

## **Fish Diversity in Western Ramganga River of Kumaun Himalaya Uttarakhand, India**

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### **Abstract**

Present investigation deals with seasonal variation in ichthyofauna diversity in Western Ramganga River at Chaukhutiya (Almora), India. Spring fed river Western Ramganga harbors varieties of ichthyo-fauna. During one year of the study period (i.e. Jan 2012 to Dec., 2012) 14 fish species were recorded. Identified fish species belonged to four families, namely Sisoridae, Cyprinidae, Botinae and Mastacembellidae. Of these four families, Cyprinidae comprise the dominant family represented by 8 species and Mastacembellidae was the last abundant family in terms of species composition during the entire study period and contributed single species in the Western Ramganga River.

**Keywords:** *Fish Diversity, Kumaun Himalaya, Western Ramganga River*

### **INTRODUCTION**

Fish and fisheries play a vital role in addressing hunger and poverty. Fishes are a rich source of protein, essential fatty acids, vitamins and minerals. These fatty acids, mainly omega 3 fatty acids are very beneficial and difficult to obtain from other food sources. Food and feeding of fishes is totally depending on the amount of available food present in that aquatic system. Nikolsky, (1999) found the biota present in the water exerts a profound relationship with productivity and food feeding habits of fishes in the water bodies. Various environmental factors that determine the characters of water have great influence on the growth of fishes. Physical alteration of habitat, deterioration of water quality, over exploitation and fishing during spawning period are the prime causes which affect fish growth. Fish growth and diversity also can be influenced by hydro chemistry, intensity of light, presence of food and submerged aquatic vegetation. Khanna and Singh, (2006) reported that in the last two decades rich fish fauna has declined considerably and besides that, fishes like the *Barilius bendelisis*, *Barilius bola*, *Schizothorax richardsonii* and *Tor putitora* have become rare and considered as threatened species. Soil erosion, constructions of buildings, roads in river catchment, and uses of explosives, bleaching powder and ichthyotoxic plants have

caused considerable damage to the ecology of mountain rivers resulting depletion of fish species. Therefore, urgent attention and necessary step must be taken to augment the fishery potential. Several studies have been made on the ecology and diversity of fishes in various water bodies, (Bhatnagar, 1964; Pathani, 1980; Taylor, 1986; Linthoingambi *et al*, 2013). However, our information on this respect of hill stream fishes is quite scanty (Badola and Singh, 1984). In the last few years a significant amount of work has been reported on hill stream fishes by some researchers like (Badola and Singh, 1981; Nautiyal and co-workers, 1991; Pathani, 1995; Negi and Negi 2010; Kanwal and Pathani, 2012; Singh *et al*, 2013) etc. The present chapter is devoted to identification of fish species inhabiting in the Western Ramganga River because a number of fish species are declining at an alarming rate either by natural disaster or anthropogenic activities therefore, their study is necessary to maintain the ecological balance of the aquatic ecosystem.

#### **MATERIAL AND METHODS-**

The present study was conducted from January 2012 to December 2012 in the Western Ramganga River. The Chaukhutiya sampling site was selected for the study. The selected site Chaukhutiya situated at an altitude 1090 amsl. Fish species were collected monthly from selected sampling site with the help of local fishermen and villagers. After collection fishes were preserved in 10% formalin solution. Representative specimens of different fish species were identified in the laboratory using standard books and key like (Day, 1978 and Jayaram, 1999) etc.

#### **RESULTS-**

During the present research, fish species showed a high degree of seasonal variation. In Western Ramganga River a total 14 fish species were collected in the collection. The fish species collected during the entire study period (Jan., 2012 to Dec., 2012) from the Western Ramganga River are given in the Table 1. Identified fish species belonged to four families namely Sisoridae, Cyprinidae, Botinae and Mastacembellidae. Of these four families, Cyprinidae comprises the dominant family represented by 8 species. The second dominant family in terms of species composition was Botinae and contributed (3) species. Sisoridae was the third dominant family in terms of species composition and contributed 2 species. Mastacembellidae was the last abundant family in terms of species composition during the entire study period and contributed single species in the Western Ramganga River. These species were identified regularly with their various body measurements and fin formula. The number of species present in different months varied markedly throughout the study period. Monthly qualitative composition of fish diversity at selected sampling spot Chaukhutiya in the Western Ramganga River has been depicted in Table (1). During entire one year study period

(i.e. Jan 2012 to Dec., 2012) maximum fish species 13 were recorded in October and minimum 4 fish species were noted in January, February and July.

