit for fish and shrimp farmers, fishers and fish traders;
- Facilitating alternative income generating activities for rural poor and unemployed people towards poverty alleviation; and
- Formulation and implementation of development projects towards sustainable utilization of fisheries resources to ensure food security.

8th Five Year Plan (FYP)

Strategic objectives of 8th Five Year Plan

The key objectives for the sector were established as:

a. Enhancement of the fisheries resources and production;
b. Poverty alleviation through creating self-employment and improvement of socio-economic conditions of the fishers;
c. Meet the demand for animal protein;
d. Achieve economic growth and earn foreign currency by exporting fish and fisheries products;
e. Maintain ecological balance, combat climate change impact, conserve biodiversity and improve public health;
f. Resource management including manpower development for ensuring optimum productivity, sustainability of production and conservation of fisheries resources;
g. Marketing safe and quality fish in the domestic and international market;
h. Accelerate harvesting of fish commercially;
i. Establish and maintain fish and wetland sanctuaries which will comprise complete ban on fishing in certain eco-sensitive areas;
j. Strict implementation of the fish act, 1990;
k. Assist the fisher folk accessing social safety nets program like VGD and VGF and alternative livelihoods support;
l. To harness the potential of blue economy, stock assessment of marine fisheries and sustainable exploitation of marine fishes, especially tuna and tuna like other pelagic fishing;
m. Transformation of livelihood to reduce fishing pressure on sea.

Strategic objectives: The key objectives of the NFP (National Fisheries Policy), 1998 are:

a. Enhancement of the fisheries resources and production;
b. Poverty alleviation through creating self-employment and improvement of socio-economic conditions of the fishers;
c. Meet the demand for animal protein;
d. Achieve economic growth and earn foreign currency by exporting fish and fisheries products; and
e. Maintain ecological balance, conserve bio-diversity and improve public health.

Development targets of the fisheries sector

The following targets to be achieved in the fisheries sector has determined in the 8th Five Year Plan align with perspective plan and SDGs :

- Increased 12.50% aquaculture and 11% fish production by 2025 from baseline year 2019-20;
- Increased 15% marine fisheries production by 2025;
- Raise per capita fish intake available to 64 g/day from domestically produced fish and fisheries product by 2025;
- Raise export to 1.00 lakh MT by 2025 from frozen shrimp, fish and value added fish products.
- Ensure quality seed and feed at growers level;
- Reappear at least 50% of endangered fish species in sanctuary areas by 2025;
- Creation of 20% employment opportunity for unemployed youths;
- Fish farmers/ fishers income raise to 30% by 2025;
- Harness the potential of blue economy, stock assessment of marine fisheries and promote sustainable exploitation of marine fishes, especially tuna and tuna like other pelagic fishing;
- Promote value chain in fish and fisheries products;
- Ensure safe and quality fish supplies in the domestic and international market;
- Value chain development of fish and fisheries products.

1.3 Organizational Setup

DoF has the following wings to render its services for the development of fisheries sector:

- Inland Fisheries,
- Marine Fisheries,
- Fisheries Resource Survey System (FRSS),
- Fish Inspection and Quality Control (FIQC) and
- Training.

1.3.1 Manpower under revenue

In line with the Vision-2021 of the present democratic government in Bangladesh, the country is now well-prepared to succeed in its motive for a Digital Bangladesh. While Bangladesh is taking great strides towards holistic and sustainable

development, Department of Fisheries has been working hard since its inception to render the services and responsibilities for sustainable fisheries production and socio-economic development by providing modern and effective aquaculture technologies and efficient fisheries management practices to the fishers. The organization holds 5948 positions under the Director General (DG) along with 1 Additional Director General (ADG), 8 Principal Scientific Officer/Directors. There are 25 Deputy Directors including 8 divisional Deputy Directors, 64 District Fisheries Officers, 71 Senior Assistant Directors, 487 Senior/Upazila Fisheries Officers and other staff members. Regardless, there is insufficient number of staff and manpower with various crucial positions remaining vacant. Manpower structure/sanctioned under revenue budget and manpower in position of DoF is shown in the following table 1.

Table 1.1. Manpower under revenue budget and manpower in position

Class		Sanctioned Posts	Posts in Position	Vacant Posts
1		2	3	4
Class-I	Cadre	1303	701	602
	Non-Cadre	333	251	82
Class-II		665	327	338
Class-III		2112	1579	533
Class-IV		1535	1285	250
Total		**5948**	**4143**	**1805**

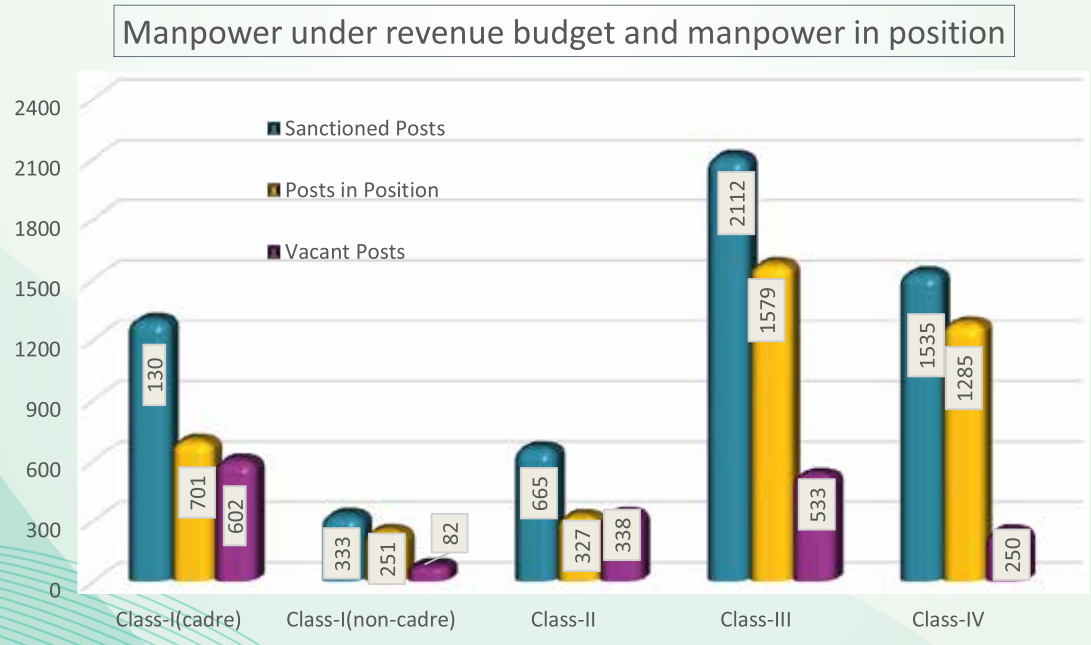


Fig. 1.1: Manpower under revenue budget and manpower in position

In order to meet the SGDs goals as well as EU requirements aligning the 8th Five Year Plan, it needs appropriate institutional framework with adequate educated qualified and skilled manpower to face future challenges for sustainable fisheries development. DoF does not have institutional set-up that provide quality technical support and know-how to undertake and successfully complete the massive task of rural fisheries development at union level. Globally, efficient service delivery and service receivers are now getting the highest priority. The service providers are encouraged to invent new processes to deliver the service at the door step of the people without any hindrance and delay. So, for ensuring prompt, trouble-free, people oriented, and efficient service delivery system, it would be strengthened to international standards with adequate professionally committed manpower with logistic supports and legal frameworks for efficient discharge of assigned duties and responsibilities. A way forward to institutional capacity of DoF is mentioned below in brief:

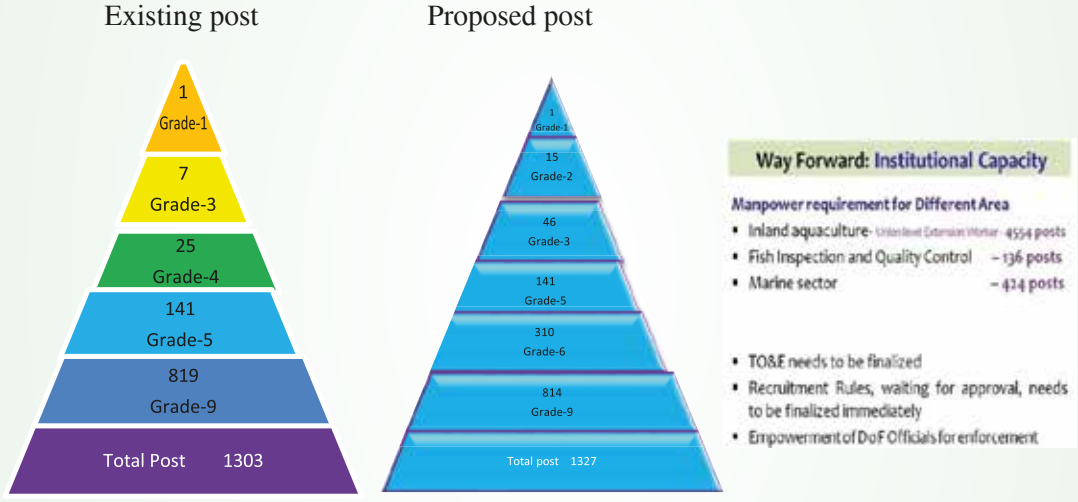


Fig. 1. 2: Manpower status

1.4 Budget allocation

The Departmental budget is a comprehensive blueprint of the annual activities expressed in financial terms. The budget has two distinct categories - (a) Revenue and (b) Development budget.

1.4.1 Revenue budget

Activities which include expenditures of pay and allowances, supplies and services, repair-maintenance and rehabilitation, miscellaneous, procurement of civil works

and projects and program apart from Annual Development Program (ADP) fall under revenue budget. During the last five years, non-development budget of DoF is shown below.

Table 1.2. Non-development budget of DoF (Taka in lakh)

Economic Group/Code	Description	2016-17	2017-18	2018-19	2019-2020	2020-2021
1	2	5	6	7		
3111	Pay of Officer	5113.20	5394.43	6591.23	7426.11	7194.50
3111	Pay of Staff	4624.58	4878.93	5431.40	5103.80	5318.18
3111	Allowances	6909.21	7324.56	8702.71	9222.04	9304.54
3211-3257	Supplies and Services	5597.20	6833.46	6212.16	7282.05	7114.05
3268	Repair & Maintenances	743.56	761.62	546.82	768.74	754.06
4111	Civil Works	310.00	316.00	340.67	30.00	30.00
4112-4113	Assets Procurement	360.00	375.00	338.35	439.63	423.39
8113	Land	-	90.00	160.0	00	0.00
1200	Special Activities	-	-	180.0	180.00	240.00
	Total :	**23657.75**	**25974.00**	**28503.34**	**30452.37**	**30378.72**

1. 4.2 Development budget

Development budget includes all expenditures under Annual Development Program (ADP).

Table 1.3. Development budget of DoF (Taka in lakh)

Financial Year	Number of Project	Development budget						Achievement
		Allocation			Expenditure			
		Total	Local Currency	Project Aid	Total	Local Currency	Project Aid	
1	2	3	4	5	6	7	8	9
2016-17	22	34461.00	29004.00	5457.00	33187.07	28154.35	5032.72	96.31%
2017-18	18	34961.00	25787.00	9174.00	33881.42	25064.48	8816.94	96.92%
2018-19	14	35885.00	25993.00	9892.00	35464.59	25746.25	9718.34	98.83%
2019-20	10	34648.00	26071.00	8577.00	24645.49	18544.30	6101.19	71.13%
2020-21	13	47603.00	26208.00	21395.00	44858.45	24368.12	20490.33	94.23%

Fig. 1.3: Development and Non-Development budgetary allocation of last five years

1.5 Revenue earnings

There are two major sources of government revenue earnings:

- Tax Revenues (TR); and
- Non-tax Revenues (NTR).

All revenue earning by the DoF is non-tax revenues. During last five years, non-tax revenue earned by the DoF is shown in Table 4.

Table 1.4. Non tax revenue earned in last five years (Taka in Thousand)

Economic Code	Description	2016-17	2017-18	2018-19	2019-20	2020-21
1	2	3	4	5	6	7
1431101	Penalty	8449	5563	6030	3927	7602
1423204	Rent of Govt. vehicles	41	475	27	23	52
1423213	Fish hunting fee	3177	3026	2777	3303	1043
1423213	Other service fee	16373	17934	16223	186	14139
1421301	Rent of non-residence	216	85	512	365	283
1421302	Rent of Residences	1000	1122	1825	2531	1655
1423213	Fish and fisheries product	63575	10615	12344	90305	122536
1422328	Tenders and other documents	235	23	116	677	20
1423226	Non-usable materials and scrap etc.	33	0	120	3	936
1423226	Miscellaneous non-commercial sale	1627	2943	122	1382	0
1441202	Refund of extra payment	2	51	440	87	1271
1441299	Miscellaneous revenue earning	5982	3201	2242	9282	24659
1423201	Examination fees				0	14797
1431101	Forfeiture				7	1402
1431101	Farm and company registration				1662	973
1422199	License fee				28659	26106
	Total	**100710**	**14057**	**15387**	**142399**	**217474**

Chapter 2

Fisheries Resource Management

Bangladesh is enriched with vast fisheries resources. Due to favorable natural conditions and geographical location, these fisheries resources have a high potential of increasing fisheries production. The fisheries resources of our country are divided into two major groups such as inland fisheries and marine fisheries. Inland fisheries is further divided into two groups i.e. aquaculture and inland capture. Inland fisheries occupy an area of 47.04 lakh ha and marine capture covers 1,18,813 sq.km along with 200 nautical miles of EEZ from the base line. The culture fisheries include ponds, ox-bow lakes and coastal shrimp farms. The flood-plains and the beels, which cover an area of 27.60 lakh ha, offering tremendous scope and potential for augmenting fish production by adopting aquaculture-based enhancement techniques.

Fig. 2.1: Snapshot of a Haor, Kishoregonj and a Baor, Jassore

The country has huge opportunities for the development of brackish water aquaculture boosting shrimp production and earning substantial amount of foreign currencies. Production of shrimp from culture and capture fisheries increased to a great extent in the beginning of 1980's. Since then, shrimp farming has been expanded to over 2.63 lakh ha of land by 2020-21 from 1.4 lakh ha in1980. It is expected that with the introduction of improved scientific method of shrimp culture, the present production of shrimp will be increased substantially. The country has limited access to marine fisheries resources in the Bay of Bengal. Only demarsal fish and shrimp are being trapped from here. Other potential marine resources are yet to be exploited on commercial scale. Only 15% of total fish production comes from marine capture fisheries and 85% from inland fisheries. The status of fisheries resources and fish production of the country is shown in Annexure 1.

Fig. 2.2: Fish Production during the last five years

The present democratic government has undertaken new policy for sustainable aquaculture production; provide need based aquaculture extension services, implements fish conservation activities which increased the national fisheries production as well as the fisheries sector. Besides these, fisheries extension and conservation activities, AIGs and rehabilitation program for poor fishers were undertaken. Through the execution of Fisheries Friendly Policy of the present government, total fish production has been increased from 35.48 lakh MT in 2013-14to 46.21 lakh MT in 2020-21.

2.1 Aquaculture extension approach

DoF carries out its extension services by involving good number of professionals at different hierarchy. DoF motivates and facilitates fish farmers and fishers for adopting eco-friendly management regimes in aquaculture and fisheries resource management to enhance production and productivity. It provides updated research findings and better farm techniques to farmers/growers for increasing production through establishing effective linkage between the various research institutes and the fish farmers. DoF also serves as liaison agency between farmers and other organizations, both public and private.

In the recent past, several development projects of DoF have been launched with strong extension and institutional strengthening components for both carp and shrimp culture. Different approaches and strategies of aquaculture have been adopted under different projects. Extension services include technical advice on all sorts of aquaculture and related activities, user-friendly mobile apps, publication and distribution of booklets, posters, leaflets etc.

In addition to regular revenue budget-led extension and advisory services, following

approaches are also focusing aquaculture and fisheries extension:

- Demonstration of aquaculture technology;
- Problem solving advices in the office;
- Use of Fisheries information & community centre;
- Farm visit and advice;
- Farmers training; and
- Group/Community based aquaculture and fisheries management.

2.2 Fish seed & post larvae production

2.2.1 Fish seed produced in hatchery/farms

During 1961-62 to 1974-75 the government has established Fish Seed Multiplication Farms (FSMFs) to supply required quantity of quality seeds to the fish farmers. During that period, mostly wild fish seeds collected from the rivers were reared in the FSMFs and supplied to the fish farmers. In the mid 60s, due to reduction in the availability of wild carp seeds in the rivers and as the natural fish seeds were not able to meet the growing demand of the fish farmers, the government has established fish hatcheries to produce quality fish seed and at the same time the induced breeding technology was disseminated to the private sectors. At present the country is self-sufficient in carp seeds production, though quality fish seeds are produced in a limited scale. For that, DoF has promulgated Fish Hatchery Act, 2010 and Fish Hatchery Rules 2011 for the production of quality spawn and fingerlings by regulating fish hatchery and farms.

Source of Production	2017		2018		2019		2020		2021	
	No of hatchery	Production (kg)	No of hatchery	Production (kg)	No of hatchery	Production (kg)	No of hatchery	Production (kg)	No of hatchery	Production (kg)
1	6	7	8	9	10	11	12	13		
Government fish farm	85	12826	102	12059	103	13485	102	14924	102	19460
Private hatchery	814	650636	824	674695	935	650535	1068	972910	1055	928570
Total	**899**	**663462**	**926**	**686754**	**1038**	**664020**	**1170**	**987834**	**1157**	**948030**

Table 2.1. Production of carp hatchling of last 5 (five) years

Table 2.2. Production of fry in last 5 (five) years

Year	Govt. Nursery (Production in Lakh)	Private Nursery (Production in Lakh)
1	2	3
2017	252	87912
2018	277	82236
2019	338	82116
2020	441	95726
2021	298	92051

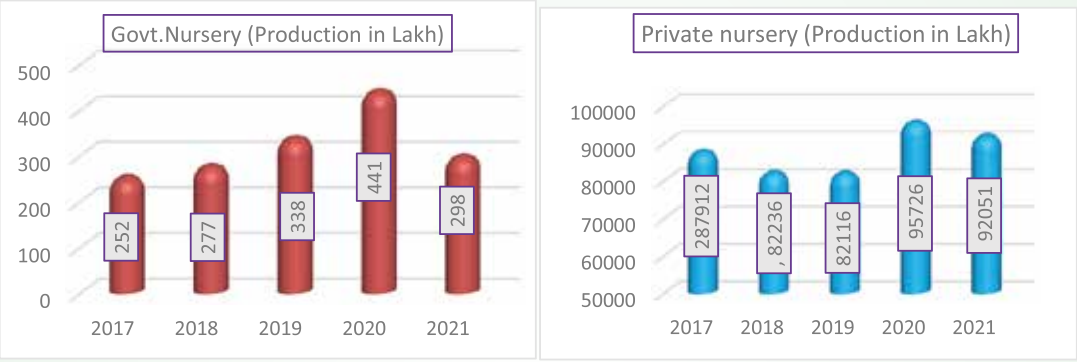


Fig. 2.3: Fry production from 2017-2021

With the establishment of Brood Bank Project ,DoF

Fig. 2.4: Induced breeding in carp hatchery

has taken initiative to produce quality brood fishes which are free from genetic drifts and in-breeding problems. Both Government and private fish hatcheries are producing quality brood for the production of quality hatchlings and fingerlings.

Fig. 2.5.: Fertilized eggs collection from Halda river

2.2.2 Fish spawn/fry collected from natural sources

During sixties and early seventies aquaculture

activities included mainly rearing of natural carp hatchlings collected from the river Jamuna, Padma, Boral, Old Brahmaputra and fertilized eggs from the river Halda of Chattogram. Availability of hatchlings from natural sources is declined due to habitat destruction and change in ecological system. The natural sources carp hatchling production during 2016 to 2020-2021 is shown in the table 6.

Table 2.3. Carp hatchlings collection from natural sources

Year	Fish hatchling (Kg)
2016	4819
2017	5067
2018	9274
2019	2496
2020	2606
2020-21	105.725

2.2.3 Shrimp/prawn PL production in hatchery

As a result of introduction and extension of breeding technology of Galda and Bagda, many private entrepreneurs have established shrimp hatcheries for the

production of shrimp post larvae(PL). About 33 Galda and 44 Bagda hatcheries have been established by both government and private sectors which produced 2.37crore Galda and 721.04 crore Bagda PL in the country in 2020-2021

Table 2.4. Production of Galda and Bagda PL during last 5(five) years

Name	2017		2018		2019		2020		2020-21	
			No.of hatchery	Production (PLin crore)	No.of hatchery	Production (PLin crore)	No.of hatchery	Production (PLin crore)	No.of hatchery	Production (PLin crore)
Galda	36	5.05	46	5.21	35	1.58	33	2.36	33	2.37
Bagda	49	1383.04	49	1412.04	42	979.37	43	792.952	44	721.04
Total	**85**	**1388.09**	**95**	**1417.25**	**77**	**980.95**	**76**	**795.31**	77	**723.41**

FRSS 2020-2021, DoF.

2.3 Fresh water aquaculture

Fig. 2.6: Fish haresting in pond

The country has immense natural potential for developing the fisheries sector. Aquaculture production contributes 57.10 % of the total fish production. Through this remarkable achievement, aquaculture is high priority and focused area during the recent past decades. Because of continuous deterioration of open water fisheries due to natural and man-made changes in the fish habitats and fish populations, the Government is trying hard to increase fish production through aquaculture. The expansion of fish production is largely due to improvement in the use of aquaculture technologies by farmers. Extension and training supports have aided the adoption of technologies by farmers. The development of long-term efficient and effective aquaculture training and extension support has contributed to the growth in aquaculture production in Bangladesh.

2.3.1 Fresh water fish culture in ponds

Currently pond aquaculture has been practiced in a total area of about 4.07 lakh ha and pond aquaculture is producing about 20.90 lakh MT fish in 2020-2021.

Table 2.5. Status of pond culture (2020-21)

Culture Method	Production Range	Number of Pond	Area (Ha)	Production (MT)
Extensive	*<1.5MT/Ha*	4,90,932	32,194	43,605
Semi-intensive	*1.5-4 MT/Ha*	14,08,117	2,39,586	8,78,356
Intensive	*>4 - 10MT/Ha*	5,14,087	1,16,948	8,17,609
Highly Intensive	*>10 MT/Ha*	77,553	18,897	3,51,217
Total		**24,90,689**	**4,07,625**	**20,90,787**

2.3.2 Fish culture in borrow-pit and khal/ditch through development

Different types of water bodies improved under Enhancement of and other completed projects also included in the aquaculture systems. Information **Fish Production through Restoration of Water bodies Project (EFRWP)** of developed water body and its area are shown in Table 9.

Fig. 2.7: Developed water body

Table 2.6. Developed water body under the project **Enhancement of Fish Production through Restoration of Water bodies in the year 2020-21**

No of scheme	No of district	Developed area	Total expenditure(lakh taka)	No of beneficiaries
1133	56	1060.700 ha	12852.350	8490

2.3.3 Fish culture in baor (Ox-bow Lake)

A total of about 600 baors having an area of 5,671 ha are situated in the south west part of the country. Different development projects are being implemented to increase the fish production from baors. Attempts have been taken for increasing fish production by adopting improved aquaculture through fingerling stocking and management practices.

