

DIVERSITY, DISTRIBUTION AND OCCURRENCE OF FISHES IN BEGNAS LAKE, POKHARA, NEPAL

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ABSTRACT

Present paper deals with the diversity of fishes in Begnas Lake, Pokhara. Fishes were identified and their occurrence, average size range, weight and market price were determined. Altogether 17 species of fishes belonging to five orders, seven families and 17 genera were recorded, of which 11 species were indigenous, while six species were exotic. Family cyprinidae was dominant in terms of both species composition and occurrence. Knowledge of fish diversity has been expected as a useful tool for both quality and quantity harvesting of fish as well as for future studies.

Key words: Fish diversity, indigenous, exotic, sustainable utilization, conservation, Lake Begnas.

INTRODUCTION

Water resources of Nepal include rivers, streams, reservoirs, lakes, ponds, marshes and swampy lands, which cover about 406,380 ha of total area of the country (Sharma, 1986; RONAST, 2003). The aquatic ecosystem has large number of economically important animals especially fish which is important source of food. Nepal is rich in water resources and fishing is a longstanding tradition (Gurung *et al.*, 2005). It also offers excellent habitat to 186 indigenous and 11 exotic species of fishes with high economic, environmental and academic value (Shrestha, 1995; Subba and Ghosh, 1996). Shrestha (2008) reported 232 species including carps, catfishes, feather backs, eels, hill stream fishes, exotics etc. distributed from terai lowlands through the mid-hills to the high Himalayan uplands.

Freshwater fishes are increasingly threatened by a range of factors, including habitat loss, over exploitation and biological invasions. These are mostly a result of catchment fragmentation, dam/ weir construction, water and aggregate abstraction and the prevalence of illegal and

destructive fishing methods such as small mesh nets, use of plant derived toxins, electricity and dynamites (Shrestha, 1994). Main objective of the present work was to study the fish diversity of Begnas Lake and specific objectives were to find out their size range, weight range, occurrence and local market price. Ferrow and Badgami (1980), John and Dhewajoo (1989), Fisheries Research Center (FRC) (1992) and Pokharel (1998, 1999, 2006), reported fish diversity of water bodies in the Pokhara Valley.

MATERIALS AND METHODS

Study Area

Begnas lake, the second largest in the Pokhara Valley, lies in mid-hills at an altitude of 650 m above sea level (Figure 1). It extends between 28°7'N to 28°12'N latitude and 84°5' E to 84°10' E longitude. It is situated at the base of Begnas hill about 13 km east of Pokhara city, with watershed area of 225 ha and an average depth of 9.37m.

Sampling

Present study was conducted during February to July 2017. Three sites (Piple, Lipdi and Majhi Kuna) were selected for sampling fishes. Sampling was done weekly using different types of nets (gill net and fish traps) especially gillnets with the help of fishermen. Fish traps were placed during afternoon hours, whereas the gill nets were left installed overnight and observed next morning. Fishes were identified using reputed taxonomic books (Shrestha, 1981; Jayaram, 1999; Shrestha, 2008).



Figure 1. Location map of study area.

RESULTS

Species diversity, distribution and occurrence

Altogether 17 species of fishes belonging to five orders, seven families and 17 genera were recorded in the present study as shown in Table 1. Family cyprinidae was found to be the dominant, which included 11 species. Fish species such as *Chagunius chagunio*, *Oreochromis niloticus*, *Tor putitora*, *Puntius conchoni*, *Xenentodon cancila*, *Cirrhinus mrigala*, *Mystus bleekeri*, *Barilius bendelisis* and *Mastacembelus armatus* were recorded from

all sites, indicating these species were abundant. Species such as *Puntius sophore*, *Aristichthys nobilis*, *Danio devario*, and *Channa punctatus*, were recorded from two sites indicating their less occurrence, while species such as, *Catla catla* and *Ctenopharyngodon idella* were recorded from a single site indicating their least occurrence. Among three sampling sites the highest number of species were recorded at Site 1 with 16 species, 14 species at Site 3 and 12 species at Site 2.

