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# FISH BIODIVERSITY IN CHANDAGARI BEEL UNDER MITHAPUKUR UPAZILLA, RANGPUR, BANGLADESH

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***Abstract:*** **The present study was carried out to observe the fish biodiversity in Chandagari beel under Mithapukur upazilla, Rangpur, Bangladesh. It was continued during the period from May to August 2016. A definite structured questionnaire had used to collect the important data from sixty randomly selected temporary fishermen from the study areas. The present study had indicated the presence of 47 species of fish from the Chandagari beel. Among the recorded 47 species; fifteen species were abundant (31.91%), sixteen species common (34.04%), ten species less common (21.28%) and six species were rare (12.77%) respectively. Catfishes (19.15%) were the most dominant group followed by Carps (17.02%), Barbs (1064%), Perches (12.77%), Snakeheads (8.51%), Eels (6.38%), Minnows (2.13%), Clupeids (4.26%) and Miscellaneous (19.15%) respectively. In the study area species are classified into four types such as endanger (12.77%), vulnerable (6.38%), near threat (6.38%) and least concern (74.47%). This study will be very helpful to indicate areas of high fish biodiversity and to make fish sanctuary to reduce the loss of fish biodiversity in the Chandagari beel.**

***Keywords:*** **Fish Biodiversity, Chandagari beel, Reduction of biodiversity loss.**

## 1. INTRODUCTION

Bangladesh is an agricultural country (Banglapedia 2015). Agricultural is included as agriculture, fisheries, livestock Halim *et al*. (2017) Fisheries and aquaculture play a crucial role as a source of animal protein for billions of people worldwide and support the livelihoods of 10-12 % inhabitants in the world (FAO 2012). In 2011, global aquaculture production was increased to 62.7 from 59 million tons in 2010 of which 89% came from Asia where Bangladesh achieved 5th position (FAO 2012) which was replaced by 4th position through advancement in 2013 (FAO 2014). Demand for fish is leaping with the population increase in Bangladesh for the last three decades ((FAO 2012) which has increased the land use competition between agricultural crop production and fish farming Ahmed and Garnett (2011). Bangladesh is blessed with a vast extensive water resources in the form of ponds, natural depressions (*haors* and *beels*), lakes, canals, rivers and estuaries covering an area of 4.56 million ha and 2,640 sq nautical miles area in Bay of Bengal (DoF 2011). The country is represented by the great combined delta and flood plains crisscrossed by numerous rivers and their tributaries. In Bangladesh, total fish production has increased about 1.5 folds in 10 years, from just over 24,40,011 metric tons in 2006-07 to 36,84,245 metric tons in 2014-2015 (DoF 2015). About 6 million peoples are directly or indirectly engage in this

sector (DoF 2015. The 'Beel' is a term, used for large surface water body that accumulates surface runoff water through internal drainage channel (Banglapedia 2004). A large portion of rural family members are engaged in fishing from the beels and other open water bodies. Beels are large surface water bodies that accumulate surface runoff water through internal drainage channels; these depressions are mostly topographic lows produced by erosions and are seen all over the country. Bangladesh has a total of about 4,500 beels covering an area of about 1,14,161 ha which is 2.91% of total inland water bodies (DoF 2015). These provide nearly 2.51% of total inland fish production. The overall production of beels is about 88,911 mt which is rather low. Total area of Chandagari beel is 60 acres. Average fish production is 20.90 mt approximately. About 47 different species fish have been found in this beel similar to (Halim *el al*., 2017; Raushon *el al*., 2017 and Majumder *el al*., 2017) Bangladesh ranked third in Asia, with approximately 260 indigenous fresh water species with 143 small indigenous species Rahman (2005). The inland aquatic habitats of Bangladesh are rich in faunal biodiversity containing at least 265 species of finfish, 63 species of prawn, several species of turtles, tortoises, freshwater mussels and other living aquatic organisms Rahman *et al*. (1998). Fish biodiversity has been degraded due to many reasons such as overfishing, aquaculture practice, exotic species, habitat loss and degradation, segmentation, pollution, alterations to hydrology, dredging etc. thus the availability of our indigenous freshwater fish species have declined to a great extent over the years and many of them are either rare or at the verge of extinction Halim *et al*. (2017). Among the 260 freshwater fish species 54 are threatened in Bangladesh (IUCN Bangladesh 2000). Chandagari beel has a great contribution to remove rural poverty and to supply food to the poor fishing community. Considering the above these facts, the present study was carried out to assess fish biodiversity in this beel.

