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Study on aquatic biodiversity of Medha beel in the Northern region of Bangladesh

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ABSTRACT

The Medha beel has surrounded the Upazilla of Kolmakanda, Netrokona district an average are of 122.15 ha for the period of January 2003 to December 2007. A total number of 70 species of fishes, four species of prawn, one species of crabs, one species of snail and four species of reptiles were identified so far from the Medha beel. About 10 types of fishing methods were found in operation. Increasing the rate of fishing pressure within five years by seine net (moshari jal) from 15.4 to 20.5% and current jal (mono filament gill net) from 22.0% to 34.4% were identified as detrimental gear killing including different species during spawning and post spawning periods. An increasing rate in fishing pressure of the water bodies was a thread to aquatic biodiversity of the Medha beel. The aquatic production of the Medha beel was declined dramatically over the last five (2003-2007) years. The total production of the Medha beel was decreased from 105.31±5.28 to 54.64±3.43 mt within five years and the percentage of total production was sharply decreased from 12.98 to 48.12% over the same period. So, a number of commercial important fish species like as major carps, mohasher (Tor tor), nandina (Labeo nandina), olive barb, sharpunti (Puntius sarana), Gajar (Channa marulius) and reptiles (Kachuga tecta and Morenia petersi) were extinct, nine species were facing an extremely high risk of extinction, 39 species were facing a very high risk of extinction and 19 species were facing a more or less high risk of extinction between 2003 and 2007.

Key wards: Aquatic lives, biodiversity, endangered and illegal fishing.

The study of biodiversity has become a major concern to the fishing biologists against the backdrop of rapid decline in the natural population of fish and aquatic biota across all the continents of the world. Biodiversity encompasses genetic species, assemblage, ecosystem and land cape levels of biological organization with structural, compositional and functional components (Noss 1990, Cairns and Lackey 1992). Though loss of aquatic species has been occurring rapidly, the aquatic organisms have received comparatively little attention from conservation biologists (Allendrof 1988). A rich diversity of fish species is critical to the ecology and sustainable productivity of the flood plains. Fisheries resources in Bangladesh like Medha beel are under severe threat due to over-exploitation and environmental degradation, which includes human interventions through construction of flood control embankments, drainage structures and sluice gates, conversion of inundated land to cropland thereby reducing water area and indiscriminate use of pesticides. Pollution from domestic, industrial and agrochemicals wastes and run off have resulted in extinction of a considerable amount of aquatic biota in same stretches of the open water system (Disaster, 1990).

Medha beel receives surface runoff water by rivers and khals, and consequently, a beel becomes very extensive water body in the monsoon and dries up mostly in the post-monsoon period. Medha beel of tectonic origin and connected with the Ubdha Khali and Goshai River. The beel basin comprised the flood plains of the Medha tributaries with abundant aquatic vegetation. However, through gradual sedimentation, the basin becomes shallower leading to the formation of reeds and sedges. This resulted in providing enough food and shelter for fish and other aquatic fauna and added to the fertility of the water bodies by their excreta promoting rich growth of phytoplankton and macrophytes thus partly contributing to the process of eutrophication.

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The basin of the Medha beel supports a large variety of wetland bio-diversity and works as natural reservoir as it plays a key role in basin water resources by regulating water flows of the Ubdhakhali and Goshai River system. In the past century or so, when the population pressure was less, most of the rim-lands of the beel remained as cultivable wasteland was used for extensive grazing in the dry season. As population increased, boro cultivation expanded on these marginal lands leading to a large area being drained. Thus, the existences of these wetlands of Medha beel are now threatened.

MATERIALS AND METHODS

The Experimental Medha beel comprising an average were of 122.15 ha with an average depth 1.22±0.05 m. Potika, Jatra Bari, Rampur, BorKhapon, Uttar Kaghoji para and Rana Gaon villages, have surrounded the beel. The study observation period was during January 2003 to December 2007 and based on both primary and secondary data, comprehensive literature review and extracted of local knowledge and information. Collection of primary data was made by field observation and different experimentations v*iz.* experimental fishing in the beel, survey of different fishing methods, survey of fish markets adjacent to beel, monitoring of hydrological, meteorological, physico-chjemical and biological characteristics of beel and fishers' perception as well. Secondary data were collected from the fishers, local administration and Department of Fisheries (DoF).

A bamboo made meter scale measured water depth. Water temperature was measured using a

Celsius thermometer and transparency was recorded by using a Secchi disc of 20 cm diameter. Dissolved oxygen and pH were measured directly using a digital electronic oxygen meter (YSI Model 58) and an electronic pH meter (Jenway Model 3020). Alkalinity was determined by titrimetric method (Clesceri *et al.*1989). The plankton sample was collected fortnightly from the euphotic zone using 0.55 blotting silk plankton net and later analyzed numerically with the help of Sedgewick-Rafter counting cell (SR-cell) under a compound microscope (Clesceri *et al.,* 1989). Calculation of the abundance of plankton was done by Stirling, 1985.

