Original Article

Bulletin of Pure and Applied Sciences.
Vol.36 A (Zoology), No.2, 2017: P.85-92
Print version ISSN 0970 0765
Online version ISSN 2320 3188
DOI 10.5958/2320-3188.2017.00012.2

CURRENT STATUS OF FISH FAUNA OF RIVER JHELUM AND DAL LAKE OF KASHMIR VALLEY

Imtiaz Ahmed[1]*, Zubair Ahmad[1] and Ishtiyaq Ahmad[1]

Authors Affiliation:
[1]DST Sponsored Fish Nutrition Research Laboratory, Department of Zoology, University of Kashmir, Hazratbal Srinagar-190006, India

***Corresponding Author:**
Imtiaz Ahmed,
Sr. Assistant Professor,
DST Sponsored Fish Nutrition Research Laboratory,
Department of Zoology,
University of Kashmir,
Hazratbal Srinagar-190006, India.

E-mail:
drimtiazkuzoo@gmail.com;
imtiazamu1@yahoo.com

Received on 08.10.2017
Accepted on 02.12.2017

Abstract:

Fish fauna form an integral part of aquatic ecosystems and any drastic changes taking place in the medium in which they live can affect the productivity, diversity, ecology and distribution. In order to assess the current status of fish fauna of the river Jhelum and Dal lake of Kashmir valley. Study was carried out for the period of two years from January 2014-2016. Monthly samplings were carried out at 8 study sites- In upper stream of river Jhelum two sites were selected- Larkipora and Khanabal and in downstream Zero bridge and Parimpora, while in Dal lake- Hazratbal, Gagribal, Nageen and Nishat. During the study period, a total of 14 species of fishes of different genera were recorded. As we know, apparently the fishery resources of the Kashmir valley has thus declined over a period of time indicating many intrinsic and extrinsic vital disturbances which are altering the health of this vital economic, ecologic lentic and lotic water bodies.

Keywords: Kashmir valley, Fish fauna,Jhelum, Dal lake

INTRODUCTION

Fisheries in India are a very important economic activity and a flourishing sector with varied resources and potentials. India is also an important country that produces fish through aquaculture in the world. India is home to more than 10 percent of the global fish diversity. Presently, the country ranks second in the world in total fish production with an annual fish production of 9.06 million metric tones.

The valley of Kashmir gifted with the exotic natural beauty is often considered as Paradise on earth. It is situated between latitudes 32 and 37 being broader between longitudes 73 and 80 lying on the north western region of the Indian Subcontinent, surrounded on all sides by mountain ranges and is famous for lakes, springs, rivers etc. These water bodies constitute an adequate habitat for aquatic life particularly for the fish.

Kashmir valley located at an altitude 5,200 feet above sea level and temperature ranges from 16^0 F in winter to 95^0 F in summer, but to a great extent the climate of the valley is kept moderate by the large expenses of water bodies such as Jhelum, Wullar, Dal, Manasbal etc. Besides the lakes, there is a network of rivers, streams and springs etc. All these water bodies contain varied forms of freshwater life including fish. Due to rich Ichthyofauna, state has attracted the large number of zoologists beginning with Heckel (1838). Since that time many others have also worked on the fish and fisheries of the valley. The prominent workers in the field have been those of Day (1878); Mukherji (1936); Silas (1960); Das and Subla (1964, 1970); Tilak (1987); Raina and Naraian (1992); Yousuf (1996) and Kullander et al. (1999).

Fish plays a vital role in the development of a nation. Besides being a cheap source of highly nutrient protein, it also contains essential nutrients required by the human body (Sikoki and Otobotekere, 1999). Also fish is an important source of food for mankind all over the world from the times immemorial. Fish is a very important source of animal protein in the diets of man. The importance of fish as a source of high quality, balanced and easy digestible protein, vitamins and polyunsaturated fatty acids is well understood now (Ravichandran et al., 2011). Fish is a favourite food stuff for the majority of societies. Fish meal contains most important nutritional components and serve as a source of energy for human beings (Ojewala and Annah, 2006; Sutharshiny and Sivashanthini, 2011).

