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Study of fish fauna, species diversity and relative abundance of fishes in river Yamuna of western Doon Uttarakhand

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Abstract
During the present investigation, a total of 9 genera, 3 families and 2 orders reported from the Yamuna River. *Tor putitora* was the most abundant fish with 20.13 percentage composition; it constitutes 0.169 abundance and 20.21 percentage relative abundance. *Tor putitora* was followed by *Barilius bendelisis* with percentage composition of 18.83, its abundance was 0.158 and with relative abundance of 18.89. Of all the fishes with Tor *tor* was least abundant with percentage composition of 1.29, it constitutes 0.010 abundance and 1.20% relative abundance. The fish species diversity during the study period was 0.889 which indicates the good diversity of the River Yamuna during the study period.

Keywords: Realtive abundance, species diversity, percentage composition

1. Introduction
Uttarakhand is rich in terms of fish diversity due to two major important perennial rivers of India i.e. Ganga and Yamuna supported by many other tributaries. It has also many fish production seed and farms like Bhimal and Dakhrani where culturing of many species like Mahseer and common crap is practiced in order to enhance the fish productivity in the state [1]. Doon valley acts as a connective link between the plains and hill stream fishes. Geographically the Dehradun district can be divided into Eastern and Western Doon valley. Eastern part is supported by Ganga with number of tributaries and western part is supported by Yamuna with number of tributaries as Asan and tons etc. However the western part of the Doon valley remains less explored as compared to the eastern Doon valley as the accessibility in the western Doon valley. As per the review of literature, the research work on fishes was carried out in the Eastern Doon valley [2-6]. Whereas Western Doon Valley (Yamuna drainage) remains less explored due to tough terrain and poor accessibility of roads [7]. Recently, western Doon Valley was surveyed by some researchers [8-12]. They conducted the survey of fish fauna of the western Doon valley and worked on the taxonomy, ecology, food and feeding, breeding habitat, fishing methods, GIS and Remote sensing application and conservation and management approach related to the fish and fisheries of the area. In the present study attempt has been made to find out the fish fauna, fish species diversity and relative abundance in River Yamuna.

2. Materials and Methods
The study was carried out from February, 2015 to February, 2016. For the collection of fishes, cast net of 1-2 m diameter with mesh size of 0.05 cm knot to knot with heavy sinkers, which allow rapid settling of the net at the bottom is used. At the each study site, at a time 10-15 throws were casted at different sites of the lake between mid-morning and late afternoon on a fixed day every month. Representative specimens of different fish species were preserved in 10% formaldehyde solution and identified in the laboratory using standard references [13-15].

3. Results
During the present investigation, a total of 8 genera, 3 families and 2 orders reported from the Yamuna River. *Tor putitora* was the most abundant fish with 20.13 percentage composition; it constitutes 0.169 abundance and 20.21 percentage relative abundance (Table: 1). *Tor putitora* is followed by *Barilius bendelisis* with percentage composition of 18.83, its abundance was 0.158 and with relative abundance of 18.89. of all the fishes with *Tor tor* was least abundant with percentage composition of 1.29, it constitutes 0.010 abundance and 1.20% relative abundance. *Mystus bleekeri* had 3.89 percentage compositions, with abundance of 0.032 and 3.83 relative abundance. *Puntius sophore* had 4.54% percentage composition, with abundance of 0.038 and 4.55 relative abundance. *Garra lamta* had 6.49 percentage compositions with abundance of 0.054 and 6.45 relative abundance.

Mastacembelus armatus had 5.54 percentage composition, with abundance of 0.049 and 5.86 relative abundance. *Puntius ticto* had 11.04 percentage composition and with abundance of 0.092 and 11.0 relative abundance. *Chagunius chagunio* had 11.04 percentage composition with abundance of 0.092 and 11.0 relative abundance. *Danio devario* had 16.88 percentage composition, with abundance of 0.142 and 16.98 relative abundance (Fig 1 & 2). As per the commercial values of the fishes are concerned the fishes like genus *Barilius, Puntius* and *Tor* are food fishes. As per the conservation status is concern *Tor putitora* and *Mastacembelus armatus* are endangered. The fish species diversity during study period was 0.889 which indicates the good diversity of the River Yamuna during present investigation (Table: 1).

