BANGLADESH
NATIONAL CONSERVATION STRATEGY

INLAND FISHERIES

M NIAMUL NASER
1.1 GENERAL

Natural resources had been from the historical times considered as input to productions and therefore extracted for the use to support economic growth and advancement of material welfare. They continue to play the same role but in recent times a few more roles have been recognized for them widely. For national economic Bangladesh is gifted with vast stretch of inland open water resources characterized by rivers, canals, natural and man-made lakes, freshwater marshes, estuaries, brackish water impoundments and floodplains. The potential fish resources of Bangladesh resulting the richest in the world in production, only after China, India and Myanmar. The inland fish diversity is attributed by the diverse habitats created by the Bengal Delta wetlands and the confluence of the major rivers of the earth the Brahmaputra, Ganges and Jamuna that flow from the Himalayan Mountains into the Bay of Bengal. There are, however, concerns about the gradual decline in the condition of open water fish stocks which have been negatively impacted tempted upon both natural and anthropogenic activities. In addition the climate change has impact on fisheries in various ways.

The inland fisheries sector in Bangladesh includes two major sub-sectors: inland capture or open-water fisheries and inland culture or closed-water fisheries. The inland capture fisheries comprised of open water bodies that includes rivers, tributaries, canals, open Beels (natural depressions often with permanent area of water), Hills streams, Haors (bowl-shaped deeply flooded depressions) and floodplains. The inland culture fisheries are closed water bodes like ponds, closed Beels, lakes, shrimps Ghers, Baors (ox-bow lakes), closed flood control canals etc. It also includes the largest mangrove forest Sundarbans wetlands.

According to FRSS (2015), Bangladesh has a total inland water area of 4.7 million ha of which 83.1% is open water capture fishery and 16.9% for closed water culture fishery. The inland open water fishery resources have been playing a significant role in the economy, culture, tradition and food habit of the people of Bangladesh. Rivers, estuary their ramified branches cover about 853,863 ha area of area. Seasonal floodplain expands over a massive 2.7 million ha of area for 4-6 months of the year. Inland open water also contains estuarine areas with semi-saline waters (0-10 ppt), huge number of Beels and Haors in the north-east and the manmade Kaptai lake-the largest artificial lake of 68800 ha, situated in the south-east hill districts of Bangladesh. The country is blessed with 0.79 million of closed waters in the form of ponds, ditches, oxbow lakes (channel of dead rivers) and brackish water fish and shrimp farms.

The inland water bodies of Bangladesh are extremely bio-diverse: more than 264 species of native fishes (under 154 genera and 55 families) and more than 52 species of shrimps are found in the inland water areas (Rahman 2005, Paul 2001). In addition, more than 24 species of alien fishes are introduced, the other aquatic resources include molluscs, crabs, frogs, turtles and tortoises and aquatic mammals. Among mollusc, more than 20 species of
Gastropods are recorded from inland waters whereas 6 species pearls bearing bivalves belongs to the family Unionidae have been reported. Some of these are naturally producing rare pink pearls and some are edible to the indigenous population of Bangladesh. Also, there are 11 species of inland water crabs belonging to the families Portunidae, Potamidae, Grapsidae and Parathelphusidae are recorded. Among these there are four species of high proced exportable edible brackish water crab belonging to the genera *Scylla*. More than twenty species of frogs and toads having a wide distribution play a very important role in controlling insect pests. Of these, the Indian bull frog (*Haplobatrachus tigerinus*), skipper frog (*Euphlyctis cyanophlyctis*), Cricket frog (*Fejervarya limnocharis*) and Green frog (*E. hexadactylus*) are important. Bangladesh’s cricket frog (*Fejervarya asmati*) is the only recorded endemic frog species from Chittagong. The species of tortoises and turtle number about 25. Most of these species are edible and endangered according to the IUCN (2000, 2015). The catch and export of the most of the amphibian and reptilian species are banned under the Wildlife (Preservation and Security) Acts, 2012 of the country.

### 1.2 IMPORTANCE OF THE SECTOR

Fisheries resources play a very important role in the economy of Bangladesh accounting for about 3.65% to GDP and 23.84% to agricultural GDP. Fish supplements to about 60% of country’s animal protein intake (MOF 2016). About 10% of annual export earning comes from the fisheries sector and it ranks 3rd among the export oriented industries. This sector provides employment to about 1.2 million full-time and 12 million part-time fishermen and workers (DOF 2014). In 2014, the FAO ranked Bangladesh as 4th in aquaculture and 5th in openwater fish producing country of the world (FAO, 2014).

![Figure 1](#)

**Figure 1**

**Fish Production Trend Shows That The Culture Fisheries are Boosting In Bangladesh (The Country Included the Marine Catch)**

The open-water fishery resources are self-sustaining system although human interventions have significantly deteriorated its physical condition and productivity in recent years. The culture fishery on the other hand is primarily an economic venture managed by private individuals and farms supported by the government, research institutes and non-governmental organizations (NGOs) and banks. The inland fisheries resources contribute...
about 80% of the annual catch. The relative contributory trends in last ten years of these sub-sectors are shown in Figure 6.1 shows that the aquaculture sector is contributing more than the other sectors. The average annual growth rate of the fisheries sector in the recent past has been about 5%, which is likely to increase due to the growing of aquaculture sector and open water Hilsa conservation activities in large.

1.3 RELATIONSHIP OF THIS SECTOR WITH OTHERS

Historically, the fisheries sector in Bangladesh has been managed on ad-hoc basis. In case of managing the public water bodies, the main objective has been to maximize revenue through leasing these wetlands to the highest bidder. When it came to increasing the production of fish, the policy was biased towards promoting culture fisheries. Over the years, many exotic species such as silver carp, catfish, tilapia, pangas etc. have been introduced (Table) that practically eliminated local species from the fishponds. The brackish water shrimp and crab culture has been encouraged as it earns valuable foreign currency from shrimp and crab culture.

1.3.1 OTHER SECTORAL INTERVENTIONS ON THE MANAGEMENT PRACTICES

The basic mechanism for managing fishery resources in inland open-waters of Bangladesh has been based on allocation of fishing rights through periodic leasing. The Ministry of Land directly owns the rivers, their tributaries and seasonal as well as perennial wetlands. For the sole purpose of revenue generation, the Ministry of Land leases out stretches of rivers and wetlands, called jalmahals, to intermediaries, called ijradars, i.e., lessees through auction. In the auction process, the lease is given to the highest bidder. The river fisheries and the seasonal Beel fisheries are normally leased out for a term of one year while the permanent Beel are leased out for a 3-year term. The lease period commences on the first day of the Bengali Year and terminates on the last day of the same year. Some Beel fisheries and group fisheries are leased out to the same lessee for 6 years and in rare cases, up to 9 years.
This pattern of dividing the rivers into segments and leasing them out to middlemen lease holders or *Ijaradars* have encouraged over fishing of fish stocks. The situation in the seasonal *Beel* is worse, where every year, during the dry season, the last fish is taken out by draining the *Beel*. The situation in permanent *Beel* is not much different. In such *Beel*, brush shelters are placed in deeper regions to create safe haven for mother fish stock. Unfortunately, fish taking shelter in these deeper pockets are caught annually even though this is not legally allowed. At the end of the lease, all fish are extracted and that leaves no room for survival of any fish – large or small.

Thus, the present scheme of wetland and river management is neither fair nor ecologically sustainable. The wetlands are leased out to influential village elites leaving the traditional fishermen trapped in the vicious circle of poverty. Also, due to unsustainable fishing practices, leased wetlands are being populated by mostly a few commercially important species through release of fries grown in hatcheries. Thus numerous species of native fish have become locally extinct all over the country.