The Medha beel was sampled simultaneously during winter (mid November to February), pre monsoon (February to April), monsoon (May to August) and post monsoon (September to mid November) for assessment of aquatic lives abundance and availability. The present study was given a broad picture of a stock of fishes, crabs and reptiles that was collected directly from fishers' catch, fishing through enclosure with bana (made by bamboo), khata and kua fishing, and market survey (Kolmakanda, Borkapon and Modyanagor Bazar). Resident fish species was recorded through fishing in the deep pool areas and man-made kuas where water remains during dry season (January to mid April). The data were analyzed through one way ANOVA using MSTAT followed by Duncan's Multiple Range Test to find out whether any significant difference existed among treatment means (Zar 1984).

RESULTS AND DISCUSSION

Morphometry and hydrodynamics

Generally, there are three main sources of water input into the Medha beel ecosystem viz. overspill from the river channel, surface flow and regeneration. Water flows were determined by both rainfall and flooded water from the Meghaloya's hilly range, India. The Goshai River passes through the eastern side and Ubdhakhali River passes through the Northern side of the beel. This beel is connected with the rivers by one cannel locally called Nuanagorar khal. In the dry season, almost 50% areas of the beel were dried up except the canals, and khata and kua fishing area where water remains during January to mid-April. Flooding of the beel originated from the Goshai and Ubdhakhali River. Surface run-off and increased in river height due to inflow of rainwater from the upper stretch, cause inundation of floodplains, often causing resumption of connection between beel and river. The more water gain or exchange of water took place during southwest monsoon when floodplains were flooded. The early flood phase (April to early June) occurred in the early monsoon season when the water level in basin was relatively low. The water level in the floodplain rose and felt in accordance with the water level in adjacent with Medha beel. The deep flood phase (June to September) began when the water level in the Goshai and Ubdhakhali River, causing deep flooding. Floodwater in flood plains started receding in the post-monsoon season (October to December). After recession of flood, water level in the beel decreased snapping the beel connection with the river. The beel was dried up through evapo-transpiration and seepage. Except deeper portion of the beel, the people used most of the area for crop practice by extracting water from the beel. The water loss by various means caused shrinkage of the effective water area and lowering of depth in the beel. So, the status of the aquatic biodiversity of the beel was suffered in the study period.

Physical characteristics

Soil texture of Medha beel was varied from clay to loam. The soil structure of the deeper bed appeared to have predominantly clay and in the surrounding structure of the wetland was recorded loam to clay (Table 1).

Table 1: Physical features of sediment of the Medha beel

Location	Soil texture of the bed of beel (%)		
	Clay	Loam sand	Sandy
Deeper bed	71.1±3.48^{a}	27.3±2.14^{b}	1.6±0.17^{c}
Wet land bed	17.1±2.28^{b}	80.5±4.85^{a}	2.4±0.55^{c}

Figures with different superscripts in the same row varied significantly (P>0.05). Figures in the parenthesis indicate the range.

Water depth of the Medha beel varied from 2003 to 2007. Highest depth (1.68±0.11 m) was the mean water depth of the beel was not statistically significant (P>0.05), but the trend to beel bed recorded in the year 2003 and lowest depth (1.58±0.094 m) was recorded in 2007 (Fig. 1). Although, was shallow to shallower between 2003 and 2007 due to siltation and sedimentation.

The water physico-chemical parameters of the Medha beel, which included temperature, transparency, pH, dissolve oxygen and alkalinity of water, were are furnished in Table 2. The mean water temperature of the Medha beel were not statistically significant (P>0.05) in the entire study period. An increasing trend of water temperature in monsoon and post monsoon season and decreasing in winter is supported by Mathew (1975). Mean Secchi disk transparency differed significantly (P<0.05) during the year 2003-2007. Higher values occurred during the year 2007 and summer months due to stable condition of water. pH did not differ significantly (P>0.05). A significant rise in pH during pre-monsoon followed by a drop in winter was noted. The mean dissolved Oxygen (DO) was not differ significantly (P>0.05). Similar Phenomena were noted by Saha *et al.* (1988). Total alkalinity

