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Status of Aquatic Resources in Someswari River in Northern Bangladesh

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Abstract

A total number of 66 species of fishes, including three species of prawn, one species of crabs, one species of snail and four species of reptiles were so far identified from the Someswari River. About 10 types of fishing gear and craft were found in operation. Increasing rate of seine net, Kapuri jal (17.6-23.3%) and gill net, current jal (29.8-34.4%) were identified as detrimental gear resulting in mortality of bi-catch of different species during the last four years. The increasing rate in exploitation of the water bodies is a threat to the aquatic biodiversity of the Someswari River. The natural production of aquatic life in the Someswari River declined dramatically over the last four (2001-2005) years. The total production of Someswari River decreased from 95.79±6.89 to 38.61±2.83 mt over this five-year span and the total production percentage sharply decreased from 19.61% to 59.68% over the same period. As a result, six important commercial aquatic lives mohasher (*Tot tor, Tor putitora*), nandina (*Labeo nandina*), olive barb (*Puntius sarana*) and reptiles (*Kachuga kachuga* and *Morenia petersi*) became extinct, 56 species were facing an extremely high risk of extinction and 11 species were in the verge of extinction between 2001 and 2005.

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Introduction

The study of biodiversity has become a major concern to fishery biologists against the backdrop of rapid decline in the natural population of fish and aquatic biota across all continents of the world. Biodiversity encompasses genetic species, assemblage, ecosystem and landscape levels of biological organization with structural, compositional, and functional components (Noss 1990; Cairns and Lackey 1992). About 20% of the commercially important fresh water fish species are now extinct or endangered; the main threats being habit degradation, over exploitation, pollution and competition for water. The worldwide loss of biodiversity is widely accepted as a major problem (Moyle and Williams 1990). Amid rapid loss of aquatic species, still, 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 are under severe threat due to environmental degradation which includes human interventions through construction of flood control embankments, drainage system and sluice gates, conversion of inundated land to crop land thereby reducing water area and indiscriminate use of pesticides. Pollution from domestic, industrial and agrochemical wastes and run off have resulted in the extinction of a considerable amount of aquatic biota in same stretches of the open water system (Diaster 1990; Mazid and Hossain 1995; Alam 1996; Hussain 1977).

Someswari River originates from the hilly area of Nokhrak Habri of Baghmara and Thura district of Maghaloya, India. The former with 24-26 km course flows across the Bijoypur and Ranikong from northern to southern Jaria-Jhanjyle through the Sibgonj bazaar (West bank) and Durgapur Sadar (East bank) before joining the Kangsha River (Fig. 1). In November 1991, a small abandoned channel north of Durgapur with a flow direction towards the east has been rejuvenated after 1990 (Alam 2004). This small meandering channel is locally named Atrakhali channel. However, no evidence of water flow was observed in the original Someswari River and Atrakhali channel except during the rainy season. The water flow of the river is continuous. There are two flood phases: the early flood phase and the deep flood phase. The early flood phase (April to early June) occurs in the early monsoon season when the water level in rivers and basin is relatively low. The water level in the floodplain rises and falls depending on the water level in adjacent rivers. The deep flood phase (June to September) begins when the water level in the Someswari and Kangsha Rivers, cause deep flooding in the northern areas of Netrokona district. Floodwater in flood plains starts receding in the post-monsoon season (October to December). Water recession starts in shallow areas and when the water surface area shrinks, fishes and other aquatic organisms move with the water flow into the deep-water area of the river.

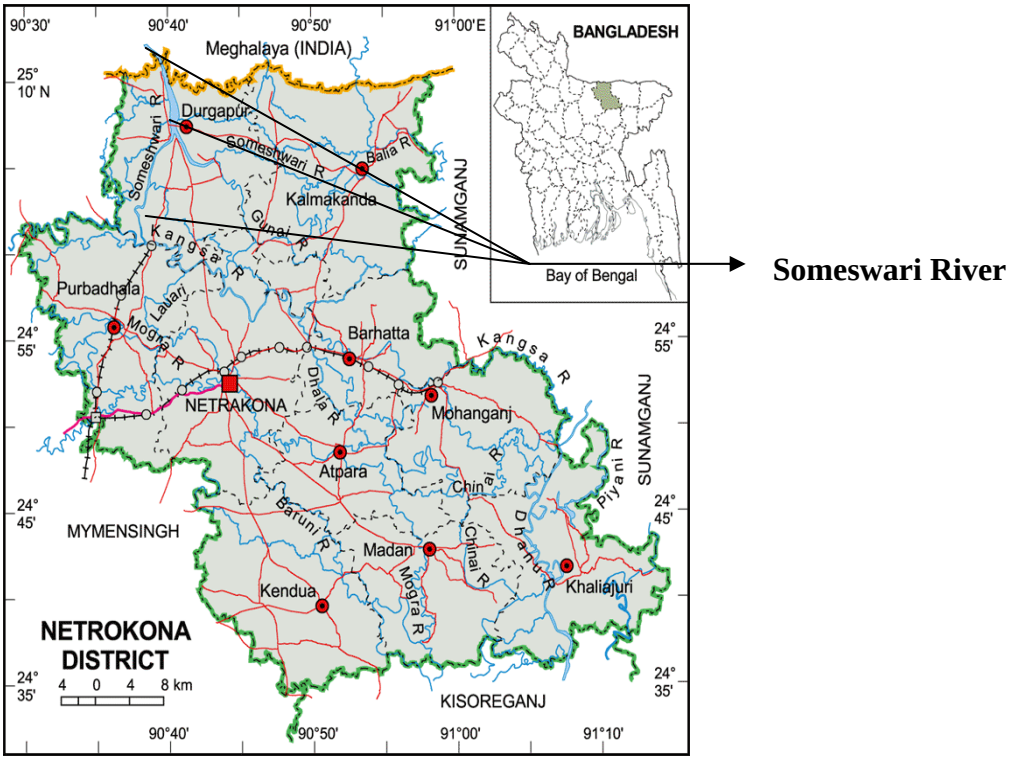

Fig. 1. Map of Bangladesh and Netrokona district showing the location of Someswari River

Someswari River once had an abundance of native wild fishes, crabs and reptiles. Due to over-exploitation and various ecological changes in the Someswari River, some important fish species, and reptiles have disappeared. This river is under great stress and its existence is endangered because of the changing aquatic ecosystems. The downstream of the river system is siltated, which reduces the rate of water flow and causes habitat degradation. Like other floodplains, the feeding and breeding grounds of fishes in and around the Someswari River have been reducing drastically from various human created problems. Indiscriminate destructive fishing practices, soil erosion, siltation, construction of flood control and drainage structures and agro-chemicals have caused havoc to the aquatic biodiversity in Bangladesh.