## 2. MATERIALS AND METHODS

The study was carried out in Chandagari beel under Mithapukur upazilla in Rangpur district during period from May to August 2016. In the study, a total of 60 fishermen (temporary) were randomly selected from two villages (Mokrompur-40 and Zadbpur-20) surrounding the beel. At first, primary information was collected from Senior Upazila Fisheries Officer, Mithapukur regarding the fish biodiversity and fish availability in Chandagari beel. During collection of data, both primary and secondary sources were considered. For the study a combination of interview schedule, participatory rural appraisal (PRA) tool such as, focus group discussion (FGD), social mapping and cross interviews with key informants were used for fishermen. The collected data were summarized and processed for analysis by using MS Excel and SPSS-20 version. Tables, graph had been used for data presentation.

## 3. RESULTS

A variety of fishes which comprising of 47 species were recorded at Chandagari beel described by catfishes, carps, snakehead, perch, eels, barbs and minnows, clupeids and other miscellaneous species which are described below.

### 3.1 Catfishes:

Nine species of catfish (19.15%) were recorded in study areas during the period of investigation (Table 3.1).

### 3.2 Carps:

During the period of present investigation eight species of carps (17.02%) were recorded (Table 3.2).

### 3.3 Snakehead:

Four species of snakehead (8.51%) were recorded during study period (Table 3.3).

### 3.4 Perches:

In case of perch six species of perches (12.77%) were recorded (Table 3.4).

### 3.5 Eels:

Three species of eels (6.38%) including guchi baim (*Macrognathus pancalus*), tara baim (*Macrognathus aculeatus*) and lal baim (*Macrognathus armatus)* were abundantly found (Table 3.5).

### 3.6 Barbs and minnows:

During study period five species of barbs (10.64%) and one species of minnows (2.13%) were found (Table 3.6).

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**3.7 Clupeids:**

In case of clupeids, two species (4.26%) fish were found in the study areas (Table 3.7).

**3.8 Miscellaneous:**

Nine other miscellaneous (19.15%) fish species (Table 3.8) were recorded during study period.

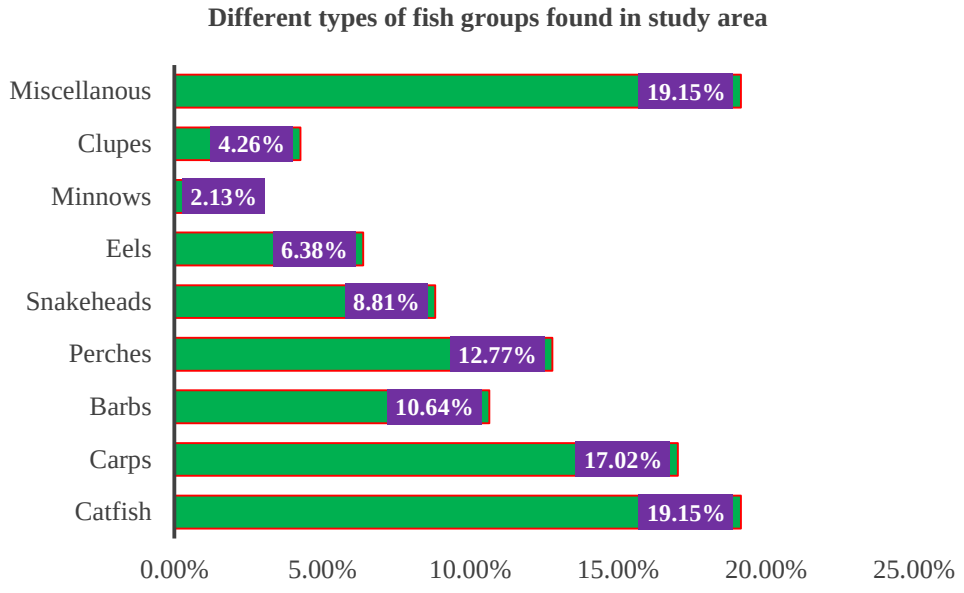


**Fig 3.1: Different types of fish groups recorded during the period of study**

According to their availability, all the species were classified into four types such as abundant, common, less common and rare (Fig: 3.2).

