Ichthyo-Faunal Diversity Of Suswa River, Doon Valley, Uttarakhand, India

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Abstract: The fish fauna of Suswa River was studied for a period of one year (June, 2015 – May, 2016). A total of 45 species belonging to 5 orders, 13 Families and 26 Genera were collected from various sampling stretches. Family Cyprinidae was found to be the most dominant represented by a total of 24 species. The water quality of Suswa river is depleting and the river carry a huge amount of pollution load hence it provides a suitable environment for the survival of hardy fishes such as *Clarius batrachus*, *Heteropneustes fossilis*, *Channa marulius*, *Channa harcourt butleri*, *Colisa labiosus*, *Colisa fasciatus*, *Colisa lalia etc*. On the other hand, the IUCN (2015 - 4) status outlines that 36 species are Least Concern, 1 Vulnerable, 1 Endangered, 3 Near Threatened and 4 Not Assessed. Anthropogenic activities as well as ecological processes contribute to the fishery status of aquatic bodies.
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Key Words: Ichthyofaunal Diversity, Suswa River, Doon Valley.

Introduction

Doon valley is bestowed with rich network of perennial rivers/hill streams, ponds and reservoirs, which provides an ideal habitat for the diversified fish fauna to flourish. Geographically, Doon valley is divided into Eastern and Western Doon valley. As per the review of literature the research work on fishes was carried out mostly on Eastern Doon valley (Ganga drainage) the important contributors are Hora and Mukerjee (1936), Lal and Chatterjee (1963), Singh (1964), Grover (1970), Tilak and Husain (1973, 1976, 1977a, b, 1990), Husain (1985, 1987, 1995), Grover and Tripathi (1985), Husain and Tilak (1995), Grover *et al.* (1994), Rauthan *et al.* (2009). Western Doon valley (Yamuna drainage) was explored by Singh (1964) for the first time surveyed the Western Doon valley later Husain (1985, 1987, 1995,) worked on selected parts. Recently Uniyal *et al.* (2001, 2002, 2006), Bahuguna *et al.* (2001), Uniyal (2002), Uniyal and Kumar (2006), Uniyal and Mehta (2007) conducted the extensive survey of Western Doon valley and worked on the taxonomy, ecology, food and feeding, breeding habitat, hydro-biology, fishing methods, GIS and Remote sensing application and conservation and management approach related to the fish and fishery of the area. Gupta and Rana (2009a, b, c, d) and Rana and Bhatt (2014) also evaluated the fish fauna of Doon Valley in terms of taxonomic details and statistical analysis, respectively. In our present study, we have carried out a more extensive survey to document and update the diversity of fish fauna of Suswa River.

Material And Methods

Doon Valley, part of district Dehradun (latitude – 29°58′ and 30°32′ N and longitude – 77°35′ and 78°20′E) comprises of 2 main river basins, namely, the Ganga river basin and the Yamuna river basin. The present study was carried out on Suswa River. Suswa river is an important river in Eastern Doon, which forms a rectangular drainage (originating at Mothronwala, near Clement Town area) taking a dendritic course towards the water parting line of the Mussoorie hills on one hand and the Siwalik range on the other. The bulk of Suswa water flows in various small, isolated streams underneath the Motichur forest. Flowing South-East for about 26 kms through the valley, it meets the main stream of Ganga at Gauri Ghat (Raiwala). Rispana, Bindal, Jakhan Rao, Sukh Rao, Ramgarh Rao I, Chorpani Rao, Fanduwala Rao, Kans Rao, Beriwara Rao are the principal tributaries of Suswa, but most of them remain fallow for most part of the year, holding some run offs only during monsoons/local rains.

Sampling was regularly / periodically done for a period of one year (June, 2015 – May, 2016) at the 4 sampling stations established along the river. Each sampling station was divided into stretches along its length, according to altitudinal variations to adjudge the spatial and temporal interrelationships. Each stretch covering an approximate distance of about 4 – 7 kms, was thus established as sampling sites. Fish samples were collected by employing standard gears, using variety of fishing nets of varying mesh sizes – gill nets, cast nets, drag nets with the help of trained fishermen on the sampling stations.

Table 1. Sampling Stations at Suswa River.

