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Abundance of Pisces and Status of Water of mathabhanga-Churni River in Indo-Bangla Border Region.

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ABSTRACT

Measurement of water quality parameters plays a vital role in determining the pollutional load and correctness of a particular water body for aquatic organisms. The present investigations was carried out to measure the physiochemical parameters of Mathabhanga- Churni river in Indo-Bangla Border region to assess the pollution status for a period of one year from June 2012-to May 2013. The calculated physiochemical parameters revealed that the average ranges of Temperature, pH, DO, BOD, COD, Hardness, Alkalinity, Nitrate, Organic carbon and Freeco2 were 33.150c and 19.260c, 8.4 and 6.4, 5.1mg/l and 0.88mg/l, 46mg/l and 2.04mg/l, 420mg/l and 250mg/l, 660mg/l and 322mg/l, 560mg/l 380, 95mg/l and0.99 mg/l, 54mg/l and 16.4mg/l, 22mg/l and 05mg/l respectively. The results obtained from study showed that the measured parameters exhibit a great seasonal variation in different months of the year during the investigation and showed great difference in standard criteria of water quality indicates huge pollution effect on aquatic organisms especially on fish faunal diversity.33 fishes were identified during the investigation from one year and most of the species were carps and cat fishes. Labeo rohita, Cirrhina mrigala, Catla catla are dominant among carps and Heteropneustus fossilis,Clarius batrachus,Notopterus notopterus, Mystus cavasius, Mystus vitatus are most common among the cat fishes. Eutopiictys vacha, Puntius sophore, Notopterus chitala,Corica saborna and Gudusia chapra, Rita rita are rarely found during investigation. The river faces a great ecological threat affecting the fish diversity. Some protecting measure should be taken to combat water pollution in order to save the valuable natural resources.

KEYWORDS : Mathabhanga Churni, Physicochemical parameters,pollution load, fish fauna.

Introduction:

River Mathabhanga- Churni is a very important river in Bangadesh and India especially Chuadnga district in Bangladesh and Nadia district in India. It is the tributaries in Ganges Padma river system, one of the major river system in Bangladesh. It originates in Bangladesh territory by leaving the main channel of the Ganges about 16 kilometers below the divergences. The river divides into two after reaching Krishnaganj, Nadia district of West Bengal. The eastern branch is known as Ichamoti River and the western is known as Churni River. The river has a great economic importance in sociological, environmental and economical aspects.It is the major source of surface water in this region and plays an important role in maintaining agriculture, fish production and livelihood of the fishermen. This river is believed to be an important spawning and breeding ground in reverine fishes. But recently, the river has lost her productivity due to unplanned development, rapid urbanization, huge siltation, encroachment, indiscriminate use of agrochemicals, domestic sewage and industrial effluents, chemical fertilizer etc. The aquatic environment of this river particularly low riparian areas are seriously polluted causes a great ecological imbalance. As a result fish and other aquatic organisms face a threat in last 20 or 30 years, a large number of fish species are locally extinct or eliminated affected the livelihood of the fisherman and local people deprived of their daily protein intake. The south Asian countries have 2800km^3/year estimated fresh water resources collectively(Gleick,1980).But withdrawl of fresh water for agriculture and industrial purpose is highest in India estimated as 380km^3/year and Bangladesh is only 22km^3 per /year(Subramanium,V.2004).

Ghosh and Konar(1991) studied that fish faunal diversity has been decreased alarmingly in Churni river due to anthropogenic activities particularly sugar mill and wine factory effluents in Darsana, Chuadanga, Bangladesh. Das and Chakraborty(2007) reported that 63.6% of total fish species are apparently eliminated in Churni River since 1983. Rapid urbanization is the main cause of Water pollution(DoE 2001.) the surface water of the rivers of Bangladesh are deteriorating day by day(DoE,1993, Hossain2001).the optimum water quality parameters are essential for the growth of aquatic plants and animals. The physical factors play an important role in maintaining the productivity of the aquatic body. But chemical factor like BOD and COD indicates the pollutional status of the water body(Sabbir etal 2010). The productivity of an aquatic body depends on its physiochemical status which may be used as tropic level and the potentiality of fisheries. .Life of an aquatic ecosystem depends on by physiochemical condition and constant situation of water.