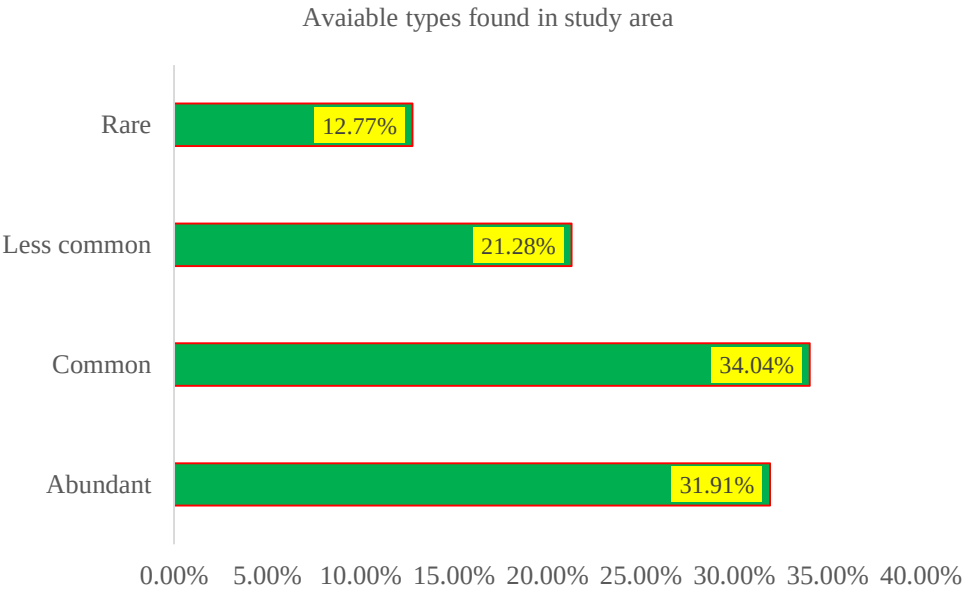


**Fig 3.2: Available types found in study area**

According to IUCN (2015 a, b) Species are classified a. Extinct (EX), b. Extinct in the wild, c. Threatened (1. Critically endanger, 2. Endanger and 3. Vulnerable), d. Near threatened, e. Least concern, f. Data deficient and g. Not evaluate. In the study area species are classified into four types such as endanger (12.77%), vulnerable (6.38%), near threat (6.38%) and Least concern (74.47%) (Table 3.3).

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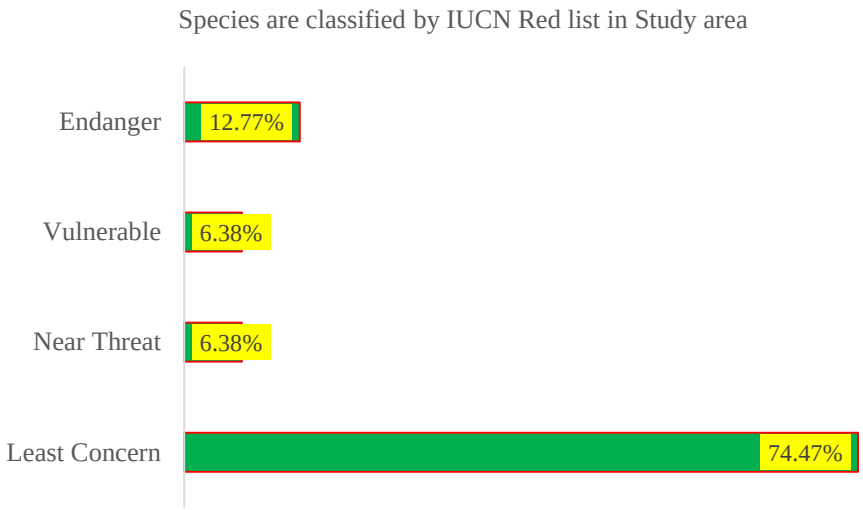