**Among Institutions**

The Ministry of Fisheries and Livestock (MOFL) is the major public sector institutions in the fisheries sector. For the fisheries matters it includes the Department of Fisheries (DOF), the Bangladesh Fisheries Research Institute (BFRI) and the Bangladesh Fisheries Development Corporation (BFDC). The Upazila administration contains a fisheries office technically guided by DOF. The administration of the sector comprises about 5,200 persons, including some 1,200 professionals. In addition several other government agencies are actively involved in fisheries administration, management and development. The ministries along with the authorised agencies are listed in Table 6.3.
## Table 1
### Different agencies and their role in Bangladesh fisheries sectors

<table>
<thead>
<tr>
<th>Sl.</th>
<th>Ministries</th>
<th>Agency involved</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ministry of Agriculture</td>
<td>DoEx Universities</td>
<td>Fisheries extension and education through agricultural universities</td>
</tr>
<tr>
<td>2</td>
<td>Ministry of Water Resources</td>
<td>WDB, CEGIS &amp; IWM</td>
<td>Management of waterbodies, rivers and river channels Planning water resources</td>
</tr>
<tr>
<td>3</td>
<td>Ministry of Finance</td>
<td>Banks</td>
<td>Loan for fisheries sectors</td>
</tr>
<tr>
<td>4</td>
<td>Ministry of Local Government, Rural Development and Cooperatives</td>
<td>LGED</td>
<td>Fish culture, community based management</td>
</tr>
<tr>
<td>5</td>
<td>Ministry of Commerce</td>
<td>EPB</td>
<td>Training in export quality</td>
</tr>
<tr>
<td>6</td>
<td>Ministry of Social welfare</td>
<td></td>
<td>Training in fish culture</td>
</tr>
<tr>
<td>7</td>
<td>Ministry of Education</td>
<td>Universities, UGC</td>
<td>Fisheries education and Research</td>
</tr>
<tr>
<td>8</td>
<td>Ministry of Science, Information and Communication Technology</td>
<td></td>
<td>Research grants</td>
</tr>
<tr>
<td>9</td>
<td>Ministry of Environment and Forest</td>
<td>DoF, DoE</td>
<td>Conservation Pollution control</td>
</tr>
<tr>
<td>10</td>
<td>Ministry of Fisheries and Livestock</td>
<td>DoF, BFRI, BFDC</td>
<td>Administered and research in fisheries</td>
</tr>
<tr>
<td>11</td>
<td>Ministry of Planning</td>
<td>IMED PC</td>
<td>Monitoring and evaluation and Planning for fisheries</td>
</tr>
<tr>
<td>12</td>
<td>Ministry of Land</td>
<td>Local administration</td>
<td>Leasing Jalmohal and waterbodies</td>
</tr>
<tr>
<td>13</td>
<td>Ministry of Youth and Sports</td>
<td>Directorate of Youth</td>
<td>Leasing small ponds</td>
</tr>
<tr>
<td>14</td>
<td>Ministry of Disaster Management and relief</td>
<td></td>
<td>Climate change issues</td>
</tr>
<tr>
<td>15</td>
<td>Ministry of Shipping</td>
<td>BIWTC</td>
<td>Maintaining the waterways</td>
</tr>
</tbody>
</table>

### Non Government Organizations (NGO) and Development Partners

NGOs are becoming increasingly active in the fisheries sector. There are close to 300 NGOs in the country – about 30% of them are funded externally. NGOs involved in fisheries mainly work on promoting aquaculture, and to a lesser extent on community based management of wetlands. Only very recently, a few NGOs have become involved in cooperative based fish sanctuary management involving traditional fishermen. Some of the major NGOs working on the sector are GRAMEEN, PROSHIKA, BRAC, CARITAS, VOSD etc. Among international NGOs, Worldfish, Practical Action, MCC, CARE, IUCN and Katalyst are involved in various works in Bangladesh.
External Influences in the Fisheries Sector

Donors like IDA (World Bank), ADB, UNDP, FAO, DFID, IFAD, DANIDA, CARE, EU, USAID, CIDA, IUCN, NORAD, SIDA, IDB and Ford Foundation are involved in Bangladesh’s fisheries sector with the aim of increasing the fish production and improving the fisheries management. These donors fund studies, research, institutional development, pilot activities, etc. They also show concern for the rights of the fishermen and their role in management. Among the donors the World Bank takes the leading role. These donor agencies have contributed significantly to increasing the culture fisheries yield.

1.4 ANALYTICAL CONTEXTS WITHIN THE FRAMEWORK OF SDGs

Meanwhile, aquatic habitats in both open and closed water bodies have been encroached upon and altered to reclaim more land for agriculture and housing. Embankments and closures have been built to provide flood control and irrigation, which interfered with spawning migration of brood fish and loss of natural nursery ground for fish fry. The water quality has also been altered alarmingly due to indiscriminate use and disposal of industrial pollutants, agro-chemical residues and organic wastes into the open water system, making the open water aquatic environment hazardous for fish. As a result the open-water fish resource has significantly declined both in terms of catch as well as biodiversity. Destruction of coastal spawning grounds along the Sundarbans and other mangrove areas hampered some anadromous fishes like Hilsa which lay eggs in inland rivers and water bodies. Unfortunately, due to the use of illegal gill net and mosquito nets and over fishing, very few of these can now make it to their spawning grounds and has negative impacts on life cycle of many fish species.

The sector complies directly or indirectly with the nine goals of Sustainable Development Goals of UN for 2030. The basic relationships are summarized in Box. 6.00.
## Box 1

The inland fisheries compliances with nine SDG goals of UN for the year 2030

<table>
<thead>
<tr>
<th>SDG Goal</th>
<th>Major features</th>
<th>Relationships</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>End poverty in all its forms everywhere</td>
<td>The fishermen constitute more than 2% of the population.</td>
</tr>
<tr>
<td>2</td>
<td>End hunger, achieve food security and improved nutrition and promote sustainable agriculture</td>
<td>The fishery entrepreneurships can end hunger for poor fishers. The supply of fish can ensure improved nutrition for the population. Proper policy can ensure the sustainable agriculture.</td>
</tr>
<tr>
<td>3</td>
<td>Ensure healthy lives and promotes well-being for all at all ages</td>
<td>Fish as nutrition is good for the source of protein, fatty acids and minerals. For healthy life good amount of fish is required in the table.</td>
</tr>
<tr>
<td>5</td>
<td>Achieve gender equality and empower all women and girls</td>
<td>Socially the fisherwomen are neglected. However, their contribution to family security during absence of men in fishing season need to be recognized.</td>
</tr>
<tr>
<td>6</td>
<td>Ensure availability and sustainable management of water and sanitation for all</td>
<td>Fish needs water and the conflicts of water uses and habitat changes due to housing, agriculture or else are of prime objectives to look into. Pollution by sewage and contamination of fish with filthy contaminants are of interest in this area.</td>
</tr>
<tr>
<td>12</td>
<td>Ensure sustainable consumption and production patterns</td>
<td>The sustainable consumption of fish and other agricultural products are of great importance for the agrobased country like Bangladesh. Proper policy will ensure the availability of the fish as renewable natural resources.</td>
</tr>
<tr>
<td>13</td>
<td>Take urgent action to combat climate change and its impacts</td>
<td>The impact of climate change on fish and fisheries are evident. Urgent action is needed to ensure fish for the future resources.</td>
</tr>
<tr>
<td>14</td>
<td>Conserve and sustainable use the oceans, seas and marine resources for sustainable development</td>
<td>Conservation and sustainable use of coastal inland waters and mangrove area could help in preserving the nursing and feeding ground of many brackishwater and marine fishes. In addition Pangus, Hilsa, Edible crabs, Golda etc use coastal ground for the purpose.</td>
</tr>
<tr>
<td>16</td>
<td>Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels</td>
<td>The fishermen society are of extreme vulnerable to the natural calamity, hunger and injustice of the locals. Good governance, education and social justice can ensure better harmony of the communities. Better institutional support can build effective and accountable fishers community in future.</td>
</tr>
</tbody>
</table>
On the positive side, the share of culture fishers has considerably increased in the recent years keeping the total annual fish production increasing over time. However, this has been due to the culture of a few commercial varieties such as shrimp, major carps, catfish, tilapia, koi and pungas. The situation is comparable to monoculture in crop-agriculture - the increasing volume of culture fisheries has so far contributed little in conserving the fish biodiversity of Bangladesh. The major achievement of Bangladesh expected to match the UN SDG for 2030.

- The fish production and fish requirement of Bangladesh will match by the year 2020. The double the income of fishers and productivity of culture fisheries is expected by 2030;
- The activities towards nonfarm employments are encouraged to the fishers, especially in case of Hilsa fisheries;
- The knowledge financial services, markets and opportunities for value addition is priority by the government in the sector;
- Establishment of more sanctuaries, control of pollution, protection of fish-fisheries and habitat are of prime area that the government works.
- Proper policies and governance can ensure the future sustenance of the renewable fisheries resources of Bangladesh. Policies and Strategies for Increased Production of Nutrient-rich Small Fish in Bangladesh Fish For Better Nutrition is one of the example from the sector.

1.5 SCOPE OF THE REPORT

This report will deal with only fin and shell fish resources of Bangladesh. The other aquatic animal groups from amphibians, reptiles, birds and mammals will be discussed in separate section. The total theme will led by the UN's 2030 SDG issues and climate changes impacts on the fisheries.