Materials and Methods

Experimental design

A survey of the study area, the Someswari River was conducted during 2001-2005 with particular emphasis on soil and water quality, biological productivity and status of fishery exploitation. For the purpose of the study of soil structure, water quality and biological productivity, the river course was divided into upper and lower regions. The river courses of Bijoypur and Ranikong (boarder of India) to Shibgonj and Birishiri constitute the upper region while the Shibgonj and Birishiri to Jariya-Ganjail constituted the lower region, wherein the Someswari River joins with the Kangshow River.

Study of water quality parameters

Water temperature (^{o}C) was recorded using a Celsius thermometer and transparency (cm) was measured using a Secchi disc (20 cm diameter). Dissolved oxygen (mg/l) and pH were measured directly using a digital electronic oxygen meter (YSI, Model 58, USA) and an electronic pH meter (Jenway, Model 3020, UK). Alkalinity was determined following the titrimetric method (Clesceri et al. 1989).

The plankton sample was collected every fortnight using 0.55 mm 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 following Stirling, 1985.

Sampling of fish

The investigation was conducted from 2001-2005 and was sampled simultaneously for winter (mid November to February), pre monsoon (February to April), monsoon (May to August) and post monsoon (September to mid November) for assessment of fish abundance and availability.

Data collection

An organized sampling program spread over a reasonably long time is needed to get a true picture of the catch and composition. The present study, being a rapid survey, gives only a broad picture of the stock of fishes, crabs and reptiles that could be obtained through market survey (Kamarkhali bazar, Shibgonj bazar, Durgapur sadar bazar, Birishri bazar, Gaonkandia

bazar and Jaria-Janjail bazar) and interaction with fisherman in the riverside and even in the river.

Analysis of experimental data

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

Physical characteristics

Soil texture of the Someswari River bed varied from sandy to loam sand. In the upper region, the structure of the bed appeared to be predominantly sandy and in the lower region, the soil was recorded to be sandy to loam sand also (Table 1).

Location	Soil texture of the riverbed (%)		
	Sandy	Loam sand	Clay
Upper region	91.4±5.62	7.2±4.22	1.2±2.32
Lower region	60.3±6.11	24.5±3.88	15.2±4.80

Table 1. Physical features of sediment of the river Someswari

The physico-chemical parameters of the Someswari River, which included temperature, transparency, pH, dissolved oxygen and alkalinity of water, are furnished in table 2. It is evident from table 2 that the mean water temperatures were not statistically significant ($P>0.05$) in the entire river course. Mean Secchi disk transparency differed significantly ($P<0.05$), during the year 2001-2005. Higher values occurred during the year 2002 and summer months due to reduced flow and relatively stable conditions. The pH did not differ significantly ($P>0.05$). A significant rise in pH during pre-monsoon followed by a drop in winter was recorded. The mean dissolved oxygen (DO) did not differ significantly ($P>0.05$), during the investigation period. Total alkalinity differed significantly ($P<0.05$). The lower region showed the lowest value of alkalinity (102.80 mg/L) in winter.

Table 2. Physico-chemical parameters of experimental Someswari River

Parameters	Years				
	2001	2002	2003	2004	2005
Temperature (^{o}C)	26.29±6.11 (14.88-32.74)	26.28±6.35 (14.78-32.80)	25.92±7.44 (14.51-32.50)	26.28±6.02 (15.08-32.55)	26.34±6.22 (15.45-32.38)
Transparency (cm)	40.14±7.24^{c} (30.12-52.36)	46.34±6.42^{a} (29.02-51.44)	38.25±7.41^{d} (27.15-47.34)	42.16±7.44^{b} (28.32-49.25)	42.28±8.74^{b} (28.85-48.62)
pH	7.25± 2.44 (5.70-8.70)	7.66±3.16 (5.66-8.78)	7.55±2.88 (5.55-9.02)	7.38±1.08 (6.05-8.60)	7.88±3.22 (6.10-8.22)
Dissolved oxygen (mg/L)	5.35±1.54 (4.08-8.24)	5.14±1.18 (4.34-7.75)	5.44±1.42 (4.14-7.82)	5.11±1.22 (4.11-8.04)	5.25±1.66 (4.04-8.18)
Alkalinity (mg/L)	132.22±10.44^{c} (105.24-140.45)	122.26±10.22^{e} (109.88-135.12)	128.68±9.25^{d} (111.25-139.05)	137.22±9.33^{b} (102.80-145.32)	142.66±12.44^{a} (120.16-147.85)

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

Plankton population

An abundance of plankton in the Someswari River is shown in table 3. The quantity of phytoplankton and zooplankton was particularly dominant in the lower region of the Someswari River where Someswari met with the Kangsha River. Plankton population was much less in the upper region of the river where running water flows the whole year. The phytoplankton consisted of 27 genera in the Someswari River in four broad groups viz., Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae. Chlorophyceae contributed the following genera: *Protococcus, Mougeotia, Microspora, Mesotenium, Clasterium, Eremesphaera, Chlorococcum, Ophiocytium, Penium, Spyrogyra, Zygnema, Kirchneriella, Gonotozygon, Pediastrum, Oocystis, Tetraedron, Volvox.* Bacillariophyceae included various species belonging to genera *Melosira, Diatoma, Fragilaria* 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 significantly differed (P<0.05) during the five year study period. The abundance of Bacillariophyceae significantly differed (P<0.05) during the five year period also. The mean abundance of total phytoplankton significantly differed (P<0.05) during investigation period. Among zooplanktons, the represented genera were *Bosmina, Brachionus, Cyclops, Filinia, Keratella, Trichocerca, Lecane, Diaptomus, Daphnia, Moina, Nauplius* and *Oicomonas* belonging to two groups. The zooplankton population consisted of 12 genera including nauplii in two groups viz., Rotifera, Crustacea and other groups. Rotifera and Crustacea differed significantly (P<0.05) during the investigation period. The mean abundance of total zooplankton

differed significantly (P<0.05) in the Someswari River.