**Fig 3.3: Species are classified by IUCN Red list.**

**TABLE 3.1: A LIST OF CATFISHES AS RECODED DURING THE PERIOD OF PRESENT STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Bagridae | Long bled catfish | *Mystus tengra* | Less common | Least Concern |
| 2 | Bagridae | Rita | *Rita rita* | Rare | Endanger |
| 3 | Bagridae | Striped dwarf catfish | *Mystus vittatus* | Less common | Least Concern |
| 4 | Bagridae | Long whiskered catfish | *Mystus aor* | Rare | Least Concern |
| 5 | Clariidae | Walking catfish | *Clarius batrachus* | Common | Least Concern |
| 6 | Heteropneustidae | Stinging catfish | *Heteropneustes fossilis* | Common | Least Concern |
| 7 | Schilbeidae | Gharua bachcha | *Clupisoma garua* | Less common | Endanger |
| 8 | Schilbeidae | River catfish | *Eutropiichthys vacha* | Rare | Least Concern |
| 9 | Siluridae | Freshwater shark | *Wallago attu* | Common | Vulnerable |

**TABLE 3.2: A LIST OF CARP SPECIES AS RECORDED DURING THE PERIOD OF STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Cyprinidae | Indian major carp | *Labeo rohita* | Abundant | Least Concern |
| 2 | Cyprinidae | Common carp | *Cyprinus carpio* | Common | Least Concern |
| 3 | Cyprinidae | Black rohu | *Labeo calbasu* | Common | Least Concern |
| 4 | Cyprinidae | Silver carp | *Hypophthalmict-hys molitrix* | Common | Least Concern |
| 5 | Cyprinidae | Indian major carp | *Catla catla* | Abundant | Least Concern |
| 6 | Cyprinidae | Indian major carp | *Cirrhinus cirrhosus* | Common | Near Threat |
| 7 | Cyprinidae | Minor carp | *Labeo bata* | Common | Least Concern |
| 8 | Cyprinidae | Reba | *Cirrhinus reba* | Less common | Near Threat |

**TABLE 3.3: A LIST OF SNAKEHEADS AS RECORDED DURING THE PERIOD OF STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Channidae | Snakehead murrel | *Channa striatus* | Common | Least Concern |
| 2 | Channidae | Spotted snakehead | *Channa punctatus* | Abundant | Least Concern |
| 3 | Channidae | Asiatic snakehead | *Channa orientalis* | Common | Least Concern |
| 4 | Channidae | Giant snakehead | *Channa marulius* | Less Common | Endanger |

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**TABLE 3.4: A LIST OF PERCH SPECIES AS RECORDED DURING THE PERIOD OF STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Anabantidae | Striped gourami | *Colisa fasciatus* | Common | Least Concern |
| 2 | Anabantidae | Honey gourami | *Colisa chuno* | Less common | Least Concern |
| 3 | Anabantidae | Climbing perch | *Anabas testudineus* | Abundant | Least Concern |
| 4 | Centropomidae | Round glass perchlet | *Chanda baculis* | Common | Least Concern |
| 5 | Centropomidae | Indian glass perchlet | *Chanda ranga* | Less common | Least Concern |
| 6 | Centropomidae | Elongated glass perchlet | *Chanda nama* | Less common | Least Concern |

**TABLE 3.5: A LIST OF EEL SPECIES AS RECODED DURING THE PERIOD OF PRESENT STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Mastacembelidae | Striped spiny eel | *Macrognathus pancalus* | Abundant | Least Concern |
| 2 | Mastacembelidae | One-Striped spiny eel | *Macrognathus aculeatus* | Abundant | Near Threat |
| 3 | Mastacembelidae | Tire-track striped spiny eel | *Macrognathus armatus* | Abundant | Endanger |

**TABLE 3.6: A LIST OF BARBS AND MINNOWS AS RECODED DURING THE PERIOD OF STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Cyprinidae | Barb | *Amblypharyngodon mola* | Abundant | Least Concern |
| 2 | Cyprinidae | Barb | *Rohtee cotio* | Abundant | Least Concern |
| 3 | Cyprinidae | Spot fin swamp barb | *Puntius sophore* | Common | Least Concern |
| 4 | Cyprinidae | Fire-fin barb | *Puntius ticto* | Abundant | Least Concern |
| 5 | Cyprinidae | Barb | *Puntius sarana* | Abundant | Least Concern |
| 6 | Cyprinodontidae | Top minnow | *Esomus danricus* | Abundant | Least Concern |