Data and Methods of Analysis

This study carefully examines some existing reports and study on fisheries resources in Bangladesh. Information and data on fisheries resources are collected, compiled and analyzed for the report are based upon secondary data and gray literature. Internet sources include research paper, reports, workshop outputs and information published in the web sites were reviewed. Review also includes policy papers, declaration, and conventions on natural resources, bio-diversity, and ecology. Both Bengali and English popular daily newspapers are studied for seeking information and data.

This research deliberately searches the present scenario of all aspects of aquatic resources in Bangladesh and focuses on their effective management and conservation. Very few researches are available to focus on both things. Therefore, this study is unique in terms of focusing the present scenario of natural resources and the research highlighting status of the resources in light of SDGs.
2.1 FISH HABITAT

Bangladesh is one of the world’s largest deltas through which flow two of the world’s largest rivers – the Ganges and the Brahmaputra. The country is literally crisscrossed by some 250 large and small rivers. The floodplains of these rivers and the natural depressions (Haor – seasonal wetland, Baor – oxbow lake, and Beel – perennial water bodies) go under water during the monsoon and create huge open water fish habitat. In an undisturbed floodplain, the productivity is as high as 779 kg/ha per year, which is the highest in the world. A table in Box. 6.1 summarizes the areas of inland water bodies in Bangladesh that serve as diverse fish habitats.

All the major rivers end at the Bay of Bengal. Near the confluence of the sea and the rivers, freshwater is replaced by a mix of saltwater and freshwater producing brackish water, and forming a distinct estuarine zone. A wide range of salinity gradients is encountered in the rivers up to a considerable distance upstream from the shoreline along the Bay of Bengal. Along the coast in the south, an estimated 2.5 million hectare of low-lying lands are subject to tidal inundation. Much of these areas provide, during high tides, temporary nursery and grazing grounds for larvae, fry and juveniles of different fish shrimp species.

Inland Water Ecosystems
Open-water fish are broadly categorized into two groups: white fish – that reside in flowing waters such as rivers; and black fish – that primarily reside in static water bodies such as ponds, lakes and Beels. White fish typically migrate upstream or into floodplains and wetlands during spawning season. Black fish on the other hand spawn and reside in the same water body.

Table 2
Distribution of Inland Water Areas

<table>
<thead>
<tr>
<th>Sector of Fisheries</th>
<th>Area (ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Capture</strong></td>
<td></td>
</tr>
<tr>
<td>1. Rivers &amp; Estuaries</td>
<td>853863</td>
</tr>
<tr>
<td>2. Sundarbans</td>
<td>177700</td>
</tr>
<tr>
<td>3. Beels</td>
<td>114161</td>
</tr>
<tr>
<td>4. Kaptai lake</td>
<td>68800</td>
</tr>
<tr>
<td>5. Flood lands</td>
<td>2691910</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>3906434</strong></td>
</tr>
<tr>
<td><strong>Culture</strong></td>
<td></td>
</tr>
<tr>
<td>1. Ponds</td>
<td>372397</td>
</tr>
<tr>
<td>2. Baors</td>
<td>5488</td>
</tr>
<tr>
<td>3. Shrimp farms</td>
<td>275588</td>
</tr>
<tr>
<td>4. Seasonal culture waterbodies</td>
<td>133330</td>
</tr>
</tbody>
</table>
There are three types of fish migrations observed from Bangladesh (Figure 6.1). Each type of migration requires a different type of behaviour and probably different sets of physical stimuli. A gradual rise in the river water in different areas of the country usually starts from late February or early March (pre-monsoon season). The process of sexual maturation and staging migration and movement for breeding activity occur in this pre-monsoon period when air and water temperatures rise. During the early monsoon (April-May), almost all species of fish are seen with ripe or ripening gonads. For the major carp species of Bangladesh, the upper reaches of the Brahmaputra River in the Assam Hills, the Ganges River below Farakka, the haor basins of Sylhet and the upper Barak River region as well as the Halda river are the major spawning areas. Carps (Rui, Katla, Mrigal, etc) migrates to the hilly water areas during rainy season to breed in the flowing river water. The country has its only natural card spawning area in Halda River. Unlike the carps, many species of prawn (like Golda, Pangus, etc) requiring brackish water saline environment or Hilsa needs freshwater for spawning, and they migrate to estuarial and coastal environments to breed. The juveniles then undertake upstream migration through the rivers to reach the food rich floodplains to feed and grow until recession of flood. The growing prawn, like the carps, move back into the flowing river habitats with the receding waters. The opposite of prawns is Hilsa, a fish that live in the marine environment in the Bay of Bengal but undertake spawning migration into the fresh water habitats in Meghna estuary and adjacent river systems to spawn. Floodplain fishes portray the complete coverage of trophic range from planktophagic to piscivorous habits. The young fish mainly feed on periphyton, detritus, zooplankton and small insects. Within-year changes in the growth rate have been noticed in floodplain fish owing to expansion and contraction of aquatic body, seasonality of temperature and rainfall, and flood-associated changes in food availability. About 75% of the expected first year growth of the juveniles occurs within six months after spawning. Slow growth has been observed during the dry season. Mortality rates are higher in the dry season, especially when the water level is receding and fishes are more concentrated in the water body. In such a situation, they become more susceptible to attack by predators, disease and other environmental stresses. About 75% to 80% mortality has been recorded during this period in floodplain lagoons with an overall decrease of 40% in biomass within a three-month period. Differences in the amount of water remaining in the floodplains in the dry season, together with its duration, strongly influence survival varies from one year to the next. Vast coastal water along the Bay of Bengal coastal flushing area is known as brackish water area. This water area is mainly included special types of vegetation called mangrove. The coastal islands mostly comprised of mangrove forest types of vegetation. The largest mangrove forest the Sundarbans is also belongs to the inland ecological system. Mangrove area is potentials area of breeding and nursery grounds for many major fishes of

<table>
<thead>
<tr>
<th>Pen culture</th>
<th>7553</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cage culture</td>
<td>10</td>
</tr>
<tr>
<td><strong>Sub-total</strong></td>
<td><strong>794361</strong></td>
</tr>
<tr>
<td>Inland total</td>
<td><strong>4700795</strong></td>
</tr>
</tbody>
</table>
Bangladesh. A series of embanked area was created during 70's to protect the agricultural lands from salinity. However, this is turn now converted in to shrimp Gher's by allowing water in during high tide. The present thrust of foreign currency earning strategy, shrimp and crab culture is the most common in the coastal areas. Recently other high priced riverine fish species are collected and stocked in these Gher's for culture, causing imbalance the river faunal composition. During the low water season in winter, the fish take refuge in the river or deep Beel water. Hilsa, one of the major open water fish migrate from the Bay of Bengal to the Meghna river estuary to breed. This phenomena is called anadromy, and comprised major fishery (77.35% in 2014-2015) of the river.

Biodiversity Status
Under IUCN Red list program, the fish fauna of Bangladesh has been assessed twice in 2000 and in 2015. While the crustaceans been assessed for once in 2015. In 2000 in total 266 fin fish species been assessed and in 2015, in total 253 species been assessed. In both no regionally extinct fish is recorded. The total threatened fish species has increased from 54 in 2000 to 64 in 2015 (Table 6.2.). The numbers of CR reduced to 3 from earlier studies, while EN and VU in 2015 assessed year increase to 13 species. Among Crustaceans (i.e. shrimps and crabs.), 13 species been declared to be threatened; while 47 species are least concern, 79 species are data deficient. Two species one of each is categorized to not threatened and not endangered. This clearly indicate the escalation nature of threats to the aquatic biodiversity of Bangladesh.

<table>
<thead>
<tr>
<th></th>
<th>Fin Fishes</th>
<th></th>
<th>Crustaceans</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2000</td>
<td>2015</td>
<td>2015</td>
</tr>
<tr>
<td><strong>Species evaluated</strong></td>
<td>266</td>
<td>253</td>
<td>141</td>
</tr>
<tr>
<td>Regionally Extinct (RE)</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Critically endangered (CR)</td>
<td>12</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Endangered (EN)</td>
<td>28</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>Vulnerable (VU)</td>
<td>14</td>
<td>25</td>
<td>11</td>
</tr>
<tr>
<td><strong>Total threatened fishes</strong></td>
<td>54</td>
<td>64</td>
<td>13</td>
</tr>
</tbody>
</table>

Source: IUCN Red List, 2000 and 2015

2.1 RESOURCE DEGRADATION

Bangladesh is producing more fish through aquaculture. The expansion of aquaculture area is increasing each year (Figure 00). This will ultimately occupy the natural water area in future. The aquatic resources degradation is also evident due to conversion of wetland to agricultural land, road or housing.

