Pakistan J. Zool., vol. 48(1), pp. 285-288, 2016.

Short Communication

Current Scenario and Threats to Ichthyo-Diversity in the Foothills of Hindu Kush: Addition to the Checklist of Coldwater Fishes of Pakistan

Arif Jan,* Abdul Rab, Rooh Ullah, Hussain Shah, Haroon, Iftikhar Ahmad, Muhammad Younas and Ikram Ullah

Department of Zoology, Shaheed Benazir Bhutto University, Sheringal, Dir Upper.

ABSTRACT

Chitral, the pinnacle of Hindu Kush, draining 31 notable glaciers, is least studied for Ichthyo-faunal diversity. This work explored the fish fauna and the risk factors for the Ichthyo-faunal diversity loss at the foothills of Hindu Kush. A total of 21 fish species were collected from different parts and tributaries of River Chitral, from Shandur up to Arandu, extending to Afghanistan border. Our collection reported 4 fish species for the first time from Pakistan, namely *Acanthocobitis uropthalmus, Lepidopygnosis typus, Horalabiosa palaniensis, Horalabiosa joshuai*. One species namely *Nangra robusta* is reported for the first time from River Chitral. Alluvial nature of rocks, construction of hydro projects and duck ponds, introduction of exotic species, erosion and sedimentation of rivers and streams, illegal fishing, and effluent discharges are the major concerns. Major threats to biodiversity loss need to be addressed for proper conservation of biodiversity as a whole and Ichthyo-diversity in particular.

Article Information

Received 16 January 2015
Revised 9 August 2015
Accepted 19 September 2015
Available online 1 January 2016

Authors' Contributions

AJ has conducted the field work, analyzed the data and wrote the article. HS, H and IA helped in the field work arrangements. MY, RU and IU helped in literature search. AR helped in identification.

Key words

Ichthyo-fauna, biodiversity, cold water fishes.

A minimum of 193 freshwater species represent the freshwater fauna of Pakistan. These species belong to class Actinopterygii, sub class Teleostei, 3 cohorts, 6 superorders, 13 orders, 30 families and 86 genera (Rafique, 2007; Rafique and Khan, 2012). This variety is contributed by both the exotic and native species of Pakistan; however a high proportion is of endemic species, belonging to three genera (*Triplophysa, Schistura* and *Glyptothorax*), have low agility restricted to their native river systems. Their cold water nature keeps them confined to the hilly streams, isolated from other cold water and warm water species. Their cold water habitat provides distinct adaptations and evolution. The history of these fish species can be traced back to the uplift to Himalayas, Hindukush and Karakoram ranges, because of which the ancestors of these fishes had to face hard conditions of snow cold and fast running water (Jayaram, 1982). Most of the endemic fish species of Pakistan are restricted to mountainous and sub-mountainous areas. The damming importance of this region is a serious threat to the extinction of some of the important freshwater Ichthyo-diversity (Regnier *et al*., 2009). Around 20% of the world's freshwater fish is currently either endangered or extinct (Ali *et al.*, 2010).

The Northern landscape of Pakistan is covered by high mountains, and serves as a perennial source of freshwater. Here in this region three ranges the Himalayas, Hindu Kush and Karakoram extend from east to west. Water of this region and of western low mountains are classified as cold water and its Ichthyo-fauna as cold water fishes of both native and exotic nature. Coldwater fishes are restricted only to this part of the country (Petr, 1999). The main objective of the study was to examine the Ichthyo-diversity and to identify the causes and threats of its loss, in the vicinity of the Himalayas, which is a worldwide focused point in terms of biodiversity.

Chitral is bestowed with a vast variety of aquatic resources because of the presence of Hindu Kush (a sub range of Himalaya) in its vicinity. About 31 prominent glaciers serves as permanent sources of streams and small rivers, which finally act as tributaries to river Chitral. The presence of cold water habitat is ideal for preserving and the evolution of freshwater fauna of Chital (IUCN, 2009).

Materials and methods

Fish samples were collected from different localities of district Chitral including the remote areas, *e.g.* Yar Khoon lasht, Sor laspur, Mastuj and Booni upto Arandu. Fishes were fixed in 10% formalin solution immediately after its collection and were shifted to 70% alcohol later on in the laboratory of the Department of Zoology, Shaheed Benazir Bhutto University, Chitral Campus. The fishes were identified using the following standard fish identification keys: Jayaram (1999), Talwar and Jhingran (1991), Mirza and Sandhu (2007), Nelson

* Corresponding author arifjan@sbbu.edu.pk
0030-9923/2016/0001-0285 $ 8.00/0

(2006), and Mirza, (1990). Online help for verification of the fish species was also taken from "www.fishbase.org". A keen observation at the collection sites were taken for the overall risk factors and feasibilities of conservation and propagation of Ichthyo-diversity.

Results

A total of 21 fish species belonging to class Actinopterygii, sub class Teleostei, 4 families and 15 genera were collected in this work.