Jhelum the major river of Kashmir originates from the spring Verinag located in the foot of the Panjal mountains in the district Anantnag. Unfortunately, all along its course through the valley of Kashmir, the river is loaded with large quantities of sewage and agricultural runoff from the catchment.

Dal lake is a Himalayan urban lake, located in the heart of Srinagar ($34^018/$ N latitude and $74^091/$ E longitude) at an average altitude of 1583 m. During the past few years grave concern is being voiced by people from different walks of life over the deteriorating conditions of Dal Lake.

There is need to have many more studies, so as to develop a strategy for the overall improvement of the fishery resources of the region. The present study provides an updated status of the fish fauna of river Jhelum and Dal lake of Kashmir valley so as to assess the possible management strategies that need to be implemented.

MATERIAL AND METHODS

Study Area: The Kashmir valley nested in the north western folds of the Himalaya enjoys a continental climatic condition with marked seasonality resembling sub-mediterranean type characterized by varying rainfall occurring throughout the year. The valley is mainly drained by river Jhelum and its tributaries and has passed through various geological successions ranging from the oldest Archean to the recent Alluvium. Another study area was selected as one of the famous lake in Kashmir valley i.e., Dal lake.

Study Sites: A total of two water bodies were surveyed in Kashmir valley. In these water bodies different sites were selected for sampling (Table 1 and 2).

Table 1: Geographical attributes of the study sites of Dal Lake

Site	Elevation	Latitude	Longitude
Hazratbal (I)	5224ft	34⁰07′47.39″	74⁰50′15.19″
Gagribal (II)	5261ft	34⁰04′57.51″	74⁰51′0293″
Nageen (III)	5190ft	34⁰ 06′58.26″	74⁰49′48.66″
Nishat (IV)	5254ft	34⁰07′56.57″	74⁰52′39.86″

Table 2: Geographical attributes of the study sites of river Jhelum

Site	Elevation	Latitude	Longitude
Larkipora (I)	5482ft	33⁰38′43.18 ″	75⁰10′24.65″
Khanabal bridge (II)	5255ft	33⁰44′22.79 ″	75⁰06′29.68″
Zero bridge (III)	5210ft	34⁰04′11.96 ″	744948.14″
Parimpora (IV)	5206ft	34⁰06′26.00 ″	74⁰45′33.01″

Fish Collection: Fish specimens were procured on monthly and seasonal basis from 2014-16 with the help of fishermen. For fishing, different methods were used like indigenous method of cast net, drag net, hand net, rectangular net etc. The specimens were preserved in 10% formalin and brought to the laboratory for further studies. Fish specimens were identified with the help of the standard taxonomic works (Kullander et al., 1999). Fishing was usually carried out during morning hours.

RESULTS AND DISCUSSION

During the present study, a total of 14 species of fish were encountered at 8 different sites from the river Jhelum and Dal lake (Table 3 and 4). In the river Jhelum, *Schizothorax plagiostomus* was found to be the most abundant *Schizothorax* species at the site-I and II (Larkibal and Khanabal) followed by *S. esocinus*, *S. curvifrons*, *S. labiatus*, *Triplophysa kashmirensies*, *T. marmorata*, *Crossocheilus diplochilus*, *S. niger*, *Cyprinus carpio communis* and *C. carpio specularis* while at site-III and IV, *S. esocinus* was found most abundant followed by *S. plagiostomus* (Table 5 and Fig. 1). In Dal lake, at site-I and III, *Cyprinus carpio communis* and *C. carpio specularis* were found to be most abundant followed by *Crossocheilus diplochilus*, *Puntius conchonius*, *Carassius carassius*, *Gambusia holbrooki*, *S. niger*, *S. curvifrons*, *Botia birdi* and at site-III and IV *Crossocheilus diplochilus* was found to be most abundant followed by *Carassius carassius* and *Cyprinus carpio specularis* (Table 6 and Fig. 2).

