Our Nature (2009) 7:182-186

Seasonal Distribution and Relative Abundance of Fish Fauna of a Small Hill-Stream Dangchaura (Takoli) Gad, along with River Alaknanda

B. Bisht[1], A.K. Badoni[2] and S.N. Bahuguna[2]

[1]*Department of Zoology, P.G. College Agastyamuni, Rudraprayag, Uttarankhand, India.*
[2]*Department of Zoology, HNB Garhwal University, Srinagar Garhwal, India*

Received: 22.07.2008, Accepted: 26.04.2009

Abstract
The present study was carried out to investigate seasonal distribution and relative abundance of fish fauna of a small hill stream Dangchaura (Takoli) Gad along with river Alaknanda. The differences in availability of fish-fauna were directly related to the nature of profile and slope of tributary; which affects the migration and breeding grounds of the fishes inhabited in the main river Alaknanda.

***Key words*:** Hill-stream fish fauna, Seasonal distribution, Dangchaura Gad

Introduction

Geo-graphically the Alaknanda valley forms the central region of Garhwal Himalaya. The Garhwal Himalaya is situated between the latitudes $29^0$26' to $31^0$28'N and longitudes $86^0$6'E. The stream Dangchaura (Takoli) Gad is the right bank tributary of the river Alaknanda in the lower valley. The Uttaranchal state contains a very rich and colorful icthyofauna where the considerable work has been done by Badola and Singh (1980), Bahuguna and Singh (1981), Singh and Bahuguna (1983a, b), Tilak and Baloni (1983), Nautiyal and Lal (1994) etc. but most of the work has been conducted on big snow fed river system of Garhwal Himalaya while no work has been done on small spring fed tributaries. Hence an effort has been made to full fill the gap of knowledge in eastern part of Tehri district.

Materials and methods

Monthly collection of fishes was made in different sites of the stream (Figure 1). Besides personal fish collection some fishes procured from local fisherman from different sampling sites. The collections were made by using different fishing methods which were used commonly by the local people. The fresh fishes fixed in 8% formalin. Before preservation a small cut was given at abdominal region without injuring the alimentary canal. Formalin injections were also given in fishes for better preservation and fixation of internal organs. The preserved fishes were kept in glass jars, plastic jars with proper labeling .Fish identification was done by using various morphometric and meristic characters of different fish species. The identification of different fishes was done with the help of Day (1878), Srivastava (1968), Badola (1979), Husain (1987), Datta Munshi and Srivastava (1968) and Talwar and Jhingran (1991).

Results and discussion

Variation in the availability of fishes has been recorded from different sites of the stream (Table 1). During winter season 9, 10, 13, 8 and 9 species from sites S1, S2, S3, S4 and S5 were recorded where as in summer season the availability of fishes were 9, 10, 12, 11 species from sites S1, S2, S3, S4 and S5 respectively. While 9, 10, 15, 16 and 13 species were recorded from sites S1, S2, S3, S4 and S5 in monsoon season, and in autumn season the availability of fishes was 9, 11, 9, 8 and 4 from sites S1, S2, S3, S4 and S5 respectively. During the study period the highest diversity was recorded in monsoon season. Snow trout *Schizothorax* sp. and mahseer *Tor* sp. have been observed from Dangchaura (Takoli) Gad in this season. The most abundant species recorded from Dangchaura (Takoli) Gad was *Nemacheilus* followed by *Barilius* and *Glyptothorax* in all season, while *Schizothoraichthys progastus* recorded rarely from site S4 and S5 only in monsoon season. Maximum fish fauna was recorded during monsoon season due to migratory behavior of some fishes and change in physico-chemical nature (temperature, dissolved oxygen, water velocity, pH, and turbidity).Some other factors like long stream length. As well as stream geometry (*viz.* stream shape, nature of stream profile, average gradient, slope and circularity index etc.) affects the availability of fishes. (Bahuguna and Badoni, 2002). During the study period snow trout (*Schizothoraichthys progastus*) and mahseer (*Tor putitora, Tor tor*) have been observed in Dangchaura (Takoli) Gad, during the monsoon season and sometimes in winter and summer season .This is due to the breeding, migration and availability of basic fish food items (macro-zoo benthos, algae, diatoms and zoo-planktons), which attracts the good variety of fishes towards the Dangchaura (Takoli) Gad (Bahuguna and Badoni, 2002). Similar opinion has also given by Singh and Kumar (2000).