Table 3. Mean variation of phytoplankton (individual/ml) and zooplankton (organism/ml) population in the Someswari River

Plankton group ($\times 10^3$ cells/L)	Years				
	2001	2002	2003	2004	2005
Chlorophyceae	16.05±5.04^{c} (12.66-24.24)	13.55±6.21^{e} (10.04-17.42)	18.05±4.22^{a} (13.57-24.32)	15.41±5.22^{d} (12.14-23.02)	17.61±4.77^{b} (13.18-24.04)
Bacillariophyceae	10.12±3.34^{e} (8.48-15.41)	12.28±4.06^{b} (8.88-15.14)	11.28±3.50^{c} (9.01-17.22)	10.78±3.56^{d} (11.18-19.12)	13.01±3.22^{a} (10.28-18.38)
Cyanophyceae	7.18±2.10 (4.55-9.48)	8.07±2.05 (5.01-10.22)	7.85±2.22 (4.25-9.88)	8.32±2.15 (5.01-10.12)	7.44±2.21 (4.85-10.34)
Euglenophyceae	0.02±0.00 (0.01-0.03)	0.04±0.03 (0.01-0.06)	0.08±0.05 (0.04-1.10)	0.04±0.02 (0.02-0.5)	0.03±0.01 (0.01-0.05)
Total Phytoplankton ($\times 10^3$ cells/L)	33.37±6.66^{e}	33.94±6.10^{d}	37.26±7.47^{b}	34.55±6.44^{c}	38.09±7.57^{a}
Rotifera	5.88±2.55^{c} (3.10-7.76)	5.61±1.12^{d} (4.22-6.18)	6.11±2.05^{a} (4.05-8.14)	4.88±1.11^{e} (4.12-6.88)	6.08±1.42^{b} (3.58-7.16)
Crustaceae	3.28±1.26^{e} (2.12-5.22)	4.14±1.12^{c} (3.11-5.50)	4.48±1.22^{b} (3.08-5.66)	4.11±1.22^{d} (3.05-5.62)	4.88±1.55^{a} (3.22-5.18)
Others	1.08±0.52 (0.80-2.02)	1.72±0.77 (1.01-2.58)	1.65±0.52 (1.08-2.55)	1.08±0.56 (0.98-2.02)	1.57±0.62 (1.02-2.24)
Total Zooplankton ($\times 10^3$ Organisms/L)	10.24±2.40^{d}	11.47±1.96^{c}	12.24±2.57^{b}	10.07±2.01^{e}	12.53±2.34^{a}

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

Craft and gears used

The fishermen generally used boat in the river for the transportation of nets and related materials during fishing. They used seine net (ber jal and komor jal), thela jal, dharma jal, bua jal, lift net, cast net, current jal and various types of fish trap, hook and line according to season and availability of different species of fishes. There are so many fish traps (vair, dugair, ghuni and phlo etc.) and hook and line (barshi, fulkuichi, Jhupi aikra etc.) used to capture groups of major carp, minor carp, cat fish, small cat fish, clupidae, eels, large and small prawn, crabs and reptiles.

Figure 2 shows a remarkable yearly increase in fishing effort by using illegal fishing gear like gill net (current jal) and ber jal (kaperi jal). The percentage of catch statistics by using current jal and ber jal (kaperi jal) were 29.80%, 30.70%, 31.70%, 32.60% and 34.40%; and 17.60%, 18.80%, 21.30%, 22.20% and 23.30% in the years 2001, 2002, 2003, 2004 and 2005, respectively and using current jal and ber jal (kaperi jal) differed significantly (P<0.05). Catch

statistics by using Komor jal were 17.80%, 15.40%, 16.50%, 17.30% and 17.50% in the years 2001, 2002, 2003, 2004 and 2005, respectively but the use of Komor jal differed significantly (P<0.05). The catch statistics using thela jal, dharma jal, dharma jal, bua jal, lift net, cast net, fish trap and hook and line was decreasing and differed significantly (P<0.05) in the years 2001, 2002, 2003, 2004 and 2005. A significant reduction in fish abundance is recorded in the Someswari River every year by using illegal fishing gear.

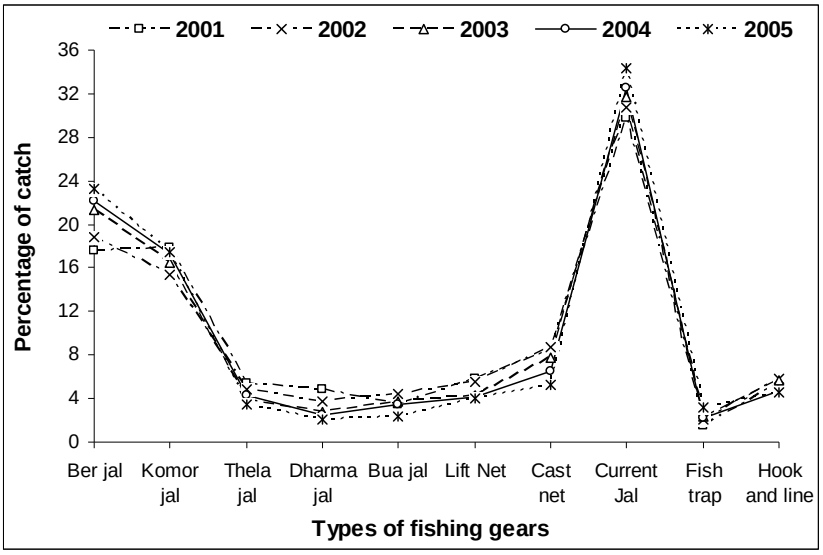

Fig. 2. Percent composition of catches by different types of fishing gear, 2001- 2005.

Fish catch and composition

An organized sampling program was run for a long time to get a true picture of the catch and composition. The present investigation gave a broad picture of the stock of fishes and other aquatic lives obtained through market survey and interaction with fishers in the river.