Based on results of frequency of occurrence the fish species could be categorized under five categories i.e. Abundant (81-100%), frequent (61-80%), Common (41-60%), Occasional (21-40%) and Rare (1-20%) Table (2). Observation on frequency of occurrence of various fish species during the entire study period revealed that only one species belonged to the abundant category, 3 species were frequent, 8 species were common, 2 species were occasional and none of the species were rare in occurrence. Five most important species in order of their decreasing frequency were: *Tor putitora* (83.33%), *Botia almorhae* (75%), *Barilius bendelisis* (66.66%), *Schizothorax richardsonii* (66.66%), and *Garra gotyla* (58.33%) etc. During the whole study period, the Shannon-Weiner diversity of fish fauna in the Western Ramganga River at Chaukhutiya ranged from a minimum of 1.27 (February) and a maximum of 2.48 (October) Fig: 1.

## DISCUSSION

Fishes are present in every kind of freshwater ecosystem, whether it is a river, stream, pond or lake. Basically, the species richness, community abundance and the population size of various fish species vary from one ecosystem to other. Even within a lentic or the lotic water bodies, the number of species and community abundance may vary from one ecosystem to another. Much research work has been done on fish diversity in lakes, rivers, ponds and reservoirs, etc. Species richness of Western Ramganga was compared with reports from certain water bodies of India. Vidyadhar, (2005) estimated 43 fish species in tributaries of Ramganga; Pathani and Upadhyay, (2006) recorded 18 fish species belonging four families in the Western Ramganga River; Negi and Negi, (2010) estimated 10 species in rivers of Kumaun Himalaya; Negi and Rajput, (2012) found only 9 fish species in Nainital Lake. In the present study 14 fish species were recorded in the Western Ramganga River. This number is quite lower than most of the above mentioned aquatic bodies, but higher than that of little ones. It was found various ecological conditions, nutrition load, available food and dissolved oxygen, etc., affects the diversity of fishes at a great extent. In the present study, maximum collected fish species belong to Cyprinidae family. Similar results have been also reported by (Pathani and Upadhyay, 2006; Negi and Negi, 2010).

The ecological parameters considered in this study included species diversity indices. Diversity indices are good indicators of pollution in aquatic ecosystems. Ramesha and Sophia, (2013) in their studies reported that a diversity index greater than 3 indicates clean water and between 1 to 3 indicates moderately polluted water while values less than 1 is characteristic of heavily polluted

water. Data on diversity indices and the concentration of dominance of fish community are available for comparison. Negi and Rajput, (2012) found maximum fish diversity index ( $H'$ ) 2.359 in Bhimtal Lake and in Nainital lake  $H'$  1.978.

In Western Ramganga River diversity index values is between 1 and 3 which indicates that river water is moderately polluted. Present investigation, also reveal that the fish diversity of a river is closely related to geographical variation and seasonal variations in hydrography.

## Conclusion

Briefly, extensive survey, observation and fair examination of ichthyo-faunal diversity in the Western Ramganga River and their comparison with standards references, it can be concluded that the water quality of the Western Ramganga River in Chaukhutiya region is fairly good and suitable for fish production as evident from the diversity of fishes.