In Streams and rivers the changes takes place along their length is directly related to the eco-physico-chemical nature (water depth, current, substratum etc.). All these factors which changes along the length of streams are also the factors which controls the distribution of the various section of the biotic fauna and flora (Bahuguna and Badoni, 2002).

Over all the variation in seasonal distribution and relative abundance of fish fauna is directly related to change in physico-chemical nature, variation in altitude and longitude, channel course and water discharge, co-morphological adaptive organs of the fishes, vast aerial expansion, higher number of streams, pattern and geometry of tributaries. Substratum is the major factor which influences the distribution and abundance of fish fauna.

Substratum is the major factor, which influence the distribution and abundance of fish fauna. Dangchaura (Takoli) Gad possesses rocky substratum with big boulders and pebbles, which forms the most favourable breeding grounds for the fishes especially for *Tor*, *Schizothorax* and *Glyptothorax* sp. Developing, hatchlings, hiding in crevices of rocks, stones and gravel, react differently to the current and turbidity of water (Shrestha, 1993; Uniyal, 2003). Fast current and breeding season of these fishes force them for upward and downward migration too. Amount of water is also responsible for variation in distribution, because amount of water affects the valley lengthening and valley widening. The fishes are moves in higher quantities in a narrow stream valley of,

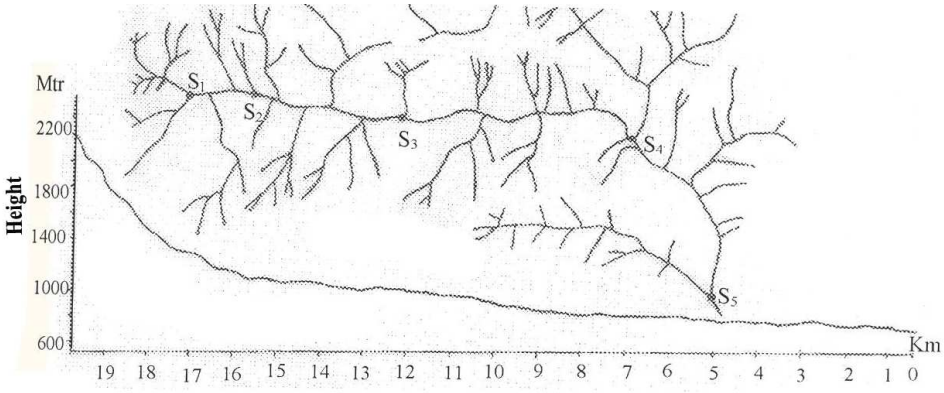

Figure 1. Stream geometry of Takoli Gad

Table 1. Seasonal distribution and relative abundance of fish fauna of Dangchaura (Takoli) Gad along with river Alaknanda.