Six baors of Jashore and Jhenaidah districts were taken under DoF through the MoU signed between Ministry of Land and Ministry of Fisheries & Livestock for biological management. In 2019-20 fiscal year, 951.08 MT (Govt. part 570.53 MT and fishermen's part 380.55 MT) of carp fishes and 259 MT of Small Indigenous Species (SIS) are produced from six baors under DoF. In 2020-21 fiscal year, target of carp fishes and Small Indigenous Species (SIS fish production were 950.88 MT (Govt. part 570.53 MT and fishermen's part 380.55 MT) and 314 MT respectively from these six baors. These six baors of Baor Fisheries Development Project (Rev) under DoF carry a vital role to improve the socio-economic status of the fishermen involved.

Annual Fish Production of Baors in 2020-21

Sl. No.	District	Area (Ha)	Production (Metric Ton)
1	Faridpur	437	812
2	Gopalganj	791	1048
3	Madaripur	1119	1351
4	Rajbari	14	32
Dhaka Division		**2361**	**3243**
5	Bagherhat	90	15
6	Chuadanga	498	1632
7	Jashore	1474	3655
8	Jhenaidah	881	1886
9	Kushtia	87	201
10	Magura	118	241
11	Meherpur	81	250
12	Satkhira	81	196
Khulna Division		**3310**	**8076**
TOTAL		**5671**	**11319**

FRSS 2020-2021, DoF

Socio-economic development of the fishermen of 6 baors with Baor Development Project (Rev) under DoF:

Fishermen of 6 baors with Baor Development Project (Rev) under DoF in Jhenaidah and Jashore districts maintain their livelihood depending on the baor fishery. Fishermen get 40% of carp fishes and 100% of Small Indigenous Species (SIS) that help directly maintaining their livelihood. The poor fishermen live on the bank of the baors having Fisherman Identity Card (FID) get their access to fish in the pertaining baors with paying nominal amount of license fee. According to the ''Guideline of production, marketing and management of fish seed and fish from fish seed multiplication farms and baors 2019'' all fishermen take part in the meeting arranged by group leaders and group leaders being a member of local baor management committee take part in the meeting at every month. They get a chance to exercise expressing their views, raise their problems before the meeting and get solution that increase leadership among them thereby enhancing democratic value in their mind.

Fishermen and their family members consume more fish and can get more protein and minerals from fishes specially SIS. The children along with the family members of fishermen can boost up immunity to defend many diseases by eating more fishes. Fishermen jointly protect baor from poaching of fishes and they become committed to abide by the 'Fish Protection and Conservation Act 1950' and not to catch mother fish and juvenile fishes from baor. In this way, local indigenous fish species regenerate by getting time to reproduce and enough time to be reared up. In every baor, fishermen thinking their own welfare repair and maintain one or two fish sanctuaries established by DoF. Mother of various types of indigenous fish species get shelter into these sanctuaries and get chance to survive in the dry season to reproduce in the next breeding season.

Fishermen produce fish naturally in the 06 baors and they do not apply any feed, fertilizer and detrimental chemicals to the carp fishes stocked. Various types of indigenous fish species are produced naturally. For that reasons, many indigenous even endangered and critically endangered fish species are still now found in these baors. These baors are performing as a live gene bank of various indigenous fish species.

2.3.4 Cage culture

Several decades ago, attempts were taken to raise fish in cages under different development projects by several institutions / organizations of the country. Nowadays, cage culture is very popular, interesting and attracting means of livelihood and people are engaging themselves day by day in this culture system with fish species like monosex tilapia, pangas, koi, shing, magur, thai swarpunti etc. Cage culture is majorly being practiced in Chandpur, Laxmipur, Bhola, Kurigram, Bramhmbaria,, Dhaka, Madaripur, Narsingdi, Pabna,Sirajgonj and other regions of the country. In 2020-2021, about 4995 MT fishes were produced by cage culture in 1,79,115 cubic metres.

Fig. 2.9: Cage culture in open water

2.3. Pen culture

Pen culture is also one of the potential means of producing fish from vast water body or canal .In recent years, pens are made with different materials like bamboo, net, iron-meshed, wooden pillar etc. The area of pen also varies size from half to few hectares. The fish species reared in the pen are carp, tilapia, pangas etc. Feeds are also applied in pen culture system but not regularly. Both single and multi-owner are found in pen management. Culture period also varies from June to December depending on availability of water. Pen culture is becoming popular in and around Dhaka and Narayangonj and expanding every year. In 2020-21, about 14282MT fish were produced from pen culture area of 7314 ha.

2.3.6 Fresh water mud eel culture

Monopterus cuchia is an important freshwater air breathing, swamp mud eel fish. It commonly occurs in the freshwater of Bangladesh, Pakistan, Northern and Northeastern India and Nepal. Once, indigenous cuchia was abundant throughout the Bangladesh, plenty in mud holes in shallow 'beels' and 'boro' paddy field particularly in old Sylhet, Mymensingh and Tangail Districts. But nowadays, this fish is hardly found in the open water area. The biodiversity, ecosystem of natural water bodies are being decreased due to global warming and climate change. M.cuchia is exported to many countries of south East Asia and Europe. In 2020-21,9195 MT cuchia is produced. In this financial year, 3151.13 MT cuchia was exported which earned 63.59 crores taka.

Cuchia is an important fish for the livelihood of tribal people in terms of home consumption and trade. The tribal people belonging to the Garo, Hajong, Shawtali, Koch, Rajbongshi community believe this fish to be therapeutic one and traditional use for treatment of various ailments, viz. reported to cure weakness, anemia and asthma.

Fig. 2.11: Fresh water mud eel culture

Considering the importance of this species in nutritional, medicinal, economic and biodiversity point of view DoF has been started cuchia culture through a project. In 2020-2021, 735MT cuchia is produced through culture and 8460 MT is produced through capture which is in total 9195 MT.

2.3.7 Pearl Culture

At present, oysters are being cultivated in 22 Upazilas of 19 districts in Bangladesh to produce pearl. According to the consolidated report after collecting data from all the divisions, 46

Fig. 2.12: Pearl culture

oyster farmers (36 males and 10 females) in 22 Upazilas of 19 districts earn 18.07 lakh BDT by cultivating 82.87 KG pearls in 37 freshwater ponds oysters. Pearl cultivation activities are going on in some more Upazilas.

Under the project of conservation and development of indigenous species of fish and snails, there are 200 pearl production demonstration farms with an area of 20.24 ha will be implemented. There is also an intervention under this project to train 4930 farmers regarding pearl culture, oyster and snail conservation and production of pearl ornaments. Under the AFF-3 activities of the National Agricultural Technology Project, Phase-2 under the Department of Fisheries, the pearl cultivation activities in Sadar Upazila of Rajbari district have yielded the expected results.

To make pearl farming activities more dynamic and productive, it is needed to provide training to interested person, increase pearl seed production in the country or import seed from abroad , set up pearl processing laboratory and develop marketing channels.

2.4 Coastal aquaculture

2.4.1 Shrimp (bagda) culture

Black tiger shrimp (Penaeus monodon) in Bangladesh is known as Bagda. Bagda grows faster

Fig. 2.13: Bagda farming in Gher,Paikgacha, Khulna

and bigger in size, the species is very popular for coastal aquaculture among shrimp varities available.

in Bangladesh. Bagda culture has been starting in the south-west region of the country using agricultural land since early 1970s. The larvae of shrimp and other fishes are trapped into the crop fields during high tide and reared for several months. With the increasing demand of shrimp and prawn in the international market expansion of shrimp farming was observed in dyke elevated rice fields (traditionally known as ‘Gher’).

In 1994, government declared the coastal region as ‘Open for brackish water shrimp farming` through a government order. From then, brackish water shrimp farming has been expanded rapidly. By 2020-2021over 1,91,964ha of land were brought under bagda culture and till it’s areas are increasing. The highest shrimp culture area was in south-west region i.e Bagerhat, Khulna and Satkhira region because of abundant source of saline water and shrimp post larvae (fry) in the Sundarbans mangrove forest and surrounding rivers and estuaries.

Among the coastal districts, the highest production of bagda was observed in Bagerhat, Khulna, Satkhira and Cox`s Bazar. The culture system of bagda involves traditional extensive to improved extensive. In 2020-2021,bagda production in Bangladesh was 68,704.39MT.

Table 2.7 Shrimp farming and production

Year	Area farmed (ha)	Shrimp productionMT)	Remarks
2013-14	215305	71430	Paddy and salt are produced in very near to coast as alternative crops. White fish and crabs are also produced in some places as by-culture.
2014-15	216468	75274	
2015-16	206763	68217	
2016-17	205654	68272	
2017-18	184821	61709	
2018-19	185308	63171	
2019-20	186275	64688	
2020-21	191964	68704.39	

FRSS 2020-2021, DoF.

2.4.2 Prawn (Galda) culture

The Giant freshwater prawn (Macrobrachium rosenbergii), called as Galda in Bangla, were being trapped and reared with other fishes in the tidal pond and low lands. Generally, the species were harvested from the river/canals, floodplains and beel areas which have connectivity with rivers. At present Macrobrachium sp. is being cultured in gher in organized way along with other aquaculture, agriculture and horticulture crops. Different culture systems such as monoculture, poly culture along with other fishes and aquaculture in paddy fields along with paddy are being practiced. In the year of 2020-2021the unit production of Galda is 714 kg/ha. Currently galda are farming in gher, pond and paddy field covering an area of about 71,062 ha. About additional 1.46907lakh MT fish are produced along with galda.

Table 2.8. Prawn (Galda) farming and production

Year	Area farmed (ha)	Production (MT) Prawn
2013-2014	59972.23	42097
2014-2015	59115	42053
2015-2016	68746	46189
2016-2017	67063	48574
2017-2018	73860	51571
2018-2019	73245	52197
2019-2020	71613	51096
2020-2021	71062	50750.15

FRSS 2020-2021, DoF.

2.4.3 Introduction of SPF black tiger shrimp

Shrimp aquaculture is an important foreign currency earning sector of Bangladesh. Besides, more than a million coastal people depend on their livelihood on Black Tiger Shrimp (Penaeus monodon) culture. By 2020-2021,over 1,91,964 haof lands are used for black tiger shrimp cultivation in south-west region i.e Bagerhat, Khulna, Satkhira and Cox`s Bazar.

Fig.2.14: SPF shrimp in Bagerhat

At present, 44 Bagda shrimp hatcheries are operating

in Bangladesh to produce post larvae (PL) for shrimp farms. These shrimp hatcheries produce about 721.04crore shrimp PL in the year 2020-2021. All these shrimp hatcheries are using the wild brood stock from the Bay of Bengal that are mostly contaminated with microbial pathogens. Since the broods are collected in batches of 100 or more by fishing trawlers, it is practically impossible to screen out the broods from known pathogens through PCR tests. Besides, the shrimp hatcheries use many individual brood shrimp for maturation in community tanks. So, it is virtually impossible to screen-out the pathogen free brood shrimp in this set up.

During the last one decade, there have been intensive efforts to domesticate P. monodon (black tiger shrimp) broods to produce SPF stock through selection. The PL of these domesticated SPF broods have performed better in terms of disease, survival, growth and FCR. The domesticated broods are known to be produced in Hawii, Mosambique and Thailand. The SPF broods have been successfully introduced in Vietnam, Malaysia and Philippines. In the year 2014 Bangladesh imported and introduced SPF broods first time from Hawii of America.

As per the government Fish Hatchery Act 2010 and Fish Hatchery Rules 2011, it is mandatory for hatcheries to supply disease free PL to the farmers. Therefore, for the sustainability of tiger shrimp hatcheries and farming it is imperative that the shrimp hatcheries use SPF (Specific Pathogen Free)Black Tiger Shrimp to produce disease free PL. By introducing SPF broods, contamination of pathogens to the post larvae from the broods could wholly or largely be eliminated depending on the degree of compliance with prescribed bio-security rules.

At present, disease free PL producing programs are continuing by SPF Black Tiger Shrimp brood. In the year 2015, about 3.1 crore and the year of 2020-2021 about 62.10 crore disease

free PL are supplied among the farmers of Bagerhat, Khulna, Satkhira and Cox's Bazar districts.

2.4.4 Crab culture and crab fattening

Recently traditional mud crab (Scylla serrata) culture has been practiced in Bangladesh based on capture and fattening of juvenile from the wild. Now mud crab is recognized as a valuable export commodity. After shrimp, mud crabs have become the second-most exported crustacean from Bangladesh. Because of high prices in international markets, mud crab farming is gaining popularity in the coastal districts of Bangladesh. It has been harvested in greater Khulna, Barisal and Chittagong regions. Mud crabs are less susceptible to disease and more resistant to adverse environment conditions and climate change. Many shrimp farmers are switching to mud crab farming. Two types of crab are available in the coastal region of Bangladesh-Scylla serrata and Scylla olivacea. From this only mud crab (Scylla serrata) is cultivable in Bangladesh.

Fig. 2.15: Crab culture in Cox,s Bazar

Based on the increasing demand of gravid female in the south-east Asian countries, a sustainable aquaculture technology has been developed. Culture of juvenile crab in pen and cage is now practicing in some selected areas of Bangladesh. This culture technology and production performance changed the socio-economic condition of the adopted communities and the fellow farmers also become interested to practice this kind of crab fattening. Department of Fisheries is implementing a project for the development of culture and management technique of crab in the selected areas of coastal region of Bangladesh.

Indigenous Technological Knowledge (ITK) of stakeholders and based on the lessons learnt from the culture practice the existing culture technology will be redesigned for future expansion. The mud crab aquaculture will generate income and employment and enhance export earnings. Crab farming and production in Bangladesh is shown below.

Table: 2.9. Crab farming and production

Year	Area farmed (ha)	Crab production (MT)	Remarks
2016-2017	27010	14421	Nowadays, Crabs are cultured as main crop in coastal areas.
2017-2018	9854	11787	
2018-2019	9377	12084	
2019-2020	9535	12562	
2020-2021	9602	12337.13	

FRSS 2020-2021, DoF.

Crab seeds are not available in our country. At present Farmers are collecting seeds from nature. For this reason, crab seeds production technique should be developed for crab culture. In this context, a crab hatchery has been established in Kolatoli, Cox's bazar in 2018 by DoF and crab seed production is trying under the supervision of a foreign consultant.

2.5 Inland open- water fisheries resource management

Fig.2.15: Fish harvesting in lake

The open water body of Bangladesh looks like a vast sea as recognition of her large water body. It has potential as inland open water resources, including 8,53,863 ha of rivers and estuaries, about 1,77,700 ha of Sundarbans where in 2020-21 annual fish production was 21544 MT, 1,14,161 ha of natural depressions or beels where production was 1,04871 MT.68,800 ha of Kaptai reservoir where in 2020-21 production was 12345 MT and about 26,45942 ha of floodplains. Annual flooding during the rainy season inundates up to 60% of the total land surface. Bangladesh possesses the 3rd largest capture fisheries and 5th culture fisheries in the world. After China and India, Bangladesh is the third largest country in the world of inland fisheries. The inland open water is inhabited by 260 species of fish and 24 species of shrimp. Despite the existence of huge resources the inland capture fisheries has over the years been replaced as top fish producing source by aquaculture, due mainly to decline and degradation of resources. The priority is given to improve biological management that will restrict the declination of resources and production. The DoF has prepared a sub strategy on Inland Capture Fisheries based on the National Fisheries Strategy 2006 and National Fisheries Policy 1998.

2.5.1 Community based fisheries management (CBFM)

Fig.2.16: Community based fish culture training in Taras, Sirajgonj

Bangladesh has achieved recognition for its inclusive fisheries management through local community engagement. Community based management of resources is a time-driven and successful activity initiated by DoF. Bangladesh is emerging as a country of having positive lessons from community based management of open water. At present 13 ongoing development projects under implementation includes community based fisheries management and more than 0.20 million people are enjoying the benefits. Establishment of Community Based Organizations (CBOs) and village level sub committees has been recognized as the first and fundamental step in creating sustainable co-management of fisheries resources in the decision making process by user's group. Initial work on networking by community based organizations has been started at regional level. More emphasis has been given to work with community based fisheries management in the inland capture fisheries sub-strategy.

2.5.2 Fingerling stocking

Fig. 2.17: Fingerlings stocking

Natural recruitment of carp spawn and fingerling declining due to human interferences and environmental degradation hampered the productivity of open water capture fisheries resources. To improve the productivity of open water, the Ministry of Fisheries and Livestock through the Department of Fisheries initiated regular program from revenue and development budget to release fingerlings of major carp in open water bodies, floodplains and closed water bodies throughout the country. Stocking of fish fingerlings into beels and floodplains is a temporary measure to address the quick

declination of fish production in open water.

Table: 2.10. Stocking of fish fingerlings in open water bodies and floodplains

Financial Year	Fund allocated Tk (crore)	Fingerling released		No.of beneficiaries
		Number(million)	Weight(MT)	
2009-10	3.37	14.40	200.45	530347
2010-11	4.00	12.39	241.12	2363631
2011-12	8.86	15.23	570.19	2365631
2012-13	8.74	17.14	480.24	1012000
2013-14	7.16	18.95	385.52	974186
2014-15	7.15	15.54	317.72	1054100
2015-16	7.23	29.33	320.38	1387300
2016-17(P+R)	16.48	23.90	968.98	801135
2017-18 (Revenue)	7.86	11.48	279.88	1076000
2018-2019 (P+R)	7.3225	9.887	266.00	971488
2019-20(P+R)	7.3976	7.308	270.82	843100
2020-21(R+P)	6.88183	?+4.73lakh	242.815	15908519

2.5.4 Beel nursery

Beel nursery has been proved to be a significant tool for increasing fish production in natural water bodies. DoF has continued the program as regular activity under revenue and development budget in various low lying rice field, floodplain, beel, haor, canal, river and government/non-government water bodies from 2009-10 fiscal year to increase natural

Fig.2.18: Beel nursery activities

production in these areas along with surrounding linked water bodies. During 2020-21 fiscal year,533 beel nurseries were successfully established which allocated money 1.60 crore taka from revenue budget where 398000 beneficiaries are involved. From 3 development projects,51 beel nurseries were established which allocated 46.20 lakh taka where 6941 beneficiaries are involved.

2.5.5 Establishment and Management of fish sanctuary

Fig.2.19: Fish Sanctuary in Gopalganj

Introduction of sanctuary approach for fisheries resource conservation opened up a new horizon for sustainable use of valuable fish species. To stop the degradation of aquatic biodiversity specially species diversity of fish and other aquatic species in open water, a set of technical interventions like establishment of fish sanctuaries, fish habitat restoration have been undertaken during the past years. Establishment of aquatic sanctuary is one of the effective tools for conserving fish stock, protecting biodiversity and increasing fish production. Total numbers of 494 fish sanctuaries were established by DoF in different selected water bodies. There are 6 Hlisa sanctuaries which length 432 km and one sanctuary in Halda river which area 547.61 ha.

In 2020-21 financial year, under revenue budget following sanctuaries are managed and repaired.

No. of sanctuary	Expenditure (taka)	No of beneficiaries (person)
333	80 lakh taka	1,28,000

In 2020-21 financial year, under development budget following sanctuaries are established.

No. of sanctuary	Expenditure (taka)	No of beneficiaries (person)
26	78 lakh taka	1928

Sanctuary management enhance and conserve aquatic biodiversity, protect and conserve endangered fish species from extinction. It ensure food security through fish production, increase fish stock, ensure flow of food chain and protect the genetic pollution. Fish sanctuary is the permanent shelter for protection of fish for natural propagation. By sanctuary management there are found abundance of endangered species like Chital, Foli, Kalibaosh, Aair, Tengra, Meni, Rani, Swarpunti, Madhu pabda, Kajoli, Gojar, Tara baim,Teri punti, Bamosh, Batasi, Kakila, Poya, Bata, Khoksha etc. In fact the advantage of sanctuary is infinite. From this point of view sanctuaries are managed regularly from 2015-16 fiscal year under revenue program. Besides this, different development projects establishing and restoring habitat as sanctuary.

2.6 Marine Fisheries Resource Management

By the virtue of Solemnity and sincere leadership of honorable Prime Minister Sheikh Hasina, Bangladesh established her legitimate right in the 1,18,813 square kilometer area of the Bay of Bangle resolving the dispute over the maritime boundary with neighbor countries Myanmar and India during 2012 and 2014 respectively settled by International Tribunal on the Law of the Sea (ITLOS) and International Court of Arbitration.

This verdict ensures the sovereign right to explore, exploit, use, preserve, develop and manage the living and non-living resources in the EEZ of the Nation. This verdict also opens the opportunity for Bangladesh to fulfillment of animal protein, employment, poverty alleviation, export earnings and harness the potential from the sea to promote and strengthen her blue economy for the well-being of the nation. It is now very important to take effective initiatives for the promotion and strength of her blue economy keeping the Marine Bio-bank through proper conservation, management and ensuring scientific sustainable yield from the vast Marine ecosystem for the economic well-being of the country.

2.6.1. Short term, Mid term and Long term "Plan of Action" according to Blue Economy

- In 2014 by the guidance of the Ministry of Fisheries and Livestock, the Department of Fisheries has already taken short term, midterm and long term "Plan of Action" to rise up Bangladesh middle earning's country. The "Plan of Action" was updated in 2018 according to the SDG (2018-2030) of the United Nations.
- **Short term Activities:**
  - Conduct assessment of fisheries stocks and finding of new fishing grounds;
  - Conservation of marine fisheries resource;
  - Development of handling of captured fish, as well as supply chain system to reduce the post-harvest loss;
  - Initiate commercial exploitation of Tuna and other large pelagic species from over 200 meters depth within EEZ and Area Beyond National Jurisdiction (ABNJ);
  - Initiative for participation and membership of the International organization, as well as regional forums.
- **Midterm Activities:**
  - Determination of Maximum Sustainable Yield (MSY) and Maximum Economical Plan;
  - Strengthening of Monitoring, Control and Surveillance (MCS) system;
  - Combat Illegal, Unreported and Unregulated (IUU)fishing;
  - Uplift of livelihood of coastal fishers;
  - Measures are taken to conserve the aquatic biodiversity of the Sundarbans, the world's largest mangrove forest.
- **Long term Activities:**
  - Development of a modern database for marine fisheries resources;
  - Integrated planning for the expansion of mari-culture and coastal aquaculture;
  - Development of Monitoring, Control and Surveillance (MCS) system;
  - Introduce Marine and Coastal Spatial Planning.