The occurrence of various fish species is shown in Table 2. It was observed that *Oreochromis niloticus*, *Chagunius chagunio*, *Cirrhinus mrigala*, *Puntius conchoni*, *Tor putitora*, *Clarias batrachus*, *Mystus bleekeri*, *Barilius bendelisis*, *Xenentodon cancila* and *Mastacembelus armatus* had higher occurrence; *Puntius sophore*, *Danio devario* and *Channa punctatus* had moderate occurrence; and *Catla catla* and *Ctenopharyngodon idella* had lower occurrence during the study period.

Table 1. List of fish species recorded from Begnas Lake.

SN	Taxa	Local Name	Site 1	Site 2	Site 3
I.	Order : Cypriniformes				
	Family : Cyprinidae				
	1. <i>Puntius sophore</i> (Hamilton Buchanan)	Bhurluk	+	+	-
	2. <i>P. conchoni</i> (Hamilton Buchanan)	Vita	+	+	+
	3. <i>Chagunius chagunio</i> (Hamilton Buchanan)	Rewa	+	+	+
	4. <i>Tor putitora</i> (Hamilton Buchanan)	Sahar	+	+	+
	5. <i>Catla catla</i> (Hamilton Buchanan)	Bhakur	+	-	-

	6. <i>Cirrhinus mrigala</i> (Hamilton Buchanan)	Naini	+	+	+
	7. <i>Danio devario</i> (Hamilton Buchanan)	Sera	+	-	+
	8. <i>Barilius bendelisis</i> (Hamilton Buchanan)	Fageta	+	+	+
	9. <i>Cyprinus carpio</i> var. <i>communis</i> (Linnaeus)	Common carp	+	-	+
	10. <i>Aristichthys nobilis</i> (Richardson)	Big head carp	+	-	+
	11. <i>Ctenopharyngodon idella</i> (Valeciennes)	Grass carp	-	-	+
II.	Order: Siluriformes Family : Claridae 12. <i>Clarias batrachus</i> (Linnaeus) Family : Bagridae	Magur	+	+	+
	13. <i>Mystus bleekeri</i> (Day)	Junge	+	+	+
III.	Order : Beloniformes Family : Belonidae 14. <i>Xenentodon cancila</i> (Hamilton Buchanan)	C h u c h e bam	+	+	+
IV.	Order : Perciformes Family: Cichlidae 15. <i>Oreochromis niloticus</i> (Linnaeus)	Tilapia	+	+	+
	Family : Chamidae 16. <i>Channa punctatus</i> (Bloch)	Bhoti	+	+	-
V.	Order : Synbranchiformes Family : Mastacembelidae 17. <i>Mastacembelus armatus</i> (Lacepede)	Bam	+	+	+

Note: '+' indicates presence, '-' indicates absence and '*' indicates exotic fish.

Size range, weight range and market price

The size range of various fish species is shown in Table 3. It was observed that, *Oreochromis niloticus* ranged from 23.5 to 26.0 cm in size, *Barilius bendelisis* had size range 8.37 to 20.75 cm, *Chagunius chagunio* 18.62 to 20.0 cm and *Cirrhinus mrigala* 30.25 to 32.25 cm, which was the highest size range. Similarly, *Puntius conchoni* had size range 5.5 to 6.0 cm, which was the lowest; *Tor putitora* had 12.0 to 14.0 cm, *Clarias batrachus* 15.0 to 21.5 cm, *Mystus bleekeri* 14.5 to 16 cm, *Xenentodon cancila* 26.5 to 27.0 cm and *Mastacembelus armatus* had 25.0 to 29.9 cm size range respectively. Likewise, *Puntius sophore* had size range 12.0 to 12.5 cm, *Aristichthys nobilis* 35.0 to 43.0 cm, *Danio devario* 10.0 to 11.0 cm and *Channa punctatus* had 15.0 to 16.0 cm; *Catla catla* and *Ctenopharyngodon idella* had less occurrence having size 95.0 cm and 8.0 cm respectively.