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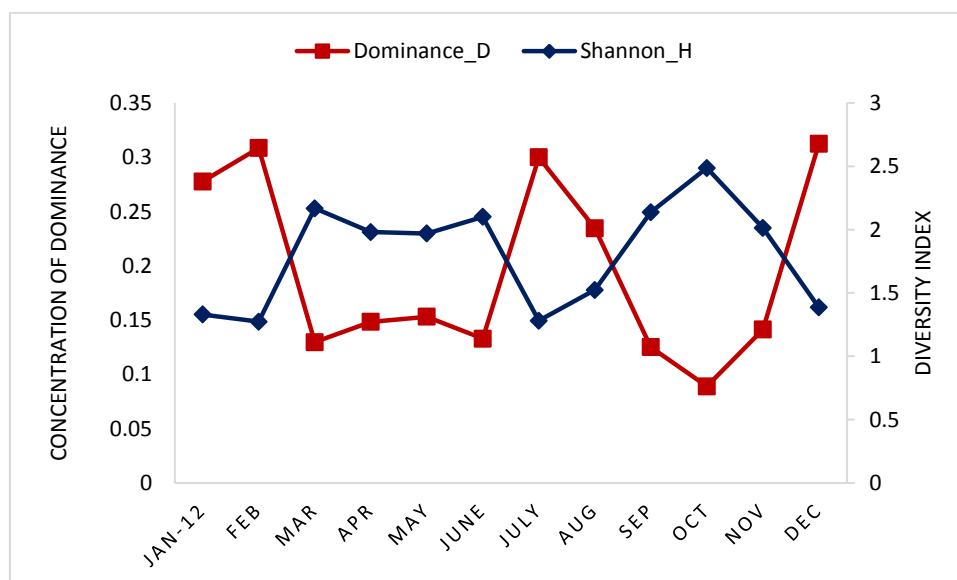


Fig-1: Seasonal variations in Shannon-Weiner diversity index and the concentration of dominance of ichthyofauna in the Western Ramganga River from Jan., 2012 to Dec., 2012.

**Table 1: Qualitative composition of Ichthyofauna diversity in selected sampling site Chaukhutiya during the entire study period (i.e. Jan 2012 to Dec 2012)**

	Jan 201 2	Feb	Mar	Apr	Ma y	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Tot al
<b>Family Cyprinidae</b>													
<i>Schizothorax richardsonii</i>	+	+	+	+	-	-	-	-	+	+	+	+	8
<i>Schizothorax plagistomus</i>	-	-	+	+	-	-	-	+	+	+	-	-	5
<i>Labeo dero</i>	-	+	+	+	-	-	-	-	+	+	+	-	6
<i>Barilius bendelisis</i>	-	-	+	+	+	+	+	+	+	+	-	-	8
<i>Barilius vagra</i>	-	-	-	+	+	+	-	-	+	+	-	-	5
<i>Garra gotyla</i>	+	-	+	-	+	+	-	-	-	+	+	+	7
<i>Tor tor</i>	-	+	+	+	-	-	-	-	-	+	+	-	5
<i>Tor putitora</i>	+	+	-	+	+	+	+	+	-	+	+	+	10
<b>Family Cobitidae-</b>													
<i>Botia almorhae</i>	+	-	+	+	+	+	-	-	+	+	+	+	9
<i>Nemacheilus rupicola</i>	-	-	+	-	+	+	-	-	-	+	+	+	6
<i>Nemacheilus montanus</i>	-	-	+	-	+	+	-	-	+	+	+	-	6
<b>Family Sisoridae</b>													
<i>Glyptothorax pectinopterus</i>	-	-	-	-	-	+	+	+	+	-	-	-	4
<i>Pseudoecheneis sulcatus</i>	-	-	-	-	-	-	+	+	-	+	-	-	3
<b>Family Mastacembellidae</b>													
<i>Mastacembelus armatus</i>	-	-	+	-	+	+	-	-	+	+	-	-	5
<b>Total</b>	4	4	10	8	8	9	4	5	9	13	8	5	

**Table 2: Percent Frequency of occurrence during entire one year of study period in Western Ramganga River**

	Abundant (81-100%)	Frequent (61-80%)	Common (41-60%)	Occasional (21-40%)	Rare (1-20%)
<b>Family Cyprinidae</b>					
<i>Schizothorax richardsonii</i>		√			
<i>Schizothorax plagistomus</i>			√		
<i>Labeo dero</i>			√		
<i>Barilius bendelisis</i>		√			
<i>Barilius vagra</i>			√		
<i>Garra gotyla</i>			√		
<i>Tor tor</i>			√		
<i>Tor putitora</i>	√				
<b>Family Cobitidae</b>					
<i>Botia almorhae</i>		√			
<i>Nemacheilus rupicola</i>			√		
<i>Nemacheilus montanus</i>			√		
<b>Family Sisoridae</b>					
<i>Glyptothorax pectinopterus</i>				√	
<i>Pseudoecheneis sulcatus</i>				√	
<b>Family Mastacembellidae</b>					
<i>Mastacembelus armatus</i>			√		

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