**TABLE 3.7: A LIST OF CLUPEID FISH SPECIES AS RECORDED DURING THE PERIOD OF STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Clupeidae | Ganga river sprat | *Corica soborna* | Rare | Least Concern |
| 2 | Clupeidae | Indian river shad | *Gaduasia chapra* | Rare | Vulnerable |

**TABLE 3.8: A LIST OF MISCELLANEOUS FISH SPECIES AS RECORDED DURING THE PERIOD OF STUDY**

| SI No. | Family | Common name | Scientific name | As Survey report | As IUCN (2015a, b) |
|---|---|---|---|---|---|
| 1 | Belonidae | Freshwater gar fish | *Xenentodon cancila* | Common | Least Concern |
| 2 | Cobitidae | Bengal loach | *Botia Dario* | Rare | Endanger |
| 3 | Cobitidae | Guntea loach | *Lepidocephalus guntea* | Abundant | Vulnerable |
| 4 | Gobiidae | Bar-eyed goby | *Glossogobious giuris* | Abundant | Least Concern |
| 5 | Notopteridae | Humped feather back | *Notopterus chitala* | Less Common | Endanger |
| 6 | Palaemonidae | River prawn | *Macrobrachium daganum* | Less common | Least Concern |
| 7 | Palaemonidae | Monsoon river prawn | *Macrobrachium lumarre* | Abundant | Least Concern |
| 8 | Tetraodontidae | Ocellated puffer fish | *Tetraodon cutcuttia* | Rare | Least Concern |
| 9 | Palaemonidae | Freshwater prawn | *Macrobacium rogenbergii* | Common | Least Concern |

## 4. DISCUSSION

Bangladesh having vast and diversified water resources of 4.34 million ha is unique in term of valuable wetland ecosystem and associated aquatic biodiversity ranking third in Asia with approximately 260 indigenous fresh water species Rahman (2005). During the period of study 47 species of the fish fauna were recorded. Among them, 9 catfishes, 8 species of carps, 4 species of snakeheads, 6 species of perches, 3 species of eels, 5 species of barbs, 1 species of minnows, 2 species of clupeid species, and other miscellaneous 9 species were found in varying level of abundance similar to Halim *et al*. (2017). According to the abundance of fish species, they were categorized into 4 groups like, abundant (31.91%), common (34.04%), less common (21.28%) and rare (12.77%) similar to Halim *et al*. (2017). Among 47 species the highest numbers of fishes were catfish (19.15%) and the lowest (2.13%) were minnows. A total of 68 species recorded of fish in water bodies of Itna, Kishoregonj Sakawat (2002). A total of 54 species recorded of fish in water bodies of Kafrikhal beel Halim *et al*. (2017) similarly 52 species were found in shorupdah beel, Manirumpur, Jessore Majumder *et al*. (2017) and 55 species were found in the the old Brahmaputra river, Mymensingh Raushon,*et al.* (2017). A total number of 70 species of fishes were identified so far from the Gharia Beel Chakraborty and Mirza (2007). A total number of 40 species of fish including three exotic species from Chanda Beel Ehshan *et al. (*2000). About 260 species of freshwater fish recorded belonging to 55 families in Bangladesh Rahman *et al.* (1998). Rana (2003) recorded 101 species of fish from the Baral beel under Chalan beel flood plain system in Rajshahi reagion. Nishat *et al*. (2005) conducted a survey in the Nail beel and identified a total of 79 fish species including 38 rare species. This was because only the observed fishes were recorded. The regular presence of freshwater catfish recorded belonging to the family Siluridae in the beels, haor, baors, flooded water bodies, ponds, streams and rivers of Bangladesh Siddique (2001). Carps (6.38%) were the valuable fish in Chandagari beel. A total of 92 species of fish and prawn identified from Sylhet-Mymensingh sub-basins Haroon (2002). A total of 14 species of non-resident fish and resident species identified which 30 were common, 9 rare and 5 highly endangered in Pirla beel under Netrokona district Siddique (2001). A list of 106 fish species published belonging to 68 genera from the district of Mymensingh and Tangail Doha (1973). About 105 fish species recorded from Chalan beel Ahsan (2008). There were some rare species which were very incidentally or occasionally available, such as- *Botia dario, Clupisoma garua, Puntius ticto, Osteobramaa cotio* etc. Once upon a time, small fishes were abundant in the rivers, *beels, jheels*, canals, streams, ponds etc. in Bangladesh Ahsan (2008); Jhingran and Talwar (1991); Shafi and Quddus (1982). In the study area 47 species are classified into four types such as endanger (12.77%), vulnerable (6.38%), near threat (6.38%) and Least concern (74.47%). Ahsan (2008) recorded a total of 105 fish species where 45 where threatened including 25 endangered, 14 vulnerable and 6 critically endangered fish species in the Chalan beel. Sayeed (2010) reported 106 species of fishes belonging to 10 orders, 31 families and 71 genera including critically endangered (6), endangered (20), vulnerable (10) and threatened (18) from Chalan beel. But now-a-days, these species of fish are going to be disappeared despite of their ability to reproduce naturally due to environmental degradation. Fish habitat destruction by roads, embankments, drainage and flood control, and natural siltation along with over-fishing, have been commonly cited as causes of the deterioration of the country's resources Ali (1997) and Hughes (1994).