Table 2: Physico-chemical parameters of Medha beel

Parameters	Years				
	2003	2004	2005	2006	2007
Temperature (^{o}C)	26.32±6.38 (15.41-33.10)	26.55±6.55 (15.52-32.55)	26.42±7.11 (15.35-33.05)	26.28±6.48 (14.75-32.85)	26.55±6.38 (14.60-33.15)
Transparency (cm)	35.55±7.14^{d} (26.50-48.22)	40.27±8.22^{a} (28.15-50.42)	31.44±6.18^{e} (25.82-51.25)	38.15±7.17^{c} (25.38-44.12)	44.11±8.15^{b} (29.52-55.17)
pH	7.55± 3.11 (6.15-8.44)	7.66±2.44 (6.50-8.88)	7.50± 1.55 (6.65-8.85)	7.70±2.22 (6.60-8.77)	7.66±2.25 (6.50-8.85)
Dissolved oxygen (mg/L)	4.48±1.22 (3.38-7.34)	4.77±1.54 (3.88-8.04)	4.58±1.22 (4.01-8.04)	4.68±1.52 (3.62-7.77)	4.86±1.88 (3.58-7.66)
Alkalinity (mg/L)	134.22±8.04^{c} (112.24-145.45)	128.22±7.24^{b} (109.08-140.42)	117.14±6.22^{e} (101.22-136.05)	122.55±9.22^{d} (110.12-136.42)	140.16±6.62^{a} (114.12-150.88)

Figures with different superscripts in the same row varied significantly (P>0.05). Figures in the parenthesis indicate the range was differed significantly (P<0.05).

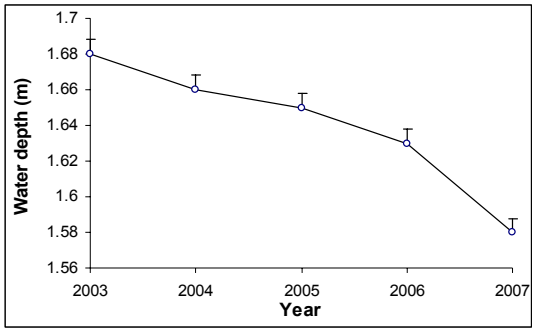

Fig. 1: Water depth of the Medha beel between the year 2003 and 2007.

Plankton population

The quantity of phytoplankton and zooplankton was particularly dominant in the month of June and July and lowest count was obtained in December and January (Table 3). The phytoplankton consisted of 26 in the Medha beel in four broad groups' viz., Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae. Chlorophyceae contributed the genera were *Clasterium, Chlorococcum, Eremesphaera, Gonotozygon, Kirchneriella, Mesotenium*, *Microspora, Oocystis, Ophiocytium, Pediastrum, Penium, Protococcus*, *Spyrogyra, Tetraedron, Volvox, Zygnema.* Bacillariophyceae included various species belonging to genera *Diatoma*, *Fragilaria, Melosira*, and *Navicula.* Cyanophyceae included the genera of *Anabaena, Chroococcus, Merismopedia, Mycrocystis* and *Oscillatoria.* Euglenophyceae included only the genera of *Euglena.* Chlorophyceae was the dominant group which was significantly higher (P<0.05) during five years study period. The mean abundance of total phytoplankton was differ significantly (P<0.05) during investigation period. The phytoplankton consisted of 26 genera, which is more or less similar investigation of Sugunan and Bhattacherjya, 2000. Among zooplankton, the represented genera were *Bosmina, Brachionus, Cyclops, Daphnia, Diaptomus, Filinia, Keratella, Lecane, Moina, Nauplius, Oicomonas* and *Trichocerca* belonging to two groups. The zooplankton population consisted of 12 genera excluding nauplii in two groups viz., Rotifera, Crustacea and other groups, which are almost similar observation of Sugunan and Bhattacharyya (2000). Rotifera and Crustacea were differed significantly (P<0.05) during investigation periods.

Macrophytes

A total number of 12 species belonging 12 genera and 10 families of aquatic weeds were identified from Medha beel (Table 4). Hizal, *Barringotonia acutangula* grows in the deeper regions. *Najas najas* species was accounted dominant among the identified weeds. The eggs of prawn and different fish species were identified into the *N. najas* and water hyacinth (*Eichhornia crassipes*) during summer to winter. Water hyacinth usually covered a layer on the surface of Khua in the deep. However, due to changing ecosystem health, using pressure of human consumption and cattle food the status of the population of aquatic weeds was reduced day by day.

Craft and gears used

Generally fishermen used boat for transport of nets and related materials and used seine net or ber jal, komor jal, thela jal, bua jal, lift net, cast net, current jal and various type fish traps, hook and lines; and fishing by dewatering FAD (Fish aggregating device) according to season and availability of different species of fishes. During monsoon and post monsoon, fisher's used lift net, current jal, cast net, traps, hook and lines to catch fishes.