Name of species	Winter					Summer					Monsoon					Autumn				
Order Cypriniformes	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5	S1	S2	S3	S4	S5
Family: Cyprinidae																				
Sub-family: Rasborinae																				
Genus: *Barilius* Ham-Buch																				
1. *Barilius barna* (Ham-Buch)	-	-	+	+	+	-	-	+	+	-	-	-	-	+	+	-	-	+	+	-
2. *B. bendelisis* (Ham-Buch)	-	-	+++	+++	+++	-	-	+++	+++	+++	-	-	++	+++	+++	-	-	++	+++	+++
3. *B. vagra* (Ham-Buch)	-	-	++	++	++	-	-	++	++	++	-	-	++	++	++	-	-	++	++	++
Sub-family: Cyprininae																				
Genus: *Tor* Gray																				
4. *Tor chelynoides* (Mc Clelland)	-	+++	+++	++	+	-	+++	+++	++	+	-	+++	+++	++	+	-	+++	++	++	+
5. *Tor putitora* (Ham-Buch)	-	-	-	-	+	-	-	-	-	+	-	-	++	++	+++	-	-	-	-	-
6. *Tor tor* (Ham-Buch)	-	-	-	-	-	-	-	-	-	-	-	-	+	+	+	-	-	-	-	-
Sub-family: Garrinae																				
Genus: *Crossocheilus* Van Hasselt																				
7. Crossocheilus latius latius (Ham-Buch)	-	-	-	+	+	-	-	-	+	+	-	-	+	+	+	-	-	-	+	+
Genus: Garra Ham- Buch																				
8. *Garra gotyla gotyla* (Gray)	-	-	-	+	+	-	-	-	+	+	-	-	-	+	+	-	-	-	+	-
9. *G. lamta* (Ham-Buch)	-	-	-	-	-	-	-	-	+	+	-	-	+	+	+	-	-	-	-	-
Sub-family: Schizothoracinae																				
Genus: *Schizothoraichthys* Misra																				
10. *Schizothoraichthys progastus* (Mc Clelland)	-	-	-	-	-	-	-	-	-	-	-	-	-	+	+	-	-	-	-	-
Genus: *Schizothorax* Heckel																				
11. *Schizothorax richardsonii* (Gray)	-	-	++	+ +	++	-	-	++	++	++	-	-	++	+++	+++	-	++	++	-	-
12. *S. plagiostomus* Heckel	-	-	-	-	-	-	-	-	-	-	-	+	++	++	++	-	-	-	-	-
Family: Balitoridae																				
Sub-family: Nemacheilinae																				
Geuns: *Nemacheilus* Bleeker																				
13. *Nemacheilus botia* (Ham-Buch)	++	++	-	-	-	++	++	-	-	-	+	-	-	-	-	+	+	-	-	-
14. *N. montanus* (Mc Clelland)	+++	+++	++	-	-	++	++	++	-	-	++	++	++	-	-	++	++	++	-	-
15. *N. rupecola* (Mc Clelland)	++	++	++	-	-	+++	++	++	++	+	++	++	++	++	++	++	++	++	++	-
16. N. zonatus (Mc Clelland)	+++	++	++	-	-	+++	++	-	-	-	++	++	-	-	-	++	++	-	-	-
17. *N. gangeticus* (Menon)	++	++	++	-	-	++	++	++	-	-	++	++	++	-	-	++	+	-	-	-

18. *N. multifaciatus* Day	++	++	++	-	-	+++	++	++	-	-	++	++	-	-	-	++	++	-	-	-
Order: Siluriformes																				
Family: Sisoridae																				
Genus: *Glyptothorax* Blyth																				
19. *Glyptothorax pectinopterus* (Mc Clelland)	++	++	++	++	+	++	+++	+++	++	++	++	++	++	++	++	++	++	++	+	-
20. G. madraspatanum (Day)	++	++	++	-	-	++	++	++	-	-	++	++	++	+	-	++	++	-	-	-
Genus: *Pseudecheneis* Blyth																				
21*: Pseudecheneis sulcatus* (Mc Clelland)	++	++	++	-	-	++	++	++	++	++	+	++	++	++	-	++	++	+	-	-
TOTAL SPECIES	9	10	13	8	9	9	10	12	11	11	9	10	15	16	13	9	11	9	8	4

S1= Ghatt gad (Below Machyari, alt. 1120 m), S2= Kelabada (Jakhand, alt. 970 m), S3= Takoli (alt. 790 m), S4= Dugadda (alt. 670 m), S5= Juyalgarh (alt.520 m), +++= Abundant, ++= Common, += Rare, -= Absent

Dangchaura (Takoli) Gad rather than the wider valley of rivers Alaknanda. Thus stream geometry also plays a significant role to determine the fish habitat, fish breeding ground and fish migration, along the stream. Longer stream length increases the abundance of fauna. Fish communities change along the length of rivers. Similar observations has been reported by Kleerekoper (1955), Oliff (1960), Chacko and Ganapati (1952) and Allen (1956, 1960). In Dangchaura (Takoli) Gad the Alaknanda fish habitat is found up to the distance of 15 km. from confluence. Another factor, which affects the fish habitat of the study area, is gradient of the stream. Higher gradient shows the less amounts of fish fauna. In Dangchaura (Takoli) Gad, the stream gradient is gradually rising towards source (0.10 m/km). Therefore high quantities of fishes are found in Dangchaura (Takoli) Gad.

Acknowledgements

Authors are thankful to ICAR New Delhi for financial support and also thankful to Prof. J.P. Bhatt, Head of the Department Zoology for providing laboratory facilities.

References

Allen, K.R. 1956. The geography of Newzealand's freshwater fish. *Newz. Sci. Rev.* ***14*****:** 3-9.

Allen, K.R. 1960. Freshwater fauna of Wellington. Science in Wellington, Roy. Soc. Newz. Handbook. pp. 23-47, 445.