Another cause of aquatic resources degradation is huge pesticide uses. The accidental seepage of pesticide used in the agricultural land causes total killing of the ecosystem (REF). The use of pesticide in 2012 is 40,882 mt and the uses is 135% increase in its ten years from baseline data at 1996 (Figure 00).
Trends in water area usages by fisheries sector in Bangladesh in selected years

Pesticide (mt) use in Bangladesh
2.3 RESOURCE DEPLETION

The natural spawn from river area is very low and less than 1% of the country demand (FRSS, 2015). The only natural carp breeding ground is situated at Halda river, Chittagong. The river is now declared as ECA but various man made and climatic problems resulted in low fish spawn production and fluctuations every year (Figure 00).

The annual fish catch from the rivers of Bangladesh shows that in total 1,74,878 mt fishes were produced in 2014-2015 fiscal year. Of them more than 77.5% was Hilsa alone, whereas major and minor carps (2.25%), larger catfishes (0.85%), zeol fishes (0.25%), shrimps (3.2%) and other fishes (16%) of the total catch (Figure 00).
Considering Hilsa alone in the major river system, it is found that the major catch is from Lower Meghna river system, followed by lower Padma, upper Meghna and Padma (Figure 00). The abundance of the fish was highest in early fifties in upper Padma river system. The production was sharply reduced in the Padma river system after the Farraka barrage construction in early 70’s.

Climate Change and Fisheries
The climate change issues on inland fisheries have been explained in several documents (IUCN 2012, ). The impacts are summarized in Box-6.00. The major climatic factors that influence the fish and fisheries of Bangladesh so far identified as, rainfall, drought and temperature. This causes habitat and food loss for the animals. Biologically the climatic factors such as rainfall influencing the reabsorption of most of the fishes of the country while temperature is important for the survival of the spawns and even adults in extreme cases. For example in Nachole, Chapai-Nawabganj (Figure 00), the monthly rain fall varied in years 2001 to 2003. In 2001, the spawn that was born in June rainfall time can better survived than the September spawns. The October spawn after 2003 rainfall will face high mortality in winter in November onwards. Thus the rainfall and temperature have important impact of the natural fisheries resources. In hatchery, the high temperature causes low survival of spawns.

In addition, the low water depth and the complete drying of wetland resulted in total loss of biodiversity of aquatic organisms. The adaptive plan for the fisheries resources includes research on quick growing fishes as well as taking measures in improving the habitat quality.
Box 6.2: Climate Change issues in Fisheries

Meteorological Factors that have effects on the sector
- Rainfall
- Drought
- Temperature
- Water depth
- Storms/surges

Impacts

Natural
- Habitat changes
- Loss of species
- Food chain disruption
- Loss of biodiversity

Biological
- Changing Breeding cycles
- Low or less Hatching success
- Low Survival rates
- Emerging diseases
- Less production

Economics & livelihoods
- Profit Loss
- Livelihoods loss for fishers

Figure 00. Patterns of monthly rainfall in Nachole, Chapai Nawabgong, Rajshahi district
Between 2004 and 2014, the inland fish catch has grown on average at 4 to 7.3% per year. This, however, gives a wrong impression about the health and sustainability of the capture fisheries in Bangladesh. This per annum growth is actually contributed by the growth of culture fisheries where only a few commercial varieties such as carp, pungas, tilapia, catfish and shrimp are grown. A comparative picture of the growth of capture and culture fish catch is shown in figure 6.2. It is evident that despite numerous projects undertaken by the government and the NGOs, the capture fish growth/catch has remained stagnant as it faces serious threats from anthropogenic activities and mismanagement. On the other hand, the growth of commercial fisheries has created its own set of concerns ranging from environmental pollution, loss of genetic diversity and social conflicts to name a few. Following is a brief summary of the major problems faced by the fisheries sector of Bangladesh.

### 3.1 STRUCTURAL INTERVENTIONS

Flood control and irrigation structures such as dams, barrages and embankments, serve as physical barriers to fish migration. According to an estimate of the formerly Master Planning Organization, over 0.81 million hectares of floodplain have been permanently removed from fish production by the year 1985, and another 2.0 million hectares of floodplain fish habitat will be lost by the year 2025. This will have drastic consequences on fish diversity as, 60% of the 265 fish species found in Bangladesh are floodplain dependent. The Muhuri Closure in the Feni River has removed commercial Hilsa fishing from the Feni River above the dam. The dam has also destroyed the brackish water ecosystem. In addition to blocking fish migration, cross-dams and barrages slow down or stop the flow, turning the river water from lotic (flowing) to lentic (stagnant). This changes the species composition and diversity in the modified ecosystem and hydrologic regime.

### 3.2 INDUSTRIAL POLLUTION
According to a DOE report, there are 425 major, 1175 moderate and 2200 minor polluting industries in Bangladesh. With a few exceptions, dumping their wastes in the nearby river without any treatment. The annual emission into water by the industrial sector alone is about 50,000 tons of BOD and 106,000 tons of TSS. The most polluted rivers flowing around major urban or industrial areas are the Buriganga, the Sitalakhya and the Karnafuli and the Rupsha. In addition, ports, shipyards and shipwrecking industries in Mongla and Chittagong cause significant oil pollution to local water bodies that eventual affect the coastal waters.

### 3.3 AGROCHEMICALS

Farmers use fertilizer and pesticides to increase and protect agricultural yield. These chemicals contaminate soil and water, enter into the food web, and cause bioaccumulation of toxic substances. There are about 250 varieties of pesticides that are used in Bangladesh. Annually between 48,690 tons of pesticides are used in 2008 in the country and as much as 25% of this may end up in the water bodies eventually discharging into the Bay of Bengal. The use of pesticide tripled in 10 years since 2000 and. These chemical residues can kill fish at lethal dose. Even at sub-lethal dosage, other aquatic species may be harmed that are part of the food web of open water fish species.

### 3.4 DRY SEASON IRRIGATION

When irrigation water is taken from surface water sources such as beels, baors, canals and ponds, they shrink in size, or in some cases, completely dry out leaving no space for fish. This goes against the objective of maximizing fish productions from beels and baors. Excessive groundwater withdrawal can have similar effect.

### 3.5 OPEN ACCESS FISHING AND LACK OF PROPER INSTITUTIONS

Open-water fisheries are considered “public property” as per the State Acquisition and Tenancy Act of 1950. This has lead to uncontrolled and indiscriminate fishing. State managed or leased water bodies are also managed with the sole objective of revenue generation. There is no post-lease monitoring to ensure that the leased out wetlands are managed according to the terms and conditions spelled out in the lease contract. This leasing agreement is managed by the Ministry of Land as opposed to the Ministry of Fisheries and Livestock, which is another reason for lack of fish friendly management of the wetlands.

### 3.6 FISHING PRACTICES

Using extra fine nets, bank to bank netting and illegal catching of brood fish and fish fry have serious adverse affect on open water fish. In the Padma and the Meghna, bank to bank fishing has all but blocked the movement of anadromuos fish like the Hilsa. Government since 2004 has taken several measures to control the Hilsa and other fisheries in the open
water. So far five Hilsa fish sanctuaries been established. Ban on fishing Jatka (Juvenile Hilsa) and other fishes are implemented.

### 3.7 DEGRADATION OF WETLANDS

Due to sedimentation and encroachment, wetlands have lost both their productivity and biodiversity. In some coastal areas, people are deliberately trying to trap sediments within the coastal swamps for land reclamation. This is generating more employment and income for the local communities at the expense of fish resources. Wetlands are being encroached upon for agricultural, industrial and urban development. These activities are taking up wetlands on permanent basis and might have contributed to extinction of many indigenous varieties of fish (Figure 00).