The weight range of various fish species is shown in Table 4. It was observed that the weight of *Oreochromis niloticus* ranged from 300.0 to 330.0 gm, *Barilius bendelisis* 5.0 to 7.5 gm, *Chagunius chagunio* 3.75 to 55.00 gm, *Cirrhinus mrigala* 345.0 to 425.0 gm (the highest range), *Puntius conchoni* 0.03 to 1.0 gm (the lowest range) and *Tor putitora* 10.0 to 20.0 gm. Likewise, the weight of *Clarias batrachus*, *Mystus bleekeri*, *Xenentodon cancila* and *Mastacembelus armatus* ranged from 12.6 to 73.3 gm, 15.02 to 40.00 gm, 56.66 to 60.00 gm and 40.0 to 80.0 gm respectively.

Table 2. Occurrence of fishes at Sites 1 to 3.

SN	Taxa	Site 1	Site 2	Site 3	Total (No.)
1.	<i>Puntius sophore</i>	19	47	-	66
2.	<i>P. conchoni</i>	15	40	119	174
3.	<i>Chagunius chagunio</i>	60	56	49	165
4.	<i>Tor putitora</i>	21	6	12	39

5.	<i>Catla catla</i>	1	-	-	1
6.	<i>Cirrhinus mrigala</i>	15	23	16	54
7.	<i>Danio devario</i>	1	-	1	2
8.	<i>Barilius bendelisis</i>	64	85	64	213
9.	<i>Cyprinus carpio</i>	2	-	3	5
10.	<i>Aristichthys nobilis</i>	1	-	1	2
11.	<i>Ctenopharyngodon idella</i>	-	-	1	1
12.	<i>Clarias batrachus</i>	18	20	10	48
13.	<i>Mystus bleekeri</i>	10	3	4	17
14.	<i>Xenentodon cancila</i>	25	29	86	140
15.	<i>Oreochromis niloticus</i>	530	555	372	1457
16.	<i>Channa punctatus</i>	2	5	-	7
17.	<i>Mastacembelus armatus</i>	17	18	23	58
	Total	801	887	761	2449

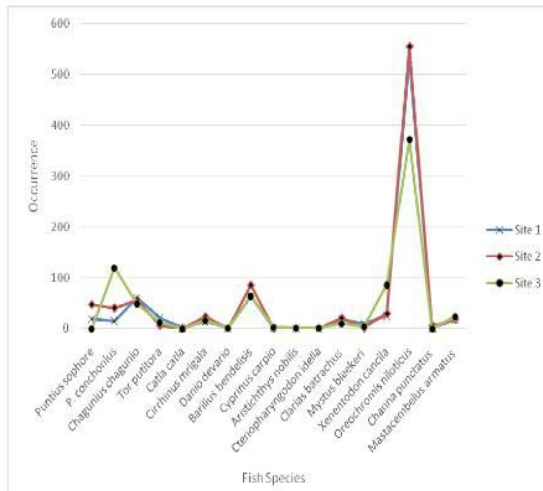


Figure 2. Occurrence of fishes at Sites 1-3.

Table 3. Size range of fishes at Sites 1 to 3.

S.N	Taxa	Site 1	Site 2	Site 3	Average Size
1.	<i>Puntius sophore</i>	12.5	12.0	-	12.50
2.	<i>P. conchonius</i>	6.0	5.5	6.3	5.93
3.	<i>Chagunius chagunio</i>	20.0	23.0	18.62	20.54
4.	<i>Tor putitora</i>	14.0	11.0	14.00	12.00
5.	<i>Catla catla</i>	95.0	-	-	95.00
6.	<i>Cirrhinus mrigala</i>	32.25	30.25	32.00	31.50
7.	<i>Danio devario</i>	10.0	-	11.0	10.50
8.	<i>Barilius bendelisis</i>	8.37	10.75	9.0	9.37

9.	<i>Cyprinus carpio</i>	29.0	-	30.0	29.50
10.	<i>Aristichthys nobilis</i>	35.0	-	43.0	39.00
11.	<i>Ctenopharyngodon idella</i>	-	-	38.0	38.00
12.	<i>Clarias batrachus</i>	15.0	17.0	21.5	17.83
13.	<i>Mystus bleekeri</i>	14.5	16.0	16.0	15.50
14.	<i>Xenentodon cancila</i>	26.5	26.66	27.0	26.72
15.	<i>Oreochromis niloticus</i>	23.5	22.5	26.0	24.00
16.	<i>Channa punctatus</i>	16.0	15.0	-	15.50
17.	<i>Mastacembelus armatus</i>	29.66	27.00	25.00	27.22