Table 3: Fish species presently encountered from the river Jhelum, Kashmir

S. NO.	Fish species	Local name
1.	*Schizothorax esocinus* (Heckel, 1838)	Chhurru
2.	*Schizothorax plagiostomus* (Heckel, 1838)	Khont
3.	*Schizothorax labiatus* (McClelland, 1842)	Chush
4.	*Schizothorax curvifrons* (Heckel, 1838)	Satter gad
5.	*Schizothorax niger* (Heckel, 1838)	Ale gad
6.	*Triplophysia kashmirensis* (Hora , 1922)	AraGurun
7.	*Triplophysa marmorata* (Heckel ,1838)	AraGurun
8.	*Cyrinus carpio communis* (Linnaeus, 1758)	Punjabe gad
9.	*Cyprinus carpio specularis* (Linnaeus, 1758)	Punjabe gad
10.	*Crossochelius diplochilus* (Heckel, 1838)	Tetthar

Table 4: Fish species presently encountered from Dal Lake, Kashmir

S. NO.	Fish species	Local name
1.	*Cyprinus carpio communis* (Linnaeus, 1758)	Punjabe gad
2.	*Cyprinus carpio specularis* (Linnaeus, 1758)	Punjabe gad
3.	*Crossocheilus diplochilus* (Heckel, 1838)	Tetter
4.	*Carassius carassius* (Linnaeus, 1758)	Gang gad
5.	*Puntius conchonius* (Hamilton 1822)	Rosy barb
6.	*Gambusia holbrooki* (Girard 1859)	----
7.	*Botia birdi* (Chaudhuri, 1909)	Rama gurun
8.	*Schizothorax curvifrons* (Heckel, 1838)	Satter gad
9.	*Schizothorax niger* (Heckel, 1838)	Ale gad

Table 5: Contribution of fish by number at different study sites at river Jhelum

Species	Site I	Site II	Site III	Site IV
Schizothorax esocinus (Heckel, 1838)	23	24	22	19
Schizothorax plagiostomus (Heckel, 1838)	27	25	15	22
Schizothorax labiatus (McClelland, 1842)	18	16	12	15
Schizothorax curvifrons (Heckel, 1838)	17	19	14	10
Schizothorax niger (Heckel, 1838)	19	10	12	14
Triplophysia kashmirensis (Hora , 1922)	15	17	12	8
Triplophysa marmorata (Heckel ,1838)	14	15	12	9
Cyrinus carpio communis (Linnaeus, 1758)	6	7	4	2
Cyprinus carpio specularis (Linnaeus, 1758)	5	3	4	1
Crossochelius diplochilus (Heckel, 1838)	12	11	8	10
Total	156	147	115	110

Table 6: Contribution of fish by number at different study sites at Dal lake

Species	Site I	Site II	Site III	Site IV
Cyrinus carpio communis (Linnaeus, 1758)	44	31	41	31
Cyprinus carpio specularis (Linnaeus, 1758)	47	35	45	27
Crossocheilus diplochilus (Heckel, 1838)	27	38	32	34
Carassius carassius (Linnaeus, 1758)	17	9	18	10
Puntius conchonius (Hamilton 1822)	19	10	12	14
Gambusia holbrooki (Girard 1859)	10	6	12	8
Botia birdi (Chaudhuri, 1909)	1	0	2	0
Schizothorax curvifrons (Heckel, 1838)	3	1	2	0
Schizothorax niger (Heckel, 1838)	5	3	4	1
Total	173	133	168	125