#### Changes in Aquatic areas in Inland Fisheries Sectors (2005-2015)

<table>
<thead>
<tr>
<th>Metric tonnes</th>
<th>2005-06</th>
<th>2009-10</th>
<th>2014-15</th>
</tr>
</thead>
<tbody>
<tr>
<td>River &amp; Estuaries</td>
<td>500000</td>
<td>1000000</td>
<td>1500000</td>
</tr>
<tr>
<td>Beels</td>
<td>75000</td>
<td>125000</td>
<td>175000</td>
</tr>
<tr>
<td>Flood plains</td>
<td>2250000</td>
<td>2750000</td>
<td>3250000</td>
</tr>
<tr>
<td>Aquaculture</td>
<td>500000</td>
<td>1000000</td>
<td>1500000</td>
</tr>
</tbody>
</table>

Source: FRSS, DoF

### 3.8 DEGRADATION OF WETLANDS

Since the late 1950s, about more than 24 species of alien fishes have been brought into the country to help boost the fish catch (Table 6.5). During the major floods of 1987, 1988 and 1998, members of these species escaped out of the ponds into the open water. These fishes may cause outbreak of diseases that were previously non-existent. For example, a deadly disease, Epizootic Ulcerative Syndrome, entered Bangladesh with the exotic fish *B. goniontus* that has affected numerous floodplain species. Moreover, most alien fishes are fierce competitors and some of them are highly carnivorous. The accidental release in the open water can significantly lower the biodiversity in the long run.
<table>
<thead>
<tr>
<th>Sl</th>
<th>Species introduced</th>
<th>Source</th>
<th>Year</th>
<th>Purpose of introduction</th>
<th>Feeding habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Gouramies (Trichogaster pectoralis)</td>
<td>Singapore</td>
<td>1952</td>
<td>Insect and weed control</td>
<td>Carnivore</td>
</tr>
<tr>
<td>2</td>
<td>Tilapia (Oreochromis mossambicus)</td>
<td>Thailand</td>
<td>1954</td>
<td>Insect control, Malaria eradication and aquaculture</td>
<td>Omnivore</td>
</tr>
<tr>
<td>3</td>
<td>Common carp (Cyprinus carpio)</td>
<td>India</td>
<td>1960</td>
<td>Aquaculture</td>
<td>Omnivore</td>
</tr>
<tr>
<td>4</td>
<td>Grass carp (Ctenopharyngodon idellus)</td>
<td>Hong Kong, Japan</td>
<td>1966</td>
<td>Weed control, aquaculture</td>
<td>Planktivore</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>1970</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Silver carp (Hypophthalmichthys molitrix)</td>
<td>Hong Kong</td>
<td>1969</td>
<td>Aquaculture</td>
<td>Planktivore</td>
</tr>
<tr>
<td>6</td>
<td>Mosquito fish (Gambusia spp.)</td>
<td>Thailand?</td>
<td>1973</td>
<td>Mosquito control</td>
<td>Planktivore</td>
</tr>
<tr>
<td>7</td>
<td>Nile Tilapia (Oreochromis niloticus)</td>
<td>Thailand</td>
<td>1974</td>
<td>Aquaculture</td>
<td>Omnivore</td>
</tr>
<tr>
<td>8</td>
<td>Rajputi (Barbonemus gonionotus)</td>
<td>Thailand</td>
<td>1977</td>
<td>Aquaculture</td>
<td>Planktivore</td>
</tr>
<tr>
<td>9</td>
<td>Mirror carp (Cyprinus carpio var specularis)</td>
<td>Nepal</td>
<td>1981</td>
<td>Aquaculture</td>
<td>Omnivore</td>
</tr>
<tr>
<td>10</td>
<td>Sucker fish (Hypostomus plecostomus)</td>
<td>Thailand</td>
<td>1980</td>
<td>Ornamental</td>
<td>Omnivore</td>
</tr>
<tr>
<td>11</td>
<td>Bighead carp (Aristichthys nobilis)</td>
<td>Nepal</td>
<td>1981</td>
<td>Aquaculture</td>
<td>Planktivore</td>
</tr>
<tr>
<td>12</td>
<td>Black carp (Mylopharyngodon picseus)</td>
<td>China</td>
<td>1983</td>
<td>Snail control, aquaculture</td>
<td>Carnivore</td>
</tr>
<tr>
<td>13</td>
<td>Pangas (Pangasius hypophthalmus)</td>
<td>Thailand</td>
<td>1990</td>
<td>Aquaculture</td>
<td>Omnivore</td>
</tr>
<tr>
<td>14</td>
<td>African Magur (Clarias gariepinus)</td>
<td>Thailand</td>
<td>1990</td>
<td>Aquaculture</td>
<td>Highly carnivore</td>
</tr>
<tr>
<td>15</td>
<td>GIFT (Genetically Improved Framed Tilapia)</td>
<td>Philippines</td>
<td>1994</td>
<td>Research and Aquaculture</td>
<td>Omnivore</td>
</tr>
<tr>
<td>16</td>
<td>Genetically Improved Scale carp (Cyprinus</td>
<td>Vietnam</td>
<td>1995</td>
<td>Research and study by BFRI</td>
<td>Omnivore</td>
</tr>
</tbody>
</table>
### Table 3.1

<table>
<thead>
<tr>
<th>Sl</th>
<th>Species introduced</th>
<th>Source</th>
<th>Year</th>
<th>Purpose of introduction</th>
<th>Feeding habit</th>
</tr>
</thead>
<tbody>
<tr>
<td>17</td>
<td>Milk fish (Chanos chanos)</td>
<td>Philippines</td>
<td>1996</td>
<td>Barackishwater aquaculture</td>
<td>Planktivore</td>
</tr>
<tr>
<td>18</td>
<td>Red Piranha (Pygocentrus natteri)</td>
<td>Thailand, China</td>
<td>2003</td>
<td>Aquarium, Culture</td>
<td>Highly carnivore</td>
</tr>
<tr>
<td>19</td>
<td>Pira Pitinga (Piractus brachypomus)</td>
<td>Thailand, China</td>
<td>2003</td>
<td>Aquarium, Culture</td>
<td>Herbivore</td>
</tr>
<tr>
<td>20</td>
<td>Climbing perch (Anabas testudineus)</td>
<td>Thailand, Vietnam</td>
<td>2005, 2006</td>
<td>Culture</td>
<td>Carnivore</td>
</tr>
<tr>
<td>21</td>
<td>*Giant pangus (Pangasianodon gigas)</td>
<td>Thailand</td>
<td>2006</td>
<td>Culture</td>
<td>Herbivore</td>
</tr>
<tr>
<td>22</td>
<td>*Mud Eel (Monopterus albus)</td>
<td>China/Thailand</td>
<td>2010</td>
<td>Culture</td>
<td>Highly carnivore</td>
</tr>
</tbody>
</table>

### 3.9 PROBLEMS FOR SHRIMP CULTURE

Although, shrimp culture has become a major export earning source of Bangladesh, it has created a number of serious environmental concerns. First, there was no zone based restriction on the location of shrimp farms. As a result, many farms in the grater Khulna and Chittagong area were set up by clearing the mangrove forest. In the process, the Chokoria Sundarban has been completely wiped out - a loss that can perhaps never be reversed.

Second, collection of shrimp fries from the coastal areas adversely affects other fish and aquatic species. Fine nets, which are used to catch shrimp fries, indiscriminately catch many other species that die in the process, gets thrown away leading to water pollution. Only introduction of modern hatcheries and intensive shrimp culture can help solve this problem.

Third, brackish water shrimp farms need inflow of salt water that often cause with farmers growing crops and vegetables that cannot tolerate brackish water. Discharge of waste water from shrimp farms also cause serious local water pollution. Moreover, shrimp culture being less labour intensive, it has indirectly contributed to rural unemployment, marginalization of landless labourers and social conflicts between locals and immigrant workers in the shrimp farms.

### 3.10 CLIMATE CHANGE

The impact of climate change on fisheries has been identified. Some major impact is summarised in Table 6.6. The change in weather and seasonal cycle, the growth and diseases in aquaculture will be affected. The composition of fish, mortality and habitat loss in the openwater area are of prime concerns.
Table 6.6 Some major issues of climates change on fisheries

<table>
<thead>
<tr>
<th>Items</th>
<th>Issues</th>
<th>Impacts</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in rainfall regime</td>
<td>Flooding</td>
<td>Destruction of fish habitat</td>
</tr>
<tr>
<td></td>
<td>Fish breeding</td>
<td>Change in breeding season for major openwater fishes</td>
</tr>
<tr>
<td></td>
<td>Aquaculture</td>
<td>Loss of fish due to the fish loss due to flood</td>
</tr>
<tr>
<td>Change in hot weather</td>
<td>High water temperature</td>
<td>Less oxygen in the water caused less habitable in water column</td>
</tr>
<tr>
<td></td>
<td>Low water level</td>
<td>Hot water causes less oxygen in the water</td>
</tr>
<tr>
<td></td>
<td>Aquaculture</td>
<td>High feeding requirements; high mortality in the hatcheries</td>
</tr>
<tr>
<td>Extended cold weather</td>
<td>Cold water</td>
<td>Causing less metabolic activities of fish. Low or no growth.</td>
</tr>
<tr>
<td></td>
<td>Low water level</td>
<td>Causing death of fishes in high cold season in Northern Bengal wetlands</td>
</tr>
<tr>
<td></td>
<td>Aquaculture</td>
<td>No growth and loss in culture venture</td>
</tr>
<tr>
<td>Salinity intrusion</td>
<td>Habitat</td>
<td>Loss of habitat for freshwater fishes</td>
</tr>
<tr>
<td></td>
<td>Species composition</td>
<td>More carnivore fishes intrude from the brackishwater area</td>
</tr>
<tr>
<td></td>
<td>Aquaculture</td>
<td>More diseases in shrimp and other culture fishes</td>
</tr>
</tbody>
</table>
4.1 NATIONAL PLANS