2.6.2. Conservation of Marine Fisheries Resources

- In 2000 the Government has declared a 698sq km area in the Bay of Bengal as a "Marine Reserves" as a part of conservation and management measures. Now the area of the reserve is being protected;
- In 2019 the Government has declared a 3,188 sq. km area at Nijhum Dewip and its adjacent area of Hatia, Noakhali coastal zone as "Nijhum Dewip Marine Protected Area". A management plan of the MPA is also developed and approved by the Ministry of Fisheries and Livestock;
- Since 2015 the Government has imposed 65 days ban period from 20 May to 23 July in every year to ensure the breeding and protection of fish species in the Exclusive Economic Zone. During this ban period fishing of any kinds of fish and crustaceans by all types of vessels in the Bay of Bengal is prohibited;
- The Government has imposed 22 days ban period during the peak breeding season of Hilsa every year to ensure the breeding of Hilsa;
- The Government has prohibited"Jatka" (Below 25 cm size Hilsa) fishing for 08 months (November to June) in every year in coastal and marine water;
- To reduce the fishing pressure and ensure sustainable management of fisheries resources ban has been imposed on fishing with destructive fishing gears like set bag net (BehundiJal), push net (Shrimp seed collected net) and other destructive gears in the coastal areas of the sea;
- As bottom trawling is harmful to the breeding and nursery ground of the sea, so the provision of a new license for bottom trawler is being stopped as well as bottom trawler is converting into mid water trawler. In this regard till now, 68 bottom trawlers have been converted into mid water trawlers by the Ministry of Fisheries and Livestock.

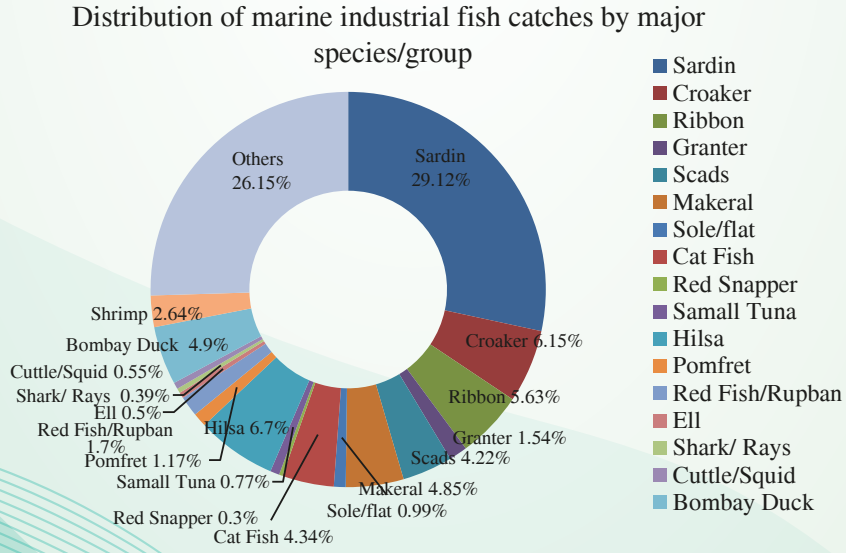


Fig. 2.20: Distribution of marine industrial fish catches by major species/group in 2020-21

2.6.3. Marine Fisheries Resources Survey (Stock Assessment)

❖ **Fishery Independent Survey (Research Vessel based):**

- The Fisheries Research and Survey vessel "RV Mean Shandhani" has already conducted 27survey cruises till February 2021 in the Bay of Bengal. All the collected data by the survey vessel have been preserved for further biological analysis. The first Survey Report for 2016-17 to 2018-19 has been published (link:http://mfsmu.fisheries.gov.bd/site/download/03cb42dc-8a4f-4dd3-a089-43e5f5bcf61b). The report is now being used for the development of the Marine Fisheries Management Plan. In accordance with the report, from24 surveys, 457 fish and other species havebeen identified. Where 373 species of fish, 21 species of sharks & rays, 24 species of shrimps, 21 species of crabs,03 species of lobsters,01 species of mantis, 04 species of octopus, 05 species of squids and 05 species of cuttlefish have been recorded;
- The Ministry of Fisheries and Livestock has approved the Cruise Plan for 2021-2022. This Cruise Plan consists of 01Trial, 3 Shrimp cruises, 3 demersal cruises and 3 pelagic cruises. "R V Mean Shandhani" has already been conducted 01trial cruise and 05 survey cruises by the financial assistance of the "Sustainable Coastal and Marine Fisheries" project;
- With the assistance of the Food and Agriculture Organization (FAO) of the United Nations and the Institute of Marine Research (IMR) under the program of EAF_ Nansen, an acoustic survey cruise has been conducted in the Bay of Bengal with the Research Vessel R V Dr. FridtjofNansenduring02-17 August 2018to collect data on the stock of fish and shrimp and the survey report has been submitted to the Ministry of Fisheries and Livestock;
- Ministry sent a request letter to FAO for 30 days survey cruise by R V Dr. Fridtjof Nansen in the EEZ of Bangladesh.

❖ **Fishery dependent survey:**

❖ **Land-based Survey:**

- To Collect Catch and Effort data of artisanal fisheries for land base survey 212 landing centers have been selected in the coastal area by the assistance of the "Sustainable Coastal and Marine Fisheries" project;
- A system is going to be developed for online data collection of fishing boats and gears;
- Manual preparation for Collect Catch and Effort data of artisanal fisheries is ongoing.
- Logbook for industrial vessels:

- Logbooks data are collected from industrial vessels for fishery monitoring and stock assessment.

Fig.2.21: Survey Vessel R V Meen Shandhani

2.6.4. Enacting Acts, Rules and Policies

1. Marine fisheries sector is governed by "Marine Fisheries Act, 2020" (Previous The Marine Fisheries Ordinance, 1983);
2. "Marine Fisheries Act, 2020" has been passed on 16 November 2020 in the 11th National Parliament and published in Govt. gazette on 26 November 2020;
3. Prepared a draft of "Marine Fisheries Rules 2021" and after completing dialogue with the relevant stakeholders and incorporating their comments the draft of "Marine Fisheries Rules 2021" was submitted to the Ministry of Fisheries and Livestock;
4. After completing a series of policy dialogues with the concerned stakeholders, a revised "National Marine Fisheries Harvest Policy 2022" has been drafted and submitted to the Ministry of Fisheries and Livestock. The Ministry of Fisheries and Livestock has conducted an inter-ministerial meeting with associated stakeholdersfor finalizing the draft;
5. All industrial fishing trawlers and mechanized fishing boats are required to have registration and license for fishing;
6. Artisanal fishing boats have to require permission from Marine Fisheries Office or Local Fisheries Office to fish in Bangladesh marine waters;
7. It is mandatory for all licensed fishing vessels to take Sailing Permission (SP) from Marine Fisheries Office under the Department of fisheries (DoF) are;

8. Trawlers are allowed to catch fish/shrimp in an area not shallower than a 40-meter depth zone. Artisanal and mechanized fishing boats are allowed to fish below the 40-meter depth zone.

9. With the assistance of the "Sustainable Coastal and Marine Fisheries" project Marine Fisheries Management Plan-Part 1 (Industrial) has been developed by completing policy dialogue with the concerned stakeholders and the Ministry of Fisheries and Livestock has already been approved the plan in October 2021.

2.6.5 Monitoring Control and Surveillance (MCS):

a. Establishment of Vessel Monitoring System (VMS) and Joint Monitoring Center (JMC) :

i. Vessel Monitoring System (VMS) software prepares, Fisheries Monitoring Centre (FMC) and establishment work is ongoing by "Sustainable Coastal and Marine Fisheries (SCMF)" Project.;

ii. Automatic Identification System (AIS) shall have to install in large mechanized fishing boats by this project;

iii. Global System for Mobile (GSM) shall have to install in artisanal and small mechanized fishing boats which are fishing in near shore areas by this project;

iv. Joint Monitoring Center (JMC) approved by the Ministry of Fisheries and Livestock;

v. DoF prepared a draft of the Memorandum of Understanding (MoU) for the operation of the Joint Monitoring Center (JMC);

b. Surveillance check post and Landing center:

i. DoF has a Marine Fisheries Surveillance check post at Patenga, Chattogram and 16 Marine Fisheries Surveillance check posts are going to be set up at coastal areas by the "Sustainable Coastal and Marine Fisheries" Project;

ii. Primary site selection completed for establishing of 16 Marine Fisheries Surveillance check posts;

iii. Procurement process is ongoing of 16 patrolled boats for 16 Marine Fisheries Surveillance check posts;

iv. 65 landing centers shall be established by "Sustainable Coastal and Marine Fisheries" Project.

c. Training and Awareness Programs

i. Fishers are provided with training on the FAO-CCRF, compliance with various acts, regulations and rules emphasizing the importance of conservation for sustainable exploitation of marine and coastal resources;

ii. Regular meetings are arranged on various issues of non-compliances happen by fishers with the presence of representatives from the Bangladesh Navy, Bangladesh Coast Guard, Rapid Action Battalion (RAB), Bangladesh Police, Mercantile Marine Department, Border Guard Bangladesh, Bangladesh Marine Fisheries Association, Mechanized Boat Owner's Association, District Fisheries Officers of coastal districts to help mitigation measures and comply with rules and regulations;

iii. Mass awareness campaigns are organized in major fish landing centers and in fisher's villages to actively discourage the deleterious impacts of destructive fishing methods and gears. Fishers and the representatives of local people are motivated to show respect for Marine Fisheries Ordinance and Rules promulgated to restore our biodiversity and protect the resilience of the marine environment;

iv. Strong Monitoring, Control and Surveillance (MCS) procedures are in place to increase boat registration and issuance of fishing licenses. The National Plan of Action (NPOA) to eliminate Illegal, Unregulated and Unreported (IUU) fishing in the Exclusive Economic Zone (EEZ) of Bangladesh place.

2.6.6 Marine Fisheries Resource Management Approaches

I. Mesh size of trawl nets and gears are controlled for industrial fishing trawlers;

II. Minimum mesh size of 45mm is mandatory at the cod end for shrimp trawl and 60mm for the fish trawl;

III. ESBN (Estuarine Set Bag Net) has been banned (Prohibition in operating illegal estuarine set beg net throughout the year has been declared on 7 April 2013).

IV. To facilitate spawning and conservation of marine fisheries resources, fishing has been banned for 65 days from 20 May to 23 July in each year, for all types of vessels in the Bay of Bengal;

V. The Government has imposed 22 days ban period during the peak breeding season of Hilsa every year to ensure the breeding of Hilsa;

VI. The Government has prohibited "Jatka" (Below 25 cm size Hilsa) fishing for 08 months (November to June) every year in coastal and marine water;

VII. Juvenile Hilsa (Jatka) Conservation Week has been observed in 36Upzella as a national program to protect Juvenile Hilsa to ensure their growth;

VIII. Under The "Marine Fisheries Act, 2020" (Previous The Marine Fisheries Ordinance, 1983)fishing area is demarcated for small-scale fisheries to minimize the conflict between industrial fishing vessels and artisanal fishing vessels;

IX. Harvesting provisions are made in three tiers: (1) up to 40 m depth artisanal and mechanized boats operate; (2) from 40 m to 200 m depth industrial trawlers operate; and (3) from 200 m depth to the end of the EEZ and ABNJ (Area Beyond National Jurisdiction)long-liner and purse seiner operate;

X. No new fishing license for industrial fishing vessels (mid-water/ bottom trawler/shrimp trawler) are providing since 2015;

2.6.7 IUU Catch Monitoring

1. The Government has enacted the "Marine Fisheries Act, 2020" to incorporate FAO-CCRF to control, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing to conserve marine life;

2. The European Union through its Council Regulation EC 1005/2008 has laid down a Catch Certificate Scheme (CCS) to combat IUU Fishing. Under this Scheme any

company wanting to export marine fish to European Union countries must have IUU-Catch Certificate (CC) approved by the flag state's Competent Authority;

3. The Marine Fisheries Ordinance 1983 was amended in 2010 to facilitate issuing IUU-Catch Certificates by the Director, Marine Fisheries Office as Competent Authority;
4. Every month five industrial fishing trawlers are inspected to monitor IUU catches in the Bay of Bengal;
5. The "National Plan of Action" (NPOA)- IUU Fishing has been developed with the assistance of the Food and Agriculture Organization (FAO) of the United Nations and the draft "National Plan of Action" (NPOA)- IUU Fishing has been approved by the Ministry of Fisheries and Livestock on 2 May 2021;
6. Bangladesh has been signed the FAO Agreement on Port State Measures (PSMA) 2009 in December 2019 to prevent, deter and eliminate Illegal, Unreported and Unregulated (IUU) fishing.

2.6.8 Marine Reserve/Protected Area (MR/MPA)

1. As a protective management measure, in the year 2000 the Government has declared 698 sq. km Marine Reserves (MR)area in the Bay of Bengal to protect and conserve marine fisheries resources. The Marine Reserves area is protected from fishing.
2. In 2019 the Government has declared a 3,188 sq. km area at Nijhum Dewip and its adjacent area of Hatia, Noakhali coastal zone as "Nijhum Dewip Marine Protected Area".A management plan for this MPA has been approved by the Ministry of Fisheries and Livestock.

2.6.9 Fishing Fleet Operation

In Bangladesh, traditional fisheries exist side by side with commercial fisheries. About 231 industrial trawlers were active in fishing out of 262 industrial fishing trawlers in the fiscal year of 2020-21. At the same time, 67,669 mechanized and artisanal boats were engaged in traditional fishing in the Bay of Bengal. These traditional mechanized and artisanal fishing boats are involved in the use of relatively simpler gears such as gillnets, set bag nets, trammel nets by the array boats. Artisanal boats are engaged in daily fishing by nature in a very low depth close to the coastline involving 3-5 fishermen. Mechanized boats typically fish for 7 to 9 days within 40 m depth of contour carrying ice cubes in their boats. The number of fishermen varies from 15 to 30 based on the size and gear used.

Based on freezing and preservation capacities, industrial trawlers are of two kinds; trawlers having still hulled (Categorized as freezer trawlers) and wooden body trawlers (Categorized as non- freezer/ice trawlers). Based on the fishing mode they are also different types like a bottom fishing trawler, mid-water trawler and shrimp trawler. The gross tonnage capacity of the industrial fishing fleet ranged between 56 to 148 mt for wooden bodies and 251 to 668 mtfor steel-hulled freezer trawlers.

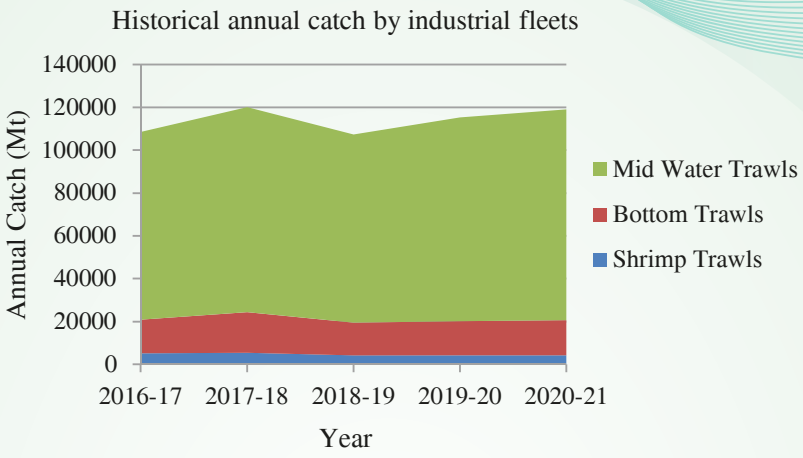


Fig.2.22: Historical annual catch by industrial trawler fleet 2016-17 to 2020-21.

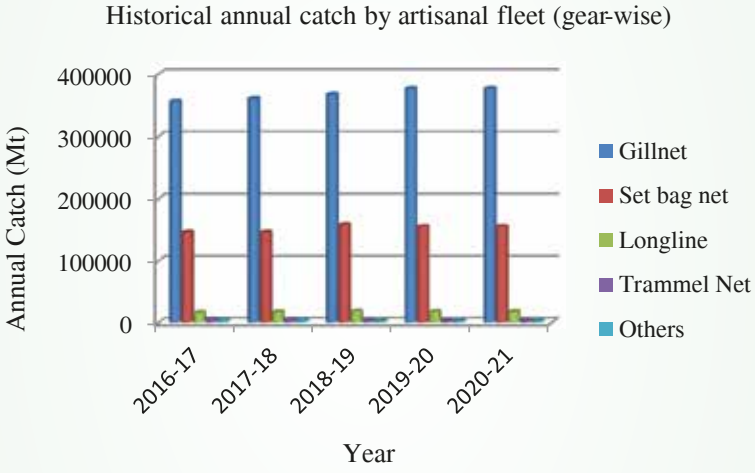


Fig.2.23: Historical annual catch by artisanal fleet (gear-wise) from 2016-17 to 2020-21.

2.6.10 Licensing activities of mechanized fishing boats

Marine Fisheries Office (MFO) under DoF provides a license for mechanized fishing vessels but the licensing required a prior Certificate of Inspection (COI) from the MFO and vessel registration from the Mercantile Marine Office (MMO). At present, combined camps are being operated by MFO and MMO at different fishing sites to provide the same one-stop service.

Table 2.11. Licensing activities of mechanized fishing boats

Year	License Issues (Nos.)			Revenue
	New	Renew	Total	(Lac taka)
2016-2017	313	1255	1568	41.57
2017-2018	332	1229	1561	42.13
2018-2019	114	1186	1300	37.41
2019-2020	159	1295	1454	45.16
2020-2021	341	1061	1402	45.53

2.6.11 Licensing Activities of Industrial Fishing Vessel/Trawler

During 2020-21, a total number of 262 industrial trawlers were engaged in fishing in the EEZ. The fleet comprised 37 shrimp trawlers, 59 bottom trawlers and 125 mid-water trawlers. 41trawlers are permitted to fish on the trial trip basis by the order of the High Court Division of the Honorable Supreme Court. Fishing licenses for industrial fishing vessels also require prior registration and COI from MMO. They also require a fishing license from MFO.All fishing licenses are subject to be renewed every two years after.

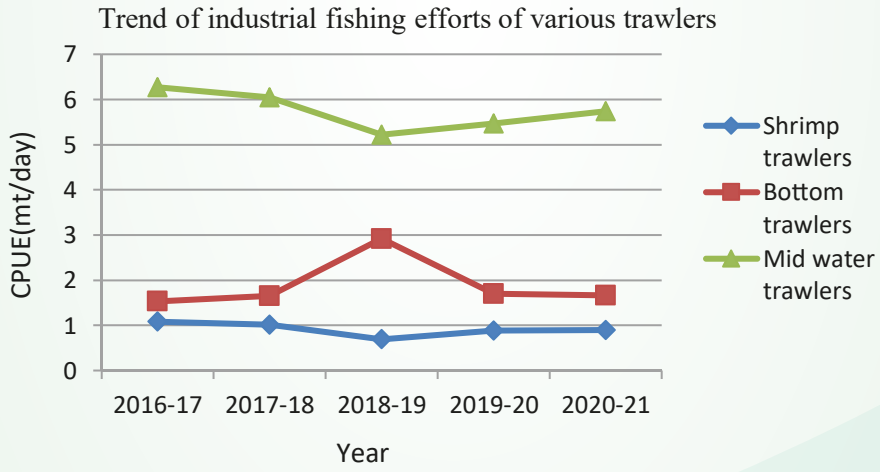


Fig.2.24: Trend of industrial fishing efforts of various trawlers from 2016-17 to 2020-21.

2.6.12 Deep Sea Fishing

1. The Government has taken Initiatives to exploit tuna and tuna-like fishes and other large pelagic fishes from the deep-sea area beyond National Jurisdiction (ABJN). The Ministry of Fisheries and Livestock has issued permission against 10 long liner and 07 purse seiner vessels. The awarded companies are in the effort to collect appropriate vessels and types of equipment.

2. Ministry of Fisheries and Livestock has been permitted to import/bring 01 long liner type and 01 purse seiner type fishing boat by the joint venture to exploit tuna and tuna-like fishes and other large pelagic fishes from the deep sea area of international waters;
3. Bangladesh has achieved her full membership which is the Contracting Party Status of Indian Ocean Tuna Commission (IOTC) on 24.04.2018that would help us to build up the tuna industry in near future.
4. A pilot Project is implemented on "Tuna and Tuna like Fishing and other Pelagic Fishing at the Deep Sea". Project cost is a GoB contribution 6,106.00 lakh taka and the Project period is July 2020 to December 2023; By this project:

i) 03 long liner type fishing vessels (fishing boats including fishing gears) have to procure under processing;
ii) Have to conduct the abundance of tuna and tuna-like fishes in the deep sea area of Bangladesh EEZ and international waters;
iii) Appreciate the private entrepreneurs to exploit tuna and tuna-like pelagic fishes in the deep-sea area beyond National Jurisdiction (ABJN);
iv) Achieve the knowledge and experience about exploiting tuna and tuna-like pelagic fishes in the deep sea and international waters;
v) There is provision to employ 44 nos. of crews including 07 nos. of foreign crews;
vi) Buildup 100 numbers of experienced manpower to exploit tuna and tuna-like fishes and other large pelagic fishes from the deep-sea area;
vii) Explore opportunities of abroad training and study tour about abundance and exploit tuna and tuna-like pelagic fishes in the deep sea area of 26 officers.

2.7 Hilsa fishery conservation, exploitation, and management

Hilsa is the most popular food for its taste and flavor to the southern people of Asia. It is indissolubly linked with our tradition and culture. Hilsa is also our national fish. Not only that, Hilsa has a great economic contribution to our national economy. In 2020-21 the production of Hilsa is 5.65 lakh MT which contributes 12.22% of total fish production which is the highest as a single species and more than 1% of total GDP. About 6 lakh people are directly involved with Hilsa catch and about 25 lakh people are indirectly involved with the trade of Hilsa. Hilsa production is increased about 89% in previous 12 years.

Growth Chart of Hilsa Production:

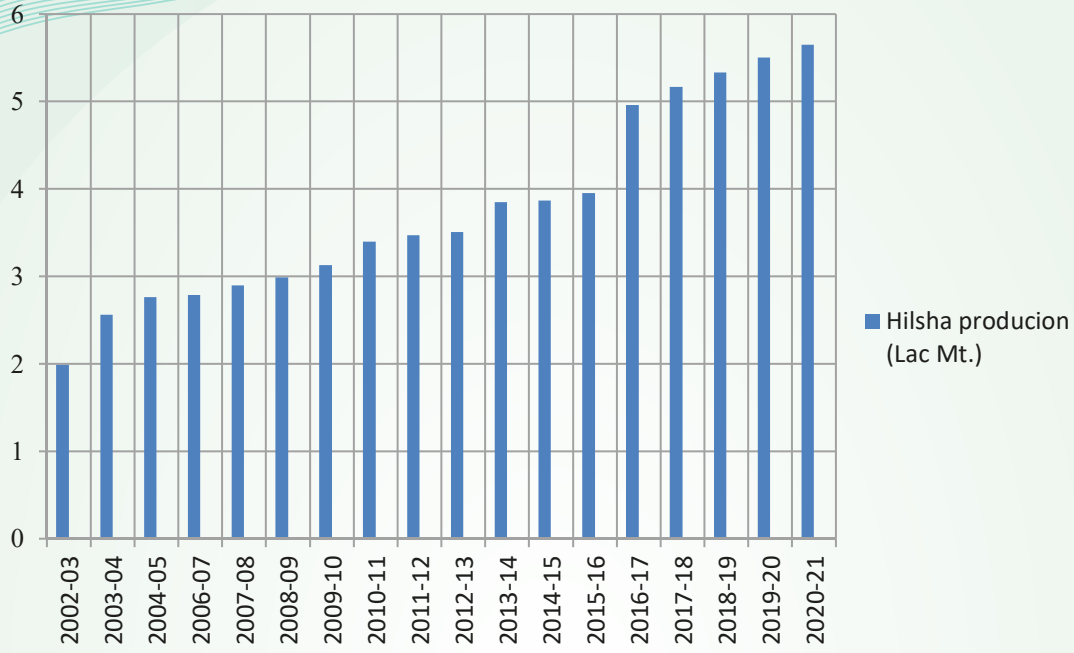


Fig.2.25: 18 years Hilsa production

Government took different initiatives to increase and sustain the Hilsa production. The major activities are

- Formulating and implementing "Hilsa Fisheries Management Action Plan";
- Identifying 7000 sq. km. major Hilsa breeding area in Bay of Bengal;
- Establishing 6 Hilsa sanctuaries;
- declaring 3188 sq. km. Marine Reserve area adjacent to nijhum deep;
- Imposing 22 days ban on Hilsa fishing at the peak spawning period of Hilsa;
- Imposing 8 months (November-June) ban on jatka fishing;
- Imposing 65 days ban on all kind of fishing in Bay of Bengal;
- Developing the livelihood of Hilsa fishermen by giving VGF (vulnerable group feeding) and AIG (alternative income generation).