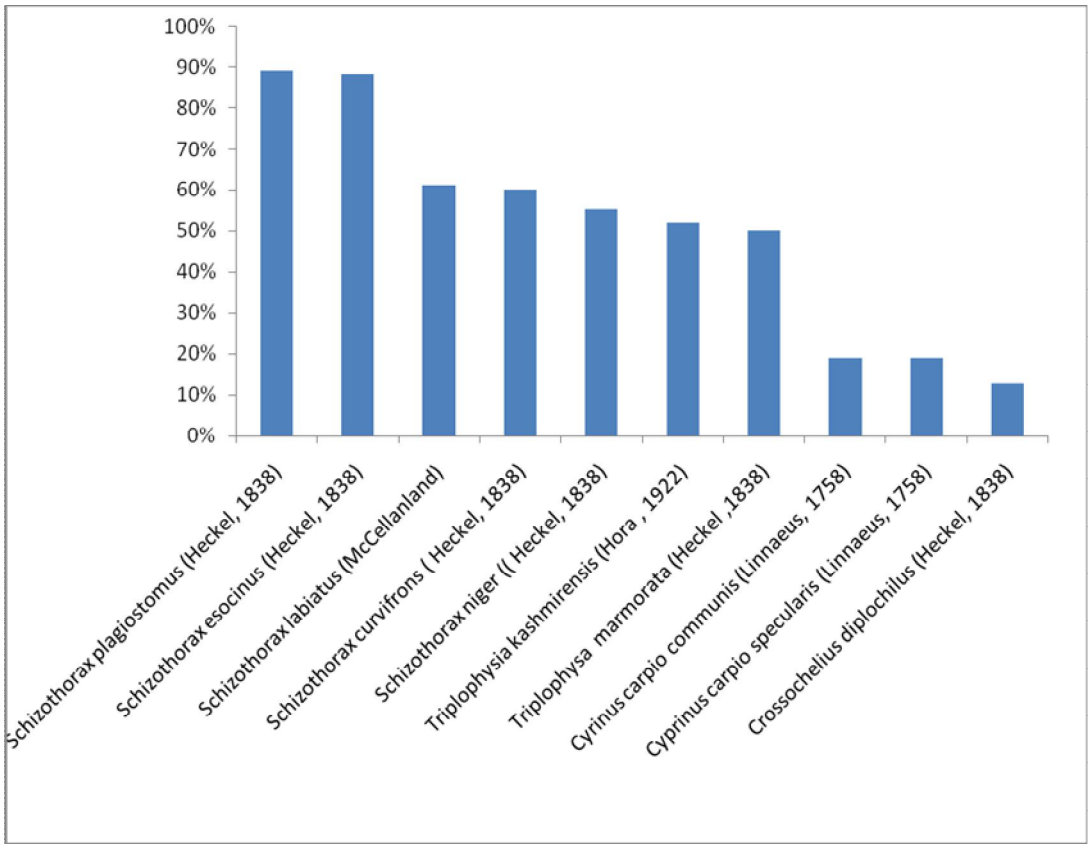

Fig.1: Percent contribution of fish catch from the river Jhelum (January 2014-16)