Table 3: Mean variation of phytoplankton (individual/ml) and zooplankton (organism/ml) population in the Medha beel

Plankton group (10^3 cells/L)	Years				
	2003	2004	2005	2006	2007
Chlorophyceae	20.45±4.28[a] (16.11-27.28)	25.82±6.12[d] (18.24-30.66)	18.65±5.26[e] (14.66-26.25)	23.27±5.02[b] (18.55-29.22)	19.66±4.85[c] (16.12-25.45)
Bacillariophyceae	11.12±2.25[d] (8.12-15.47)	13.18±2.88[a] (10.08-18.11)	10.42±2.68[b] (7.35-15.45)	11.18±2.66[b] (8.22-16.04)	13.18±3.01[d] (9.90-18.44)
Cyanophyceae	5.42±1.11 (3.55-9.18)	7.17±1.05 (4.12-10.11)	6.22±1.32 (4.05-9.75)	6.12±1.15 (4.42-9.22)	5.72±1.01 (3.85-8.11)
Euglenophyceae	1.02±0.13 (0.72-1.12)	0.85±0.04 (0.63-0.98)	0.88±0.01 (0.74-1.0)	1.01±0.11 (0.80-1.11)	0.52±0.01 (0.40-0.82)
Total Phytoplankton ($\times10^3$ cells/L)	38.11±8.39	47.02±10.64[b]	36.17±7.50[e]	41.58±9.54[a]	39.08±8.40[d]
Rotifera	4.18±1.34[a] (3.15-5.06)	5.65±1.65[c] (3.46-6.78)	6.11±1.84[b] (4.22-7.26)	4.82±1.44[c] (3.02-6.18)	5.48±1.58[a] (3.11-6.04)
Crustaceae	3.18±1.06[d] (2.42-4.88)	4.11±1.12[c] (3.40-6.01)	3.18±1.26[e] (2.45-5.01)	4.11±1.22[b] (3.16-5.55)	4.22±1.46[a] (3.02-5.95)
Others	1.02±0.24 (0.80-1.58)	1.22±0.82 (1.01-1.85)	1.12±0.48 (0.88-2.03)	1.11±1.32 (0.92-1.96)	1.04±0.28 (0.88-1.75)
Total Zooplankton ($\times10^3$ Organisms/L)	8.38±1.62[b]	10.98±2.25[c]	10.41±1.99[c]	10.04±1.97[d]	10.74±2.28[a]

Figure in the same row having the same superscript are not significantly different (P>0.05). Figures in the parenthesis indicate the range.

Table 4: Aquatic weeds of Medha beel

SL. No.	Family	Local name	Scientific name	Type	Status
1.	Lemnaceae	Edurkanipana	*Wolffia arrhiza*	Floating	+
2.	Pontederiaceae	Kachuripana	*Eichhornia crasssipes*	Floating	++
3.	Gramineae	Dal	*Hudroryza aristota*	Emergent	++
4.	Najadaceae	Najas	*Najas najas*	Submerged	+
5.	Compositaceae	Helencha	*Enhydra flucktuans*	Spreading	++
6.	Marsiliaceae	Shusnishak	*Marsileaquadrifolia*	Emergent	++
7.	Gramineae	Arail	*Leersia hexandra*	Spreading	+
8.	Commelinaceae	Kanaibashi	*Commelina bengalensis*	Spreading	++
9.	Convolvulaceae	Kalmilata	*Ipomoea aquatica*	Spreading	+++
10.	Nymphaceae	Shapla	*Numphaea nouchali*	RPFL	+++
11.	Nymphaceae	Padma	*Nelumbo nucifera*	RPFL	+++
12	Myrtaesae	Hizal	*Barringotonia acutangula*	RPFL	+

* (+++=Highest, ++ = Higher and += High) RPFL=Rooted plants with floating leaves

Fisher's also operated kata fishing by sein net (Ber jal and Komor jal) in the season of winter and spring. There are so many fish trap (vair, dugair, ghuni and pholo etc.) and hook and line (barshi, fulkuichi, Jhupi aikra etc.) were used to capture different groups of aquatic lives. In the Fig. 2, the percentage of catch statistics by using ber jal (moshari jal), current jal and FAD were 15.4%, 16.5%, 17.9%, 19.5% and 20.5%; 22.0%, 26.4%, 29.2%, 31.2% and 34.4%; and 9.4%, 10.2%, 10.4%, 11.2% and 11.7% within the year 2003, 2004, 2005, 2006 and 2007, respectively and using of current jal and ber jal (moshari jal) differed significantly (P<0.05).