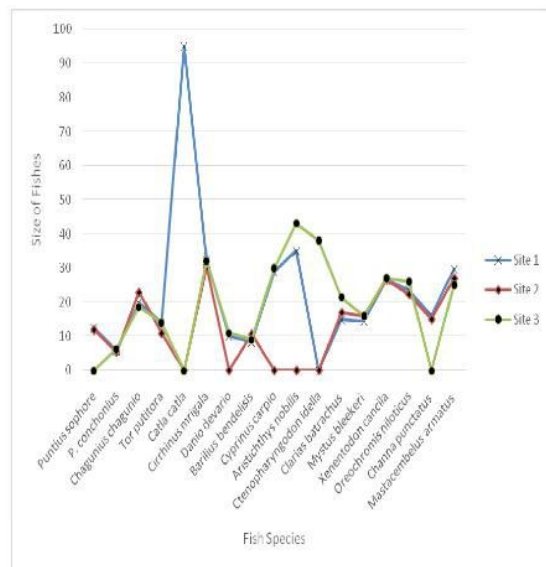


Figure 3. Size of fishes at Sites 1-3.

Table 4. Weight range of fishes at Sites 1 to 3.

SN	Taxa	Site 1	Site 2	Site 3	Average Weight (gm.)
1.	<i>Puntius sophore</i>	5.0	4.0	-	4.50
2.	<i>P. conchonius</i>	0.03	0.08	1.0	0.37
3.	<i>Chagunius chagunio</i>	55.00	120.00	37.50	70.83
4.	<i>Tor putitora</i>	10.0	15.0	20.0	15.00
5.	<i>Catla catla</i>	200.0	-	-	200.00
6.	<i>Cirrhinus mrigala</i>	425.0	345.0	380.0	383.33
7.	<i>Danio devario</i>	5.0	-	9.0	7.00
8.	<i>Barilius bendelisis</i>	6.76	7.50	5.00	6.42
9.	<i>Cyprinus carpio</i>	180.0	-	300.0	240.00

10.	<i>Aristichthys nobilis</i>	1000.0	-	870.0	935.00
11.	<i>Ctenopharyngodon idella</i>	-	-	600.0	600.00
12.	<i>Clarias batrachus</i>	73.3	126.6	95.0	98.30
13.	<i>Mystus bleekeri</i>	15.02	30.00	40.00	28.34
14.	<i>Xenentodon cancila</i>	60.00	56.66	40.00	52.22
15.	<i>Oreochromis niloticus</i>	330.0	330.0	312.5	314.16
16.	<i>Channa punctatus</i>	40.0	50.0	-	45.00
17.	<i>Mastacembelus armatus</i>	80.0	55.0	40.0	58.33

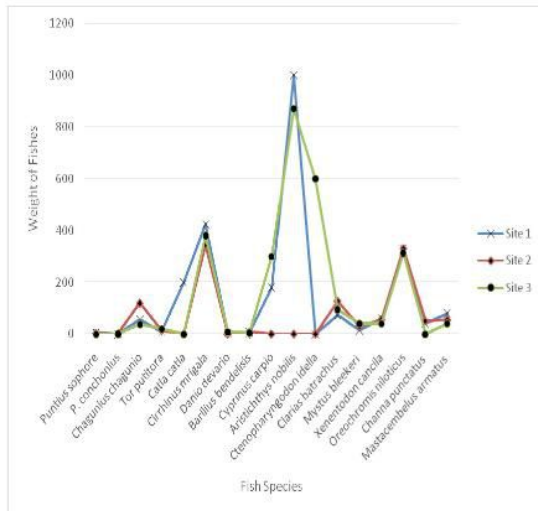


Figure 4. Weight of Fishes at Sites 1-3.