Fishing activity in the Someswari River consisted of 66 species of fish, three species of prawn, one species of crabs and four species of turtles belonging to 19 families and 50 genera. Fishing activity was continued throughout the year. During monsoon and post monsoon, fishermen used lift net, current jal, cast net, traps, and lines to catch fishes. Fishermen also operated kata fishing by seine net (ber jal and komor jal) in winter and spring. The annual catch assessment of the river was around 95.77±6.89, 76.99±5.43, 62.33±4.69, 48.13±3.49 and 38.61±2.83 mt in the years 2001, 2002, 20003, 2004 and 2005, respectively consisting of knife fish, major carp and minor carp, small fish, cat fish and small cat fish, eels, prawn, crabs and reptiles (Table 4 and Fig. 3). Cat fish was the dominant group (highest production) in the Someswari River in the years 2001-2005 and second highest production was recorded in the

group of small cat fish. The catches of all the groups of fishes, crabs and reptiles were higher in 2001 but gradually decreased in the years 2002, 2003, 2004 and 2005, respectively. Table 4 shows the existing status of the 74 aquatic wild animals of the Someswari River identified as E-06 (8%), CR-05 (7%), EN-52 (69%), VU-09 (12%), LR-02 (3%) and NO-01 (1%), respectively (Fig. 5). However, the total catch in different years differed significantly ($P<0.05$). Commercial important major carps mohasseer (*Tor tor*), putitor mohasher (*Tor putitora*), nandina, (*Labeo nandina*), local sarpunti, (*Puntius sarana*) and reptiles (*Kachuga kachuga* and *Morenia petersi*) were rarely found in the years 2001 to 2003 in the river. But these species were extinct in 2004-2005. Dela (*Rohtee cotio*), Guizza (*Mystus seenghala*), Baghair, (*Bagarius* yarrellii), Cheka (*Chaca chaca*), Chanua (*Sisor rhabdophorus*) are facing an extremely high risk of extinction and 51 other major important commercial aquatic wild species of the river are also facing a high risk of extinction day by day.

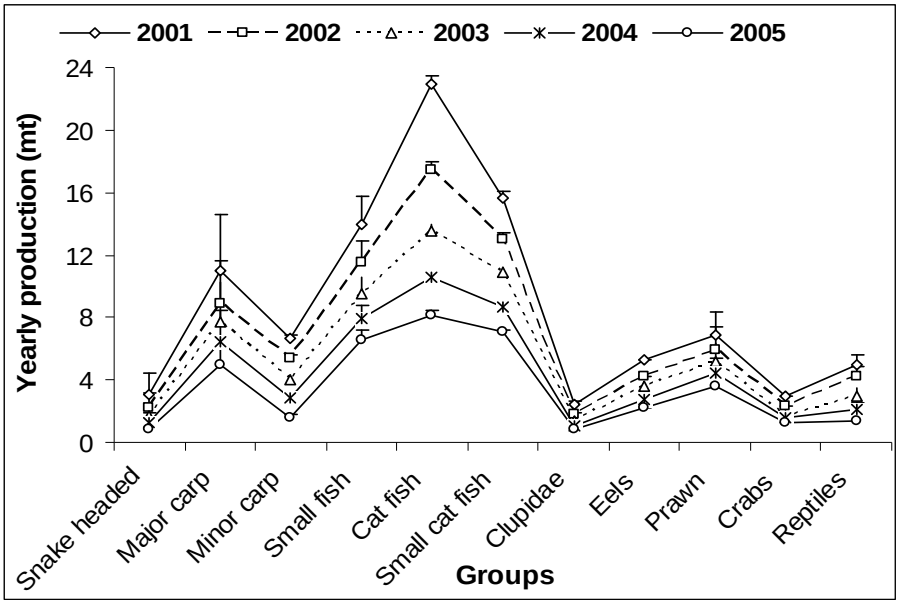

Fig. 3. The production of different groups of fishes in the Someswari River decreasing in the year 2001 to 2005.

The catch statistics of fishes in the river was decreased to 19.61%, 34.92%, 49.74% and 59.68% in the years 2001-2002, 2002-2003, 2003-2004 and 2004-2005, respectively (Fig. 4). Not only that the total catch statistics of the Someswari River showed that the abundance of different species of the river was sharply decreased within 2004-2005. In Figure 4, it is found that the percentage of different groups of fishes in the river was sharply decreased in every year and some important native species were extinct from the Someswari River. The capture of fishes, crabs and reptiles in the river was recorded highest in 2001-2002, but decreased in 2002-2004 and sharply decreased in 2004-2005. Cyprinids and catfishes are dominant groups of the river.

Table 4. Status and distribution of Someswari River of northern Bangladesh. Status code: E- Extinct, CR- Critically Endangered, EN- Endangered, VU- Vulnerable, LR- Lower risk, NO- Not threatened (As per IUCN, 2000)