S. No.	Sampling stations	Stretch
1.	S_1	Mothrowala to Doiwala
2.	S_2	Doiwala to Kansrao
3.	S_3	Kansrao to Nepali Farm
4.	S_4	Nepali Farm to Tehri Farm (Gauri Ghat)

Fish samples were preserved in 4% formalin and bought to the laboratory for routine identification, meristic and morphometric analyses under the light of available standard literature and revisionary works (Day, 1878, 1889; Jayaram, 1981, 1999; Talwar and Jhingran, 1991; Nelson, 2006; Vishawanath *et al.,* 2007).

Results

A total of 45 species were collected during the entire study period. Family Cyprinidae was found to be the most dominant family represented by 24 species (53%) followed by family Channidaerepresented by 4 species (Table 2 and Figure 1). Fish diversity at station S_3 was found to be the most rich represented by 41 species followed by station S_4 (38 species), S_2 (22 species). Fish diversity at station S_1 was found to be the least *i.e.*, 20 species. As per the IUCN (2015-4) categorization, 36 species are Least Concern, 1 Vulnerable, 1 Endangered, 3 Near Threatened and 4 Not Assessed.

Table 2: Fish species from Suswa River.

S. No.	**Classified List (Nelson, 2006)** Phylum: Chordata Subphylum: Craniata Superclass: Gnathostomata Class: Actinopterygii Subclass: Neopterygii Division: Teleostei Subdivision: Ostarioclupeomorpha Superorder: Ostariophysi Order: Cypriniformes Superfamily: Cyprinoidea Family: Cyprinidae Subfamily: Barbinae	S_1	S_2	S_3	S_4	Local Name	*IUCN (2015-4) Status
1.	*Puntius chola*	+	+	+	+	Katcha, Puti	LC
2.	*Puntius sophore*	+	+	+	+	Puti	LC
3.	*Puntius ticto*	+	+	+	+	Bhuri, Puti	LC
4.	*Puntius conchonius*	+	+	+	+	Puti	LC
5.	*Puntius sarana sarana*	-	-	+	+	Puta	LC
6.	*Puntius terio*	-	-	-	+	Putiyah	LC
7.	*Chagunius chagunio*	-	-	+	+	Chibban, Pathali	LC
8.	*Shizothorachthys progastus*	-	-	+	-	Asela, Sohal	VU
9.	Subfamily: Labeoninae *Labeo dyocheilus*	-	-	+	-	Boalla	LC
10.	*Labeo pangusia*	-	-	+	-	-	NT
11.	*Labeo dero*	-	-	+	-	Kalbans, Moili	LC
12.	Subfamily: Rasborinae *Aspidoparia jaya*	-	+	+	-	Chilwa, Chal	LC
13.	*Aspidoparia morar*	-	+	+	-	Chilwa, Chal	LC
14.	*Barilius barna*	+	+	+	+	Dhaur, Childi	LC
15.	*Barilius bendelisis*	+	+	+	+	Chedra	LC
16.	*Barilius vagra*	+	+	+	+	Popa, Dhaur, Chalra	LC
17.	*Danio rerio*	+	+	+	+	Dharidar, Salari	LC
18.	*Devario devario*	+	+	+	+	Chand	LC
19.	*Esomus danricus*	+	+	+	+	Chal	LC
20.	*Rasbora daniconius*	+	+	+	+	Bhuri	LC
21.	*Crossocheilus latius latius*	+	+	+	+	Dhanaura	LC
22.	*Garra gotyla gotyla*	+	+	+	+	Dhanaura, Gotla	LC
23.	*Tor putitora*	-	+	+	+	Pila-par Mahseer	EN
24.	*Tor tor*	-	+	+	+	Lal-par Mahseer. Machiyari, Makhani	NT
	Superfamily: Cobitoidea Family: Cobitidae Subfamily: Cobitinae					Ghiwa, Nauni	