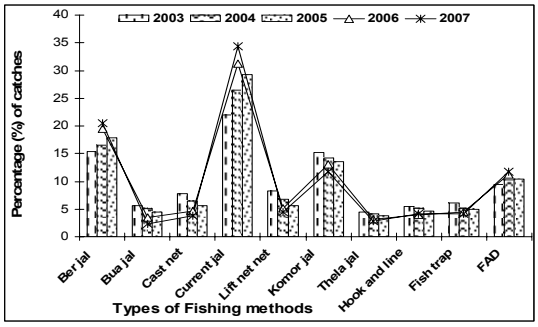

Fig. 2: Percent composition of catches by different types of fishing methods, 2003- 2007.

Catch statistics by using of komor jal were 15.2%, 14.20%, 13.50%, 13.10% and 11.70% in the year 2001, 2002, 2003, 2004 and 2005, respectively but using of komor jal was also differed significantly ($P<0.05$). Catch statistics by using of komor jal was decreased 15.20% to 11.70% between the years 2003 and 2007, respectively which is very similar study of Chakraborty and Azad, 2008.

Cast net (Jaki jal) fishing is a very popular fishing method and used whole year in the beel which is agreed by Ahmed, 1962. The catch statistics by using others gears, fish trap; and hook and line was decreased and differed significantly ($P<0.05$) in the different year. It was remarkable that fishing effort with fishing gear kaperi jal, current jal and FAD was increased in every year but using of illegal current jal was increased remarkably during study period. As a result, an average size and number of aquatic lives declined in the Medha beel, which is very similar to Haroon *et al*. (2002). He reported thirteen to eighteen types of fishing gears from the Sylhet and Mymensingh sub-basin. Sugunan and Bhattacharyya (2000) found a wide variety of fishing methods employed in the beels of Assam, India which are very similar to the present study.

Catch and composition

Estimation of catch and catch composition, an organized sampling programme was run for a long time to get an accurate picture of the catch and composition. The present investigation gave a wide picture of a stock of fishes that obtained through market and landing center survey and interaction with fishermen in the river. Fishing activity in the Medha beel was consisted 80 aquatic wild animals (70 species of wild fishes, four species of prawn, one species of crabs, one species of snails and four species of turtles) belonging to belonging to 23 families and 50 genera. The annual catch assessment of the river was around 105.31±5.28, 91.64±4.85, 79.68±4.39, 67.45±3.81 and 54.64±3.43 mt in the year 2003, 2004, 20005, 2006 and 2007, respectively consisting of 12 groups (Fig. 3). Small cat fish was the dominant group of the Medha beel in the year 2003 to 2007 and second highest production was recorded in group of small fish. The catches of all the groups of fishes, crabs, snails and reptiles were higher in 2003 but gradually lower catches was recorded in the year 2004, 2005, 2006 and 2007, respectively (Fig. 3). So, the total production of the beel was decreased 20.85%, 32.07%, 43.82% and 52.87% in the year 2003-04, 2004-05, 2005-06 and 2006-07, respectively (Fig. 4). Decreasing percentage of production in the experimental beel was very similar to the study of Moyle and Leidy, 1992. They found that worldwide 20% of all freshwater species are extinct, endangered or vulnerable.

The catch statistics of aquatic lives in the Medha beel is indicated that percentage of different group of aquatic lives was sharply decreased yearly which are very similar study of Chakraborty (2009); Chakraborty and Azad (2008); Chakraborty and Mirza, (2007). According to IUCN, 2000, indicators were used to identify the present status of the Medha beel. Commercial important major carps mohasseer (*Tot tor*), nandina, (*Labeo nandina*) were rarely found in the year of 2003. However, these species were extinct between 2004 and 2007. Local sarpunti (*Puntius sarana*), Gajar (*Channa marulius*) and Reptiles (*Kachuga tecta* and *Morenia petersi*) were rarely found in the year of 2003 to 2004, but these species were extinct (E) in the year 2005. Nine

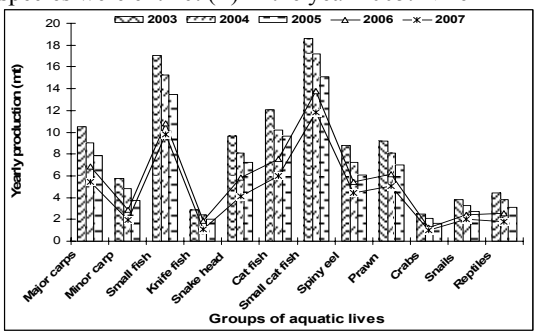

Fig. 3: The production of different groups of aquatic wild lives in the Medha beel decreasing between 2003 and 2007.

commercial importance aquatic species was facing as extremely higher risk of extinction (Critically endangered, CR) day-by-day. Thirty nine major commercial importance aquatic wild species of the beel was facing as extremely high risk of extinction (Endangered, EN), nineteen species were Vulnerable status (VL), five species were identified as Lower Risk (LR) and only two species was Not threatened (NO) position, respectively (Table 5).