2.7.1 Brood Hilsa conservation activities:

Fig.2.26: Brood Hilsa.

In 2002, Department of Fisheries prepared the Hlisa Fisheries Management action plan and Ministry of Fisheries and Livestock approved that, after giving approval according to the rule 13 (b) of the Protection and Conservation of Fish Rules, 1985, brood hilsa conservation activities had been started from 2006 in 7000 sq. km. of Bay of Bengal for 10 days. In 2011, government amended the rule 13 of the The Protection and Conservation of Fish Rules, 1985 by a gazette notification. After that from 2011 to 2014 brood hilsa conservation activities substantiated for 11 days. In 2015 government further amended the rule with the consultation of the hilsa researchers and other stakeholders, in that amendment the ban period on hilsa fishing was increased from 11 days to 15 days. Then finally the hilsa ban period was ordained 22 days during the peak spawning season of hilsa by a gazette notification in 2017. By the direct guidance of Ministry of Fisheries and Livestock Department of Fisheries substantiate the brood hilsa conservation operation and the civil administration, Bangladesh Navy, Bangladesh Air force, Bangladesh Police, River Police, RAB (Rapid Action Battalion), Coastguard, BGB (Border Guard Bangladesh) etc cooperate to implement the operation during 22days ban period on hilsa fishing.

In 2021, "Brood Hilsa Conservation Operation-2021" was substantiated all over the country from 04-25 October. During this period 2114 mobile court and 16855 operations were conducted, by which about 33.01 MT brood Hilsa and 950.40 lakh meter fishing net were seized. Seized net were destroyed in the presence of executive magistrate and the fish were distributed to the orphanage. Through these operations fishermen were fined 61.40 lakh taka and 2644 fishermen were sentenced to imprisonment.

A bird's eye view of "Brood Hilsa Conservation Operation" from 2016 to 2021

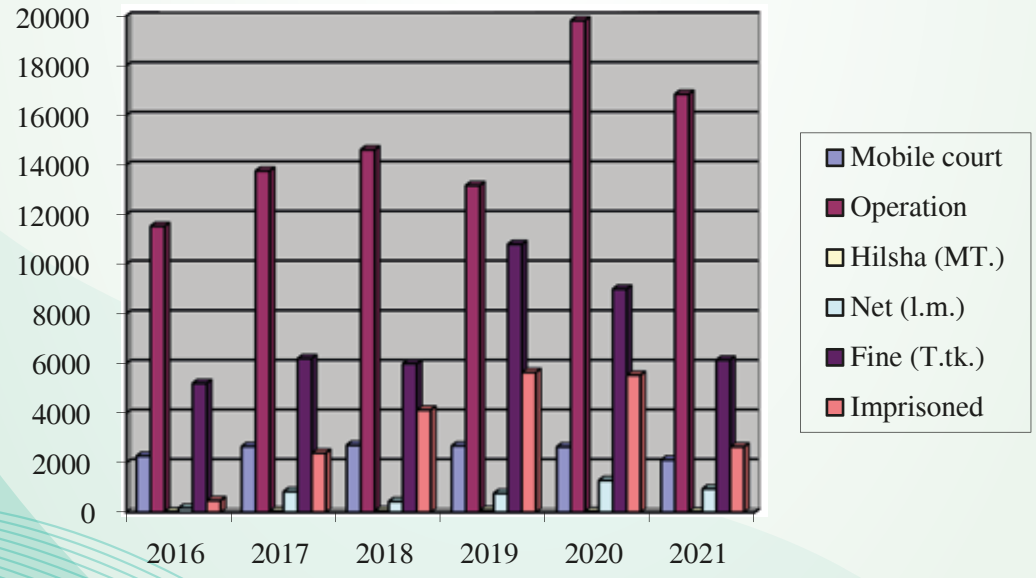


Fig.2.27: A bird's eye view of "Brood Hilsa Conservation Operation" from 2016 to 2021:

2.7.2 Hindrance of Jatka fishing:

According to The Protection and Conservation of Fish Rule, 1985, 10 inch or less than 10 inch size Hilsa fish is called jatka. In The Protection and Conservation of Fish Rule, 1985, the size of jatka was 9 inch and ban on jatka fishing was November to April. At last in 2014 to amend the existing rule, jatka size was ordained 10 inch and the ban period on jatka fishing had also been increased from November to June. In the ban period on jatka fishing DoF conducts operation in cooperation with the law enforcing agency like Bangladesh Police, River Police, Navy, coastguard etc. in 2020-21, Hindrance of Jatka fishing during ban period (November to June) 1779 mobile court and 10555 operations were conducted, by which about 484.42 MT jatka and 1689.68 lakh meter fishing net were seized. Seized net were destroyed in the presence of executive magistrate and the fish were distributed to the orphanage. Through these operations fishermen were fined 68.21 lakh taka and 981 fishermen were sentenced to imprisonment. It also should be mentioned that, Government has fixed the mesh size 6.5 cm. (2.6 inch) of gill net to prevent the jatka fishing.

Table 2.12. The scenario of law enforcement on jatka fishing from 2016-17 to 2020-21:

	Mobile court	Operation	jatka (MT.)	Net (l.m.)	Fine (T.tk.)	Imprisoned
2016-17	1459	6384	292.3	964.86	5547	992
2017-18	1971	10534	250.23	1087.52	5935	1282
2018-19	1998	17964	308.44	1396.2	14173	1358
2019-20	1421	8811	263.91	1735.16	5694	669
2020-21	1779	10555	484.42	1689.68	6821	981

Fig.2.28: Law enforcement of Jatka fishing

2.7.3 Extirpating the illegal net through "Special Combing Operation":

From 2016 the "Special Combing Operation" had been started to extirpate the abuse of illegal net in fishing. In that time this activities were substantiated only three coastal districts (Bhola, Patuakhaki, Barguna). Over the next time working area of special combing operation was increased gradually and in 2021, 17 districts (Barishal, Bhola, Patuakhali, Barguna, Pirojpur, Jhalokathi, Laxmipur, Chandpur, Noakhali, Cox's Bazar, Chattagram, Khulna, Bagerhat, Satkhira, Shariatpur, Madaripur and Munhsiganj) were included.

Table 2.13. The Special Combing Operation scenario

Year	No. of districts	Mobile court	operation	No. of Behundi net	Current net (L.m.)	Jatka (Mt.)	Fine (L. Tk.)	Jail
1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
2016	3	225	433	1326	13.37	2.284	3.99	13
2017	5	265	489	833	30.69	4.92	4.13	44
2018	10	341	935	1442	34.04	3.85	3.35	2
2019	11	424	1235	1883	88.916	8.82	5.82	7
2020	13	387	1554	2267	716.18	19.46	10.02	61
2021	17	492	1681	2448	274.18	45.95	9.63	111

2.7.4 VGF (Vulnerable Group Feeding) activities:

At the beginning of this activity, Hilsa fishermen received only 10 kg food grains (rice) per family per year as an annual allowance. The Honorable Prime Minister Sheikh Hasina, M.P. daughter of Bangabandhu realized the poor condition of jatka fishermen during ban period of jatka fishing and increased the amount of VGF (rice) from 10kg to 40 kg per family per month. Under the humanitarian aid program in 2020-21 fiscal year 56224.88 MT food grains (rice) were distributed to 3,28,815 fisher family in 96 upazila of 20 districts.

Table 2.14. The amount of VGF distributed to jatka fishermen from 2009-10 to 2020-21

Sl. no.	Fiscal Year	Distributed VGF (rice) MT.	No of family of beneficiary
1	2009-10	19768.60	164740
2	2010-11	14470.64	186264
3	2011-12	22351.68	186264
4	2012-13	24747.48	206229
5	2013-14	35856.32	224102

Sl. no.	Fiscal Year	Distributed VGF (rice) MT.	No of family of beneficiary
6	2014-15	35856.32	224102
7	2015-16	37788.16	236176
8	2016-17	38187.68	238673
9	2017-18	39787.84	248674
10	2018-19	39787.84	248674
11	2019-20	46778.08	301288
12	2020-21	56224.88	328815

VGF has also been allocated for the Hilsa fishermen during the 22 days ban on Hilsa fishing from 2016. In 2021, 11118.88 MT food grains (rice) were distributed to 555944 fisher family for 22 days in 151 upazila of 37 districts.

Table 2.15.The amount of VGF distributed to Hilsa fishermen from 20016 to 2021:

Sl. no.	Year	Distributed VGF (rice) MT.	No of family of beneficiary
1	2016	7134.46	356723
2	2017	7689.24	384462
3	2018	7914.18	395703
4	2019	8166.58	408329
5	2020	10566.84	528342
6	2021	11118.88	555944

Fig.2.29: VGF distribution

To increase public awareness regarding the conservation and protection of brood Hilsa and jatka DoF conducts different type of activities like poster, leaflet distribution, decoration of fish market, arot, fishery ghat with banner, festoon and arranging awareness program with the fishermen and other stakeholders. Since 2007, Jatka Conservation Week has been observed as a national program to protect Jatka and ensure both of its growth and production as an awareness program.

On 17 August 2017, Bangladesh has received the recognition on Hilsa as the product of Bangladesh. More than two third of Hilsa production of total produced hilsa in the world is produced in Bangladesh mainly accounts for Geographical Indication (GI) of Hilsa as a product of Bangladesh. Bangladesh has become a role model for Hilsa conservation to other Hilsa production countries.

Chapter 3

Fisheries Regulatory Activities

3.1 Fish Feed and Animal Feed act 2010 and Fish Feed Rules 2011

Fish feed is one of the most important factor for commercial aquaculture. There were no rules and regulations to maintain the quality of the feed and feed ingredients for the farmers before 2010. But the present democratic fish-friendly government has taken initiative to formulate the acts and rules and Fish Feed and Animal Feed Act 2010 and Fish Feed Rules 2011 are formulated. Currently it is being implemented all over the country. The Status of the Fish Feed and Animal Feed Act 2010 and Fish Feed Rules 2011 are given in the table below.

Fig.3.1: Feed Factory in Bangladesh

Table 3.1. Status of fish feed license under the Fish Feed Act, 2010 implementation (2020-2021)

Serial No.	Division/Head Office	Types of fish feed company (no.)			Total Number	Total revenue income (lakh Tk.)
		Fish feed production: Category :1	Fish Feed Import-Export: Category:2	Fish Feed Sale: Category-3 a and b		
1	*2*	*3*	*4*	*5*	*6*	*7*
1	Dhaka	72	94	804	970	9.68
2	Chattogram	53	37	660	750	3.10
3	Rajshahi	59	47	751	857	7.90
4	Khulna	16	58	1039	1113	6.49
	Barishal	4	3	176	183	0.40
5	Sylhet	2	1	211	214	0.55
7	Rangpur	8	13	300	321	2.40
8	Mymensingh	33	44	782	859	4.01
Total		247	297	4723	52.67	34.53

3.2 Fish Hatchery Act 2010 and Rules 2011

Aquaculture of Bangladesh is flourishing with the rapid expansion of public and private hatcheries providing support for good quality fish seed. But with the expansion of private hatcheries and for earning immediate profit the quality of fish seeds has declined over the years. The quality deterioration is mostly observed in private hatcheries. There are many reasons for the low quality, for instance, inbreeding, inter-specific hybridization, negative selection, improper brood-stock management. Furthermore, hybridization and cross breeding are threatening the genetic diversity of indigenous wild stocks of Indian Major Carps. To protect these undesirable practices, Bangladesh government promulgated the Fish Hatchery Act and Rules to ensure the quality of fish seed produced from public and private hatcheries. Under the act and rules, every hatchery must be taken registration from competent authority of DoF. The Status of the Fish Hatchery Act 2010 and Fish Hatchery Rule 2011 are given the table below:

Table 3.2. Status of Private fish hatchery registration in 2020-2021 under the Fish Hatchery Act, 2010 and Fish Hatchery Rules, 2011

Serial No.	Division	Carp Hatchery: C1	Galda/Bagda Hatchery: C2	Others Native Fish Hatchery :C3	Monosex Tilapia Hatchery:C4	Ornamental Fish Hatchery:C5	Hatchery Otherthan Fish (Crabs/Turtoise):C6	No. of Total Private Hatchery	Total revenue earned (lac Tk)
1	2	3	4	5	6	7	8	9	10
2	Dhaka	31	0	10	6	0	0	47	0.53
3	Chattogram	93	50	3	53	2	0	201	2.10
4	Rajshahi	162	1	23	9	1	0	196	1.80
5	Khulna	57	24	4	34	4	1	124	2.07
6	Barishal	24	5	2	8	0	0	39	0.23
7	Sylhet	20	০	2	8	0	0	30	0.22
8	Rangpur	85	০	11	5	0	0	101	1.15
9	Mymensingh	79	০	263	56	0	0	398	3.20
Total		551	80	318	179	7	1	1136	11.32

3.3 Protection and Conservation of Fish Act 1950 and Rules 1985

The provisions of Fish Act-1950 is the safeguard for breeding and growth of carp and other important fishes contributing to increase fish production in the country. Public awareness program were chalked out and implemented by the Upazila Fisheries Officers through meetings, general campaigns round the year and during observance of National Fish Week to create mass awareness about Fish Acts. Different awareness materials like posters, leaflets, booklets etc. were printed and distributed. In addition, TV spot prepared and broadcasted, street drama staged, workshops/seminars organized to create mass awareness. Appropriate measures were also taken to implement the Fish Act-1950 with assistance from local administration and law and enforcement agencies like Police, RAB, Coast guard, BGB, Navy etc. Mobile courts were conducted throughout the country.

Table 3.3. Enforcement of Fish Acts and Rules during 2020-2021

Division	No. of Raid in the last year	No. of Mobile Court	Amount of Fish Seized (MT)	Amount of Current Jal (Net) seized (Lakh Meter)	Case Filed	Jail	Penalty (Lac Tk)
1	2	3	4	5	6	7	8
Dhaka	1126	252	2.09	3980.4	127	2	8.66
Chattogram	747	128	32.880	141.67	3	0	3.390
Rajshahi	757	205	1.488	19.685	25	2	2.58
Khulna	590	134	0.0125	7.256	6	0	1.084
Barishal	498	131	0.2170	51.749	15	8	1.2050
Sylhet	362	187	0.042	53.398	11	5	2.077
Rangpur	498	140	2.658	9.2173	2	0	2.651
Mymensingh	203	54	0.027	4.8965	০	০	1.172
Total	4778	1231	39	4268	189	17	23

Considering the livelihoods of the fishers in the off-seasons and during implementation of fish acts, different income generating activities (IGA) program have been under taken for the affected fishers.

Chapter 4

Fisheries Inspection and Quality Control (FIQC)

Fish and fishery products have been exported since the independence of the country. At present, these products are one of the major export commodities of Bangladesh. One of the other important agenda for the department is to facilitate and maintain fish and fishery products' quality and safety to enhance export and Fish Inspection and Quality Control (FIQC) deals with this job. Envisaging this context, Government implemented the National Fish Inspection and Quality Control Project in 1976 establishing two regional offices located at Chattogram and Khulna. The office of Dhaka zone was established in 1980 under 'Establishment of National Fish Inspection and Quality Control Service' project at Matsya Bhaban.

Besides inspection and certification of exported fish and fish products throughout the year, renewal of licenses is carried out by each FIQC offices covering the establishments under jurisdiction, like fish processing plants, depots/arots, ice factories, landing centers, packing centers, non-packer exporters etc. each year. Requests for enlistment of the names of fish processing establishments and exporters intended to export to EU countries, China and Russia are sent case to case basis. Competent authorities of other countries are communicated and their requirements are met to continue and enhance export of fish and fish products. In this relation, Bangladesh has updated health certificate for exporting shrimp to Australia and fish and fishery products to the Republic of Korea. Residue monitoring of fish and fish products as well as fish feed is monitored throughout the year for ensuring safe and quality fish and fish products for consumers. Routine inspection of fish processing establishments and ice plants etc. and testing of swab, ice, water etc. are also carried out round the year for ensuring food safety.

In 2021, signatures of authorized officers of each FIQC offices involved with certification of fish and fish products has been sent to China for updating into the website of AQSIQ (Certification and Accreditation Administration of the People's Republic of China). This year two Crab processing plants (Japan Fast Trade Ltd; SAT-134 and Farid Nine Stars Agro Foods (BD) Ltd. ;SAT-141) have been enlisted by Directorate General of Health and Food Safety DG(SANTE)) of EU for exporting fish and fish products to EU countries. With these two, total number of Bangladeshi fish processing plants eligible for export to EU countries is 77. New format of EU Health Certificate has been introduced to facilitate exporting Edible Aquatic Animal Products to China.

The new Fish and Fisheries Products (Inspection and Quality Control), Act 2020 is approved by the national parliament and the formulation of rules is under process.

4.1 Quality Control Laboratories

Fig.4.1: Quality control laboratory at Savar

Department of Fisheries (DoF) has ISO 17025 accredited three Quality Control (QC) laboratories (previously known as Fish Inspection and Quality Control (FIQC) laboratories) at Dhaka, Chattogram and Khulna for testing fish and fish products, ice, swabs, fish feed and feed ingredients. QC laboratory (formerly known as FIQC laboratory), Dhaka by reshaping construction design, on the 11th floor of Matsya Bhaban building in 1994 which has been shifted at new premises at Savar, Dhaka in 2014. Two more modern laboratories have been established at Chattogram and Khulna under DoF by the financial assistance of UNIDO-SFIQC project during 2008-09. Since the creation of lab facilities, testing of microbial quality of exportable fish and fishery products has routinely been performed by the officials of three FIQC laboratories (presently Quality Control Laboratories). Moreover these laboratories started testing residues of harmful chemical residue analysis of fish and fishery products since 2007. From August, 2015, laboratory services were separated from Fish Inspection & Quality Control Services and since then `Fish Inspection & Quality Control Laboratory` have been designated as 'Quality Control (QC) Laboratory'.

To address requirements of EU and other importing countries, DoF has installed six LC-MS-MS machines at QC laboratory, Dhaka, Chattogram and Khulna for testing the contaminants and residues of prohibited antibiotics, dyes and anthelmintics in fishery product. Confirmatory test of the residues of chloramphenicol, nitrofuran metabolites (AMOZ, AOZ, AHD & SEM), metronidazole, malachite green, leuco-malachite green, crystal violet, leuco-crystal violet, anthelmintics (flubendazole, fenbendazole & mebendazole), Aflatoxin (B1, B2, G1 and G2) etc. in fishery product are being tested through LC-MS-MS machines at QC laboratory, Dhaka. Moreover, activities related to method validation of Amoxicillin and Tylosin is going on. Fish and fish products are tested for heavy metals by ICP-MS at the laboratory of Dhaka and Chattogram. Method development of testing different chemical residues through one LC-MS-MS machine at QC laboratory, Chattogram is under way. Furthermore, two ELISA systems have been added to each of QC laboratory, Chattogram and Khulna for screening tests of the residues of chloramphenicol, nitrofuran metabolites, oxy-tetracycline, tetracycline, chlor-tetracycline, metronidazole, malachite green, leuco-malachite green, crystal violet, leuco-crystal violet, histamine, methyl testosterone, diethyl stilbesterol etc. of fishery products. Method of testing of chloramphenicol, malachite green, leuco-malachite green, crystal violet and leuco-crystal violet has already been developed and validated through LC-MS-MS machine at QC laboratory, Khulna. Method validation of testing nitrofuran metabolites through LC-MS-MS machines is underway at this laboratory. Testing method of pesticide residues like DDT, Aldrin, Heptachlor, Endrin and Dieldrin by GC-MS (TOF) machine has been

developed at QC Laboratory, Dhaka in 2017. Method has been developed and validated for confirmatory test of tetracylines in shrimp matrix through UPLC at QC lab, Chattogram in 2018 and development and validation of same test in fish matrix has been completed in 2019 at the same laboratory.

Method has been developed and validated for screening test of Amoxicillin, Gentamycin, Sulfonamides and Tylosin through ELISA at QC lab, Chattogram and Khulna in 2018. Now, method has been developed and validated for screening test of Gentamycin, Sulfonamides and Estradiol hormone through ELISA at QC lab, Dhaka in 2020.

Most of the test scopes of three QC laboratories are accredited according to ISO 17025: 2017 by Bangladesh Accreditation Board (BAB) except those very recently developed and validated. In 2018, BAB has carried out audit to the QC laboratories and accreditation of these three laboratories has been renewed upto 2021. Method of testing shrimp diseases specially those concerned with SPF shrimp has been developed and validated at QC lab at Chattogram and Khulna. These labs are already capable of detecting White Spot Syndrome Virus (WSSV), Yellow Head Virus (YHV), Acute Hepatopancreatic Necrosis Disease (AHPND), Infectious Hypodermal and Hematopoetic Necrosis Virus (IHHNV), Taura Syndrome Virus (TSV), Infectious Myonecrosis Virus (IMNV), Macrobrachuium rosenbergii Nodavirus (MrNV) by using PCR technique. Furhtermore, testing protocol for porcine and bovine test through PCR machine has been validated at the Quality Control laboratory of Chattogram.