S. No.	**Classified List (Nelson, 2006)** Phylum: Chordata Subphylum: Craniata Superclass: Gnathostomata Class: Actinopterygii Subclass: Neopterygii Division: Teleostei Subdivision: Ostarioclupeomorpha Superorder: Ostariophysi Order: Cypriniformes Superfamily: Cyprinoidea Family: Cyprinidae Subfamily: Barbinae	S_1	S_2	S_3	S_4	**Local Name**	***IUCN (2015-4) Status**
25.	*Lepidocephalichthys guntea*	+	+	+	+		LC
26.	*Lepidocephalichthys annandalei*	-	-	+	+	Gadera, Ghiwa	LC
27.	Family: Balitoridae Subfamily: Nemacheilinae *Acanthocobitis botia*	+	+	+	-	Baktia, Gadera, Ghiwa, Nauni	LC
28.	Order- Siluriformes Family: Amblycipitidae *Amblycepsmangois*	+	+	+	+	Chhoti singhi	LC
29.	Family: Sisoridae Subfamily: Glyptosterninae *Glyptothorax pectinopterus*	+	+	+	+	Pathar-chatti	LC
30.	*Glyptothorax telchitta*	-	-	-	+	Sipliya	LC
31.	Superfamily: Siluroidea Family: Clariidae *Clarias batrachus*	-	-	+	+	Mangur	LC
32.	Family: Heteropneustidae *Heteropneustes fossilis*	-	-	+	+	Singhi	LC
33.	Family: Bagridae *Mystus tengara*	-	-	+	+	Kater	LC
34.	*Mystus bleekeri*	-	-	+	+	Kater	LC
35.	Superorder: Cyprinodontea Order: Beloniformes Superfamily: Scomberesocoidea Family: Belonidae *Xenentodon cancila*	-	-	+	+	Sua	LC
36.	Series: Percomorpha Order: Synbrachiformes Suborder: Mastacembeloidei Family: Mastacembelidae *Macrognathus pancalus*	-	-	+	+	Baam	LC
37.	*Mastacembelus armatus*	-	-	+	+	Baam	LC
38.	Order: Perciformes Family: Nandidae Subfamily: Badinae *Badis badis*	+	+	+	+	Chiri	LC
39.	Suborder: Anabantoidei Family: Osphronemiidae Subfamily: Luciocephalinae *Colisa fasciatus*	-	-	+	+	Sunera	NA
40.	*Colisa lalius*	-	-	+	+	-	NA
41.	*Colisa labiosus*	-	-	+	+	-	NA
42.	Suborder: Channoidei Family: Channidae *Channa punctatus*	+	-	+	+	Sauli, Sewal	NA
43.	*Channa gachua*	+	-	+	+	Sowan, Dawla	LC
44.	*Channa marulius*	-	-	-	+	Saur	LC
45.	*Channa harcourtbutleri*	-	-	-	+	-	NT
Total		**20**	**22**	**41**	**38**		

['+'= presence of species; '-' = absence of species. * = IUCN (2015-4) status. VU = Vulnerable, EN = Endangered, NT = Near Threatened, LC = Least Concern, NA= Not Assessed]