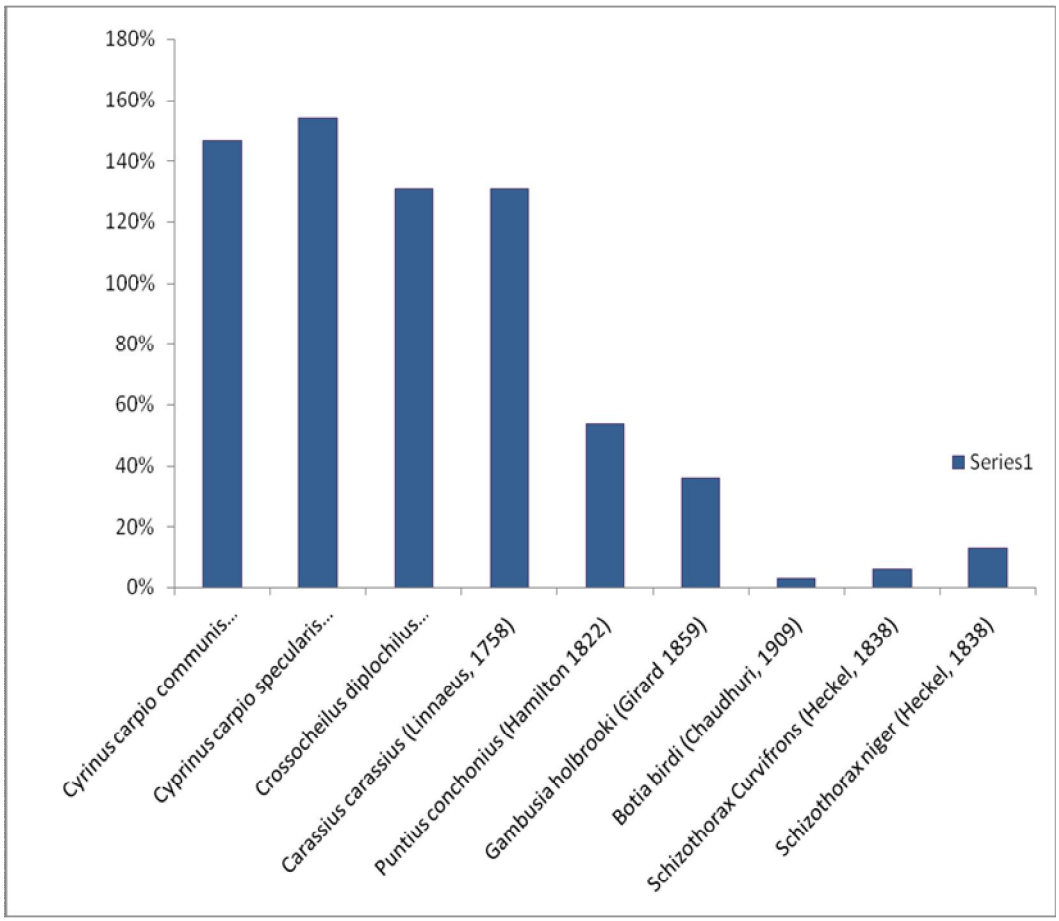

Fig. 2: Percent contribution of fish catch from Dal lake (January 2014-16)

Kullander et al, 1999 made a standardized fishing along the Jhelum river and associated lentic water bodies in Kashmir valley obtained fourteen native and four introduced fish species over a period of eight years, five species of *Schizothorax*, four of which are specialized lotic forms and out of these one is mostly found in lentic water bodies (*S. niger*). 11 fish species from river Jhelum has been also reported by Yousuf et al, 2006 and in comparison to the present study only 10 species were reported from river Jhelum. However, certain fish species in river Jhelum viz. *Gambusia holbrooki*, *Bangana diplostoma*, *Botia birdi* and *Puntius sophore* were not observed in the present study but were found in Dal Lake. Also, during the present investigation certain species viz. Rainbow trout and Brown trout were not found either of the river Jhelum and Dal lake water bodies. As per Khan, 2004, the anthropogenic pressure along the catchments has poorly affected the fish production in the lentic and lotic water bodies of Kashmir.

According to Sunder and Subla, 1984 and Yousuf et al. 2006 described the fishing effort is an index of fish population structure in a water body and it appears that the fish population in the Dal lake has comparatively got lowered over the past few decades, probably because of over-exploitation, increasing level of pollution, loss of habitat, disturbances of breeding grounds etc. On an another side, the fish population in the Dal lake has been declined to a large extent due to various factors like encroachment, agricultural activities, urbanization, eutrophication and overfishing (Shafi and Yousuf, 2012).

CONCLUSION

The present study moderately reflects that the fish diversity has been apparently got declined in the river Jhelum and Dal lake of Kashmir valley. Most probably the aquatic ecosystem (Dal Lake and river Jhelum) are not getting the sufficient time to recover its natural community structure. So, much more efforts need to be oriented to preserve their important lentic and lotic fish habitat which has great economic and ecological values.

SUGGESTIONS

There are several factors which greatly affects the production of fishes. The main concern for the depletion of fishery resources from these water bodies is over-fishing and encroachment, therefore, it is very important to monitor these water bodies regularly. In order to manage fisheries in the river Jhelum and Dal Lake, immediate steps need to be undertaken e.g; fishing in the river Jhelum and Dal Lake should be regulated so as to avoid over exploitation of this vital resource. The entry of domestic sewage, solid wastes and agricultural wastes into these water bodies needs to be controlled and poorly managed. Also aquatic weeds present in these aquatic ecosystems must be cultivated and should be properly utilized because of its high nutritional values and economic values. A separate authority needs to be established to monitor the physico-chemical and biological characteristics of the river Jhelum and Dal lake water bodies.