SL No	Group/ Family	Local name	Scientific name	Production (mt)					Status
				Someswari River					
				2001	2002	2003	2004	2005	
	Snake headed:								
1	Notopteridae	Chitol	*Notopterus chitala*	0.78 ±0.08	0.61 ±0.06	0.40 ±0.04	0.18 ±0.02	0.08 ±0.01	EN
2	Notopteridae	Foli	*Notopterus notopterus*	0.38 ±0.03	0.22 ±0.02	0.15 ±0.02	0.11 ±0.02	0.04 ±0.01	EN
3	Belonidae	Kakila	*Xenentodon cancila*	1.90 ±0.12	1.38 ±0.08	1.18 ±0.07	1.01 ±0.06	0.75 ±0.04	LR
	Major carps:								
4	Cyprinidae	Catla	*Catla catla*	0.99 ±0.8	0.72 ±0.05	0.44 ±0.05	0.28 ±0.04	0.19 ±0.01	EN
5	Cyprinidae	Rui	*Labeo rohita*	1.14 ±0.09	1.09 ±0.08	0.97 ±0.05	0.74 ±0.04	0.52 ±0.04	EN
6	Cyprinidae	Mrigal	*Cirrhinus mrigala*	1.68 ±0.08	1.48 ±0.07	1.34 ±0.07	1.18 ±0.06	1.02 ±0.05	EN
7	Cyprinidae	Mahashol	*Tot tor*	0.08 ±0.01	0.04 ±0.01	0.02 ±0.01	0.01 ±0.0	0.01 ±0.0	E
8	Cyprinidae	Mahashol	*Tot putitora*	0.06 ±0.01	0.03 ±0.01	0.01 ±0.0	0.0	0.0	E
9	Cyprinidae	Nandil	*Labeo nandina*	0.02 ±0.01	0.01 ±0.0	0.00	0.00	0.00	E
10	Cyprinidae	Kalbaus	*Labeo calbasu*	1.28 ±0.08	1.12 ±0.06	1.08 ±0.05	0.95 ±0.04	0.74 ±0.04	EN
11	Cyprinidae	Ghonia	*Labeo gonius*	1.38 ±0.08	1.12 ±0.07	1.02 ±0.06	0.96 ±0.05	0.66 ±0.05	EN
12	Cyprinidae	Common carp	*Cyprinus carpio*	4.40 ±1.04	3.24 ±1.01	2.88 ±1.0	2.33 ±0.08	1.88 ±0.06	VU
	Minor carp:								
13	Cyprinidae	Along	*Bengala elanga*	1.29 ±0.07	1.05 ±0.06	0.84 ±0.04	0.52 ±0.03	0.29 ±0.01	EN
14	Cyprinidae	Bhangna bata	*Labeo bata*	1.1 ±0.06	1.01 ±0.05	0.79 ±0.05	0.60 ±0.04	0.25 ±0.02	EN
15	Cyprinidae	Ghora muikha	*Labeo pangusia*	0.91 ±0.05	0.77 ±0.05	0.55 ±0.04	0.41 ±0.03	0.32 ±0.03	EN
16	Cyprinidae	Jarua/Utti	*Chagunius chagunio*	0.88 ±0.06	0.71 ±0.05	0.52 ±0.03	0.41 ±0.03	0.28 ±0.01	EN
17	Cyprinidae	Puda	*Puntius sarana*	0.58 ±0.04	0.36 ±0.03	0.11 ±0.02	0.02 ±0.01	00	E
18	Cyprinidae	Tila koksa	*Barilius tileo*	1.01 ±0.08	0.87 ±0.05	0.65 ±0.04	0.48 ±0.03	0.22 ±0.01	EN
19	Cyprinidae	Bhol	*Raimass bola*	0.88 ±0.05	0.65 ±0.04	0.54 ±0.04	0.39 ±003	0.24 ±0.01	EN
	Small fish:								
20	Cyprinidae	Mola	*Amblypharyngodon mola*	0.77 ±0.06	0.68 ±0.05	0.52 ±0.04	0.45 ±0.04	0.40 ±0.03	EN
21	Cyprinidae	Kashkhaira	*Chela laubuca*	0.58 ±0.04	0.52 ±0.03	0.43 ±0.03	0.36 ±0.02	0.44 ±0.03	EN
22	Mugillidae	Kachi Kholya	*Sicamugil casoasia*	0.21 ±0.02	0.16 ±0.01	0.12 ±0.01	0.08 ±001	0.06 ±0.01	EN
23	Cyprinidae	Baspata	*Danio devario*	0.44 ±0.04	0.33 ±0.02	0.28 ±0.02	0.22 ±0.02	0.17 ±0.01	EN
24	Cyprinidae	Dhela	Rohtee *cotio*	0.41 ±0.03	0.32 ±0.03	0.18 ±0.02	0.09 ±0.01	0.01 ±0.0	CR

Table 4 (cont.)