National development Strategies and programs for the fisheries sector are formulated in the context of the country’s five-year development plans. The major objectives related to fisheries sector development during the Sixth Five Year Plan (2011-2015) have been set according to the vision 2021 and objectives of the perspective plan as well as the goals of the Millennium Development Goals. The monitor able targets fall in seven broad categories: (i) Income and Poverty; (ii) Human Resource Development (iii) Water and Sanitation; (iv) Energy and Infrastructure, (v) Gender Equality and Empowerment; (vi) Environment Sustainability; and (vii) Information and Communications Technology (ICT). To achieve these Department of Fisheries has taken elaborate programs and some of them are as follows;

- Generate additional employment opportunities in fisheries and ancillary industries to help poverty alleviation;
- Increase fish production and improve nutritional level;
- Improve socio-economic conditions of the fishermen, fish farmers and other engaged in the fishery sub-sector;
- Increase export earnings from shrimp, fish and fish products;
- Improve environmental conditions and establishment of sanctuaries;
- Improve the biological and institutional management mechanisms for judicious use on fisheries resources;
- Strengthening research, extension, management and co-ordination in order to transfer technology and encourage production activities in the private sector; and
- Enlistment of fishermen in database to assist in during the lean season and for better governance.

These objectives are broad based and specific details are often difficult to workout. Because past plans were over-optimistic, government spending has achieved only about 25% of the targets. This shortfall reflects the absence of consistent programs and the poor implementation capacity of the fisheries administration.

4.2 REGULATIONS, ACTS AND POLICIES RELATING TO FISHERIES

Formal fisheries management in Bengal (part of which is now Bangladesh) has a long history. As early as 1793, the British rulers had given large tracks of lands to the landlords who were supposed to collect tax from the assigned estates. Since then many acts, rules, ordinances have been formulated, the chronology of which is shown in Box 1. These efforts culminated by the formulation of the National Fish Policy in 1998. The important objectives of these amendments have been reflected in the last three items in Box 1: the national
environmental, water and fish policies, implications of which on open water fisheries are briefly summarized below.

**Box 6.1: Important acts, rules and policies related to fisheries**

Permanent Settlement Regulation 1, 1793  
The Private Fisheries Protection Act, 1889  
State Acquisition and Tenancy Act, 1950  
The Protection and Conservation of Fish Act, 1950 (see Annexure 1)  
Bangladesh Fisheries Development Corporation Act, 1973  
The Fish and Fish Products (Inspection and Quality Control) Ordinance, 1983  
The Fisheries Research Institute Ordinance, 1984  
The Protection and Conservation of Fish Rules, 1985  
New Fisheries Management Policy of 1986  
National Environmental Policy of 1992  
National Water Policy, 1997  
National Fish Policy, 1998  
Reservoir Protection Act 2000  
Jolmohal Management Policy 2009 (Proposed)  
Shrimp Gher leasing Policy 2013  
National Shrimp Policy 2014

**National Environment Policy 1992**
The fisheries and livestock objectives in the National Environmental Policy 1992 are as follows:

- Ensure appropriate environment for the conservation and development of fisheries;
- Prevent activities, which diminish the wetlands/natural habitats of fish and encourage rehabilitative measures in this area;
- Ensure that development activities in fisheries and livestock do not create any adverse impact on the mangrove forests and other ecosystems;
- Evaluate existing projects on water resources development, flood control and irrigation to determine their adverse impact on fisheries and adopt measures for alternate fish culture upon improvement of environmental conditions.

The Environmental Action Plan that was formulated to achieve the objectives of the National Environmental Policy, 1992 laid down the following provisions as shown in Table 6.4.
Table 6.4 Provisions Related to Fisheries Accordingly to NEP of 1992

<table>
<thead>
<tr>
<th>Sector</th>
<th>Implementing Agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fish and Livestock Resources</td>
<td></td>
</tr>
<tr>
<td>1. Steps will be taken to rehabilitate wetlands such as haors, baors, and beels and declare them as protected areas for pisciculture. Wetland areas will not be encroached upon.</td>
<td>Ministry of Fisheries and Livestock Haor Development Board Directorate of Fisheries</td>
</tr>
<tr>
<td>2. Pisciculture will be encouraged in all ponds and tanks. Over extraction of fish from ponds and wetlands will be prohibited. Similar prohibition will be effected for shrimp fry and other fish resources.</td>
<td>Ministry of Fisheries and Livestock Directorate of Fisheries Upazilas Administration</td>
</tr>
<tr>
<td>3. Ministry of Environment and Forest will advise on the environmental aspects of protection and augmentation of shrimp cultivation. The government will delineate appropriate coastal areas for.</td>
<td>Ministry of Fisheries and Livestock Ministry of Environment and Forest Department of Environ-shrimp cultivation Directorate of Fisheries</td>
</tr>
<tr>
<td>4. Necessary research and programs for prevention of fish disease and epidemics will be strengthened.</td>
<td>Ministry of Fisheries and Livestock Fish Research Institute Agriculture University</td>
</tr>
<tr>
<td>5. Regular monitoring and research will be conducted on the state of wetlands like haors, baors, and beels etc.</td>
<td>Ministry of Fisheries and Livestock Ministry of Defense SPARRSO Survey of Bangladesh</td>
</tr>
</tbody>
</table>

National Water Policy, 1997

Availability of water is essential for sustenance and growth of fisheries sector. Accordingly several provisions have been made on the National Water Policy that include the following: (i) fisheries will receive due emphasis in water resources planning when the anticipated social impact is high; (ii) attempt will be made to keep the impact on natural aquatic environment to a minimum; (iii) state owned swamps and marshes that are important for fish, waterfowl and other wild life will not be drained; (iv) water bodies such as haor, boar, beel, road-side ditch will be reserved for fish production and development to the extent possible; (v) perennial links of these water bodies with rivers will be properly maintained; (vi) water resources projects will not interrupt fish movement and adequate provisions in controlled structure will be made to allow fish migration and breeding; and (vii) brackish aquaculture will be confined to specific zones designated by the Government for this purpose.
**National Fisheries Policy, 1998**

With the growing importance of the fisheries sector, Bangladesh Government formulated the National Fish Policy in 1998 for sustainable management of fisheries resources. The Policy has specific Strategies for each of its components that can be translated into Action Plans by relevant agencies. For open water fisheries, the policy calls for minimizing damage on fish and fish habitat during development activities. It aims for improving the current leasing system to ensure participation of real fishermen in fisheries management. The policy also calls for setting up fish sanctuary, open water stocking and integrated fish cum rice farming. The policy specifically prohibits draining out of natural open water bodies. It calls for protection and restocking of endangered and threatened fish species. Essential features of this policy have been summarized in Box 6.2.

### Box 6.2: National Fisheries Policy 1998

**Goals:**

1. Develop and increase the production of fish resources;
2. Poverty alleviation through creation of self-employment and improve their socio-economic condition;
3. Meet the demand of animal protein;
4. Promote economic growth and earn foreign currency through export of fish and fish products; and
5. Preserve environmental balance, biodiversity and improve public health.

**Scope:**

1. All government, autonomous, multinational organizations, NGOs and individuals involved with the fisheries sector will fall under the National Fish Policy.
2. All water bodies used for fisheries will fall under this policy.

**Major policy components:**

1. Policy for conservation, management and harvesting of inland open water fish resources;
2. Policy for inland closed water fish culture and management;
3. Policy for coastal shrimp and fish culture;
4. Policy for conservation, management and harvesting of marine water fish resources;
5. A set of supporting policies pertaining to: Hygienic unloading centers, transport and marketing, processing and quality control, export, education, training and extension, research, institutional framework, fish ecology, credit and cooperatives.

**National Shrimp Policy, 2014**

The National Shrimp Policy 2014 was put forward to maintain a sustained shrimp culture practices by emphasised into a. Production and management of shrimp farm; b. Processing, quality control and export; c. Employment and poverty reduction and d. Environment and disease management. It empowered from shrimp farm to all stake holders towards export and consumption. By respecting the ILO laws and gender issues, the improvement of knowledge base by extension, education and research were highlighted.
Several action plans will help in the fisheries sectors for enhancing the ability of empowerments to make conservation and sustainable management for aquatic species of Bangladesh.