Table 5: Status and distribution of aquatic lives of Medha beel

Sl No	Bengali and scientific name	Status indicator
1.	Mohasseer (*Tot tor*), Nandina, (*Labeo nandina*), Local sarpunti (*Puntius sarana*), Gajar (*Channa marulius*) and Reptiles (*Kachuga tecta* and *Morenia petersi*) =06	E
2.	Bata (*Labeo bata*), Laubuca (*Chela laubuca*), Bhagna (*Cirrhinus reba*), Dhela (Rohtee *cotio*), Baghair (*Bagarius yarrellii*), Gulsa (*Mystus cavasius*), Gang tengra (*Gagata nangra*) Modhu pabda (*Ompok pabda*), Pabda, *Ompok pabo* and Along (*Bengala elanga*) = 10	CR
3.	Catla, (*Catla catla*), Rui, (*Labeo rohita*), Mrigal (*Cirrhinus cirrhosus*), Kalbaus (*Labeo calbasu*), Ghonia (*Labeo gonius*), Mola (*Amblypharyngodon mola*), Chola punti (*Puntius chola*), Phutani punti (*Puntius phutunio*), Jat punti (*Puntius Sophore*), Fulchela (*Salmostoma phulo*), Khalisha (*Colisa fasciata*), Lal khailsha (*Colisa lalia*), Chuna Khalisha (*Colisa sota*), Kanpona (*Oryzias melastigma*), Mini (*Nundas nandus*), Rani/Botya (*Botia Dario*), Rani (*Botia dayi*), Kakila (*Xenentodon cancila*), Potka (*Tetrodon cutcutia*), Chitol (*Notopterus chitala*), Shol (*Channa striatus*), Koi (*Anabas testudineus*), Neftani (*Ctenops nobiilis*), Ayre (*Aorichthys aor*), Guzia (*Aorichthys seenghala*), Rita (*Rita rita*), Kani papda (*Ompok bimaculatus*), Kajuli (*Ailia coila*), Bacha (*Eutropiichthys vacha*), Gharua (*Clupisoma garua*), Magur (*Clarius batrachus*), Baim (*Mastacembalus armatus*), Kuicha (*Monopterus cuchia*) Tara Baim (*Macrognathus aral*), Galda isa (*Machrobrachium* rosenbergii), *Kakra* (*Stylla serrata*), Snail (*Lamellidens marginalis*) and Reptile (*Chiitra indica* and *Lissemys punctata*) =38	EN
4.	Taka punti (*Puntius conchonius*), Tit punti (*Puntius ticto*), Teri punti (*Puntius terio*), Darkina (*Esomus danricus*), Chapila (*Gadusia chapra*), Nama chanda (*Chanda nama*), Kata chanda (*Pseudambasis bacuculis*), Ranga chanda (*Pseudambasis ranga*), Baila (*Glossogobus giuris*), Gutum (*Lepidocephalus gontea*), Cheng (*Channa gachua*), Taki (*Channa punctatus*), Boal (*Wallago attu*), Tengra (*Mystus vitttus*), Batashi (*Pseudontropius atheronoides*), Singi (*Heteropneustes fossilis*), Guchi (*Macrognathus pancalus*), Gura chingri (*Machrobrachium birmanicum*) and Shotka chingri (*Machrobrachium malcolmsnii*) =19	VU
5.	Common carp (*Cyprinus carpio*), Silver carp (*Hypophthalmicichthys molitrix*), Grass carp (*Ctenopharyngodon idellus*), Foli (*Notopterus Notopterus*) and Bujuri (*Mystus tengra*) =05	LR
6.	Gkatakia chingri (*Machrobrachium villosimanus*) and Thi sarpunti (*Puntius gonionotus*) =02	NO

(Status code: E: Extinct, CR: Critically Endangered, EN- Endangered, VU-Vulnerable, LR- Lower risk, NO- Not threatened; Followed as per IUCN, 2000).

Commercial important six species were extinct between the year 2003 and 2007 which is more or less similar to IUCN, Bangladesh 1998. According to IUCN, Bangladesh about 56 freshwater fish species as critically or somewhat endangered. Due to over-exploitation and various ecological changes in natural aquatic ecosystem health of Medha beel, these commercial important aquatic species were in the verge of extinction, which was similar investigation of Sarker (1993). Fig. 5 shows the existing status of the 80 aquatic wild lives of the experimental beel was identified as 7% of the aquatic lives was extinct, 11% was critically endangered, 50% was endangered, 24% was vulnerable, 6% was lower risk and 2% was not threatened, respectively. The percentage of capture fishes, crabs, snail and reptiles were recorded highest status in 2003-04, where the capture was decreased between 2005 and 2006 and sharply decreased in 2007-08. Cyprinids percentage (%) of the experimental beel differed significantly ($P<0.05$) among the different years. During winter, turtles, *Morenia petersi* and *Kachuga tecta* were caught in the beel. Khan (1982) reported that *K. tecta* distributed between the Ganges River and the Brahmaputra River. Bengal Eyed turtle, *Morenia petersi* was found in the beel. Das (1991) mentioned its occurrence in Assam of India. Turtles of the experimental beel were declined because of degradation of its habitat for irrigation and destruction in its breeding ground and nesting sites. Over exploitation for local consumption