4. Discussion

The study depicted presence of 10 species contributing about 20.58% of total fish diversity published from western Doon Valley [16] and about 14.89 percent of total fish species from an entire Doon Valley [7]. During the present investigation order cypriniformes has emerged as the most abundant group. The present finding were in accordance to the finding of earlier workers [5, 17] who reported the cypriniformes as the most abundant group with the total fish catch of 35 percent and reported the cypriniformes the most abundant group. Similar results have been reported by other researchers [18, 19]. They reported 13 fish species from the Nainital Lake in which order Cypriniformes was abundant. The result was in accordance to another ichtyologists. [20]. They have studied 12 high altitude lakes of Jammu and Kashmir to obtain information on the status of limnology and fish stocks and reported the dominance of Cypriniformes order among the all fish population. Similar observations were reported during the present study from the Yamuna River where the order Cypriniformes was the dominant among the fish population.

5. Conclusion

It has been concluded from the above study that the fishes of River Yamuna totally depend upon the physico-chemical parameters. But certain parameters such as turbidity which results in increased number of fish motility due to choking of gills. Besides this major problem is illegal fishing, which results in declining of the fish population of Yamuna River. Species diversity in different sampling sites indicated that altered habitat supports less fish species while variety habitat like shallow pool and deep pools are the primary habitats contributing to the maximum diversity, order Cypriniformes emerged as the most dominant group therefore, protection of these particular habitats is recommended for conservation and management of the fish biodiversity.

Table1: Diversity Index, Percentage Composition, Abundance and relative Abundance of fishes in River Yamuna

S. No.	Fish Species	(%)	Abundance	Relative Abundance
01	*Chagunius chagunio*	11.04%	0.092	11.00 %
02	*Barilius bendelisis*	18.83%	0.158	18.89 %
03	*Danio devario*	16.88%	0.142	16.98 %
04	*Puntius ticto*	11.04%	0.092	11.00 %
05	*Tor putitora*	20.13%	0.169	20.21 %
06	*Mystus bleekeri*	3.89%	0.032	03.83 %
07	*Puntius sophore*	4.54%	0.038	04.55 %
08	*Garra lamta*	6.49%	0.054	06.45 %
09	*Tor tor*	1.29%	0.010	01.20 %
10	*Mastacembelus armatus*	5.54%	0.049	05.86 %