<table>
<thead>
<tr>
<th>Sl</th>
<th>Policy Issues</th>
<th>Actions</th>
<th>Implementation agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Habitat identification and protection: Improvement of the understanding the species diversity of different inland waterbodies like Beels, lakes, rivers and streams of Bangladesh:</td>
<td>The country comprised of more than 265 species of fishes, more than 75 species of crustaceans (shrimp, prawns and crabs) in the major rivers and tributaries created from five major river basins, canals and wetlands like beels, ponds and floodland. The understanding of major habitat of a particular fish species within a particular habitat and its status and conservation need biodiversity assessment is foremost tusk. IUCN recently running a project on red-listing freshwater fisheries and crustacean. This could help in understanding the updated the status of each species of Bangladesh. However, the quantification population, assessment of the level of habitat degradation and pollution are lacking. This is hampering the making of conservation plans for any ‘risk’ fisheries resources. Fisheries sanctuary or refuge (seasonal/temporary sanctuary) needs to be established. For important migratory fishes like Hilsa, pangus, river eels, etc., temporary protected area may be needed in their spawning areas during breeding season. For hilsa, five sanctuaries exist but other major riverine fishes no such area are recognized. Thus unified tool or action plan is need to instant protection of value species in vulnerable period.</td>
<td>DoFr, DOE,DoF, Universities , IUCN</td>
</tr>
</tbody>
</table>

**Target in FYP:** The need to gather
<table>
<thead>
<tr>
<th>Sl</th>
<th>Policy Issues</th>
<th>Actions</th>
<th>Implementation agencies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td>additional information and fill knowledge gaps in order to advance the understanding of species and their habitats.</td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td><strong>Water pollution:</strong> Regular monitoring of the water quality and pollution of different water system</td>
<td>For the survival of aquatic animals in the wetland and the rivers, quality water is prerequisite. Being overpopulated country and agricultural country, huge organic and chemical pollutants are drained into the wetland as well as the rivers. This causes the killing of different animals from the ecosystem. <strong>Target in FYP:</strong> The need of assessment of waterbodies on regular basis and to prevent damages by closing the sources.</td>
<td>DoE and DoF</td>
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<td>3.</td>
<td><strong>Allocation of areas for fisheries:</strong> Demarking the land and water use areas</td>
<td>Due to the population expansion and multiple ownerships of land and water, conversion of wetland to house or agricultural land is high. This causes the shrinkage of wetlands of the country. The water area needs to be marked by the government to prevent land grabbing or poaching activities. <strong>Target in FYP:</strong> The need of assessment of water areas of Bangladesh on regular basis and to prevent damages from poaching by influential persons.</td>
<td>MoL along with DoF and DoFr</td>
</tr>
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<td>4.</td>
<td><strong>Fisheries Governance and livelihood support:</strong> Understanding the life patterns and livelihoods of the fisheries dependent people</td>
<td>Identifying the target fish/crustaceans habitats and the fishermen communities they support. Knowledge on the alternative income generating activities needs to be understood. For example, Hilsa fisheries are facing challenges for being illegal exploitation and huge conflicts in supporting the livelihoods for the poor fishers in ban period. A strong action plan needs to be making effective. <strong>Target in FYP:</strong> The need of assessment of impact in the landscape basis in a finite-scale fashion, and to consider all components for a sustainable management of community of biota</td>
<td>DoF, NGOs, Universities, BFRI</td>
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<td>5.</td>
<td>Alien species: Control of exotic/alien fish/crustacean/predator species import in the country</td>
<td>There are no quarantine laws and laboratories for fish importation in Bangladesh. A weak protocol for importation of selected exotic fishes is in place. This resulted introduction of mislabeled fish species in Bangladesh in many ways. More than 19 species is introduced in the aquaculture sector by the government and private sectors. Though banning was made effective for piranha and African magur fish, full eradication and illegal production in hatchery and culture system is not possible yet.</td>
<td>Customs (Revenue department), land, air and water port authorities, DoF, research in universities and BFRI</td>
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<td>6.</td>
<td>Natural, Human and transboundary attributes: Management plans incurred from human causes and natural disaster</td>
<td>Natural disaster and water flow management causing habitat loss for aquatic organisms. No such protocol developed to save animals in such state. Research on management of aquatic resources in vulnerable state is must. Impact on climate changes on fish and fisheries sector needed to assess.</td>
<td>DoFr, DoF, Disaster management dept, BFRI, Universities</td>
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<td>7.</td>
<td>Institutional management: Adopting partnerships and collaboration among various agencies, organizations,</td>
<td>Conserving natural resources in Bangladesh has many countenances depending upon the agencies it denotes upon. For example DoE use EPA rule, while DoFr use other rules to declare sanctuary in an areas. DoF use fish conservation act to implement such ban and declaring sanctuary for target fish.</td>
<td>DoFr, DOE, DoF, Universities, BIWTC, EPB, WDB, PDB, PDB, MoL, etc</td>
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<td>6</td>
<td>academia and related Industries to conserve the target fishes</td>
<td>To support and improve existing regulations and programs aimed at conserving habitats and fish communities a collaborative action plan is needed. <strong>Target in FYP:</strong> The need to strengthen partnerships among natural resource managers, agencies, organizations, academics, and individuals in order to meet shared goals and visions is must.</td>
<td>NCTB, MoEdu, MoEF, colleges and schools; extension department, media and newspapers</td>
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<td>8</td>
<td><strong>Improvement of knowledge base and Research:</strong> Improvement of educational and extension efforts to advance the understanding of fish and fisheries resources among the general public and various stakeholders,</td>
<td>The knowledge of the fish status, conservation and prevention of aquatic habitat destruction by general public of Bangladesh is very poor. To educate the huge population is not a easy task. The government has to use every educational and extension agencies to make people aware of vulnerable or rare fish survival. <strong>Target in FYP:</strong> The need to educate and engage local governments, planning commissions, and urban publics about the importance of fish and wildlife conservation as a key component of successful land use planning.</td>
<td>NCTB, MoEdu, MoEF, colleges and schools; extension department, media and newspapers</td>
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REFERENCES

Annexure1. Fisheries Legislations of Bangladesh and its modifications

THE PROTECTION AND CONSERVATION OF FISH ACT, 1950
(EAST BENGAL ACT NO. XVIII OF 1950).
[18th May, 1950]
An Act to provide for the protection and conservation of fish in 1[ Bangladesh].
WHEREAS it is expedient to provide for the protection and conservation of fishes in 2[ Bangladesh];
It is hereby enacted as follows:-

Short title, extent and commencement
1. (1) This Act may be called the 3[ * * *] Protection and Conservation of Fish Act, 1950.
(2) It extends to the whole of 4[ Bangladesh].
(3) It shall come into force on such date as the 5[ * * *] Government may, by notification in the official Gazette, appoint.

Definitions
6[ 2. In this Act, unless there is anything repugnant in the subject or context,-
(1) “Current Jal” means fishing net made of monofilament synthetic nylon fibre of different mesh sizes;
(2) “Fish” includes all cartilaginous, bony fishes, prawn, shrimp, amphibians, tortoise, turtles, crustacean animals, molluscs, echinoderms and frogs at all stages in their life history;
(3) “Fishery” means any water body, natural or artificial, open or closed, flowing or stagnant (such as river, haor, baor, beel, floodplain, canal etc.) where activities for growing fish, or for conservation, development, demonstration, breeding, exploitation or disposal of fish or of living organisms related to such activities are undertaken, but does not include an artificial aquarium of fish used as decorative article, pond or tank;
(4) “Fishery Officer” means any person whom, the Government or any officer empowered by the Government in this behalf, may appoint to carry out all or any of the purposes of this Act or to do anything required by this Act or by any rule made thereunder to be done by such officer:
Provided that, no police officer shall be so empowered;
(5) “Fishing net” means the nets which are specially meant for catching different species of fishes from water bodies and it is one type of fishing gear made of different types of yarns including synthetic yarns of different mesh sizes other than Current Jal. The common tanning materials of net are fruit of gab (Diospyros embryopteris) bark of Goran (Ceriops roxburghiana) and Coal-tar;
(6) “Fixed engine” means any net, cage, trap or other contrivance for catching fish, fixed in the earth or made stationary in any other way.]