The aim of the study is to emphasize the pollutional load for water quality parameters assessment and to fish faunal diversity in relation to the consequence of water.

Materials and Methods:

Survey and samplings were conducted during the twelve months period from October 2012 to September 2013.Six sites were selected (table-1) for investigation during the study period.

Table 1: List of sampling sites

Serial no	Name of the sites	Location
S1	Damurhuda	Bangladesh
S2	Darsana	Bangladeesh
S3	Zero point,	Indian Bangla Border
S4	Halderpara BSF camp	India
S5	Pirpur	India
S6	Krishnaganj (Shibnibus)	India

Water samples were collected at regular intervals at 11 am in the morning and 5 pm in the evening using BOD sampler bottle for laboratory test. Water temperature, pH, DO

and Alkalinity were measured on the spot. Mercury thermometer was used to measure temperature. Hanna pHEP was used to calculate PH, Rest of the parameters was measured in the laboratory using standard methods described by APHA(1989).

The fishes were collected from the fishermen of different points of the river. Local fish market visits and collection of fishes were also done at a regular interval of 15 days. The collected specimens were identified preliminary on the spot according to the taxonomic keys. The commonly available specimens were easily identified on the spot and delivered back to the fishermen. Those specimens were only brought to the laboratory which was difficult to identify on the spot. Identifications are made with the help of taxonomic key viz., taxonomic key by Rahaman (2005), and several books viz., Bhuiyan (1964), Talwar and Jhingran (1991) etc. Most of the identified specimens were preserved in 5-10% formalin and kept in the laboratory. Before preservation, a photograph was also taken for further indoor research purposes.

Result and Discussion:

The measured water quality parameters are presented in table 2.The present investigation shows highest temperature33.15 in May due to summer and lowest in January due to cold weather.The ranges of temperature of the Mathabhanga-Churni river was found suitable for aquatic species in comparison to national standard of 20-30° c(Bhaumik etal,2010 and Sabbir etal, 2010) The ranges of measured pH was 6.4 to 8.4. The minimum value was observed in the months of June to September indicates acidic in nature(below7) principally attributed to rain. Rest of the months of the year(postmonsoon,Oct-January and premonsoon, Feb-May) the river water was alkaline(above7) due to low free co^2 ,high temperature, high alkalinity, and high dumping rate at different Points. Lower levels of DO was recorded in December to February with range of 0.82 to 1.65 because the river is almost dry up and huge industrial wastes discharged from Sugar mill and wine factory, agricultural waste, runoff nutrients. This finding was similar to Rahman etal 2012.No animal can survive in the less concentration of DO. Sufficient DO is essential for the growth and reproduction of aquatic organisms(Dara etal2002, Islam etal 2010andRahman etal2012). The observed BOD values ranges from 2.04 in April and 4.46 in February. The deviation of BOD values is due to high dumping rate at different sites and low volume of water. The standard value of BOD for the purpose of drinking is 0.2mg/l and for the purpose of sewage effluents20mg/l(Sabbir etal2010.Jalil and Njiru 2010). The observed high COD value was420mg/l in March and Lowest 250mg/l in October. Compared to the values of standard criteria eg. 4mg/l is for drinking and 180-270 mg/l for bathing, so the river water was completely unsuitable for domestic use.

Table2: Seasonal variation of water quality parameters in River Mathabhanga-Churni during June 2011 to May 2012.