Following parameters are tested by the QC laboratories-

Name of Lab	**Test parameters**	
Quality Control Laboratory, Savar, Dhaka	**Fish & Fish Products**	**Fish Feed & Feed Ingredients**
	Microbiological Parameters: Aerobic Plate Count, Total *Coliforms*, Presumptive *E.coli*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Salmonella* spp. **Chemical Parameters:** Antibiotics-Nitrofuran metabolites (AMOZ, AOZ, AHD & SEM), Chloramphenicol, Metronidazole; Dyes (Crystal violet, Leucocrystal violet, Malachite green, Leucomalachite green); Anthalmintics (Flubendazole, Febendazole, Mebendazole); Aflatoxin (B1, B2, G1 & G2), Pesticides (DDT, Aldrin, Heptachlor, Endrin, Dieldrin); Formalin; Moisture; pH; Gentamycin, Sulfonamides; Estradiol hormone;Oxalinic Acid	Antibiotics (Chloramphenicol); Proximate test of fish feed and feed ingredients (Crude Protein, Non-protein nitrogen, Fat, Fibre, Ash, Moisture); NIR Screening of fish feed

Name of Lab	Test parameters	
Quality Control Laboratory, 209 NM Khan Hill Road, Muradpur, Chattogram	**Microbiological Parameters:** Aerobic Plate Count, Total *Coliforms*,*E.coli*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Salmonella* spp., *Staphylococcus aureus*, *Listeria monocytogenes*, *Shigella* spp., WSSV, YHV, AHPND, IHHNV, TSV, IMNV, MrNV **Chemical Parameters:** Antibiotics-Nitrofuran metabolites (AMOZ, AOZ, AHD & SEM), Chloramphenicol, Tetracycline, Oxy-tetracycline, Chlortetracycline, Metronidazole, Gentamycin, Tylosin, Sulfonamides, Amoxicillin; Dyes (Crystal violet, Leucocrystal violet, Malachite green, Leucomalachite green); Heavy metals (As, Hg, Pb, Cd, Cr); Methyltestosterone (MTS); Di-ethyl stilbesterol (DES); Histamine; Total Volatile Basic Nitrogen (TVBN)/Tri-methyl	Antibiotics-Nitrofuran metabolities (AMOZ, AOZ, AHD & SEM), Chloramphenicol, Tetracycline, Oxy-tetracycline, Chlortetracycline; Heavy Metals (Cr, Cd & Pb)
	Amine (TMA); Di-sodium di-phosphate/Total Phosphate; Filth;Formalin; Moisture; pH	
Quality Control Laboratory, Boyra, Khulna	**Microbiological Parameters:** Aerobic Plate Count, Total *Coliforms*,Presumptive *E.coli*, *Vibrio cholerae*, *Vibrio parahaemolyticus*, *Salmonella* spp., *Staphylococcus aureus*, *Listeria monocytogenes*, *Shigella* spp., WSSV, YHV, TSV, IMNV, MrNV, AHPND, IHHNV, NHP-B **Chemical Parameters:** Antibiotics-Nitrofuran metabolites (AMOZ, AOZ, AHD & SEM), Chloramphenicol, Tetracyclines, Oxy-tetracycline, Chlortetracycline, Metronidazole, Tylosin, Gentamycin, Sulfonamides, Amoxilin; Dyes (Crystal violet, Leucocrystal violet, Malachite green, Leucomalachite green); Heavy metals (As, Hg, Pb, Cd, Cr); Histamine ; Total Volatile Basic Nitrogen (TVBN)/Tri-methyl Amine (TMA); Di-sodium di-phosphate/Total Phosphate; Filth; Formalin; Moisture; pH	Heavy Metals (Cd, Cr, Pb, Hg)

It is worthy to mention that testing method of Chloramphenical and Nitrofuran metabolites (AHD, AOZ, AMOZ and SEM) for poultry meat matrix has been validated at QC laboratory, Dhaka in 2017.With a view to ensure external quality control, each QC Laboratory participated in international proficiency tests (PT) offered by world renowned PT provider organization on regular basis.

Analytical capacity of three QC laboratories was recognized through the overall comments in EU-FVO Audit Report-2015- "Significant improvements have also been noted in the performance of the laboratory network, accreditation of laboratories and validation of analytical methods and the competent authority can in general, have confidence in the reliability of analytical results".

4.2 Fish Inspection & Quality Control Services:

Mandate of FIQC is to ensure quality and safe fish and fishery product to global consumers. In order to maintain safety and quality of fish and fish products, following activities are carried out by three Regional FIQC offices located in Dhaka, Chattogram & Khulna.

i. Issuance of Licenses of fish processing establishments;
ii. Annual evaluation of establishments (instrumental & operational conditions) and renew of licenses;
iii. Regular monitoring of establishments' activities regarding HACCP, EU, USDA, Australia, GCC regulations etc. as per Fish and Fish Products (Inspection & Quality Control) Rules, 1997 (amended in 2008, 2014 & 2017) and Official Control Protocol;
iv. Monitor water, ice and swab quality of processing establishments and ice factories;
v. Plan and implementation of NRCP (National Residue Control Plan), FRCP (Factory Residue Control Plan) & MMP (Microbiological Monitoring Plan);
vi. Product inspection and issuance of certificates for exportable fish and fish products;
vii. Surveillance and mobile court to ensure safety of fish and fish products;
viii. Implementation of activities under APA;
ix. Conduct awareness meeting;
x. Training of stakeholders;
xi. Inspect imported consignments of fish and fish products on request of Customs Department.

The summary activities conducted by three FIQC offices in 2020-2021 is given below at a glance-

No.	Title of activities conducted	Achievement
1	Fish Processing Establishments Inspection	
	(a) Number of declared consignments inspected	5076
	(b) Number of Fish Processing Establishments routinely inspected	221
	(c) Number of Fish Packing Centres routinely inspected	1626
2	Quality assurance of Depot/Arats and inspection of traceability documents	127
3	Inspection of Ice Factories	73
4	No. of NRCP (National Residue Control Plan) samples tested	1384
5	No. of NRCP non-compliance (Chemical)	0
6	No. of fish feed/feed ingredient tested	127
7	Mobile court/raid	
	(a) Number of Mobile court conducted	12
	(b) Number of raid/campaigns conducted	101
	(c) Amount of money fined (Tk.)	348500
	(d) Shrimp destroyed (kg)	2430
	(e) Fin fish destroyed (kg)	0
	(f) Number of persons sentenced to jail	4
	(g) Number of cases filed	4
10	Amount of money fined from the fish processing establishments	4,00,000

Number of different establishments involved in fish export value chain of fish

Sl.No.	Type of Establishment	Number	Remarks
1.	Fish/Shrimp Processing plants	107	(EU approved 77)
2.	Factory Trawlers	53	
3.	Fish Packing Centres	97	
4.	Non Packer	69	
5.	Suppliers	70	
6.	Fish drying yards	33	
7.	Depots	878	
8.	Service centre/Landing centres	41	

4.3 Export of Fish and Fish Products

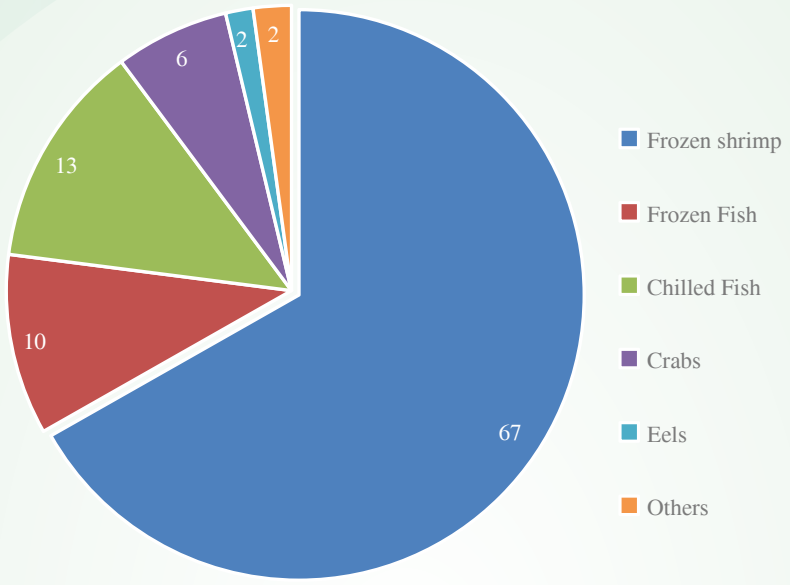
Nowadays, diversified fish and fishery products are produced and exported by Bangladesh to more than 50 countries of the world. However, major export destinations of Bangladeshi fish and fishery products remain the member countries of the European Union (EU). Among others, USA,UK, Russia, China, Japan, Canada, Australia, India, Saudi Arabia, Malaysia, Thailand, Vietnam, UAE, Hongkong, South Korea, Mayenmer, Kuait, Maldives, Oman, Singapur, Taiwan etc. are also major importing countries of Bangladeshi seafood. The success of export is achieved by ensuring quality shrimp by introducing Quality Assurance Program through 'Farm to Fork' approach along with implementation of GAP at farm level, HACCP in production and traceability throughout the value chain. Around 50-60% of total export is composed of shrimp contributing about 75-85% of total value indicates that shrimp is the major exporting seafood item of the country most of which are of aquaculture origin and organic that grows naturally with minimal or no inputs. The exported items are-

- Shrimp/Prawn (processed, frozen, ready to cook and ready to eat)
- Finfish (whole, dressed, degutted, fillets, chilled, frozen)
- Dried fish
- Dehydrated fish
- Eels (live and frozen)
- Crabs (live and frozen)
- Shark fins
- Scales of finfish
- Shell of shrimp/prawn

Table 4.1. Export statistics of Fish and Fishery Products of the last eight fiscal years are presented below-

SL. No.	Fiscal year	Quantity of Shrimp exported (MT)	Value of Shrimp exported (Million USD)	Total quantity of fish and fishery products exported (MT)	Total value of fish and fishery products exported (Million USD)
1	2013-14	47,635.41	530.57	77,328.86	630.29
2	2014-15	44,278.21	506.11	83,524.37	599.05
3	2015-16	40,726.14	459.01	75,337.93	546.28
4	2016-17	39,705.85	456.91	68,305.68	532.03
5	2017-18	36,167.77	421.39	68,935.45	514.93
6	2018-19	33,362.52	365.54	73,171.32	503.00
7	2019-20	30,036.18	347.55	70945.39	469.67
8	2020-21	30615.14	322.00	76591.69	482.19

Fig. 4.2: Product-wise Export by Value (M. USD) in 2020-21



4.4 Adoption Traceability

Traceability is the ability to track any food stuff through all stages of production, processing and distribution (including importation and at retail). When a potential food safety problem is identified, an effective traceability system can help isolate and prevent contaminated products from reaching consumers or recall if distributed into commerce and ensure corrective actions as well. Traceability should mean that movements can be traced one step backwards and one step forward at any point in the supply chain. To ensure traceability, about 207,000 shrimp and 9,651 fin fish farms of Bangladesh have been registered. Other establishments involved in supply chain of fish and fish products in the country are also registered or licensed to ensure traceability.

4.5 On-line Certification System, TRACES (Trade Control and Export System)

TRACES (Trade Control and Export System) is the European Commission's multi lingual online tool for certification on sanitary requirements for intra-EU trade and importation of animals, semen and embryo, food, feed and plants. The network not only promotes a better cooperation between the competent authorities but also between the traders themselves and their competent authorities. TRACES allows the quick detection of fake certificates and therefore contributes to the enhancement of trust vis-à-vis its partners. In 2017, Bangladesh has introduced online certification through TRACES for consignments of fish and fish products intended to export to the EU countries. On 14 December, 2019, DG-SANTE has introduced improvised format of TRACES which is called TRACES-NT, i.e., TRACES New Technology. Deputy Director of three FIQC offices have been already trained at Bangalore, India on TRACES-NT certification and Bangladesh has already started using TRACES-NT for ET certification in exporting fish and fish products to EU.

4.6 Aquaculture Residues monitoring through NRCP

Residue Monitoring Program of DoF enforced as National Residue Control Plan (NRCP), is a program to monitor status of residues and contaminant in farmed fish and shrimp to reveal the illegal use of banned or unauthorized substances as well as to determine the origin of residue contamination. For implementation of NRCP, 'NRCP Policy Guidelines 2011 (amended in 2012)' was formulated in line with the Fish and Fish Product (Inspection & Quality Control) Act-2020 and Fish and Fish Product (Inspection & Quality Control) Rules-1997 (amended in 2008, 2014 & 2017). The National Residue Control Plan is based on measures to monitor certain substances and residues thereof in live animals and animal products and fixing the levels and frequencies of sampling provided the control of certain substances and residues thereof in certain animal products.

4.6.1 NRCP: Test Parameters

4.6.1 NRCP: Test Parameters

Group name	Parameters tested
A1	Stilbenes (Diethylstilbestrol)
A3	Steroids (Methyl Testosterone)
A6	Banned Antibiotics: Chloramphenicol (CAP), Nitrofuran metabolites (AOZ, AMOZ, AHD, SEM), Metronizole (MNZ)
B1	Antibacterial substances: Tetracycline, Oxytetracycline & Chlortetracycline (TC, OTC, CTC); Amoxicillin; Gentamycin; Sulfonamides; Tylosin
B2(a)	Anthelmintics: Mebendazole, Fenbendazole
B3(a)	Organochloride pesticides (DDT, Heptachlor, Endrin, Aldrin, Di-eldrin)
B3(c)	Chemical elements (Lead, Mercury, Cadmium, Chromium, Arsenic)
B3(d)	Micotoxins (Aflatoxin B1, B2, G1, G2)
B3(e)	Dyes (Crystal Violet, Leuco Crystal Violet, Malachite Green, Leuco Malachite Green (CV, LCV, MG, LMG))

4.6.2 Planned NRCP-2021 for Shrimp and Finfish

Table 4.2. Summary of NRCP -2021 for Aquaculture Crustaceans (Shrimp & Prawn) and Finfish is as follows:

4.6.2 Planned NRCP-2021 for Shrimp and Finfish

Table 4.2. Summary of NRCP -2021 for Aquaculture Crustaceans (Shrimp & Prawn) and Finfish is as follows:

NRCP -2020 for Aquaculture Crustaceans (Shrimp & Prawn) and Finfish																	
	National Plan					Khulna Zone				Chattogram Zone					Dhaka Zone		
Test Parameter	M. rosenbergii	P. monodon	M. monocerros	Fin fish	Grand Total	M. rosenbergii	P. monodon	M. monoceros	Sub Total	M. rossenbergii	P. Monodon	M. monocerros	Fin fish	Sub Total	M. rosenbergii	Fin fish	Sub Total
	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan	Plan
A1	0	0	0	16	16	0	0	0	0	0	0	0	12	12	0	4	4
A3	0	0	0	16	16	0	0	0	0	0	0	0	12	12	0	4	4
A6 (CAP)	69	84	9	6	168	67	68	7	142	1	16	2	5	24	1	1	2
A6 (NF)	69	84	9	7	169	67	68	7	142	1	16	2	6	25	1	1	2
A6 (MNZ)	34	40	3	3	80	32	34	2	68	1	6	1	2	10	1	1	2
A6 (Sub-total)	172	208	21	16	417	166	170	16	352	3	38	5	13	59	3	3	6
B1 (Tetracyclines)	107	128	13	30	278	105	104	8	217	1	24	5	22	52	1	8	9
B1 (Amoxicillin)	17	21	2	5	45	15	17	1	33	1	4	1	4	10	1	1	2
B1 (Gentamycin)	17	21	2	5	45	15	17	1	33	1	4	1	4	10	1	1	2
B1 (Sulfonamides)	17	21	2	5	45	15	17	1	33	1	4	1	4	10	1	1	2
B1 (Tylosin)	17	21	2	5	45	15	17	1	33	1	4	1	4	10	1	1	2
B1 (Sub-total)	175	212	21	50	458	165	172	12	349	5	40	9	38	92	5	12	17
B2a	70	85	8	20	183	68	70	5	143	1	15	3	14	33	1	6	7
B3a	18	22	2	6	48	16	17	1	34	1	5	1	4	11	1	2	3
B3c	35	42	4	9	90	33	35	2	70	1	7	2	7	17	1	2	3
B3d	18	22	2	6	48	16	17	1	34	1	5	1	4	11	1	2	3
B3e	35	41	4	9	89	33	34	2	69	1	7	2	7	17	1	2	3
NC	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	523	632	62	148	1365	497	515	39	1051	13	117	23	111	264	13	37	50

Remarks: A1 : Dietylstilbestrol; A3:Methyl Testosteron; A6:CAP = Chloramphenicol, NF = Nitrofurans (AHD, AOZ, AMOZ, SEM), MNZ = Metronidazole; B1:Tetracycline, Oxytetracycline, Chlortetracycline, Amoxicillin, Gentamycin, Sulfonamides, Tylosin; B2a: Mebendazole, Fenbendazole; B3a: DDT, Aldrin, Heptachlor, Endrin, Dieldrin; B3c: Lead, Mercury, Cadmium, Chromium, Arsenic; B3d: Aflatoxin (B1, B2, G1, & G2); B3e: Malachite Green, Leucomelachite Green, Crystal Violet & Leucocrystal Violet

4.6.3 NRCP-2021 –Test details

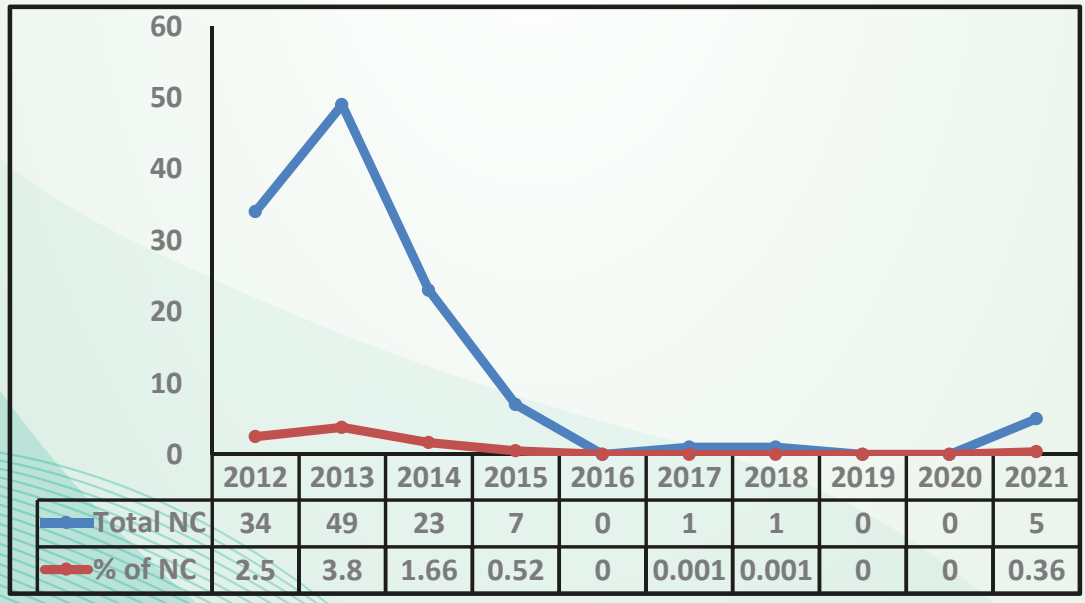
Table 4.3. Result of NRCP-2021 is as follows:

Substance category	Substance	Number of Sample Tested	Number of NC
A1	Diethylbestrol	**17**	**0**
A3	Methyl Testosterone	**17**	**0**
A6	CAP, AMOZ, AOZ, AHD, SEM	**707**	**1**
B1	TC, OTC & CTC, Amoxicillin, Gentamycin, Sulfonamaides, Tylosin	**180**	**0**
B2a	Mebendazole, Fenbendazole	**185**	**0**
B3a	Pesticides (DDT, Aldrin. Heptachlor, Endrin & Dieldrin)	**39**	**0**
B3c	Heavy metals (Pb, Cr, Cd, Hg & As)	**97**	**03**
B3d	Aflatoxin (B1, B2, G1, G2)	**46**	**0**
B3e	MG, LMG, CV & LCV	**96**	**01**
Total		**1384**	**05**

4.6.4 NRCP Findings in last ten years

The total number of NRCP samples and number of non-compliant samples in last seven years is presented in the following table. From the table, it is clear that, with the continuous effort and vigilance of the DoF, the number of non-compliant samples was reduced remarkably.

Sl No.	Year	Number of Sample Tested	Number of Non-compliance	Number of Non-compliance in substance
1.	2021	1384	05	AHD-01,Cr-01,MG-03
2.	2020	1365	0	NA
3.	2019	1340	0	NA
4.	2018	1376	1	Heavy metal (Pb)
5.	2017	1279	1	Dye (LCV)
6.	2016	1363	0	Not applicable
7.	2015	1355	7	SEM-06, CV-01
8.	2014	1388	23	CAP-02, SEM-19, AHD-01, As-01
9.	2013	1332	49	CAP-08, SEM-33, AHD-02, CV-01, Pb-04, AfI-01
10.	2012	1342	34	CAP-03, SEM-20, AHD-10, AOZ-1



	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Total NC	34	49	23	7	0	1	1	0	0	5
% of NC	2.5	3.8	1.66	0.52	0	0.001	0.001	0	0	0.36

Fig.4.3: NRCP Non-compliance

4.6.5 Feed residue testing

In addition, testing of different chemical residues of 300 samples of fish feed have been planned in 2021 for testing by three FIQC offices-

Testing Parameters	Number of Feed Samples			Total
	FIQC Office, Dhaka	FIQC Office, Chattogram	FIQC Office, Khulna	
A6 (CAP, AOZ, AMOZ, SEM & AHD)	12	22	26	60
B1 (TC, OTC & CTC)	10	22	28	60
B3c (As, Cd, Pb, Cr & Hg)	40	41	34	115
B3d (Aflatoxin B_1, B_2, G_1, G_2)	18	25	22	65
Total	80	110	110	300

4.7 Activities towards production of value added fish and fish products

The exporters are investigating more to produce value added products instead of traditional block products to meet the demands of the global market. Now a day, exporters are focusing more on production and export of value added products of shrimp and fish. As for example, in order to coup with the

Fig.4.4: Fish processing factory

requirements of competitive global seafood market two fin fish processing factories- Virgo Fish and Agro Process Ltd. and Seven Oceans Fish Processing Ltd., Trishal, Mymensingh have started production and export of fish fillet of pangas. Installation of the facilities for preparing fish ball, fish nugget etc. is underway at Seven Oceans Fish Processing Ltd.

Setting of facilities for extracting fish oil and preparation of fish meal at Virgo Fish and Agro Process Ltd. is underway. Construction of two other fin fish processing factory named Earth Agro Farms Ltd. at Gazipur and Globe Fisheries Ltd. at Noakhali are underway. A company named Bangladesh-American Agro-process Ltd. located at Cumilla has already started production of fish fillets from pangas and tilapia and other ready to cook value added products like fish finger, fish balls, fish nugget etc. of fish for local consumers. Construction of another fish processing plant named Alpha Accessories and Agro Export Ltd., Fakirhat, Bagerhat for production of 100% export oriented high value added products is underway.

Besides ensuring production, distribution and export of quality and safe fish and fish products, Department of Fisheries has organized hands on training on value added product development with fin fish specially tilapia and pangas and other seafood items at Virgo Fish & Agro Process Ltd., Trishal, Mymensingh with the support of intergovernmental organization, INFOFISH during 02-06 May, 2017. Participants from other fish industries like Seven Oceans Fish Processing Ltd. and Earth Agro Farms Ltd. also participated in the training. Initiatives have been taken to develop and commercial production of value added products like noodles, soup etc. of Hilsa with ECOFISH-BD Project support.