*Shannon-Wiener (H´) = 0.889

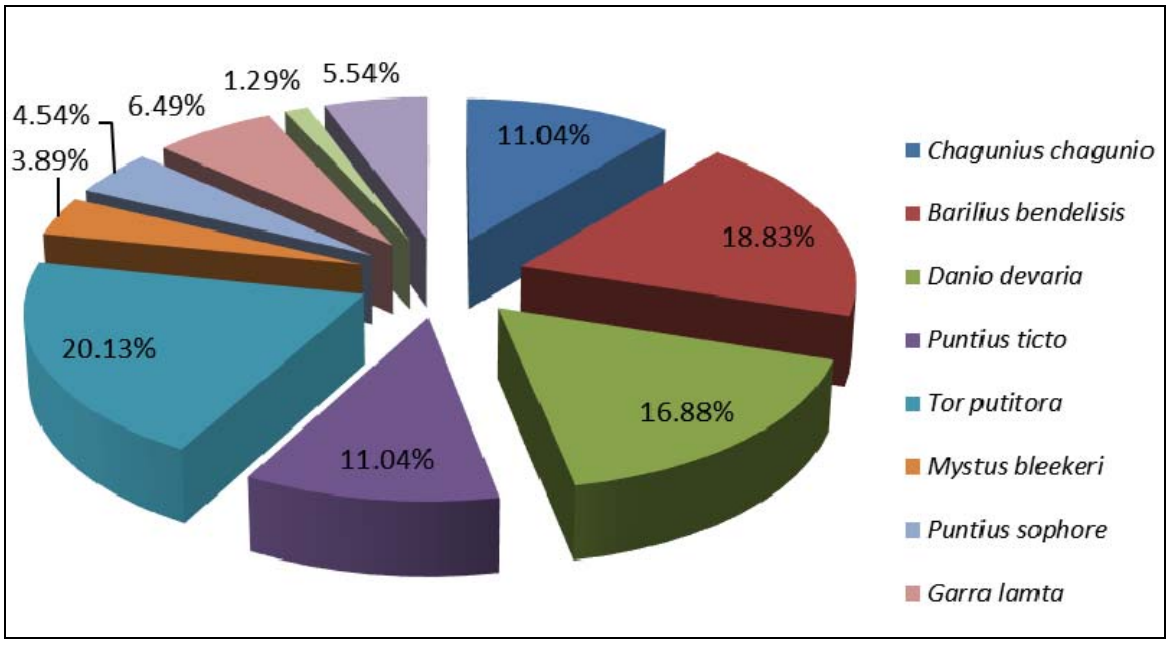

Fig 1: Percentage Composition of Fishes during Study Period

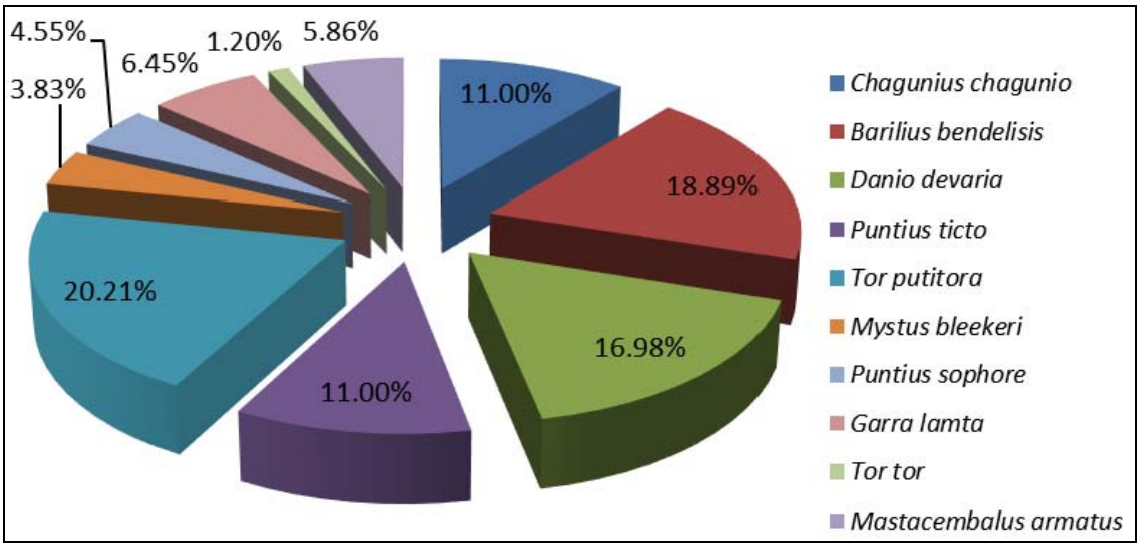

Fig 2: Relative Abundance of Fishes during Study Period

Fig 3: *Chagunius chagunio*

Fig 7: *Tor putitora*

Fig 4: *Barilius bendelisis*

Fig 8: *Mystus bleekeri*

Fig 5: *Danio devario*

Fig 9: *Puntius sophore*

Fig 6: *Puntius ticto*

Fig 10: *Garra lamta*

Fig 11: *Tor tor*

Fig 12: *Mastacembelus armatus*

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