## 5. CONCLUSION

Chandagari beel has a rich fish biodiversity. But now a days it has been faced large threat due to huge fishing pressure, overfishing, environmental pollution, siltation, urbanization and human intervention. All these threat have been created a great impact on beel ecology and ecosystem. As a result, the water quality is deteriorating day by day and the availability of fish species and another aquatic biodiversity is decreasing gradually. The complete drying up in many parts of this beel is a common scenario during lean season, which is detrimental to fish populations and ecosystem. The findings of the study will be applicable to the management of this beel. Our govt. should take proper steps to save fish biodiversity in this beel. People in adjacent areas should awareness. Moreover, the findings will to be useful to students, researchers and policy makers.

## REFERENCES

[1] Ali, M.Y. 1997. Small indigenous fish species culture in Bangladesh, proceedings of national workshop on small indigenous fish culture in Bangladesh, IFADEP-SP, Dhaka. Bangladesh, 1997.

[2] Ahsan, M.R.U. 2008. A study of fish biodiversity and marketing system in Chalan beel. MS thesis, Department of fisheries biology & genetics, Bangladesh Agricultural University, Mymensingh.

[3] Ahmed, N and Garnett, S.T.2011. Integrated rice-fish farming in Bangladesh. Meeting the challenges of food security. *Food Security*. 3(1): 81-92. http://dx.DOI.org/10.1007/S12571-011-0113-8.

[4] Banglapedia 2004. National encyclopedia of Bangladesh. Asiatic society of Bangladesh, 1st edition February, Dhaka, Bangladesh.

[5] Banglapedia 2015. National Encyclopedia of Bangladesh, Asiatic Society of Bangladesh, 1st Edition February, 2012, Dhaka, Bangladesh. Available from url:www.Banglapedia.org. [Accessed February 07, 2015].

[6] Chakrobarty, B. K. and Mirza, M. J. A. 2007. Study of aquatic biodiversity of Gharia Beel of Bangladesh, West Bengal India, West Bengal science society. *Journal of crop and weed*. 3: 23- 24.

[7] DoF (Department of Fisheries) 2011. Sangkalan (In Bangla). Ministry of fisheries and livestock. National fish week 2011. Published by director general, department of Fisheries, Dhaka.

[8] DoF (Department of Fisheries). Matsya Sankalan, annual report. Ministry of fisheries and livestock. The Government of Peoples Republic of Bangladesh, Dhaka, 129. (In Bengali).

[9] Doha, S. 1973. Fishes of the districts of Mymensingh and Tangail. *Bangladesh Journal of Zoology*. 1: 1-10.

[10] FAO 2012. The State of world fisheries and aquaculture. Food and Agriculture Organization of the United Nations, Rome, Italy.