25	Cyprinidae	Chola punti	*Puntius chola*	0.34 ±0.04	0.30 ±0.04	0.28 ±0.03	0.21 ±0.02	0.11 ±0.01	EN
26	Cyprinidae	Taka punti	*Puntius conchonius*	0.64 ±0.07	0.58 ±0.06	0.55 ±0.05	0.47 ±0.04	0.36 ±0.02	EN
27	Cyprinidae	Phutani punti	*Puntius phutunio*	0.62 ±0.05	0.52 ±0.04	0.41 ±0.02	0.38 ±0.02	0.30 ±0.01	EN
28	Cyprinidae	Jatpunti Punti	*Puntius Sophore*	0.44 ±0.03	0.38 ±0.03	0.28 ±0.02	0.25 ±0.02	0.38 ±0.01	EN
29	Cyprinidae	Teri punti	*Puntius terio*	0.55 ±0.05	0.44 ±0.04	0.38 ±0.03	0.30 ±0.02	0.33 ±0.02	EN
30	Cyprinidae	Tit Punti	*Puntius ticto*	0.61 ±0.06	0.54 ±0.05	0.48 ±0.04	0.38 ±0.03	0.30 ±0.01	VU
31	Cyprinidae	Fulchela	*Salmostoma phulo*	0.62 ±0.04	0.48 ±0.03	0.39 ±0.02	0.34 ±0.02	0.28 ±0.01	EN
32	Cyprinidae	Darkina	*Esomus danricus*	0.44 ±0.04	0.32 ±0.03	0.28 ±0.02	0.21 ±0.02	0.18 ±0.01	VU
33	Cyprinidae	Kanpona	*Oryzias melastigma*	0.22 ±0.05	0.15 ±0.03	0.11 ±0.03	0.08 ±0.02	0.05 ±0.01	VU
34	Clupeidae	Kachki	*Corica soborna*	0.87 ±0.05	0.75 ±0.05	0.66 ±0.04	0.33 ±0.02	0.28 ±0.02	VU
35	Cobitidae	Rani	*Botia dario*	0.62 ±0.04	0.56 ±0.04	0.48 ±0.03	0.32 ±0.03	0.21 ±0.01	EN
36	Cobitidae	Rani	*Botia dayi*	0.55 ±0.03	0.42 ±0.03	0.38 ±0.02	0.33 ±0.02	0.22 ±0.01	EN
37	Cobitidae	Balichata	*Nemachilus botia*	0.46 ±0.04	0.32 ±0.02	0.27 ±0.02	0.26 ±0.01	0.21 ±0.01	EN
38	Centropomidae	Chanda	*Chanda nama*	1.20 ±0.08	0.88 ±0.05	0.71 ±0.04	0.67 ±004	0.44 ±0.03	EN
39	Centropomidae	Chanda	*Pseudambasis bacuculis*	0.85 ±0.06	0.64 ±0.04	0.48 ±0.04	0.42 ±0.03	0.48 ±0.03	EN
40	Centropomidae	Ranga chanda	*Pseudambasis ranga*	0.66 ±0.04	0.55 ±0.03	0.38 ±0.02	0.42 ±0.02	0.31 ±0.01	EN
41	Gobiidae	Baila	*Glossogobus giuris*	0.90 ±0.07	0.84 ±0.05	0.77 ±0.05	0.64 ±0.05	0.52 ±0.04	EN
42.	Tetradontidae	Potka	*Tetradon cutcutia*	0.92 ±0.08	0.81 ±0.06	0.72 ±0.05	0.68 ±0.04	0.55 ±0.04	EN
	Cat fish:								
43	Bagridae	Ayre	*Mystus aor*	2.20 ±0.14	1.98 ±0.12	1.58 ±0.12	1.32 ±0.10	0.98 ±0.08	EN
44	Bagridae	Guizza	*Mystus seenghala*	3.86 ±0.16	2.46 ±0.14	1.48 ±0.08	1.09± 0.07	0.95 ±0.05	CR
45	Schilbeidae	Shilong	*Silonia silondia*	1.88 ±0.07	1.33 ±0.06	1.08 ±0.05	0.98 ±0.05	0.68 ±0.04	EN
46	Siluridae	Boal	*Wallago attu*	6.58 ±0.24	5.12 ±0.21	4.02 ±0.18	3.22 ±0.17	2.34 ±0.14	LR
47	Bagridae	Baghair	*Bagarius yarrellii*	1.92 ±1.11	1.56 ±0.11	1.22 ±1.08	1.02 ±0.07	0.87 ±0.06	CR
48	Chacidae	Cheka	*Chaca chaca*	1.05 ±0.09	0.88 ±0.07	0.67 ±0.07	0.55 ±0.05	0.35 ±0.04	CR
49	Bagridae	Ganmagur	*Mystus menoda*	2.95 ±0.11	2.08 ±0.11	1.88 ±0.08	1.28 ±0.07	1.01 ±0.06	EN
50	Bagridae	Rita	*Rita rita*	2.55 ±0.11	2.08 ±0.10	1.62 ±0.08	1.22 ±0.07	0.99 ±0.06	EN
	Small cat fish:								
51	Bagridae	Gulsa	*Mystus cavasius*	2.25 ±0.012	1.77 ±0.11	1.22 ±0.08	1.01 ±0.07	0.98 ±0.06	EN
52	Bagridae	Tengra	*Mystus vitttus*	2.21 ±0.11	1.88 ±0.11	1.54 ±0.10	1.14 ±0.10	0.95 ±0.08	EN

Table 4 (cont.)

53	Bagridae	Bujuri	*Mystus tengra*	2.22 ±0.11	2.03 ±0.11	1.88 ±0.08	1.36 ±0.07	1.11 ±0.06	VU
54	Schilbeidae	Kajuli	*Ailia coila*	1.22 ±0.08	1.08 ±0.07	0.88 ±0.06	0.72 ±0.05	0.55 ±0.04	EN
55	Siluridae	Kani Pabda	*Ompok bimaculatus*	1.77 ±0.08	1.44 ±0.07	1.21 ±0.07	1.05 ±0.06	0.88 ±0.05	EN
56	Siluridae	Madhu Pabda	*Ompok pabda*	1.54 ±0.08	1.28 ±0.07	1.12 ±0.07	0.92 ±0.06	0.70 ±0.05	EN
57	Siluridae	*Ompok pabda*	*Ompok pabo*	1.02 ±0.07	0.88 ±0.07	0.72 ±0.06	0.55 ±0.05	0.42 ±0.04	EN
58	Schilbeidae	Gharua	*Clupisoma garua*	1.47 ±0.08	1.30 ±0.06	1.22 ±0.07	1.02 ±0.07	0.92 ±0.05	EN
59	Schilbeidae	Muri Bacha	*Clupisoma murias*	0.88 ±0.06	0.72 ±0.06	0.51 ±0.05	0.46 0.04	0.32 ±0.03	EN
60	Schilbeidae	Batasi	*Pseudeutropius atherinoides*	0.80 ±0.06	0.69 ±0.04	0.59 ±0.03	0.38 ±0.03	0.30 ±.0.02	EN
61	Schilbeidae	Bacha	*Eutropiichthys vacha*	0.85 ±0.07	0.60 ±0.05	0.54 ±0.05	0.43 ±0.04	0.27 ±0.02	EN
62.	Sisoridae	Chanua	*Sisor rhabdophorus*	0.20 ±0.01	0.12 ±0..01	0.04 ±0.01	0.02 ±0.01	0.01 ±0.00	CR
	Clupidae:								
63	Clupidae	Chapila	*Gadusia chapra*	1.50 ±0.08	1.20 ±0.07	0.88 ±0.06	0.65 ±0.05	0.48 ±0.04	EN
64.	Clupidae	Hilsa	*Hilsa ilisa*	0.88 ±0.08	0.64 ±0.06	0.48 ±0.04	0.37 ±0.02	0.32 ±0.01	EN
	Eels:								
65	Mastacembeli-dae	Baim	*Mastacembalus armatus*	2.44 ±0.11	2.02 ±0.10	1.88 ±0.08	1.52 ±0.07	1.22 ±0.06	VU
66	Synbranchidae	Kuicha	*Monopterus cuchia*	2.88 ±0.09	2.18 ±0.08	1.74 ±0.07	1.28 ±0.6	1.02 ±0.05	EN
	Large Prawn:								
67	Palaemonidae	Golda Isa	*Machrobrachiu rosenbergii*	1.30 ±0.11	1.08 ±0.09	1.02 ±0.07	0.99 ±0.06	0.75 ±0.06	EN
	Small prawn:								
68	Palaemonidae	Gura Isa	*Machrobrachium biramanicus*	2.18 ±0.28	2.01 ±0.21	1.77 ±0.17	1.42 ±0.11	1.14 ±0.10	NO
69	Palaemonidae	Gul Isa	*Machrobrachium malcolmsnii*	2.42 ±0.22	2.00 ±0.16	1.74 ±0.15	1.52 ±0.14	1.32 ±0.16	VU
	Crabs/snail								
70	Potamonidae	Kakra	*Stylla serrata*	1.98 ±0.22	1.63 ±0.20	1.31 ±0.15	1.19 ±0.12	1.16 ±0.11	VU
71	Unionidae	Bivalve	*Lamellidens marginalis*	2.18 ±0.42	1.88 ±0.31	1.24 ±0.26	1.08 ±0.16	0.96 ±0.14	VU
	Reptiles:								
72	Chelonia	Spotted Flapshell	*Lissemys punctata*	1.70 ±0.12	1.40 ±0.11	1.06 ±0.10	0.91 ±0.08	0.67 ±0.07	EN
73	Chelonia	Common Roof Turtile	*Kachuga tecta*	1.72 ±0.11	1.54 ±0.11	1.01 ±0.09	0.72 ±0.06	0.45 ±0.05	EN
74	Chelonia	Painted Roof Turtile	*Kachuga kachuga*	0.88 ±0.07	0.58 ±0.05	0.35 ±0.03	0.20 ±0.01	0.0	E
75	Chelonia	Bengal Eyed Turtile	*Morenia petersi*	0.47 ±0.07	0.32 ±0.0	0.17 ±0.04	0.10 ±0.01	0.0	E
			Total	95.79 ±6.89	76.99 ±5.43	62.33 ±4.69	49.67 ±3.49	38.61 ±2.83	