Badola, S.P. 1979. *Ecological studies on the Ichthyofauna of freshwater resources of Garhwal region*. H.N.B. Garhwal University, Srinagar Garhwal. (D.Phil. Thesis)

Badola, S.P. and H.R. Singh 1980. Food and feeding habits of the Genera *Tor*, *Puntius* and *Barilius*. *Proc. Indian Nat. Sci. Acad.* B ***46*****:** 58-62.

Bahuguna, S.N. and A.K. Badoni 2002. Qualitative and quantitative productivity of fish food from three important tributaries of river Alaknanda. In: *Him. J. Env. Zool.* Vol. ***16(2):*** 215-222.

Bahuguna, S.N. and H.R. Singh 1981. Food and feeding habits of a hill stream fish *Glyptothorax pectinopterum* (Mc Clelland). *Ind. J. Anim. Sci.* ***51(10):*** 964-967.

Chacko, P.I. and S.V. Ganpati 1952. Hydrobiological survey of the Suruli river in the highways, Madurai district, India to determining its suitability for the introduction of the rainbow trout. *Arch. Hydrobiol.* ***46*****:** 128-41.

Datta Munshi, J.S. and M.P. Srivastava 1988. *Natural history of fishes and systematics of freshwater fishes of India*. Narendra Publishing House 1417, Kishan Dutt Street, Maliwara, Delhi. 403p.

Day, F. 1878. *The fishes of India being a natural history of the fishes known to inhabit the seas and freshwater of India, Burma and Ceylon*. Vols. I & II, pp xx+778. pls. cxiv.

Husain, A. 1987. *Studies on the fish fauna of some streams of Dehradun with notes on systematics, ecology, and zoo-geography*. Vol. I & II, pp. 1212+76 pls. H.N.B.G.U. Srinagar, Garhwal. (M.Phil. Thesis)

Kleerekopper, H. 1955. Limnological observation in North-Eastern Rio Grande do sul, Brazil. *Arch. Hydrobiol.* ***50*****:** 553-67.

Nautiyal, P. and M.S. Lal 1994. Fishing technique and the status of Himalayan Mahseer in the Nayar (Garhwal). In *Mahseer the game fish: Natural history, status and conservation practices in India and Nepal*. (Ed. P. Nautiyal). *Jagdamba Prakashan*, Dehradun. pp. 545-64.

Oliff, W.D. 1960. Hydrobiological studies on the Tugela river system. Part I. the main Tugela river. *Hydrobiologia* ***16*****:** 281-385.

Shrestha, T.K. 1993. Chronology of early development and life history of the golden mahseer in the intergravel environment of the Himalayan streams in Nepal. In *Advances in Limnology* (Ed. H.R. Singh). Narendra Pub. House, Delhi. pp. 253-270.

Singh, H.R. and N. Kumar 2000. Some aspects of ecology of hillstreams. Stream morphology, zonation, characteristics, and adaptive features of ichthyofauna in Garhwal Himalaya. In *Modern Trends In Fish Biology Research* (Ed. J.S. Datta Munshi), Narendra Publishing House, Delhi. pp. 1-18.

Singh, H.R. and S.N. Bahuguna 1983a. Gross morphology of the alimentary canal and seasonal variation in feeding of *Noemacheilus montanus* (Mc Clelland). *Anat. Anz. Jena*. ***154*****:** 119-124.

Singh, H.R. and S.N. Bahuguna 1983b. Food and feeding habits with gross morphology of the alimentary canal of *Puntuis chilinoides* (Mc Clelland). *J. Anim. Morphol. Physiol*. ***30*****(*****1-2*****):** 1-8.

Srivastava, G.J. 1968. *Fishes of U.P. and Bihar*. Vishwa Vidyalaya Prakashan, Varanasi. pp. xx+207, fig.113.

Talwar , P.K. and A.G. Jhingran 1991. *Inland fishes of India and adjacent countries*. Vols. 1 and 2, Oxford & IBH Publication, New Delhi. 1158 p.

Tilak, R. and S.P. Baloni 1983. On the food and feeding habits of hill-stream fishes of Tehri-Garhwal, Uttar Pradesh. 4th All India Seminar Icthyol; Dehradun. **68** (Abstract).

Uniyal, D.P. 2003. *Eco-taxonomical studies of Ichthyofauna of the Amlawa and Asan rivers of Western Doon valley*. H.N.B. Garhwal Univarsity, Srinagar Garhwal. (D.Phil. Thesis)