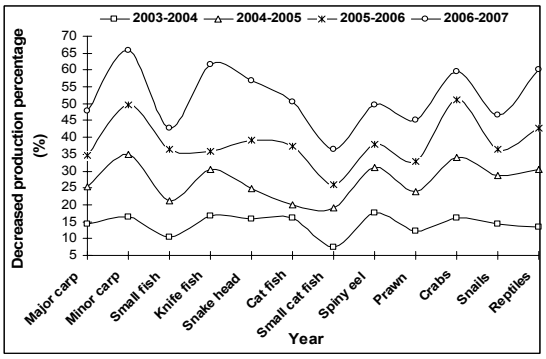

Fig. 4: The production percentage of aquatic wild lives (different groups) decreasing between 2003 and 2007.

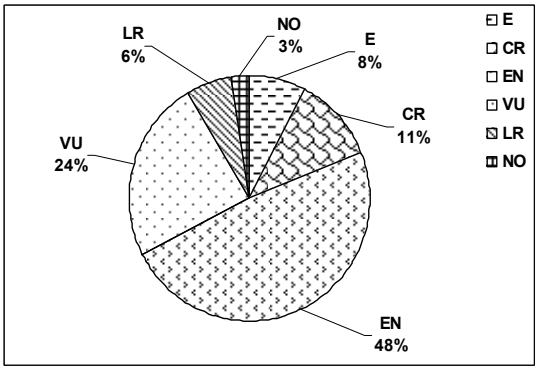

Fig. 5: Status and distribution of aquatic lives in the Medha beel.

and trade indiscriminately was possessed a threat to all species of turtles as well. Bivalve, *Lamellidens marginalis* of the Medha beel produce pink pearls which were sold for jewellery and production of lime was utilized in aquaculture and agriculture land and consumed with betel leaves and nuts which are agreed by Ali (1991). The study is clearly indicated that the aquatic lives of the beel were over exploited and poor generation was coming from poor brood fish and other aquatic lives stock between 2003 and 2007. In addition, aquatic ecosystem health is changing due to construction of flood control barrage, soil erosion, siltation and drainage structures and agro-chemicals. The genetic stock structure of aquatic populations was reduced due to pollution and destructive fishing practices. Indiscriminate killing of fish occurs due to the use of pesticides in improper doses, use of forbidden chemicals, aerial spray of chemicals was used for paddy field etc. As a result, the ecosystem health and biological diversity of the Medha beel was exhausted at an unprecedented rate (Chakraborty and Mirza, 2007). Intervention to control floods, adoption of new agricultural technologies and construction of road networks was changed the ecology of Medha beel significantly, which was similar investigation to Khan, 1993 and Ali, 1991. Stock of the wildlife broad fishes and other species in the breeding ground was suffered significant damages, resulting in a reduction of biodiversity as well as a decline in the socio-economic importance of Medha beel as a source of food and materials of livihood which was very similar investigation of Nishat, 1993 and Zaman, 1993.The action plan efforts for saving the stock of aquatic lives will be as develop community based co-management and management policy; declared as sanctuaries; stocking every year with fingerlings; enforcement of fishing rules: to prevent fishing with illegal net; prevention of killing brood fish and juveniles; Forbid unplanned digging and sedimentation; Ensure unplanned construction of flood control, embankments, drainage system and sluice gates, conversion of inundated land to cropland (reducing water area); and controlling use of pesticides and agrochemicals.

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REFERENCES

Ahmed, N. 1962. *Fishing Gear of East Pakistan*. Government of East Pakistan. Directorate of Fisheries, Dhaka. pp.37

Allendroff, F. W. 1988 . Conservation Biology of Fishes. *Conservation Biol.* **2**: 145 - 48.

Ali, M. Y. 1991 . Towards sustainable development: fisheries resources of Bangladesh International Union for Conservation of Nature and Natural Resources. *National Conservation Strategy of Bangladesh and Bangladesh Agricultural Research Council.* pp.96

Chakraborty, B. K. 2009. Aquatic biodiversity of Someswari and Nethai River and Gharia and Nidaya Beel of Northern Bangladesh. *In: Aquaculture Research Progress*, Takumi K. Nakamura (ed.).Nova Science Publishers, New York, USA. : 231- 68.