Power to make rules
3. (1) The 7[ * * *] Government may make rules for the purposes hereinafter in this section mentioned.
8[ (2) The Government may, by notification, apply such rules or any of them to any water or waters.]
(3) Such rules may-
(a) prohibit or regulate all or any of the following matters, that is to say,-
(i) the erection and use of fixed engines;
(ii) the construction, temporary or permanent, of weirs, dams, bunds, embankments and other structures;
(iii) the use or method of operation of any kind of fishing net and the size of the mesh of any fishing net;
(iv) the manufacture, import, marketing, carrying, transporting or possessing of such fishing nets, traps, gears and other contrivances as may be specified in the rules;
(b) prohibit the destruction of, or any attempt to destroy, fishes by explosives, gun, bow and arrow in inland water or within coastal territorial waters;
(c) prohibit the destruction of, or any attempt to destroy, fishes by the poisoning of waters or the depletion of fisheries by pollution by trade effluents or otherwise;
(d) prescribe the seasons during which the killing or catching of fishes of any prescribed species shall be prohibited;
(e) prescribe a minimum size below which no fish of any prescribed species shall be killed or sold;
(f) prohibit all fishing in all waters or in any specified waters for a specified period;
(g) prohibit the destruction of or any attempt to destroy fishes by drying or dewatering of any fishery.

Provided that the Government may for the purpose of pisciculture, collection of data and scientific investigation for biological study on fish permit the catching of fishes in any closed season or in any prohibited water or below the prescribed minimum size and disposal thereof subject to the condition of the licence issued for the purpose.

(4) In making any rule under this section, the Government may provide for-
(a) the seizure, removal and forfeiture of any fixed engine, finishing net, Current Jal or any other contrivance erected or used for fishing in contravention of the rules;
(b) the forfeiture of any fishes taken by means of any such fixed engine, finishing net, Current Jal or any other contrivance; and
(c) the procedure for disposal of forfeited fixed engine, fishing net, Current Jal or other contrivance or forfeited fish.

(5) The power to make rules is subject to the condition of previous publication; and the date to be specified under clause (3) of section 23 of the General Clauses Act, 1897, shall not be less than two months from the date on which the draft of the proposed rules was published.

(6) All such rules shall be published in the official Gazette and shall, unless some later date is appointed, come into force on the date of such publication.

**Power to prohibit sale of fish**

4. The Government may, by notification, prohibit for a specified period the catching, carrying, transporting, offering, exposing or possession for sale or barter of fishes below the prescribed size of any prescribed species throughout Bangladesh or any part thereof.

**Prohibition about Current Jal**

24A. (1) No person shall manufacture, fabricate, import, market, store, carry, transport, own, possess or use Current Jal.

(2) Whoever has in his possession Current Jal, shall, within 45 (forty-five) days of coming into force of this provision, surrender such Current Jal to the nearest police station, Office of the
Fishery Officer or Office of the Upazilla Nirbahi Officer, and during that period an existing possession of Current Jal by any person shall not be deemed to be an offence.]

**Penalties**

25[ 5. (1) The breach of any rule made under section 3 or of any prohibition notified under section 4 shall be punishable with rigorous imprisonment for a term which shall not be less than one year and may extend to two years, or with fine which may extend to five thousand Taka, or with both.

(2) The breach of any prohibition, described in section 4A, in connection with-

(a) manufacture, fabrication, import, marketing or storing of Current Jal by any person shall be punishable with rigorous imprisonment for a term which shall not be less than three years and may extend to five years, and shall also be liable to fine which may extend to ten thousand Taka; and

(b) carrying, transporting, owning, possession or use of Current Jal by any person shall be punishable with rigorous imprisonment for a term which shall not be less than one year and may extend to three years, or with fine which may extend to five thousand Taka, or with both.]

**Power to confiscate**

26[ 5A. When any person is convicted of an offence punishable under this Act or the rules made under this Act, the Court, before which he is convicted, shall direct that, any article or thing used or intended to be used in the commission of such offence, be confiscated.]

**Arrest without warrant for offence under the Act**

6. (1) Any person, specially empowered by the 27[ * * *] Government in this behalf, may arrest without warrant any person committing a breach of any rule under section 3 or any prohibition notified 28[ under section 4 and 4A respectively]-

(a) if the name and address of the person are unknown to him, and

(b) if the person declines to give his name and address or if there is reason to doubt the accuracy of the name and address, if given.

(2) A person arrested under this section may be detained until his name and address have been correctly ascertained:

Provided that no person so arrested shall be detained longer than may be necessary for bringing him before a Magistrate or to the nearest police-station according to the provisions of the Code of Criminal Procedure, 1898.

(3) Notwithstanding anything contained in the Code of Criminal Procedure, 1898, it will be lawful for the officer-in-charge of a police-station to detain a person produced before him under the preceding sub-section till he is produced before the Magistrate.

29[ (4) All Fishery Officers empowered by the Government shall have the same powers of search, seizure and investigation in respect of an offence under this Act as a police officer of the rank of Sub-Inspector; and any police officer, shall be destroyed after the lapse of 30 days, if in the meantime no one claims the same or otherwise initiates any other proceeding regarding his lawful claim thereto.]

**Cognizance, trial etc of offences**

30[ 7. Notwithstanding anything contained in the Code of Criminal Procedure, 1898 (Act V of 1898)-

(a) an offence under this Act shall be a cognizable offence within the meaning of that Code;
(b) no court shall take cognizance of such offence except on the complaint or a report of a fishery officer or of a police officer not below the rank of Sub-Inspector;

31[ (c) no Court other than of a Metropolitan Magistrate or Magistrate of the first class shall try an offence under this Act; and

(d) A Court trying an offence, except an offence under clause (a) of sub-section (2) of section (5), under this Act may try the offence summarily in accordance with the procedure laid down in the said Code for summary trial.]]

**Officers to be deemed public servants**

8. All persons empowered to perform any functions under this Act shall be deemed to be public servants within the meaning of section 21 of the 32[ * * *] Penal Code.

**Indemnity**

9. No suit, prosecution or other legal proceeding shall lie against any person empowered to perform any function under this Act for anything which is in good faith done or intended to be done under this Act.

10. [Repeal.- Omitted by section 11 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982).]

1 The word “Bangladesh” was substituted for the words “East Pakistan” by section 2 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

2 The word “Bangladesh” was substituted for the words “East Pakistan” by section 2 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

3 The words “East Bengal” were omitted by section 3 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

4 The word “Bangladesh” was substituted for the words “East Pakistan” by section 3 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

5 The word “Provincial” was omitted by section 3 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

6 Section (2) was substituted by section 2 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)

7 The word “Provincial” was omitted by section 5 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

8 Sub-section (2) was substituted by section 5 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)

9 The words “fishing net” were substituted for the word “net” by section 3 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)

10 The words “fishing net” were substituted for the word “net” by section 3 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)

11 Sub-clause (iv) was inserted by section 3 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)

12 The word “and” was omitted by section 3 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)

13 The semi-colon (;) was substituted for the colon (:) and clause (g) was inserted by section 3 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)
14 The word “Provincial” was omitted by section 5 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
15 Sub-section (4) was substituted by section 4 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
16 The commas and words “, finishing net, Current Jal” were added by section 3 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
17 The commas and words “, finishing net, Current Jal” were added by section 3 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
18 Clause (c) was substituted by section 3 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)
19 The comma and words “, Current Jal” were added by section 3 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
20 The words, figures and commas “section 23 of the General Clauses Act, 1897,” were substituted for the words, figures and commas “section 24 of the Bengal General Clauses Act, 1897,” by section 5 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
21 The word “Provincial” was omitted by section 6 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
22 The words “catching, carrying, transporting, offering, exposing or possession” were substituted for the words “offering or exposing or possession” by section 6 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
23 The word “Bangladesh” was substituted for the words “the Province of East Pakistan” by section 6 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
24 Section (4A) was inserted by section 4 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
25 Section (5) was substituted by section 5 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
26 Section (5A) was inserted by section 6 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
27 The word “Provincial” was omitted by section 8 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)
28 The words and figures “under section 4 and 4A respectively” were substituted for the words “under section 4” by section 7 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
29 Sub-section (4) was substituted by section 7 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
30 Section 7 was substituted by section 5 of the Protection and Conservation of Fish (Amendment) Act, 1995 (Act No. IX of 1995)
31 Clause (c) and (d) were substituted by section 8 of the Protection and Conservation of Fish (Amendment) Ordinance, 2002 (Ordinance No. XX of 2002)
32 The word “Pakistan” was omitted by section 10 of the Protection and Conservation of Fish (Amendment) Ordinance, 1982 (Ordinance No. LV of 1982)