4.7.1 Laws, Policies and Documents

Fish and Fish Product (Inspection and Quality Control) Act, 2020 is approves by the National Parliament. Legal basis for production of safe Fish and Fish Product to ensure the safety and quality of exportable fish and fishery products from farm to fork are as follows-

Legal Framework

- The Fish and Fish Product (Inspection and Quality Control) Act,2020
- The Marine Fisheries Act, 2020
- The Marine Fisheries Rules, 1983
- The Fish and Fish Product (Inspection and quality control) Rules, 1997 (amended in 2008, 2014 & 2017)
- The Fish Hatchery Act, 2010
- The Fish Feed and Animal Feed Act, 2010
- The Fish Feed Rules, 2011
- The Fish Hatchery Rules, 2011
- The Fish Quarantine Act, 2018

In addition to the regulations, the following policies and guidelines are also in place for official control of fish products-

- National Fisheries Policy-1998
- National Residue Control Plan Policy Guidelines, 2011 (amended in 2012)
- National Shrimp Policy, 2014
- Fish and Fishery Products Official Control Protocol, 2015
- Guidelines for the Control of Aquaculture Medicinal Products-AMPs, 2015
- Manual on Good Aquaculture Practice- Trainer Manual

- Compliance Guidelines for Fish Feed Production, Import & Marketing
- Guidebook on Waste Management in Fish and Fishery Industries
- Good Aquaculture Practice – A Farmer's Guide
- Compliance Guidelines for Shrimp Hatchery
- ISO/IEC 17025:2017 General Requirements for Competence of testing Laboratories

4.8 Rapid Alert System for Food and Feed (RASFF):

Shrimp of aquaculture origin of Bangladesh being contaminated by the NF metabolite evolved through repeated Rapid Alert System for food in the year 2009. Meanwhile substantial actions/ programs have been implemented for the total development of infra-structure, management and documentation. Motivational programs and training has been undertaken to increase the awareness about product quality and safety and to comply with HACCP and international obligations. Beside this, traceability system in aquaculture and processed products are being implemented and taskforce activities related to develop HACCP system in every stage from hatchery to processing of shrimp are also implemented according to EU requirements. Due to the repeated Rapid Alert System for Food and Feed (RASFF) from EU, National Working Committee was formed and that committee is working to mitigate the problem. With the continuous effort and progress achieved in residue analysis, the number of rapid alert has been reduced to zero in 2013 from the highest number of 52 in the year 2009. In 2019, there were 4 RASSF notifications (one microbial and three chemical) for fish and fish products.

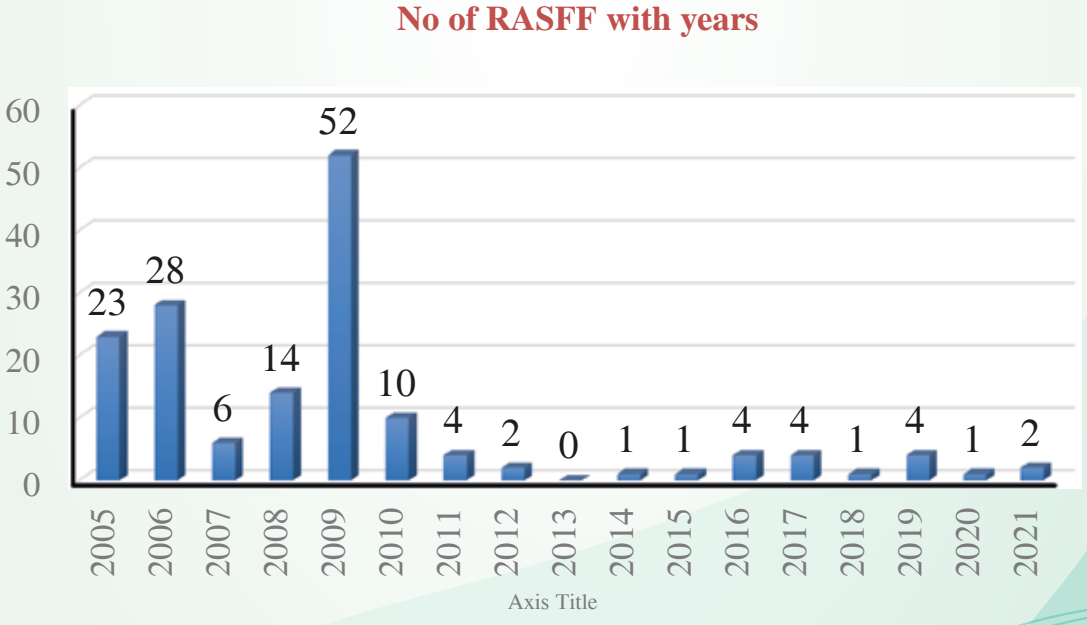


Fig.4.5: Number of rapid alerts concerning fish and fishery products exported to EU from 2005 to 2021.

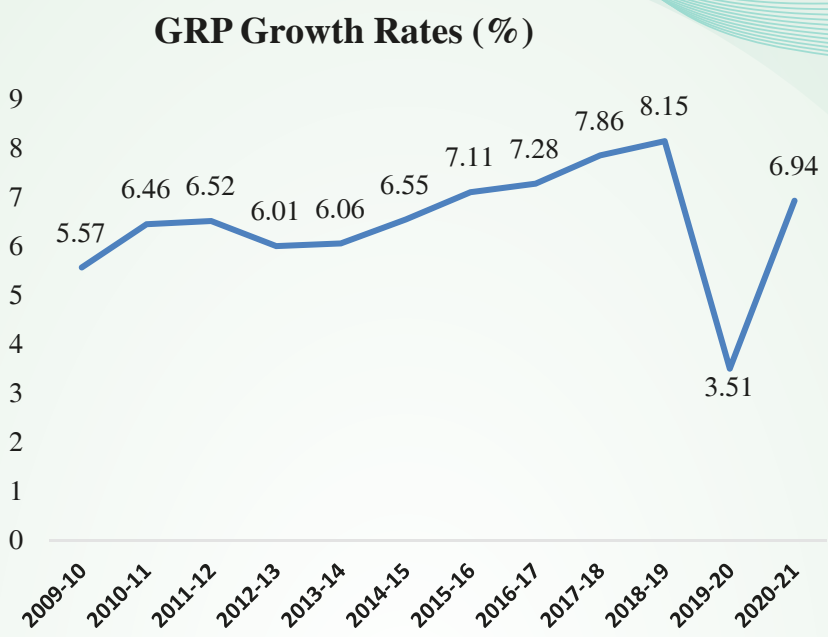


Fig.4.6: GRP Growth Rate

4.9 Audit/exposure visit by delegates of competent authorities of importing countries

4.9.1 Australian Team Visit

Two officials of the Department of Agriculture and Water Resources (DAWR) of Australian government visited Bangladesh during 12 to 18 May, 2018 in the name of 'Prawn Familiarization Visit'. Their mission was focused on prawn aquaculture, biosecurity at farm level and disease testing method in Quality labs of Bangladesh. The team visited a processing plant in Chattogram (BD Seafood Ltd.) which involved in exporting prawn products to Australia, a prawn (shrimp) farm namely Gazi Fish Culture Ltd. at Dacope, Khulna and FIQC offices in Chattogram. The team also had a meeting with DG, DoF and the Secretary, MoFL. The delegates expressed satisfaction regarding their visit.

4.9.2 EU-FVO Audit-2018

EU-FVO Audit team consisted of three members visited from 5 to 17 November 2018 to evaluate the control of residues and contaminants in live animals and animal products including controls on veterinary medical products. On 6th November 2018, they had briefing meeting with the Secretary, MoFL. On the same day they had opening meeting with CCA, and representatives of FIQC offices and testing laboratories. They visited shrimp farm at Bagerhat, and fin fish farm at Mymensingh, QC labs of Khulna, Dhaka and Chattogram,; RCA Offices in Khulna, AMP stores and EU approved Aquaculture processing establishments in Khulna and Chattogram and IFST lab of BCSIR.

4.9.3 Visit of Rosselkhoznadzor Auditors

The Federal Sanitary and Phytosanitary Surveillance of the Russian Federation (Rosselkhoznadzor) auditors will visit Bangladeshi Fish Processing Plants interested to export fish and fish products to the Russian Federation. In this relation, the response of DoF has been sent to the Russian Federation. DoF is awaiting to receive itinerary of the auditors. Meanwhile, PSO (FIQC) has visited the processing plants and instructed them for renovation in compliance with HACCP requirements and the regulations of the Russian Federation.

In the developed world, health consciousness is increasing day by day. So, currently safe food is the major issue in the developed countries. Significant efforts have been made for official control of fishery products & monitoring of residues in aquaculture towards ensuring export of fish and fishery products worldwide including EU countries, USA, Japan Russia etc. Official protocol has been formulated & enforced. Capacity has been improved along with ISO accreditation of the Lab. With all this developments, Bangladesh is now on the way to achieve better standards in food safety. The continuous progress and effort of Bangladesh for ensuring safe fish and fish products for export has been approved through the comments of EU-FVO Audit Report-2015. Regarding public health of food safety of fisheries sector, the comments was as-

- Improvements have been made since last audit and in principle, the current organization of the CA and its documented operational procedures provide for an acceptable official control system for Fishery products which is implemented in satisfactory way.
- The system in place for residues controls in aquaculture offers guarantees equivalent to EU requirements.
- The residue monitoring plan satisfies the minimum requirements laid down in EU legislation and both it and PET program are effectively implemented as evidenced by a significant decrease in the no. of N/C samples relative to previous years.

Considering the comments of EU-FVO Audit Report-2015 and on very low number of non-compliant consignments, the European Commission has repealed the EC's Decision No. EC/630/2008 and comments of EC regarding repeal of the decision was- "it appears unnecessary to require that consignments of the products imported into the Union from Bangladesh be accompanied by analytical tests" (Commission Decision no. 2015/2260).

Inspection & Quality Control Services and since then 'Fish Inspection & Quality Control Laboratory` have been designated as 'Quality Control (QC) Laboratory'.

To address requirements of EU and other importing countries, DoF has installed six LC-MS-MS machines at QC laboratory, Dhaka, Chattogram and Khulna for testing the contaminants and residues of prohibited antibiotics, dyes and anthelmintics in fishery product. Confirmatory test of the residues of chloramphenicol, nitrofuran metabolites

(AMOZ, AOZ, AHD & SEM), metronidazole, malachite green, leuco-malachite green, crystal violet, leuco-crystal violet, anthelmintics (flubendazole, fenbendazole & mebendazole), Aflatoxin (B1, B2, G1 and G2) etc. in fishery product are being tested through LC-MS-MS machines at QC laboratory, Dhaka. Moreover, activities related to method validation of Amoxicillin and Tylosin is going on. Fish and fish products are tested for heavy metals by ICP-MS at the laboratory of Dhaka and Chattogram. Method development of testing different chemical residues through one LC-MS-MS machine at QC laboratory, Chattogram is under way. Furthermore, two ELISA systems have been added to each of QC laboratory, Chattogram and Khulna for screening tests of the residues of chloramphenicol, nitrofuran metabolites, oxy-tetracycline, tetracycline, chlor-tetracycline, metronidazole, malachite green, leuco-malachite green, crystal violet, leuco-crystal violet, histamine, methyl testosterone, diethyl stilbesterol etc. of fishery products. Method of testing of chloramphenicol, malachite green, leuco-malachite green, crystal violet and leuco-crystal violet has already been developed and validated through LC-MS-MS machine at QC laboratory, Khulna. Method validation of testing nitrofuran metabolites through LC-MS-MS machines is underway at this laboratory. Testing method of pesticide residues like DDT, Aldrin, Heptachlor, Endrin and Dieldrin by GC-MS (TOF) machine has been developed at QC Laboratory, Dhaka in 2017. Method has been developed and validated for confirmatory test of tetracylines in shrimp matrix through UPLC at QC lab, Chattogram in 2018 and development and validation of same test in fish matrix has been completed in 2019 at the same laboratory.

Method has been developed and validated for screening test of Amoxicillin, Gentamycin, Sulfonamides and Tylosin through ELISA at QC lab, Chattogram and Khulna in 2018. Now, Method has been developed and validated for screening test of Gentamycin, Sulfonamides and Estradiol hormone through ELSA at QC lab, Dhaka in 2020.

Most of the test scopes of three QC laboratories are accredited according to ISO 17025: 2017 by Bangladesh Accreditation Board (BAB) except those very recently developed and validated. In 2018, BAB has carried out audit to the QC laboratories and accreditation of these three laboratories has been renewed upto 2021. Method of testing shrimp diseases specially those concerned with SPF shrimp has been developed and validated at QC lab at Chattogram and Khulna. These labs are already capable of detecting White Spot Syndrome Virus (WSSV), Yellow Head Virus (YHV), Acute Hepatopancreatic Necrosis Disease (AHPND), Infectious Hypodermal and Hematopoetic Necrosis Virus (IHHNV), Taura Syndrome Virus (TSV), Infectious Myonecrosis Virus (IMNV), Macrobrachuium rosenbergii Nodavirus (MrNV) by using PCR technique. Furhtermore, testing protocol for porcine and bovine test through PCR machine has been validated at the Quality Control laboratory of Chattogram.

Chapter 5

Human Resource Development

5.1 Training

Human Resource Development (HRD) is mandatory for DoF to enhance administrative, management and technological capacity in fisheries sector. The HRD activities meant to enhance capacity in the area of administrative, management, technological aspects and relevant cross cutting issues for conserving and managing the fisheries resources in sustainable manner. The ultimate objective is to augment productivity in fisheries sector, alleviate poverty, address gender issues, reduce unemployment and contribute balanced development having regard to goals and objectives of the national development plans. As a part of National Fisheries Policy implementation. DoF has developed a Human Resource Development Sub-strategy. DoF has organized both in-country and overseas training as major tool for technology transfer and extension activities in order to disseminate new technologies at field level. For this purpose regular training programs are being conducted from both revenue and development budget of DoF for the skill development of concerned personnel including DoF officials, fishers, fish farmers, unemployed youths, women, landless and marginal farmers etc. For the continuation of fisheries training, Governmental ready created a new sub-head named "training" in the revenue budget. The progress of training activities at a glance is shown below-

Table 5.1. Training activities in last 10 (ten) years

Financial Year	In Country Training		ForeignTraining	
	Government personnel	Fish Farmers/ Fishers/NGO personnel	Government personnel	Fish Farmers/ Fishers/ NGO personnel
2011-2012	3750	65873	166	03
2012-2013	3995	275437	103	00
2013-2014	3154	298783	76	00
2014-2015	3143	76369	130	00
2015-2016	4379	185991	85	00
2016-2017	4379	185991	124	00
2017-2018	4522	200472	74	00
2018-2019	2521	36865	201	01
2019-2020	2702	35011	64	00
2020-2021	3593	38000	00	00

Table 5.2. Training activities with workshops, seminars of development projects (2020-21)

Sl no	Fish farmer/Fishers/NGOs workers(person)	Government personnel	No of participants		Allocated money (lakh taka)	Total expenditure (lakh taka)
1	91531	1129	75903 (male)	16757 (female)	1652.06	1649.96

5.2 Development of mid level skilled manpower

The vision 2021 of the government has targeted to achieve self-sufficiency in food and increased food security. This requires achieving a dual objective of enhancing production and productivity, livelihoods security and equitable distribution of benefits side by side with the conservation of fisheries resources. Aquaculture and fisheries management in the suitable water bodies is now becomes very popular job in rural areas. Moreover day-by-day fisheries entrepreneurship is increasing tremendously to meet-up the domestic as well as global demands. However, manpower involved in such fast-growing industry is almost non-professional, without having any fundamental technical know-how. Presently they are serving only on the basis of their working experiences and very little informal trainings. To ensure the sustainable aquaculture production and environmental friendly management of the water-bodies to achieve the Eighth Five Year Plan/Vision 2041 goals, it is essential to provide grassroots level skilled technical manpower for the sector.

Fig. 5.1: Diploma Institute at Kishoreganj

As per desires of the Honorable Prime-minister, Government of the People's Republic of Bangladesh, the Department established one Fisheries Diploma Institute at Chandpur by the Fisheries Diploma Course Implementation project to build mid level technically skilled manpower. In this Institute academic activities have been started from 2009-2010 academic years and admitted 25 students in first batch. The first batch student completed their Diploma in Fisheries course in the year 2013. Diploma in Fisheries course consists of eight semesters, duration of each semester is six months. The total duration of the Fisheries Diploma Course is four years.

Considering the necessity of more skilled manpower at grassroots level, the government of Bangladesh has taken another pragmatic project named Establishment of Fisheries Diploma Institute at Gopalganj, Kishoreganj and Sirajganj districts to establish additional three new Fisheries Diploma Institutes at Gopalganj Sadar, Kishorganj Sadar and Belkuchi, Sirajganj. The academic activities of these diploma institute has been started from 2018-2019 academic calendar year and already four batches students are studying in each institutions.

Organizations like Department of Fisheries, Bangladesh Fisheries Research Institute, Bangladesh Fisheries Development Corporation, nationalized banks etc. will have the opportunity to utilize and appoint this sort of skilled manpower to progress the entire fisheries sector. Private sectors like fish processing plants, feed mills etc. and NGOs involving with this sector will also have the same opportunity. There also have some scope to utilize this sort of skilled manpower in the international labour market. So it will be easily possible to increase the total production of the sector, both qualitatively and quantitatively, by the efficient utilization of skilled manpower.

Finally, it is expected that the establishment of Fisheries Diploma Institutes will create skilled manpower at grassroots level that will help to increase fish production in the country.

5.3 Gender perspectives

The development of a country depends on men and women's participation in all sectors. The constitution of Bangladesh states that women have equal footing within all spheres of public life. It is said, recently women empowerment status has been changed and meaningful improvement

Fig.5.2: Women engagement in fish culture

has occurred in Bangladesh through their economic, social and political dimensions. But still now, due to various reasons, rural women are lagging behind than the urban women. The economic and social status of rural women remains extremely low due to economic and gender inequality. In this context, women education and employment, women's participation in income generating activities may change our socio-economic status of Bangladesh. Women's participation in aquaculture and fisheries activities is vital for the socio-economic development of Bangladesh. Considering all, ministry of fisheries and livestock, through the Department of Fisheries (DoF) has been working to create employment opportunity for women.

5.3.1 Employment and status of women in fisheries sector

In 2020-21female officers and staffs provide services in different layers of the Department of Fisheries are 19.01% and 12.90% and out of the total population employed in the fisheries sector, about 14 lac women are involved in fisheries sector. From fish processing plants to casual work women are working in different ways. The wage range of women varies from BDT 5,000-15,000/month for permanent workers and BDT 4,500-13,000/month for casual workers. Apart from this,

Fig.5.3: Women involvement in IGA

DoF creates scopes for income generation of rural women through nominating them as LEAF (Local Extension A IGA

gent for Fisheries). They are provided with BDT 2,000/month. There are 556 women out of 6663 LEAF in two development project . In 2020-21, at various development project of DoF, women participation 25.78%.

To ensure active participation of women in fish culture and management, DoF adopted various strategies:

- All development projects have taken priority based beneficiary selection specially for women, its target 25-30 percent. In 2020-21 fiscal year, women participation in development project 25.78%.
- Selected CIG women are almost 36%. Women are working 21% in training, fingerling releasing in open water, establishment of beel nursery, sanctuary establishment. etc.
- At present 80% women labourer are working in fish processing factory.
- In 2020-21, among 81015 beneficiaries, 5083 women beneficiaries got material assistance for fish culture.10932 women got training on fish culture and78 on alternative employment opportunity
- 43% women received micro credit assistance support from DoF. Using this credit today they are capable and successful fish farmers. Now they can meet up their protein demand and play important role in financially.
- Among CIG members 161 are being elected as a member of union parisad, so they can participate in development activities for the nation.

Women constitute half of the total population in our country. The economic and social status of rural women remains extremely low due to economic and gender inequality. They are also suffering from malnutrition. Women's employment can play a significant role in the socio-economic development and gender equality. To attain sustainable development, women's active participation in income generating activities is urgently needed. Women's

participation in aquaculture and fisheries activities is very crucial for the socio-economic development of Bangladesh. Considering these scenarios, the Department of Fisheries (DoF) has been working to create employment opportunity for women. In this regard the rural women have also been provided with various supports through different development projects of DoF.

5.3.2 Agenda for sustainable development

The on-going and proposed activities of DoF are aligned with the government development plan and SDG (Sustainable Development Goal) focusing gender issues in the following ways:

- Encouraging women participation through promoting small scale aqua-farming
- Scale-up of integrated homestead aqua-farming for ensuring nutrition security at household level

Development projects and programs are being implemented through DoF ensuring at least 25-30% women participation as project beneficiaries.

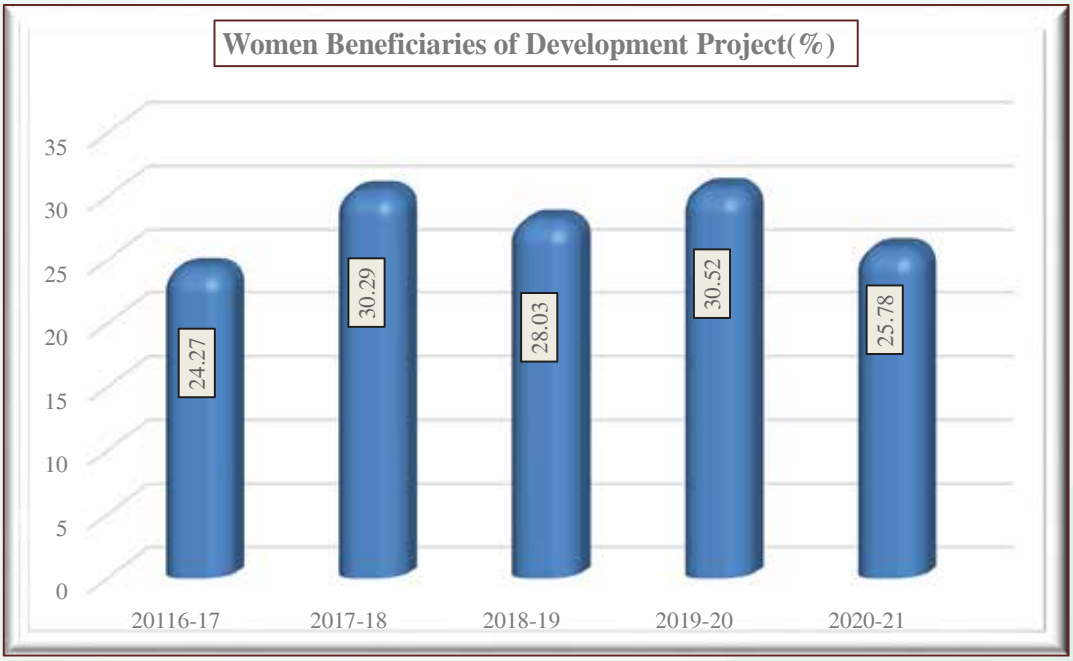


Fig. 5.4: Women Beneficiaries of Development Project in 2016-21

Chapter 6
Implementation of Development Plans and policies

6.1 Annual Performance Agreement (APA)

With a view to ensuring institutional transparency, accountability, proper utilization of resources and above all enhancing institutional efficiency the Government has taken an initiative to introduce a Performance Management System (PMS) in public sector organizations. The Prime Ministers Office (PMO) has pioneered this process by signing Performance Contracts. In that connection, Annual Performance Agreement (APA) has been introduced under the government performance management system to increase transparency and accountability in government activities, ensure proper use of resources and improve institutional capacity. This agreement sets out the Strategic Objectives of the concerned ministry/department, the activities undertaken to achieve these Strategic Objectives and the performance indicators and targets for measuring the results of these activities. At the end of financial year, the actual achievement of the concerned ministry/department will be evaluated against the targets set in the agreement. This document contains not only the agreed objectives, but also performance indicators and targets to measure progress in implementing them.