Parameters	June	July	Aug	Sept	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May
Temperature	30.54±0.92	29.12±0.65	30.85±0.47	29.68±0.23	28.76±0.13	26.32±0.45	23.24±0.166	19.26 ±0.58	20.99 ±1.38	25.55 ±1.76	28.49 ±1.52	33.15 ±1.69
pH	6.7±0.12	6.6±0.11	6.4±0.14	6.7±0.13	7.7±0.81	7.7±0.77	7.9±0.21	7.9±0.18	8±0.37	8.2±0.25	8.4±0.27	8.1±0.47
DO(mg/l)	3.94±0.12	3.75±0.07	4.06±0.26	4.5±0.10	4.32±035	4.33±0.11	1.65±0.18	1.31±0.09	0.82±0.03	5.01±0.05	4.95±0.13	4.87±0.31
B.O.D.(mg/l)	3.45±0.10	3.12±0.11	2.85±0.06	3.79±0.13	4.01±0.02	3.69±0.17	3.62±0.11	3.36±0.05	4.46±0.96	3.81±0.19	2.04±0.07	3.45±0.18
COD(mg/)	248±26.99	280±9,09	340±6.54	360±3.97	250±21.90	300±32.22	300±7.76	360±19.87	380±13.05	420±41.23	354±11.15	284±5.31
Total Hardness (mg/l)	660±20.85	426±12.04	418±5.87	356±9.76	336±30.82	322±9.09	460±21.77	308±21.79	360±5.68	376±23.12	412±18.03	600±35.98
Alkalinity (mg/l)	380±23.02	384±15.64	408±19.35	408±17.42	448±22.72	432±13.92	460±17.85	435.14±17,56	468±35,92	484±39.65	512±85.73	560±50.02
Nitrate (mg/l)	1.95±0.02	1.83±0.01	1.79±0.07	1.82±0.09	1.73±0.01	1.63±0.03	1.12±0.04	1.07±0.003	0.99±0.07	1.45±0.03	1.02±0.05	0.95±0.06
Organic carbon (mg/l)	35±1.67	49.2±0.63	45±0.51	43±0.74	24±0.62	30±1.03	18±0.77	19.6±0.35	49.2±0.97	16.4±0.51	27±0.68	54±1.07
Free Co_2 (mg/l)	12±0.62	16±0.33	12±0.51	18±0.06	10±0.70	8±0.12	5±0.43	16±0.97	14±0.42	19±0.09	22±1.01	12±0.69

The Highest value of Hardness was 660mg/l in June and lowest value 322mg/l in October obviously exceeds the standard limit 123mg/l (Islam etal 2012).The reason for increasing in total Hardness is due to increase photosynthetic activity , free co_2 is utilized and bicarbonates are transformed to carbonates (Reid and Wood,1976). The Hardness value of 50mg/l is good for fish harvesting (Swingle). Highest value of Alkalinity 560 mg/l in June and lowest380 mg/l in winter, the main reason for the presence of high value is due to high rate of degradation of waste material. So water is totally unsuitable for fish cultivation..Rich concentration of Nitrate was recorded maximum 1.95mg/l in June and lowest in May0.95mg/l. The main cause for rich content of No_3-N is due to heavy agricultural practices by the riverside and fertilizer like phosphate and nitrates enters into water body by surface runoff resulting high plankton bloom lowers the concentration of DO. The standard value of nitrate is below0.25mg/l and the obtained results exceed the standard value as a result water is highly toxic aquatic animals (Hoq 2008). Highest organic carbon was inMay-54mg/l and lowest in March16.4 mg/l. The deviation of the obtained result was due to dumping of various domestic and industrial sewage. The presence of high value of free co_2 is due to the excessive rate of photosynthesis, lowers the level of DO. Low temperature and low rainfall are also responsible for the presence of high free co_2. Availability of excessive free co_2 hampered the rate of respiration in fishes.

Table 3: List of different fishes was identified during the study period from June 2011 to May 2012

Serial no.	Common name	Scientific name	Status
01	Ruhu	Labeo rohita (Hamilton)	+++
02	Bata	Labeo bata (Hamilton)	+++
03	Kalibaus	Labeo calibasu (Hamilton)	+++
04	Mrigal	Cirrhinus mrigala(Hamilton)	+++
05	Catla	Catla catla (Hamilton)	+++
06	Swarnaputi	Puntius sarana (Hamilton)	+
07	Tit Puti	Puntius ticto (Hamilton)	+++
08	Magur	Clarius batrachus(Linn)	++
09	Tangra	Mystus vitatus (Bloch)	+++
10	Tangra	Mystus cavasius (Hamilton)	+++
11	Rita	Rita rita (Hamilton)	++
12	Singhi	Heteropneustus fossilis(Bloch)	+++
13	Boal	Wallago atto (Schnider)	+++
14	Pabda	Ompok pabda (Hamilton)	+