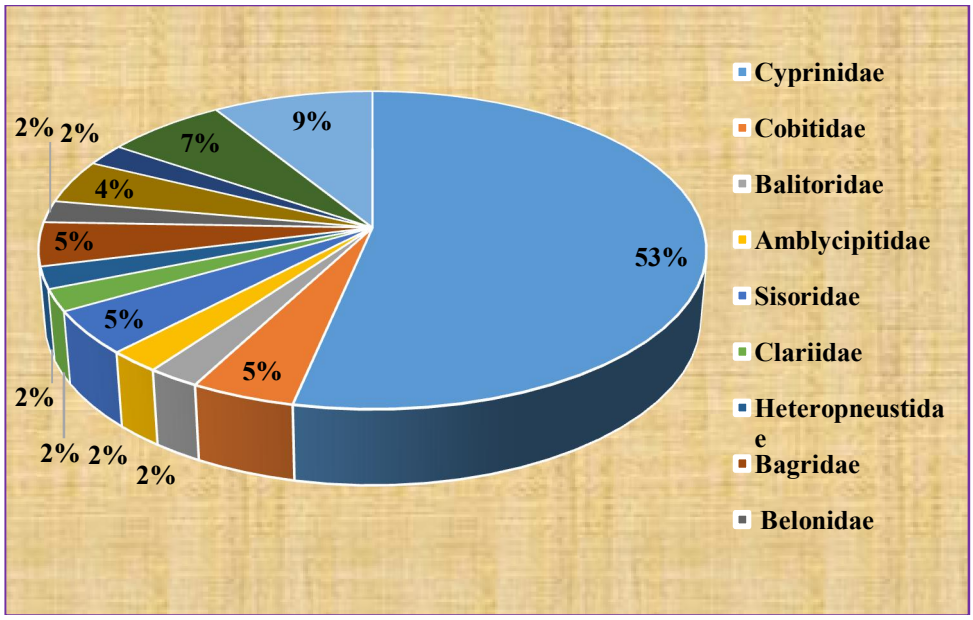

Fig. 1. Family – wise % composition of Fish Fauna of Suswa River

Discussion

Suswa River is represented by a total of 45 species belonging to 5 Orders, 13 Families and 26 Genera were collected from various sampling stretches. Family Cyprinidae was found to be the most dominant represented by a total of 24 species. The water quality of Suswa river is depleting and the river carry a huge amount of pollutional load hence it provides a suitable environment for the survival of hardy fishes such as *Clarius batrachus*, *Heteropneustes fossilis*, *Channa marulius*, *Channa harcourtbutleri*, *Colisa labiosus*, *Colisa fasciatus*, *Colisa lalia etc*. There has been a practice to assign a definite status (Endangered, Vulnerable, Least Concern, Near Threatened) to fish diversity (Sreekantha, *et al*., 2007; Sarkar *et al*., 2010) on the basis of the world recognized criteria set under CAMP (1998); IUCN (15-4). The same has been adopted in the past when the fish fauna of Doon valley was discussed (Uniyal *et al*., 2002; Uniyal and Kumar, 2006; Uniyal and Mehta, 2007).

The latest criterion, set by IUCN (2015-4) has been followed in the present observations and the status is summarized in Table 2. The overall assessment regarding the family-wise representation all over Doon Valley in general and Eastern and Western drainages in particular, has revealed the domination of the members of family Cyprinidae (Hora and Mukherjii, 1936; Uniyal and Kumar, 2006; Uniyal and Mehta, 2007) as has also been reflected in earlier observations from Himalayas and Doon Valley (Grover *et al*., 1994; Uniyal, 2002; Johal, 2002; Nautiyal, 2005; Pathani and Upadhyay, 2006; Negi and Negi, 2010) or other parts of the country (Bhat, 2003, 2004; Lakra *et al*., 2010; Shahnawaz *et al*., 2010) and abroad (Jayaratne and Surasinghe, 2010; Sumith *et al*., 2011). This fact lends support to the widely acclaimed fact that Cyprinidae tops the list of 9 largest (most species - rich) families *viz*., Cyprinidae, Gobiidae, Cichlidae, Characidae, Loricariidae, Balitoridae, Serranidae, Labridae and Scorpianidae (Nelson, 2006).

The family domination in Doon valley show that families Balitoridae and Channidae comes next in order after Cyprinidae a fact very well substantiated by the earlier studies (for Balitoridae, Bhat, 2003) (for Channidae, Vijaylaxmi *et al*., 2010 and Vijaylaxmi and Vijaykumar, 2011).

During the present investigation, *Barilius* species has emerged as the most abundant group. This finding was in accordance to the findings of Husain (1995) and Uniyal (2009) who reported the *Barilius* species as the most abundant group with a total catch of 35% and Negi *et al*. (2007) who reported the Cypriniformes as the most abundant order. According to them the altitude of the stream or the river shows inverse relationship with fish biodiversity level. The more the altitude the less will be the evenness and abundance of fish species. Anthropogenic activities as well as ecological processes contribute to the fishery status of aquatic bodies. It is also strongly affected by socio-economic factors such as land policies, property rights, population migration, urbanization, resources availability, other commercial activities, and market for the resources. According to Nautiyal (2005) fish assemblage is less at the origin because of high water current but is more towards the confluence of the river as the water content is more at that point.

Conclusion

It may be concluded from the above study that fishes of river Suswa totally depend upon quality of water and pollution free environment. Although all the parameters are found favorable for fish survival but certain parameters such as turbidity which increases due to pollution which results in increased number of fish mortality due to choking of gills besides this the major problem is illegal fishing which results in declining of fish population in Suswa river system. Hence there is an urgent need of action plan for conservation of fish habitat, fishery development etc., besides this safety measures should be taken to control illegal fishing by total ban on fishing especially in breeding season.

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