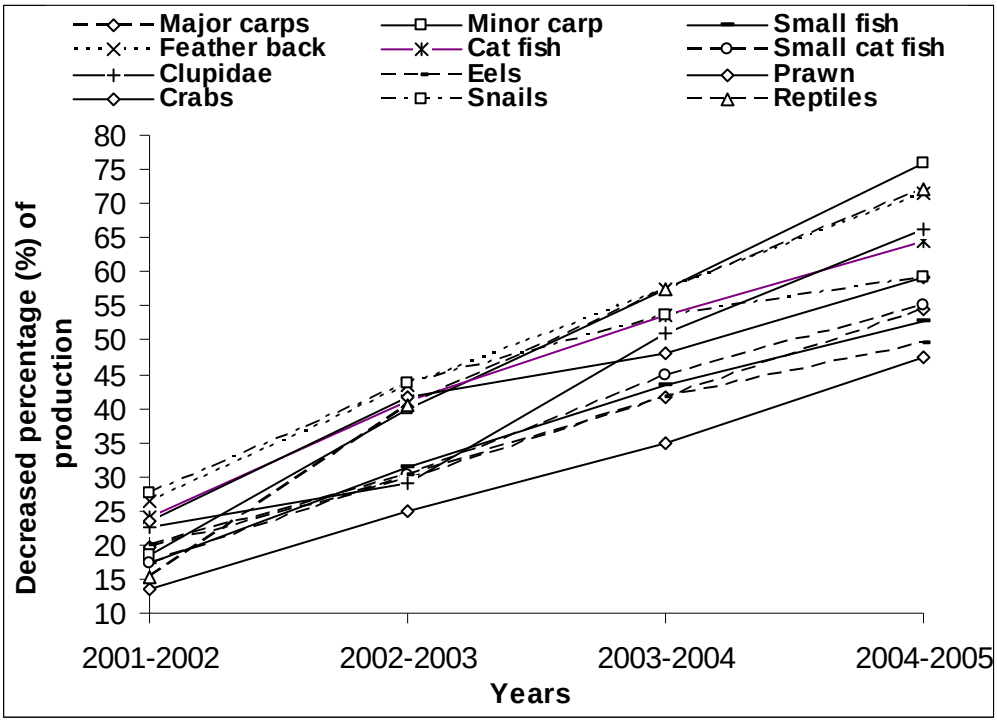

Fig. 4. The production percentage of aquatic lives in the Someswari River decreasing in the year 2001 to 2005.

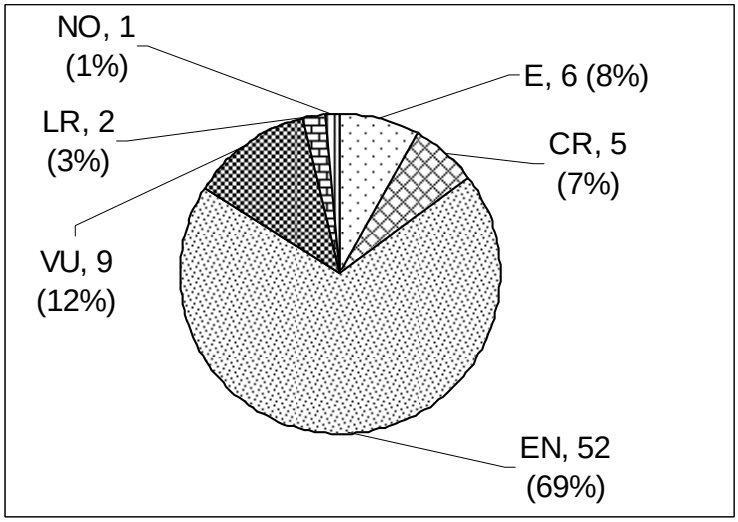

Fig. 5. Status and position of aquatic lives in the Someswari River.

However, the production percentage (%) differed significantly ($P<0.05$) among the different years (Fig. 4). Tables 4 show the existing structure of wild fishes. This study also showed a yearly sharp decrease in the river production. A total of four species (*Lissemys punctata, Kachuga tecta, Kachuga kachuga and Morenia petersi)* of fresh water turtles were found in the

Someswari River. They were regularly caught by fishermen and expert tribal hunters. Unfortunately, two important species of turtles became extinct within five years. During the investigation period, it was found that fishing effort using mesh size increased every year. As a result, average size and number of individual fish declined every year.