Chakraborty, B. K. and. Azad, S. A. 2008. Aquatic biodiversity of Khojani Shingua River in in northern *Bangladesh J. Env. Sci.* **14** : 96-103.

Chakraborty, B. K. and. Mirza, M. J. A. 2007. Aquatic biodiversity of Gharia Beel of Northern Bangladesh. *J. Crop Weed,* **3** : 23 - 34

Clesceri, L. S.; Greenberg, A. E and Trussell, R. R. 1989 . *Standard Methods of the Examination of Water and Wastewater* 17th ed., American Public Health Association, American Water Works Association and Water Pollution Control Federation, 1015 Washington D. C., USA, pp.10 - 203.

Crains, M. A. and Lackey, R. T. 1992 . Biodiversity and management of natural resources: *The Issues Fisheries.* **17** : 6 - 10.

Das, Indranil. 1991 . *Colour Guide to the Turtles and Tortoises of the Indian Sub continent*. R & A Publishing Ltd.

Dister E. 1990 . *Floodplain Protection in Central Europe.* World Wildlife Found (WWF) Institute of Floodplains Ecology Visiting Card 31/90, Germany.

Haroon, A. K. Y., Halder, G. C., Rahman, S. L, Razzaque, M. A; Alam, M. and Nurul Amin, S. M. 2002 . Sylhet-Mymensingh Basin Fish Stock Assessment. *Final Report. Bangladesh Fisheries Research Institute*, Reverine Station, Chandpur, Bangladesh pp. 81

IUCN, 1998 . List of threatened animals of Bangladesh. *Special Workshop on Bangladesh Red Book of Threatened Animals,* 22 February 1998, Dhaka, Bangldesh. pp.13

IUCN. 2000 . *Red book threatened Fishes.* The World Conservation Union, xii pp.+116

Khan, H. R. 1993 . *Water development activities* and their impacts on wetlands. P.23-32. *In*: *Freshwater wetlands Bangladesh: Issues and Approaches for management.* IUCN, Gland Switzerland. pp.23-32

Khan, M. A. R. 1982 . Chelonians of Bangladesh and their conservation, *J. Bombay Nat. Hist. Soc*. **79** : 110 - 16.

Mathew, P. W. 1975 . Limnology and productivity of Govindgarh Lake, Maddya Pradesh, India. *J. Inland Fish. Soc. India***, 11**: 16 - 24.

Moyle, P.L. and Leidy, R.A. 1992 . Loss of biodiversity in aquatic ecosystem: Evidence from Fish Fauna. *In*:. *Conservation of Biology: the Theory and Practice of Nature Conservation, Preservation and Management*. Fielder, P. L and H.L. Jani (eds).Chapman and Hall, New York, USA. 562 p.

Nishat, A. 1993 . Freshwater wetlands in Bangladesh: status and issues. pp. 9-22 *In*:. Freshwater wetlands in Bangladesh: Issues and Approaches for Management. Nishat, A., Hossain, Z., Roy, M. K., and Karim, A. (eds.)IUCN, Gland Switzerland. xii+283 p.

Noss, R.F. 1990 . A regional landscape approach to maintain diversity. *Bioscience* **33**: 700 - 806.

Saha, S. B., Gupta, M. V. and Sahabuddin, M. 1988 . Studies on the comparative efficacy of different fertilizers on the production of silver carp fry. *Bangladesh J. Fish*., **11**: 11 - 20.

Sarker, S. U. 1993 . Faunal diversity and their conservation in freshwater wetlands. In.: *Freshwater Wetlands in Bangladesh- Issues and Approaches for Management.* Nisat A., Hussain, Z., Roy, M. K.and karim, A. (eds.). IUCN, The world Conservation Union. pp 105 - 22.

Stirling, H. P. 1985 . *Chemical and Biological Methods of Water Analysis for Aquaculturist.* Institute of Aquaculture, University of Stirling, Scotland, UK. pp.119

Sugunan, V. V. and. Bhattacharjea, B. K. 2000 . *Ecology and Fisheries of Beels in Assam*. Bull. No. 104, CICFRI, Barrackpore, West Bengal pp.66

Zaman, S. M. H. 1993 . Agricultural development and sustainability of wetlands pp.63-178 *In*: *Freshwater wetlands in Bangladesh: Issues and Approaches for Management.* A. Nishat, Hossain, Z, Roy, M. K. and Karim, A. (eds.). IUCN, Gland Switzerland.

Zar, J. H. 1984 . *Biostatistics*. Prentice-Hall, Inc. Englewood Cliffs, New Jersey, USA. 718.