Serial no.	Common name	Scientific name	Status
15	Kutkutya	Chacca chacca (Hamilton)	++
16	Bacha	Eutropiictys vacha (Hamilton)	+
17	Lata	Channa punctatus(Bloch)	+++
18	Shol	Channa striatus (Bloch)	+++
19	Spiny eel	Mustacembelus armatus	+++
20	Baim	Macrognathus aculeatus	++
21	Cheli kholshe	Colisa fascianatus	+++
22	Lal Kholshe	Colisa lalia (Hamilton)	++
23	Koi	Anabua testudineus (Bloch)	++
24	Bele	Glossogobius giuris (Hamilton)	++
25	Chanda	Chanda nema (Hamilton)	+++
26	Chanda	Chanda ranga (Hamilton)	++
27	Chital	Notopterus chitala	+
28	Foli	Notopterus notopterus	+++
29	Chapila	Gudusia chapra (Hamilton)	+
30	Khorko	Corica saborna (Hamilton)	++
31	Tapa	Tetrodon cutcutia	++
32	Kakila	Xenotodon Cancila (Hamilton)	+
33	Techokha	Apocheilus panchax (Hamilton)	++

+++ for abundance, ++ for less abundance, + for rarely found.

In relation to the study of fishfauna(table-3),33 species of fishes were identified under 8 orders during the study period from June2012 toMay 2013. An order Siluriformes was the most dominant including9 species,Cypriniformes and Perciformes include8 species, Clupeiformes includes 4 species, Channiformes includes2 species, Tetrodontiformes, Beloniformes and Cyprinodontiformes includes single species. Among the fishes were identified, Most of them are carps(major and minor) and cat fishes,Carps are reported to be Himalayan in origin.Labeo rohita, Catla catla and Cirrhina mrigala are major carp and Labeo calibasu, Labeo bata, Puntius sarana are minor carp. Among the cat fishes, dominant species were Mystus vitatus, Mystus cavasius,Heteropneustus fossilis,Wallago atto, Chaca chaca, Rita rita. During the monsoon, species richness is very high and distribution is more or less uniform because the river receive huge volume of water due to heavy rainfall and migratory routes are open which allow free movements of species of fishes. During summer, monsoon flood carries huge siltation from the upper stream resulting the decreasing of depth of the river, high temperature increases the rate of evaporation, withdrawal of water for agriculture and industrial purposes, domestic and industrial sewage alters the aquatic environments broadly affect the composition of aquatic species, mortality occurs due to high pollutional load and fishes are evenly distributed. The identified species were dominated by major carps and cat fishes belonging to the family Cyprinidae. Bagridae Siluridae,Channidae,Mastacembelidae, Heteropneustidae and Notopteridae.There were 33 species available during the study period of one year of which Labio rohita,Catla catla,Cirrihna mrigala, Labio calibasu,Labio batta,Puntius sarana,Mystusvitatus, Mystus cavasus, and Channa punctatus etc are most common in all the investigation sites..Ompok pabda,Labio batta,notopterous chitala,Puntius sarana,Gudusia chapra,Eutropiichtys vacha and Rita rita,Corica saborna were rearly found during the study.The river ecological status have deteriorated due to anthropological activities resulted aquatic degradation of water quality,heavy infestation of weeds,continuous siltation and accumulation of heavy metalsetc.Similar causes for fish depletion were identified by Baishy and Bordoloi,2007. Once the river Mathabhanga-Churni was the main breeding ground of indeginous fishes.But the scenario has completely changed over two or three decades. Losses of fish diversity has a negative impact of fishermen residing by bank of the river.

Conclusion:

The overall study revealed that majority of the water quality parameters were exceeding the standard criteria as a result fish and other aquatic organisms face great ecological threat.The production of fishes were drastically lowof the river . it causes negative impacts on the socioeconomic profile of the fishers community.s People should raise voice against the harmful effect of pollutants in order to save the reverine ecosystem and renewable natural resources like fish

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