During investigation periods, amphibians (*Buffo melanostictus, Rana tigerina, Rana limnocharis, Rana cyanophyctis* and *Salamandra salamondra*) aves (whistling duck, great crested grebe, great cormorant, red crested pochard, water cock, swamphen, great black headed gull, gray-headed fish eagle, curlew, spotted redshank) and mammals (musk shrew, fishing cat, small Indian mongoose, jackle, flying fox) were identified.

Discussion

The physico-chemical factors and plankton were found to be more or less within the normal range. Water temperature of the Someswari River showed an increasing trend during monsoon and post monsoon season and decreasing in winter. (Mathew 1975). Transparency was consistently higher in the upper region, possibly due to running water of the river. The transparency of productive water bodies should be 40 cm or less (Rahman 1992). Fluctuation of dissolved oxygen concentration might be attributed to photosynthetic activity. According to Banerjea (1967), a range of 5 to 7 mg/L is productive. Oxygen values were uniformly high in the upper region and somewhat lower in the lower region. Similar phenomena were noted by Saha et al. (1988). The pH values agree well with the findings of Rahman and Rahman (2003). Alkalinity levels of the river were medium to high (Bhuiyan 1970).

The phytoplankton consisted of 27 genera belonging to four broad groups viz., Chlorophyceae, Bacillariophyceae, Cyanophyceae and Euglenophyceae. This is more or less similar to the investigation of Ehshan et al. in 1997; Hossain et al. 1998; Sugunan and Bhattacharya 2000. The zooplankton population consisted of 12 genera belonging to two groups viz., Rotifera, Crustacea and other groups. An almost similar observation was found by Ahmed et al. (1997) and Sugunan and Bhattacherjya (2000). In the present study the quantity of both phytoplankton and zooplankton are higher in the lower region due to its running water.

It was further observed that fishing effort using various types of fishing gear seine net (especially kaperi jal), gill net (current jal) and fish trap increased in every year but the average size and number of individual fish declined in the Someswari River. Haroon et al. (2002) reported eighteen types of fishing gears from the Sylhet sub-basin and thirteen types from

Mymensingh sub-basin which are very similar to this study. Cast net **(**Jaki jal), was used whole year in the wetland. It is a very popular fishing method and used in all over the Bangladesh (Ahmed 1962).

The catch statistics indicate that fishing pressure in the river increased. As a result, decreasing percentage of production was increased from 19.61% to 59.68% within five years, respectively. This is very similar to the study of Moyle and Leidy in 1992. He found that worldwide, 20% of all freshwater species are extinct, endangered, or vulnerable. The total catch statistics of fishes in the river indicate that certain percentage of different groups of fishes sharply decrease every year. As a result, important commercial major carps mohasseer (*Tot tor*), putitor mohasher (*Tor putitora*), nandina, (*Labeo nandina*), local sarpunti, (*Puntius sarana*) and reptiles, (*Kachuga* kachuga; *Morenia peters*) were extinct by the years 2004-2005 which is more or less similar to the report of IUCN, Bangladesh 1998. According to IUCN, Bangladesh about 56 freshwater fish species are critically or somewhat endangered.

Due to over-exploitation and various ecological changes in the natural aquatic ecosystem of the Someswari River, these commercial important major carps are in the verge of extinction. This agrees to the investigation of Sarker (1993**).** The following carps *L. gonia, L. rohita, L. mrigala, C. carpio* and catfishes *M. seenghala, M. aor, Rita rita, Mystus menoda* and *W. attu* occurred significantly in the study area. Dela (*Rohtee cotio*), Guizza (*Mystus seenghala*), Baghair, (*Bagarius* yarrellii), Cheka (*Chaca chaca*), Chanua (*Sisor rhabdophorus*) are facing an equally extremely high risk of extinction day by day as well as other 51 important major commercial aquatic wild species of the river.

During winter *Kachuga tecta* are caught in the pile fishery and other fish traps. Turtle *Morenia petersi* was caught in the Someswari River. This species has been reported to be distributed between the Ganges River and the Brahmaputra River and the species is endemic to Bangladesh (Khan 1982). Das (1991) mentioned that the Bengal Eyed Turtle *Morenia petersi* is restricted to the eastern part of the Ganges River and the western part of the Brahmaputra River. He also mentioned its occurrence in Assam of India. Turtles in the Someswari River have been declining due to the dewaterization of its habitat for irrigation in the winter season. Another reason is destruction in its breeding ground and nesting sites. Over exploitation for local consumption and indiscriminate trading pose a threat to all species of turtles as well.

These studies in the Someswari River have shown clearly that fish and other aquatic stocks are over exploited together with its changing aquatic ecosystems due to use of agro-chemicals, construction of flood control barrage, soil erosion and siltation as well as drainage structures. Since the downstream of the river system is siltated, the rate of water flow decreases

and results to habitat degradation. Domestic organic wastes (sewage) directly or indirectly through canals or drains to the rivers or other water bodies are polluting the aquatic ecosystem. The genetic stock structure of fish populations is reduced due to pollution and destructive fishing practices. Indiscriminate killing of fish occurs due to the use of pesticides in improper doses, forbidden chemicals, aerial spray of chemicals used for paddy field etc. These findings are similar to the study of Mazid 2002. In addition, indiscriminate destructive fishing practices have caused havoc to the aquatic biodiversity of Someswari River. As a result, the ecosystem and biological diversity of the Someswari River have been depleting at an unprecedented rate (Chakraborty and Mirza 2007). Similar findings were arrived at in the investigation conducted by Hussain and Hossain 1999. Intervention to control floods, adoption of new agricultural technologies and construction of road networks has altered the ecology of Someswari River significantly. This is similar to the investigation conducted by Khan (1993) and Ali (1991). Stock of the wildlife broad fishes and other species in the breeding ground have suffered significant damages, resulting in a reduction of biodiversity as well as a decline in the socioeconomic importance of Someswari River as a source of food and livelihood (Nishat 1993 and Zaman 1993).

Conclusion

The action plan efforts for saving the stock of aquatic lives will be: to develop a community based management policy; declare the river as a sanctuary; enforce fishing rules; prevent use of illegal net in fishing; yearly stocking of fingerlings; prevent the killing of brood fish and juveniles; ban the unplanned construction of flood control, embankments, drainage system and sluice gates; conversion of inundated land to cropland (reducing water area); and control the use of pesticides and agrochemicals.

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