ACKNOWLEDGEMENTS

We are thankful to the Head, Department of Zoology, and University of Kashmir for providing necessary facilities. The authors are also gratefully acknowledged UGC, New Delhi for financial support in the form of 'Himalayan Biodiversity–Documentation, Bio-prospection & conservation' under the Scheme 'CENTER WITH POTENTIAL FOR EXCELLENCE IN PARTICULAR AREAS (CPEPA).

REFERENCES

1. Das, S.M. and Subla B.A. (1964). The Ichthyo- fauna of Kashmir: part ii. "The speciation of Kashmir fishes with two new records of species" *Icthyologica,*3: 57-62.
2. Das, S.M. and Subla B.A. (1970). The pamir Kashmir theory of the origin and evolution of Ichthyo-fauna of Kashmir. *Ichthylogica*, 10: 8-11.
3. Day, F. (1878). Scientific results of the second yarkand mission, based upon the collection and notes of the late Ferdinand stoliczka, Ph.D. Ichthyology. Government of India, Calcutta.
4. Heckel, J.J. (1838). Fische aus Caschmir gesammelt und herausgegeben von Carl Freiherrn von Hügel, beschrieben von Joh. Jacob Heckel.
5. Kullander, S. O., Fang, F., Delling, B. and Ahlander, E. (1999) The fishes of the Kashmir valley. In: River Jhelum, Kashmir valley. *Impacts on the aquatic environment*. Nyman, L. ed. Swedmar, Goteborgs, Lanstryckeri AB., Swedmar, pp. 99-162.
6. Mukherji, D.D. (1936). Report on fishes. Part II: *Sisoridae, Cyprinidae*. *Memoirs of the Connecticut Academy of Arts and Sciences,* 10*:323-359.*
7. Ojewola, G.S. and Annah, S.I. (2006). Nutritive and economic value of Danish fish meal, crayfish dust meal and shrimp waste meal inclusion in broiler *diets. International journal of poultry Science, 5: 390-394.*
8. *Raina, M.K. and N*arain. K. (1992). A key to the species of the genus *Schizothorax* Heckel, 1838 (cyprinidae: cypriniforms) from Kashmir with a note on its taxonomy. pp 3-10.
9. Ravichandran, S; Kumaraval, K. and Florence, E.P. (2011). Nutritive composition of some edible fin fishes. *International journal of Zoological research*, 7: 241-251.
10. Shafi, S. and Yousuf A.R. (2012). Length-weight relationship and condition factor of

Schizothorax niger (Heckel, 1838) Misra from Dal lake, Kashmir. *International Journal of Scientific and Research Publications*, 3: 1-3.

11. Sikoki, F.D. and Otobotekere, A.J.T. (1999). Fisheries. The Land People of Bayelsa State Central *Niger* Delta, Port Harcourt, *Niger*ia.
12. Silas, E.G. (1960). Fishes from the Kashmir valley. *Journal of the Bombay natural history society*, 57: 66-77.
13. Sunder, S. and Subla, B.A. (1984). Fish and fisheries of river Jhelum Kashmir. *Zoological Orientalis* 1: 34-39.
14. Sutharshiny, S. and Sivashanthini, K. (2011). Total lipid and cholesterol content in the flesh of the five important commercial fishes from water around Jaffina Peninsula, Srilanka. *International journal of biological Chemistry*, 5: 161-169.
15. Tilak, R. (1987). The fauna of India and the adjacent countries. Pisces (Teleostomi) sub family: *Schizothoracinae*. Director, Zoological Survey of India, Calcutta.
16. Yousuf, A.R. (1996). Fishery resources of Kashmir. In: A.H. Khan and A.K. Pandit (eds.) Ecology, Environment and Energy. University of Kashmir pp. 75-120.
17. Yousuf, A.R.; Bhat, F.A. and Mahdi, M.D. (2006). Limnological features of river Jhelum and its important tributaries in Kashmir himalaya with a note on fish fauna. *Journal of Himalayan Ecology and Sustainable Development* 1: 37-50.