The market price of various fish species is shown in Table 5. Most of the species recorded during the study period have economic value as food, medicine, recreation and aesthetic purpose. The fish species having highest market price (Rs.500.00 to 650.00/kg) were *Tor putitora* and *Mastacembelus armatus*, the middle priced (Rs.430.00 to 480.00/kg) were *Danio devario*, *Barilius bendelisis*, *Chagunius chagunio*, *Mystus bleekeri*, *Catla catla*, *Cirrhinus mrigala*, *Ctenopharyngodon idella*, and *Cyprinus carpio*, and the lowest priced (Rs. 250.00 to 330.00/kg) were *Puntius sophore*, *Aristichthys nobilis*, *Clarias batrachus*, *Oreochromis niloticus*, *Puntius conchoniuis*, *Xenentodon cancila* and *Channa punctatus*.

Table 5. Market price of fishes

SN	Taxa	Market Price (Rs. /kg)
1.	<i>Puntius sophore</i>	260.00
2.	<i>P. conchoniuis</i>	250.00
3.	<i>Chagunius chagunio</i>	480.00
4.	<i>Tor putitora</i>	650.00
5.	<i>Catla catla</i>	450.00
6.	<i>Cirrhinus mrigala</i>	430.00
7.	<i>Danio devario</i>	480.00
8.	<i>Barilius bendelisis</i>	480.00
9.	<i>Cyprinus carpio</i>	430.00
10.	<i>Aristichthys nobilis</i>	330.00
11.	<i>Ctenopharyngodon idella</i>	430.00
12.	<i>Clarias batrachus</i>	260.00
13.	<i>Mystus bleekeri</i>	480.00
14.	<i>Xenentodon cancila</i>	260.00
15.	<i>Oreochromis niloticus</i>	260.00
16.	<i>Channa punctatus</i>	260.00
17.	<i>Mastacembelus armatus</i>	500.00

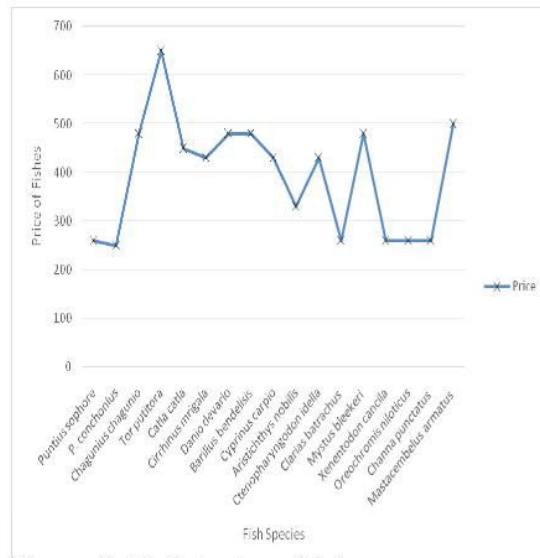


Figure 5. Market price of fishes.

DISCUSSION

In the present study, 17 species of fishes belonging to five orders, seven families and 17 genera were recorded. Family cyprinidae was found to be the dominant with 11 species, followed by the families such as, claridae,

bagridae, belonidae, cichlidae, channidae and mastacembelidae. *Oreochromis niloticus* had the highest occurrence in Begnas Lake, indicating favourable environment for their growth and survival. John and Dhewajoo (1989) reported fishes such as *Tor*, *Neolissocheilus*, *Chagunius* etc. Pokharel (1999) studied fish diversity of lakes in Pokhara Valley including Begnas and Rupa lakes and reported 17 and 16 indigenous fish species from Begnas and Rupa lakes respectively including four exotic species. Likewise, Bista *et al.* (2003) observed 17 indigenous fish species including *Clarias batrachus*, a cat fish, inhabitant of warm ecological region of Nepal, first appeared in Lake Phewa in March, 1998. The contribution of all indigenous fishes was recorded to be 59.02% and that of exotic species to be 40.98%. Six exotic species have been reported from Begnas Lake (FRC, 2016).

CONCLUSION

Begnas Lake is rich in fish diversity, with 17 species belonging to five orders, seven families and 17 genera of which *Mastacembelus armatus*, *Tor putitora*, *Chagunius chagunio*, *Barilius bendelisis*, *Oreochromis niloticus*, *Mystus bleekeri* and *Xenentodon cancila* were economically important species.

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