APA between the Director General (DG) of DoF and the Secretary of the Ministry of Fisheries and Livestock (MoFL) has been duly signed since from FY 2014-2015 to 2020-21to achieve the vision, mission and strategic objectives of DoF. For implementation of APA activities,DoF has takendifferent kinds of actions like APA team formation, monitoring team formation, nomination of APA focal point etc under the direction of APA guildeline.

DoF stood prestigious position to achieving APA targets according to DoF final evaluation report and the MoFL Budget Management Committee (BMC) meeting Minutes. Credible Performance of DoF highly appreciated from all relevant corners including Cabinet Division. DoF scored the 1st position in the implementation of APA in 2020-21 among the eight departments under the Ministry of Fisheries and Livestock. To that continuation, APA for the financial year 2021-22 signed in July 2021 between the Director General (DG) of DoF and the Secretary of the Ministry of Fisheries and Livestock (MoFL).

6.2 Sustainable Development Goals (SDGs)

The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity. DoF as the extension department under the Ministry of Fisheries and Livestock (MoFL) is being implementing SDG aligning with its mandate. MoFL in consultation with relevant stakeholders has already developed SDG Action Plan and Monitoring Frame work through National Mid-Term and Long-Term Development Plans. MoFL has taken necessary initiatives to review the progress

of the planned interventions, which eventually contributes to achieve the specific SDG targets. As per GED Handbook on Mapping of Ministries by Targets in the Implementation SDGs aligned with 8FYP (2021-2025),MoFL has identified as Lead ministry for the SDG Targets- 14.2, 14.4, 14.5, 14.6, 14.7 and 14.b under the Goal 14.Conserve and sustainably use the oceans, seas and marine resources for sustainable development and co-lead the SDG Targets-2.1, 2.3 and 2.5 under the Goal 2. End hunger, achieve food security and improved nutrition and promote sustainable agriculture. On the other hands, MoFL is associate ministry of SDG 29 indicators. Department of Fisheries (DoF) is the main stakeholder to achieve those targets of Goal 14. Total Marine Reserve area 5624sq. km that is 4.73% of total marine area which is the great achievement under goal 14.5. Under the supervision of MoFL, DoF is working to achieve the related goals and targets of the SDGs and 8th Five Year Plan.

A comprehensive action plan has been developed for the fisheries sector in line with the SDGs targets. DoF has taken different kinds of actions like as declaration and management of Marine Protected Area (MPA), Port State Measure Agreement (PSMA) signed with FAO, development of comprehensive sustainable coastal and marine fisheries management plan, National Plan of Action(NPOA), stock assessment for pelagic and demarsal fishes and also for shrimp, licensing of fishing trawlers and vessels, introduction of TED, real time VMS/AIS, alternate income generation for the marine fishers through livelihoods transformation, proper implementation of 65 days seasonal banned period in marine water and 22 days mother hilsa conservation, expansion of co-management program through CBFM.

Ongoing projects has been identified which are relevant and will contribute to achieve the 8th FYP and SDGs targets. Moreover projects intervention has been identified for 2021-2030 following the GED guideline. For the implementation monitoring of SDGs related activities data gap analysis is ongoing. Data provider identification will be finalized through this process. DoF needs strong collaboration with Mercantile Marine Department (MMD), Bangladesh Police, Bangladesh NAVY, Bangladesh Coast Guard, River Police, Department of Environment, Bangladesh Forest Department and Water Development Board etc.

6.3 Bangladesh Delta plan

The Bangladesh Delta plan (BDP) 2100 is a water centric comprehensive, integrated, long-term and holistic plan for achieving' safe, climate resilient and prosperous Delta' by 2100. In other words, 'BDP 2100 is the plan for moving Bangladesh forward towards the end of 21st Century. Bangladesh is delta and considered to be the largest in the world. Deltas are geo-morphological dynamic landforms at the boundary of land and sea, involving intricate mazes of rivers and small waterways, wetlands, estuaries and coastal barrier islands. Deltas are also home to rich ecosystems, such as mangroves and marshes. The plentiful of rivers , fresh wetlands, and lakes provide ample scope for fisheries resources. Its rivers and floodplain, which make up 80% of the country, support life, livelihoods and the

economy. The Delta six hotspots are (i) Hoar and Flash Flood Area, (ii) Coastal Zone, (iii) Chattogram Hill Tracts, (iv)Urban Areas, (v) Drought prone Areas, (vi) River Systems and Estuaries. For the first time in any development planning, BDP 2100 has taken the climate change issue as an exogenous variable in developing the macroeconomic framework of the plan. It is a techno-economic plan, which covers both technical and economic issues for the whole country. BDP 2100 is also an implementable plan having an investment program up to year 2030 linked with mobilization of financial resources. The Delta specific goals are in six of which all these goals are directly or indirectly related to the SDGs linking fully with SDG Goal 2,6,13 and 14 and partially with Goal 1,5,8,9,11 and 15. This linkage supported by appropriate interventions and policy will be continued with 8th Five Year Plan (FYP) a well as the 2nd perspective plan (2021-41) in achieving the Bangladesh's Vision for 2041. The Delta plan will create clear vision or grand design of the future in 2100. This comprehensive, techno-economic mega plan stretching period to the end of the current century is the best gift to the future generation by the present generation.

Chapter 7

Information and Communication Technology (ICT) in Department of Fisheries

Department of Fisheries (DoF) is working relentlessly to provide public services to citizens for improving the socio-economic condition of the people by increasing fish production. DoF is trying to digitalize the services so that citizens could get service quickly.

Development sequence

Under the utmost supervision of Cabinet division, DOF has prepared Service Profile with 12 services with step identification for digitalization. ICT is incorporated to provide service more effectively. One can easily get various information from Fish advice system, mobile app, SMS service, website and web portal. From Department of Fisheries website, one can get leaflets of fish culture, publication, annual report and e-books without any cost. E-training and e-recruitment systems have introduced already and running smoothly. Fish feed licensing is about to replicate and hatchery licensing activities ongoing. Some internal services like webmail, group mail, and PDS introduced for better communication. PDS is playing a significant role to know the update information of officers which typically used for transfer and other purposes. To send different types of reports and information to the head office, the system has digitalized. Various types of reports are digitalized. Besides these, e-gp, e-nothi, digital attendance, CCTV introduced. Webmail is running by e-mail policy, 2018 . To provide digital service 11 services selected for e-service under Digital Service Design Lab (DSDL).

Figure 7.1: Server System of Department of Fisheries

Key Developments within 2020 :

- ❖ Establishment of a call Centre to provide advisory services with a hotline number 16126.
- ❖ Development of four mobile apps and two web-based application for providing services;
- ❖ Development of Online fish feed licensing system;
- ❖ Development of Online e-Training system;
- ❖ For Internal services, development of service process simplification in ICT section and report automation system.

Fig.7.2: Call Centre established in DoF for providing advisory services.

Future Planning:

To Provide ICT related activities, there is no alternative of high-speed internet and networking systems for digital Bangladesh. A robust infrastructure developed and all office s equipped with computers and other accessories. DOF installed internet connection with 110 Mbps speed through the optical fiber. In Matshya Bhaban, secured and effective internet connectivity established in combination with the server, router, and manageable switches.

All employees of DOF has access to the internet for official work. Dot Bangla domain have been purchased to smoothen the whole service .All field offices connected with headquarter through social media and they are providing services by using social media.

Under the supervision of Cabinet division and a2i program, innovation activities are ongoing by the close supervision of innovation team. ICT section is supporting in ICT based innovations. DOF organized two innovation showcasing programs. Innovation corner is

introduced on the website with plenty of innovation information. DoF is encouraging the innovators by providing innovation fund.

Service Process Simplification (SPS) and Small Improvement Project (SIP) are a continuous process. One SPS idea and one SIP will be replicated in this fiscal year.

In future all the services will be in one umbrella by the implementation of software under e-service project of Ministry of Fisheries and Livestock.

DOF is working to reach the services to the doorsteps of people. We believe in giving better services that will reduce the time, cost and visit of the citizens. ICT section is trying to implement the mandate of DOF regarding information technology which will help to achieve the SDG targets and ultimately build Digital Bangladesh.

Chapter 8
Mujib Borsha and National Fish Week

8.1 Mujib Borsha

Mujib Borsha has been declared by the Government marking the 100 th anniversary of the birth of the Father of the nation, Bangabandhu Sheikh Mujibur Rahaman. The Mujib year is the period from 16 March, 2020 to March 17, 2021. Nextly, it is extended 16

Fig.8.1: Sewing machine distributed by Director General

December 2021.To celebrate the centenary, Prime Minister Sheikh Hasina inaugurated the year long program on March 17,2020. UNESCO also announced the celebration of Mujib year jointly with the Government of Bangladesh. The main purpose of celebration the Mujib year is to present the eventful life of this great leader and his ideals to the young generation of the country and the abroad. As part of celebration Government as well as all departments undertook various programs with fruitful/visionary slogan. Department of Fisheries also took programs with slogan 'Nirapod mache Bhorbo Desh, Mujib Borshe Bangladesh'. Celebrating this year, the Department of Fisheries declared two villages as Fish Village – south Bishiura graam of

Fig.8.2: Fish culture demonstration, at Fish Village

Netrokona district and Hailshar graam of

Naria Upazilla of Shariotpur distrct targeting the villages ideal and exemplary to others. It is aligned with the Government's special promise,' Aamar graam, aamar Shahor'. From revenue and development budget of DoF and with other departments, various programs are taken here:

- Package based fish culture demonstration;
- Establishment of sanctuary;
- Establishment of beel nursery;
- Fry release;
- Community based fisheries Management;
- Net supply;
- Restoration of water bodies;
- Establishment of sanitary latrine;

- Ensure child education;
- Environmental protection;
- Development of marketing system of various local product, etc

In fact, Mujib Borsha has brought many positive changes for Bangladesh. It will become a part of history for the freedom loving people of Bangladesh and the world.

8.2 Observation of National Fish Week 2020

Fig.8.3: Fingerlings Realizing at the Ganabhaban lake Naional Fish Week 2020

The Father of the Nation Bangabandhu Sheikh Mujibur Rahman inaugurated More Fish Culture Movement in 1973 by releasing 20,000 carp fingerlings at Gonobhabon Lake. Following that movement, National Fish Campaign is being observed throughout tthe country to create mass awareness to impart in the process for harnessing the potential from fisheries sector for economic growth of the country since1993. Honourable Prime Minister Sheikh Hasina inaugurated the national fish week 2020 releasing fingerlings at Gonobhaban Lake. National Fish Week 2020 has been observed nation wide from21-27July with due emphasis on fish culture and conservation. The monumental slogan for National Fish Week 2020 was Mach utpadan briddhi kori,Shukhi samriddhi desh gori. As per instruction of the Prime Minister, the Ministry of Fisheries and Livestock through the Department of Fisheries took up various programs to create mass awareness about producing more fish and conservation of fisheries resources. To motivate the fish farmers, DoF distributed fish culture helping materials (includes lime, fish feed, fingerlings etc), organized technology based improved fish culture training programs, tested various parameters of water quality, conducted mobile court/ovijan, exhibited documentary film (pramannya chitra)

Chapter 9

Covid -19 Pandemic and Fisheries sector

9.1 Impact of Pandemic Covid-19 on Aquaculture Sector and Steps Taken by Bangladesh Government

Corona virus was first detected in Bangladesh on 8 March 2020 and first casualty was reported on 18 March 2020 by IEDCR. On 22 March, Bangladesh declared a 10-day shutdown effective from 26 March to 4 April which was later extended up to 30 May 2020. On March 16, the country imposed a 14-day obligatory quarantine to all travelers entering the country. From the first week of March, Bangladesh started to postpone all types of mass gatherings as a preventive measure against the spread of Covid-19. Afterward, the Government banned all political, social, cultural, and religious rallies and gatherings in the country. Bangladesh deployed 3000 soldiers from Bangladesh Army and 400 from Bangladesh Navy on 24 March to enforce the start of a nationwide 10-day shutdown to slow the spread of the corona virus in the country along with local administration. From 25 March vehicle movement was restricted throughout the country with other precautions and guidance.

Restrictions on movement of people, vehicles etc. and panic among service providers cause low market price of fishes, difficulty in input collection, low consumer demand due to rumour of corona infection through fishes in some cases, high price of feed and other inputs, low price of hatchery produced spawn and fingerlings, delayed new stocking due to unsold mature fish, increased fish disease susceptibility, lack of capital and inability to pay workers by owners in private sector, labor shortage etc. were to paralyze the aquaculture industry more or less. At the appalling situation of Covid 19, people did not feel easy to go outside their home due to get infected by the pathogen. They stored some food items to live on instead of going to open market with public gathering. On the other hand, for the first time some people paid heed to rumor that fishes from market may cause to infect corona virus pathogen.

9.2 Steps taken by the Government

At this critical period, Department of Fisheries with the help of Ministry of Fisheries and Livestock took several interventions to normalize the situation and to run the wheel of aquaculture industry by retaining the marketing chain of fish and fish products along with its forward and backward linkages.

9.3 Control room:

Ministry of Fisheries and Livestock opened a control room to monitor all the activities related with fishery and livestock on 2 April 2020. Public officers carried out duties in the control room by turns and they made aware of the people so that they do not pay heed to rumor. If any hindrance in market chain of fishery and livestock is seen and got any complain, control room officers did instant action to solve the crisis by coordination with the

local administration. They would record all the complaints and solve the problems by consulting with senior officials of MoFL, DoF and DLS jointly.

9.4 Making growth centers or mobile market systems:

Department of Fisheries issued instructions to the Fisheries Officers at the field level to make a link of the small and marginal fishermen with market through making growth centers or mobile market systems. The local administration provided adequate assistance in this regard. As a result of taking this action, there was a huge response. Local officers from fisheries sector made a link of growth centers and mobile markets with the producers, harvesters and through this way up to 15 August 2020, a total of 703.14 crore worth 37099.35MT of fish were sold in 64 districts. Farmers got relaxation to market their fish and became able to stock fish fry again in their water bodies.

Fig.9.1: Mobile marketing at Vhairab, Kishoreganj 2. Dirai, Sunamganj 3. Dumuria Khulna

9.5 Online Fish Marketing:

The online fish marketing system played a more important role in solving the problem of fish marketing in cases of corona infection. Entrepreneurs would buy fish from fish farmers at a fair price and deliver it to the buyer's home on the basis of an online order for some profit. The Director General, Department of Fisheries, Bangladesh issued a letter regarding the adoption of online fish marketing system in all sub districts. About 30 districts and 40 sub-districts took measures for online fish marketing and up to 6 Aug 2020 total 78,486 KG fish with a value of BDT 1.74 crore i.e. 17.4 million BDT. It also helped a lot to solve the stagnant market system.

9.6 Delivery of fish with relief materials:

Fish marketing strategy with relief materials was another step forward in overcoming the fish marketing problem of fish farmers. Fish is the ideal source of safe animal nutrition with government relief. The Director General, Department of Fisheries, Bangladesh, issued an office order at the field level to provide fish while delivering relief to the poor and helpless people with the help of the local administration. The local administration and many wealthy people responded to this management. 22 Sub districts of 15 Districts across the country responded to this management system to cope up with the COVID-19 crisis regarding fish marketing.

9.7 Intensive to the farmers who become affected by Covid-19

DoF gave TK 100 crore i.e. 10 million BDT to 78074 affected fish farmers to minimize their loss. This money amounting TK 10000-18000 was provided directly to the farmers through nogod and Bkash. This incentive did a lot for the small-scale farmers to minimize their loss and get back in aquaculture.

Fig. 9.2: Ministry of Fisheries and Livestock gives incentives to the farmers

9.8 Low interest Credit to the affected farmers:

A 50 billion BDT Stimulus Package for Agriculture was announced by the honorable Prime Minister to address the impact of the Covid-19 pandemic (CIP2 monitoring report 2020). Loan at 4% rate of interest amounting TK 13.8 million BDT were disbursed to 5743 farmers engaged in fishery and livestock up to Dec 2020. On other hand, Govt. instructed all scheduled banks to disburse Agri-credit to the farmers affected by Covid 19.

9.9 Alternative income generation activities to the fishermen

Like every year, in 2020 alternative income generation activities to the fishermen was strengthened to reinstate them to earn their livelihood. Fishing net, sewing machine, cows or goats etc. were provided to the fishermen as alternative income generation items to make them economically sound and to repair their loss. On the other hand, Government from 26 March 2020 to 25 June 2020 allotted 9746.86 lakh BDT Tk for 53,593 stakeholders affected by Covid 19. It was in cash, kinds, AIG or other fisheries extension elements.

9.10 Fish production and resources conservation campaign

Campaign for boosting fish production and resource conservation national fish week was observed between 21-27 July 2020. To raise awareness of the people throughout the country for the conservation and management of fisheries resources, this program did a lot to regain

the vigor and work strength in the fisher-folk community.

9.11 Other activities:

The fish seed multiplication centers, hatcheries and nurseries took the responsibility to reach fish spawn/fingerling to the farmers/nursery owners' doorstep by their own vehicle. Maintaining social distance and complying health rules fish spawn/fingerling were sold to the farmers/nursery owners. Farmers, traders, hatchery owners would seek help from govt authority and control room extended its hands to help them and if any barrier occurs for transportation of aqua inputs i.e. fingerlings/spawn/fish feed/aqua medicine, control room members instantly dialed local administration to solve the problem. All the government officers would continue attending their offices and render advisory services to the farmers pond or water body. Government of Bangladesh took various program to raise awareness among the consumers that underwater aquatic organisms are not infected by coronavirus and it is not able to spread it through fishes. To increase demand, some TVC fillers were also made by DoF to understand the people that fish protein is very necessary to enhance resistance power from pathogens. All the farmers training was conducted near the water body by complying with health rules, maintain social distances and supplying sanitizers and mask freely to the farmers.

Chapter 10

Implementation of Development Projects

Present government is very much fisheries department friendly. Government has taken various initiatives from very beginning to increase investment for expected development of fisheries sector. An amount of taka 47603.00 lakh has been allocated for 13 development projects in the financial year 2020-2021 under the annual development program of DoF. The actual expenditure and achievements were 44858.45 lakh and 94.23 % respectively. The list with allocation and expenditure of DoF development projects and programs for vision 2021 are shown in Annexure 6.

Conclusion

Bangladesh has an impressive track record for growth and development in fisheries sector. Aquaculture has increasingly been playing a major role in total fish production of the country and presently more than half of the total production comes from aquaculture. If the available resources can manage more scientifically and mechanized way then the growth rate of fish production will create more employment opportunity, ensure food security that leads to the SDGs and vision 2041 respectively. In this way , the fisheries resource of Bangladesh has ample scope of development to strengthen the national economy. To realize the potentials we need integrated collaboration resource management for conservation of fisheries resources. Ministry of Fisheries and Livestock (MoFL) and the Department of Fisheries (DoF) are aligned to implement all possible interventions using the limited resources to uplift the socio-economic status of Bangladesh. Since, the sector has been flourishing and now been accelerated by Honourable Prime Minister Sheikh Hasina, through the implementation of the dream of Bangabandhu to make a self-sufficient sovereign `Sonar Bangal'.

Annexure

Annexure 1: Year-wise fish production in Bangladesh during last 10 years

[Unit:Metric Ton]

	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21
A.INLAND FISHERIES	**2683162**	**2821266**	**2952730**	**3085048**	**3251796**	**3496958**	**3621954**	**3724310**	**2583866**	**3939989**
(a)Inland Open water (Capture)	**957095**	**961458**	**995805**	**10,23991**	**1048242**	**1163606**	**1216539**	**1235709**	**1248401**	**1301244**
(1)River and Estuaries	145613	147264	167373	174878	178458	271639	320598	325478	331793	337051
(2)Sundarbans	21610	15945	18366	17580	16810	18086	18225	18282	21007	21544
(3)Beel (Depression)	85208	87902	88911	92678	95453	58117	99197	99890	103104	104871
(4)KaptaiLake	8537	9017	8179	8645	9589	9982	10152	10578	12696	12345
(5)Flood Plain	696127	701330	712976	730210	147872	765782	768367	781481	779801	825433
(b)Inland Closewater (Culture)	**1726067**	**1859808**	**1956925**	**2061057**	**2203554**	**2333352**	**2405415**	**2488601**	**2583866**	**2638745**
(1)Pond and Ditch	1392412	1446594	1526160	1610875	1719783	1833114	1900298	1974632	2046258	2090787
(2)Semi-Closed	132163	200833	193303	201280	207658	215547	216353	217340	225948	226608
(3)Baor (Ox-bowLake)	5186	6146	6514	7267	7729	8002	8072	10343	10969	11319
(4)Shrimp/Prawn Farm	196306	206235	216447	223582	235758	246406	254367	258039	270114	278417
(5) Crab's	-	-	-	-	-	140421	11787	12084	12562	12337
(5) Pen culture	-		13054	16084	13364	13368	11015	12361	13425	14282
(6) Cage culture	-		1447	1969	2062	2490	3523	3802	4590	4995
B.MARINE FISHERIES	**578620**	**588988**	**595385**	**599846**	**6265**	**637476**	**654687**	**659911**	**671104**	**681239**
(a)Industrial	73386	73030	76885	84846	105348	108479	120087	107236	115354	119121
(b)Artisanal	505234	515958	518500	515000	521180	528997	534600	552675	555750	562118
COUNTRY TOTAL(A+B)	**32,61,782**	**34,10,254**	**35,48,115**	**36,84,89**	**38,18,324**	**41,34,434**	**42,76,641**	**4384221**	**4503371**	**4621228**
ANNUALGROWTH RATE(%)	**6.54**	**4.55**	**4.04**	**3.85**	**5.27**	**6.60**	**3.44**	**2.52**	**2.72**	**2.62**

Annexure 2: Fish Production Trend (1983-84 to 2020-21)