[11] FAO 2014. The state of world fisheries and aquaculture. Food and Agriculture Organization of the United Nations, Rome, Italy.

[12] Ehasan, M. A., Hossain, M.S., Razzaque, A. and Alam, M.S. 2000. A usual but important fishing of Chanda Beel. *Bangladesh Journal of Zoology*. 28: 69-74.

[13] Hughes, R., Adnan, S. and Dalal, C.B. 1994. International institute for environment and development. Research and advisory services, London.

[14] Haroon, A.K.Y., Halder, G.C., Rahman, S.C., Razzaque, M.A., Alam, M. and Amin, N.S.M. 2002. Sylhet Mymensingh basin fish stock assignment. Final report. BFRI Riverine Station. Chandpur-3602, Bangladesh, 81 pp.

[15] Halim, M.A., Salam, M.A. and Hossain, M.S. 2017. Fish biodiversity in Kafrikhal *beel* under Mithapukur Upazila, Rangpur, Bangladesh. *International Journal of Fisheries and Aquatic Studies*. 5(2): 487-491.

[16] IUCN Bangladesh. Red book of threatened fishes of Bangladesh. Islam, M.A., Ameen, M. and Nishat, A. (Eds.). The world conservation union, Dhaka, Bangladesh, 2000.

[17] IUCN Bangladesh 2015a. Red list of Bangladesh: A brief on assessment result 2015. IUCN, International Union for Conservation of nature, Bangladesh. Country office Dhaka Bangladesh, 24 pp.

[18] IUCN Bangladesh 2015b. Red list of Bangladesh volume 5: Freshwater fishes. IUCN, International Union for Conservation of nature, Bangladesh. Country office Dhaka Bangladesh, pp xvi+360.

[19] Jhingran, A.G. and Talwar, P.K. 1991. Inland fisheries of India and adjacent countries. Oxford and IBH publishing co. pvt. ltd. Calcatta. 1: 541 pp.

[20] Majumder, L., Riar, M. G. S., Raushon, N. A., Soniya, S. and Mondal, R. P. 2017. Biodiversity of shorupdah beel, Manirumpur, Jessore. *Journal of Bioscience and Agriculture Research*. 13(02): 1116-1121.

[21] Nishat, I., Khan, M.H. and Molla, A.R. 2005. Restoration and suitable management of fish resources of Nail Beel in Kapasia: A Participatory ecosystem approach, Jatia Matsha Pakkha, 24pp.

[22] Rahman. 1998. Women's participation in aquaculture and fisheries for poverty alleviation in Bangladesh: Proshika's experience", *5th Asian fisheries forum for international conference on fisheries and food security beyond the year 2000*, Chiang Mai, 11-14 November Thailand.

[23] Rahman, A.K.A. 2005. Freshwater fishes of Bangladesh. *Zoological Society of Bangladesh*, Dhaka. 86-87 pp.

[24] Rana, R. 2003. Utilization of aquatic resources and livelihood strategies of the fishing communities around the Baral beel in Sirajgong district. MS Thesis, Department of Zoology Rajshahi University, 157pp.

[25] Raushon, N. A., Riar, M. G., Soniya, S., Mondal, R. P. and Haq, M. S. 2017. Fish biodiversity of the old Brahmaputra river, Mymensingh. *Journal of Bioscience and Agriculture Research*. 13(01): 1109-1115.

[26] Shafi, M. and Quddus, M.M.A. 1982. Bangladesher Mathsya Shampad (Fisheries of Bangladesh). (In Bengali). Bangla Academy, Dhaka, 444 pp.

[27] Siddique, M.A. 2001. A study on socio-economic status of fishermen and fish marketing system in Mymensingh district, Bangladesh. MS thesis, Department of Fisheries Management, Bangladesh Agricultural University, Mymensingh, 66pp.

[28] Sakawat, H.B. 2002. Haor fisheries resources in Itna Upazila under the district of Kishoregonj and their management practices. M.S thesis, Department of Fisheries Management, BAU, Mymensingh, 48 pp.

[29] Sayeed, M.A. 2010. Fish biodiversity in the chalan beel, a natural depression in North West Bangladesh, PhD Thesis, Department of Fisheries Biology and Genetics, BAU, Mymensingh.