Sector of Fisheries	Production(MT)										Growth Rate % (2020-21
	1983-84	1993-94	2003-04	2013-14	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	
A. Inland Fisheries											
1. River and Estuary	207766	143425	137337	167373	178458	271639	320598	325478	331793	337051	1.58
2. Sundarbans	7783	7127	15242	18366	16870	18086	18225	18282	21007	21544	2.56
3. Beel	51373	55592	74328	88911	95453	98117	99197	99890	103104	104871	1.71
4. Kaptai Lake	4057	6635	7238	8179	9589	9982	10152	10578	12696	12345	-2.76
5. Floodplain	200616	360597	497922	712976	747872	765782	768367	781481	779801	825433	5.85
Capture Total	**471595**	**573376**	**732067**	**995805**	**1048242**	**1163606**	**1216539**	**1235709**	**1248401**	**1301244**	**4.23**
6. Pond	107944	222542	795810	1526160	1719783	1833118	1900298	1974632	2046258	2090787	2.18
7. Seasonal cultured waterbody	0	0	0	193303	207658	215547	216353	217340	225948	226608	0.29
8. Baor	862	2201	4282	6514	7729	8002	8072	10343	10969	11319	3.19
9. Shrimp/Prawn Farm	8219	39447	114660	216447	239798	246406	254367	258039	270114	278417	3.07
10. Crab	0	0	0	0	13160	14421	11787	12084	12562	12337	-1.79
11. Pen Culture	0	0	0	13054	13364	13368	11015	12361	13425	14282	6.38
12. Cage Culture	0	0	0	1447	2062	2490	3523	3802	4590	4995	8.82
Culture Total	**117025**	**264190**	**914752**	**1956925**	**2203554**	**2333352**	**2405415**	**2488601**	**2583866**	**2638745**	**2.12**
Inland Fisheries Total (A)	**588620**	**837566**	**1646819**	**2952730**	**3251796**	**3496958**	**3621954**	**3724310**	**3832267**	**3939989**	**2.81**
10. B. Marine Fisheries											
13. Industrial (Trawler Fishing)	14500	12454	32606	76885	105348	108479	120087	107236	115354	119121	3.27
14. Artisanal	150382	240590	422601	518500	521180	528997	534600	552675	555750	562118	1.15
Marine Fisheries Total (B)	164882	253044	455207	595385	626528	637476	654687	659911	671104	681239	1.51
TOTAL FISH PRODUCTION (A+B)	753502	1090610	2102026	3548115	3878324	4134434	4276641	4384221	4503371	4621228	2.62

Annexure 3 (a): Annual Carp Hatchling Production in 2021

Source of Production	No. of Hatchery	Hatchling Production (Kg)	%
1) **Natural**			
Jamuna River	-	970	-
Padma River	-	822	-
Arialkha River	-	85	-
Brahmaputra River	-	32	-
Garai/Madhumati River	-	137	-
Surma	-	0	-
Halda River	-	106	-
Natural Total		**2152**	0.32
2) **Artificial**			
Govt. Hatchery	103	12193	*1.82*
Private Hatchery	953	656608	*97.86*
Artificial Total	**1056**	**668801**	***99.68***
COUNTRY TOTAL	**1056**	**670953**	*100*

Annexure 3 (b): Hatchling Production of Govt. Hatchery in 2021 (January - June)

Name/Location of Hatchery	No. of Hatchery	Hatchling Production (Kg)									Tilapia Juvenile (lakh)
		Major Carp	Exotic Carp	Pangas	Thai Punti	Bata	Koi	Shingi/ Magur	Other	Total	
Division-wised Fish Seed Multiplication Farm											
1. Dhaka	13	663	206	0	79	72	0	0	6	1026	0.08
2. Mymensingh	9	1149	175	0	161	77	0	12	15	1589	0.00
3. Khulna	14	1012	615	0	0	33	0	2	0	1662	0.60
4. Barishal	10	336	34	20	5	0	0	15	15	425	1.10
5. Rangpur	15	916	605	0	120	222	5	10	21	1899	0.00
6. Rajshahi	17	1244	486	10	66	331	0	10	52	2199	0.05
7. Chattogram	18	1532	317	0	254	23	0	0	0	2126	2.01
8. Sylhet	6	569	78	0	116	10	0	0	35	808	0.50
T O T A L	**102**	**7421**	**2516**	**30**	**801**	**768**	**5**	**49**	**144**	**11734**	**4**
BFRI, Mymensingh	1	321	47	3	88	0	0	0	0	459	4695
COUNTRY TOTAL	**103**	**7742**	**2563**	**33**	**889**	**768**	**5**	**49**	**144**	**12193**	**4699**

Annexure 3 (c): Hatchling Production of Private Hatchery in 2020-21

Division	No. of Hatchery	Hatchling Production (Kg)									Tilapia Juvenile (lakh)
		Major Carp	Exotic Carp	Pangas	Thai Punti	Bata	Koi	Shingi/ Magur	Other	Total	
1. Dhaka	47	10885	4260	0	1693	2428	560	360	861	**21047**	644
2. Mymensingh	339	62854	56036	5980	14361	3161	6247	26187	16907	**191733**	5349
3. Khulna	93	42555	33638	2961	1995	2247	1542	1292	1754	**87984**	2835
4. Barishal	40	10563	4836	326	2998	266	356	472	1918	**21735**	1834
5. Rangpur	96	27501	24523	0	5737	12480	412	1963	1042	**73658**	402
6. Rajshahi	175	56188	50262	12653	1813	13293	2354	9073	44381	**190017**	19049
7. Chattogram	139	44369	6942	6486	1448	908	314	282	878	**61627**	17560
8. Sylhet	24	4414	3208	30	702	343	25	0	85	**8807**	1824
TOTAL	**953**	**259329**	**183705**	**28436**	**30747**	**35126**	**11810**	**39629**	**67826**	**656608**	**49497**

Note : (1) About four lakh hatchlings contain in one kg spawn and one kg contains 1000-1200 Tilapia juvenile.

(2) Other Species: Ghania, Chital, Gulsa, Pabda, etc.

(3) No. of Hatchery mentioned which is under operation only.

Annexure 3(d):Annual PL (Post Larva) Production in 2020-21

Source of Production	Galda Hatchery		Bagda Hatchery		Total	
	No. of Hatchery	PL Production (Crore)	No. of Hatchery	PL Production (Crore)	No. of Hatchery	PL Production (Crore)
Govt. Hatchery	27	0.37	0	0	27	0.37
Private Hatchery	6	2.00	44	721.04	50	723.04
TOTAL	**33**	**2.37**	**44**	**721.04**	**77**	**723.41**

Note: No. of Hatchery mentioned which is under operation only.

Annexure 4 :Annual Catch of Marine Fisheries in 2020-21

Type of Fishing	Number of Craft (Trawler/ Boat)	Number of Unit (Gear/Net)	Catch in Metric Ton				
			Shrimp	Hilsa	Tuna & Tuna Like Fish	Other Fish	Total
Trawl Fishing							
a) Shrimp Trawler	33	90	1978	0	7893	209	10080
b) Fish Trawler	201	570	1091	7781	0	100169	109041
TOTAL INDUSTRIAL (A)	234	660	3069	7781	7893	100378	119121
B. Artisanal							
1. Gill Net Fishing							
a) Mechanized	20359	77768	0	279213	4950	63352	347515
b) Non-mechanized	16831	40585	0	26599	0	9743	36342
SUB-TOTAL	37190	118353	0	305812	4950	73095	383857
2. Set Bag Net Fishing							
a) Seasonal (MB)	10000	22404	39775	0	8530	106864	155169
b) Seasonal (NMB)	5200	10000	0	0		0	0
c) All Seasonal (NMB)	5550	10025	765	0		418	1183
SUB-TOTAL	20750	42429	40540	0	8530	107282	156352
3. Long Line Fishing							
a) Jew Fish Long Line							
i. Mechanized	2500	10191	0	0	757	14714	15471
ii. Non-mechanized	400	900	0	0		350	350
b)Other Long Line (NMB)	325	772	0	0		118	118
SUB-TOTAL	3225	11863	0	0	757	15182	15939
4. Trammel Net Fishing (NMB)	131	422	969	0		2093	3062
ii. Non-mechanized	400	900	0	0		350	350
b)Other Long Line (NMB)	325	772	0	0		118	118
SUB-TOTAL	3225	11863	0	0	757	15182	15939
4. Trammel Net Fishing (NMB)	131	422	969	0		2093	3062
5. Other Gears Fishing (NMB)	6373	15640	1719	0		1189	2908
TOTAL ARTISANAL (B)	67669	188707	43228	305812	14237	198841	562118
GRAND TOTAL (A+B)	67903	189367	46297	313593	22130	299219	681239

- AnnualGrowth Rate:1.51% , (Hilsa : 2.96%; Shrimp : 8.13%;Tuna& Tuna Like Fish and other species: 0.73%)
- Annual Growth Rate (Industrial) :3.27%; Growth Rate (Artisanal) : 1.15%

Trawler		Boat		Gear	
Type	Number	Type	Number	Type	Number
Shrimp Trawler	33	MB (Mechanized Boat)	32859	Gill Net	118353
Fish Trawler	201	NMB (Non-Mechanized Boat)	34810	Set Bag Net	42429
				Long Line	11863
				Trammel Net	422
				Other Gear	15640
Total	234		67669		188707

Annexure 5: Species-wise Catch of Marine Fisheries in 2020-21

[Unit : Metric Ton]

Type of Fishing	Shrimp (A)	Hilsa (B)	Tuna & Tuna Like Fish (C)	Other Species									Grand Total (A+B+C+D)
				Sardine	Bombay Duck	Indian Salmon	Pom fret	Jew Fish	Cat Fish	Shark/ Skate/ Ray	Other Marine Fish	Total (D)	
A. INDUSTRIAL Trawl Fishing	**3069**	**7781**	**7893**	33869	6936	0	1355	15385	5116	5400	32317	100378	**119121**
B. ARTISANAL													
1.Gill Net Fishing													
a) Mechanized	0	279213	4950	645	5500	128	2260	24183	2023	1487	27126	63352	**347515**
b) Non-mechanized	0	26599	0	0	75	0	102	1590	56	19	7901	9743	**36342**
SUB-TOTAL	**0**	**305812**	**4950**	**645**	**5575**	**128**	**2362**	**25773**	**2079**	**1506**	**35027**	**73095**	**383857**
2. Set Bag Net Fishing													
a) Seasonal	39775	0	8530	5	58996	0	5472	3020	45	86	39240	10864	**155169**
b) All Seasonal	765	0		0	145	0	25	0	7	11	230	418	**1183**
SUB-TOTAL	**40540**	**0**	**8530**	**5**	**59141**	**0**	**5497**	**3020**	**52**	**97**	**39470**	**107282**	**156352**
3) **3. Long Line Fishing**													
a) Jew Fish Long Line													
i. Mechanized	0	0	757	0	0	25	0	3167	4527	1186	5809	14714	**15471**
ii. Non-mechanized	0	0	0	0	0	10	0	115	80	26	119	350	**350**
b) Other LongLine	0	0	0	0	0	0	0	43	15	13	47	118	**118**
SUB-TOTAL	**0**	**0**	**757**	**0**	**0**	**35**	**0**	**3325**	**4622**	**1225**	**5975**	**15182**	**15939**
4.Trammel Net Fishing	969	0	0	0	40	0	0	660	225	0	1168	2093	**3062**
5. Other Gears' Fishing	1719	0	0	0	230	0	0	502	105	0	352	1189	**2908**
TOTAL ARTISANAL	**43228**	**305812**	**14237**	**650**	**64986**	**163**	**7859**	**33280**	**7083**	**2828**	**81992**	**198841**	**562118**
GRAND TOTAL **(Industrial+ Artisanal)**	**46297**	**313593**	**22130**	**34519**	**71922**	**163**	**9214**	**48665**	**12199**	**8228**	**114309**	**299219**	**681239**
%	***6.80***	***46.03***	***3.25***	***5.07***	***10.56***	***0.02***	***1.35***	***7.14***	***1.79***	***1.21***	***16.78***	***43.92***	***100.00***

Annexure 6: List of o going Development Projects in 2020-21

SL No.	Name of the project and Implementation Period	Total PP Cost (Fig. in lakh)	Project Area	Objectives	Major Activities	Achiev--ement (%)
1.	Fisheries Development Project in Rangpur Division (Jan, 2015-Jun, 2021)	8679.00	58 Upazila, 08 Districts in Rangpur Division	1. To increase fish production through development of degradated water bodies. 2. To conserve biodiversity by establishing fish sanctuaries. 3. To enhance fish production by establishing beel nursery and stocking fish species. 4. To create employment through aquaculture. 5. Skill development of relevant beneficiaries through local training and demonstration. 6. To disseminate aquaculture technologies through local extension agent for fisheries (LEAF). 7. To strengthen institutional capacity by aquaculture and fisheries development.	1. Develop water bodies through re-excavation and minor infrastructure development. 2. Establishment of fish sanctuaries. 3. Establishment of beel nursery in beels/flood plains. 4. Aquaculture in unutilized semi open water water bodies (Beels, Canals, Dead River etc.) 5. Construction of earthen Enclosure. 6. Stocking of indigenous fish and fingerlings. 7. Implementation of fish conservation Act.	95.07
2.	Expansion of Aquaculture Technology Services up to Union Level Project (Phase-II) (Mar 2015-Jun 2022)	37838.00	464 Upazilas in 61 Districts, covering 4300 Union of Bangladesh	1. To enhance aquaculture production by introducing improved aquaculture technologies in selected unions ensuring participation of the local fish farmers 2. To create employment opportunities for rural people though expansion of aquaculture enterprises 3. To develop institutional capacity, knowledge and skills of the relevant stakeholders through adequate training and improved facilities 4. To ensure effective participation of local institutions (union parishad) for ration use of aquatic resources for fisheries development 5. To establish Union-based Aquaculture Extension (UAE) system with the joint efforts of the DoF, Union Parishad, LEAF and the local fish farmers for sustaining field level extension services.	1. Aquaculture extension through LEAF at Union level 2. Upgrading, establishment of training center with dormitory; Repair & renovation of existing DoF training centre 3. Result demonstration farm on different fish culture technology 4. Result demonstration of semi-intensive Carp polyculture technology 5. Result demonstration of mixed culture of galda/bagda with Carp 6. Result demonstration of paddy cum fish culture 7. Pangas culture 8. Monosex Tilapia culture 9. Koi, Shing, Magur culture 10. CBO management of Common Beneficiary Group (CBG) farm 11. Data base preparation & conservation 12. Exchange visit program for DoF/project staff & beneficiaries	90.65

3.	Greater Comilla District Fisheries development Project (Jul, 2015-Jun, 2022)	20666.00	34 Upazilas, 03 Districts, 01 Division	1. To increase fish production utilizing local fisheries resources 2. To create employment opportunities 3. To develop rural economy through aquaculture and fisheries 4. To develop human resources through training.	1. Excavation/re-excavation of Beel/ water bodies 2. Excavation/re-excavation of govt. pond and other closed water bodies 3. Establishment of sanctuary 4. Exchange of fishing net 5. Enhance fish act implementation 6. Training on aquaculture 7. Support for alternate income generating activities (AIGAs) 8. Establishment of fish landing center 9. Establishment of pen and cage culture activities 10. Establishment of training center 11. Demonstration of koi, shing, magur etc. culture in pond	89.99
4.	Enhancement of Fish Production through Restoration of Waterbodies Project (Oct, 2015-Jun, 2022)	40900.00	61 Districts and 349Upazilas	1. To ensure food security and support to the government's poverty reduction efforts through increase of fish production at sustainable level 2. To increase consumption of fish for the people of Bangladesh 3. To increase income for the poor and marginal farmers through fish culture interventions 4. To increase income and employment of small scale fish seed traders and producers 5. To provide initial training and extension service and inputs for aquaculture interventions 6. To ensure involvement of poor beneficiaries group in aquaculture practices with improved technology packages established by the Department of Fisheries 7. To produce marketable fish.	1. Re-excavation (Pond, dighi) 2. Re-excavation (Silted Beel/Dead river/canal) 3. Construction of pipe culvert 4. Demonstration of farm on different fish culture technology	96.54
5.	National Agricultural Technology Programme Phase II Project (NATP-2) (Oct 2015-Jun 2023)	39826.23	270 selected Upazilas of 57 Districts	To increase agricultural productivity of smallholder farms and improve smallholder farmer's access to markets in selected districts.	1. CIG formation 2. Training 3. Dissemination of technology 4. Habitat restoration and conservation of endangered fish species 5. 40 beel management through community based fisheries management 6. Development of fish marketing system 7. Strengthening of District and Upazila Fisheries Office 8. Development of DoF training center	98.37

6.	Sustainable Coastal and Marine Fisheries Project (July 2018- June 2023)	186886.55	4 Division, 16 District, 75 Upazila	The overall objective of the project is to explore greater opportunity from Coastal and Marine fisheries resources while promote sustainable management of fisheries stock and environment to reduce poverty and improve livelihood of the coastal community.	1. Enabling sustainable fisheries sector investments and growth 2. Improvement of infrastructure and production practices 3. Community empowerment and livelihood transformation 4. Project management and monitoring	94.86
7.	Fisheries Development Project in Rajshahi Division (Jan 2019-Dec 2022)	4747.00	8 Districts 65 Upazila In Rajshahi division	1. To enhance fish production and productivity from aquaculture and capture fisheries of Rajshahi division. 2. To protect fish biodiversity through establishing fish sanctuary, stocking endangered fish fingerlings and creating awareness. 3. To improve fish habitat for sustaining water ecosystem and productivity. 4. To improve socio-economic condition of the vulnerable fishers community and fish farmers. 5. To adopt climate smart technologies to address climate change vulnerability in Rajshahi division. 6. To create more livelihood opportunities of marginal people of Rajshahi division.	1. Re-excavation of waterbodies 2. Establishment of sanctuary 3. Demonstration of farm on different fish culture technology 4. Support for alternate income generating activities (AIGAs) 5. Renovation of existing FSMF 6. Capacity development of different stakeholders 7. Farm registration and development of database.	89.48
8.	Chattogram Hill Tracts Fisheries Resources Development Project (March 2020-June 2024)	11827.50	3 Districts 26 Upazila of Chattogram Hill Tracts	1. To increase the production and productivity of fish through development of environment and ecology of creek/water reservoir 2. To ensure skill development of fishery related technology for creek related beneficiaries 3. To fulfill nutritional requirement and improve socio-economic condition of backward and marginal people of CHT 4. To strengthening capacity building of Department of Fisheries by infrastructure development 5. To increase income and employment of CHT people	1. Construction of embankment and drain for creek development 2. Repair and renovation of creek 3. Demonstration of farm on different fish culture technology 4. Establishment of fish sanctuary 5. Capacity development of different stakeholders 6. Support for alternate income generating activities (AIGAs) 7. Construction of office building and other infrastructure.	69.85

Pilot Project on Tuna and Similar Pelagic Fishing in Deep Sea (July 2020-Dec 2023)	6106.00	Deep sea area of the Bay of Bengal near to Chattogram District under Chattogram Division	1. To assist in developing the capacity for capturing of tuna and tuna like fishes in the Bay of Bengal 2. To ensure food security through increasing capture of marine fishes in deep sea and supply of required nutrients for increasing population 3. To explore the opportunities through exporting high valued tuna and tuna like fishes and increase export earning, and 4. To increase the institutional capacity of DoF and coastal fishermen for tuna fishing.	1. Fishing of tuna and similar pelagic fish 2. Purchase and operation of three long liner fishing vessels 3. Develop deep sea fishing strategies and action plans.	78.28
Hilsa Development and Management Project (July 2020-June 2024)	24627.53	29 District 134 Upazila	1. Increase Hilsa production through implementation of Conservation Act and creation of alternative employment opportunities for Hilsa fishermen	1. Support for alternate income generating activities (AIGAs) 2. Exchange of nets 3. Capacity development of different stakeholders 4. Implementation of Fish Act 5. Awareness building 6. Strengthening the management of Hilsa sanctuary.	85
Conservation and Development of Indigenous Fish Species and Snail Project (July 2020- June 2024)	20798.51	3 Division 10 District 49 Upazila	1. To ensure sustainable production through conservation and development of indigenous fish species and non-conventional fisheries products snails and oysters 2. To create alternative employment through fish farming in cage and paddy field and expanding appropriate technology for different places and 3. To build skilled and trained manpower to increase safe fish production through good aquaculture practices.	1. Demonstration farm of indigenous fish 2. Demonstration of snail, mussel and pearl culture technology 3. Establishment of fish sanctuary 4. Establishment of beel nursery 5. Fish fingerlings Stocking 6. Fish Act Implementation 7. Support for alternate income generating activities (AIGAs) 8. Re-excavation of waterbodies for establishment of fish sanctuary and beel nursery 9. Exchange of nets 10. Distribution of van with insulated box (crate) 11. Exposure visit 12. Capacity development of different stakeholders	84.88

12.	Community-based Climate Resilient Fisheries and Aquaculture Development in Bangladesh (Jan 2020-Dec 2023)	4796.63	3 Division 6 District 9 Upazila	*The Project will remove key barriers to effective adaptation to climate change in the fishery and aquaculture sector and build the resilience of the fishery sector through capacity development and policy reform. It will strengthen the awareness and knowledge of local communities, and enhance local adaptive capacity through transfer and adoption of appropriate site-specific climate resilient fisheries and aquaculture intervention technologies and approaches, which will be underpinned by effective knowledge management (e.g. use of ICT-based climate and disaster information services) ensuring wider dissemination of best practices and lessons learned.* ***Specific objectives:*** • *Reduce vulnerability of fisheries and aquaculture to the adverse impacts of climate change* • *Increase adaptive capacity of the fisheries and aquaculture communities and fisheries personnel to respond to the impacts of climate change* • *Promote transfer and adoption of adaptation technology*	1. Climate induced risks and vulnerability assessment of fisheries and aquaculture sub sector 2. Review of relevant national policies and strategies 3. Capacity need assessment of DoF, BFRI and other Fisheries related agencies 4. Report production on risk & vulnerability assessment in 9 Upazila 5. Awareness development/capacity enhancement of 70 communities 6. Development of collaborative early warning system & DRM 7. Site specific climate resilient & gender differentiated technology development & adoption by the targeted communities 8. Technical support to run mud crab hatchery 9. Technical support to all Govt. & Private existing Galda hatcheries of South West region 10. Establishment of quality fish/shrimp seed market 11. Delivery of small equipment to 100 communities/CBOs for water quality monitoring & rental services to others 12. Agricultural tools for CBFM and Communities 13. Feed, seed, sapling & related inputs for CBFM 14. Relief works: Emergency & disaster management support 15. Exposure visits of Fisheries communities.	99.29
13.	Technical Assistance to Reduce Food Loss in the Capture Fisheries Supply Chain Project (July 2020 - June 2022)	212.25	8 Division 17 District	1. Assess detailed post-harvest loss in capture fisheries in different locations and identify critical loss points, hot-spots for fish spoilage and assessing control zones for reducing PHFL in the capture fisheries supply chain 2. Assess status of fishery offal wastes production and management and determine their nutritive values for producing by-product 3. Develop capacity of DoF officials to identify the causes and implement measures of PHFL and develop capacity of Stakeholder through training, demonstrating and awareness campaigns to reduce PHFL 4. Enhancing empower of stakeholders by increasing market linkage connectivity and enhancing awareness to the local fish market actors about how to reduce PHFL	1. Capacity development of DoF officials on identification of the food loss in the capture fisheries value chain and how to reduce those loss. 1. Capacity development of stakeholders on best post harvest practice 2. Study on identification of critical loss points and actions to reduce PHFLs 4. Finalize the present status of Post-harvest loss reduction	100

Manpower under development project and manpower in position

Heads	Category	Numbers of posts	Numbers of vacant posts	In position
Development Projects (13 Nos)	Class-I	215	8	207
	Class-II	30	1	29
	Class-III	904	45	859
	Class-IV	234	194	40
	Total	1383	248	1135

Development Budget of DoF

(Taka in lakh)

Financial year	Number of Project	Development budget						Achievement (%)
		Expenditure			Allocation			
		Total	LC	PA	Total	LC	PA	
2020-21	13	44858.45	24368.12	20490.33	47603.00	26208.00	21395.00	94.23