1. *Acanthocobitis botia* (F. Hamilton, 1822) (Mottled loach): This species is mostly found in the upper part of the river, especially at Yarkhun river, which is the longest tributary to river Chitral.

2. *Acanthocobitis uropthalmus* (Günther, 1868) (Banded mountain loach) is being reported for the first time from Pakistan. Our collection contained 6 samples of this species. The species is reported from the Kosht region of river Chitral.

3. *Lepidopygnosis typus* (Raj, 1941) Peninsular hilltrout: This species is also reported for the first time from Pakistan. Four samples of our collection represent this species. This species is collected from Yarkhun river.

4. *Schizothorax esocinus* (Heckel, 1838) Chirruh snowtrout: This species is rare in river Chitral and its tributaries. The species is also declared as rare from river swat by Hassan *et al*. (2013). This species needs special attention in terms of its conservation and propagation. We have collected only one specimen of this species.

5. *Horalabiosa palaniensis* (Rema Devi & Menon, 1994): This species is reported for the first time from Pakistan. Ten specimens of our collection were of this species which were collected from different parts of the river Chitral.

6. *Horalabiosa joshuai* (Silas, 1954) We collected this species for the first time from Pakistan. Small number of our collection was of this species. Samples were collected from Mastuj river.

7. *Nangra robusta* (Mirza & Awan, 1973): This species is very rare in river Chitral. Only one specimen of our collection represents this species. The frequency of this species is more in river panjkora above sheringal area.

8. *Schizothorax plagiostomus* (Heckel, 1838): This is much abundant species of the river, found throughout in the lower as well as upper part of the river. Highest percentage of our collection consisted of this species. It can also be rarely found in river Torkoh and river Lotkoh.

9. *Racoma labiata* (McClelland, 1842) Kunar snowtrout: This species is found in the southern part of the district. Abundantly found in the Pak-Afghan border area at Arandu. This fish can also be found in the tributaries from Lawari top glaciers.

10. *Carassius auratus* (Linnaeus, 1758) Gold fish: Akhtar, 1991 reported this species. Considerable number of our collected specimens was of this species were found in lower parts of the river below Town area. This is considered as being an exotic species, has not established very well so for, however, due to hardy nature of the species we expected it to establish well in future.

11. *Cyprinus carpio* (Linnaeus, 1758) Gulfam:This species was also reported by Akhtar (1991). It is found in lower part of the river.

12. *Triplophysa naziri* (Ahmed and Mirza, 1963): This species is found in the lower part of the river. The range starts from town area up to Arandu, Pak-Afghan border.

13. *Oncorhynchus mykiss* (Walbaum, 1792) Rainbow trout: Rainbow trout is found especially in the upper parts of the river, above town. The fishes were abundant at Garam Chashme and Shandur region of the district.

14. *Salmo trutta fario* (Linnaeus, 1758) Brown trout: This species has established itself in almost all parts of the river. Found abundantly in upper parts of the district at Harcheen, Laspur, Sor Laspur, Yarkhun river and Garam Chashma.

15. *Glyptosternum reticulatum* (McClelland, 1842): IUCN-CCS Unit Chitral, 1999 have reported this species. Only few specimens were reported in our collection. We couldn't locate its true range.

16. *Triplophysa choprai* (Hora, 1934): Akhtarm (1991) reported this species. It is found in southern parts of the district.

17. *Glyptosternum maculatum* (Regan, 1905): This species was also reported by IUCN-CCS Unit Chitral (1999). It was rarely found above town area. Southern parts of the river contain this species.

18. *Shistora nasseri* (Ahmad & Mirza, 1963): Jalal

(1995) have reported this species. We collected this species form Booni Tehsil, however the true range is not clear. A few samples of our collection belonged to this species.

19. *Schizothorax labiatus* (McClelland, 1842) Kunar snow trout: Considerable number of our collection contained this species. It was found abundantly in almost all parts of the river. The species was also reported by Jalal (1995).

20. *Tor putitora* (Hamilton, 1822) Mahasheer: The range of the species if from southern part of the river Chitral upto Charsadda and onwards through River Kunar and river Kabul. Jalal (1995) has reported this species.

21. *Garra gotyla* (Gray, 1830) Pathar chatt: The species is reported by many species in our collection. Found in northern parts of the river especially in summer season. This species has also been reported by Jalal (1995).

All the collections were studied for fish habitat suitability. The present study revealed that high demand for freshwater consumption, diverse usage, effluent discharges along with other threats will degrade fish habitat in future. A list of threats to the Ichthyo-diversity of the study area was also reported in this work; the main problems highlighted were alluvial nature of rocks, construction of hydro projects and duck ponds, erosion and sedimentation in rivers and streams, and illegal fishing. Probably a number of species are at high risk of being extinct from this locality.

Discussion

This work is first of its kind for the study site. No written annotated account is available to explore the Ichthyo-diversity of river Chitral, despite some sporadic surveys and restricted investigative research by university students on fauna and flora, the ichthyo-diversity. As a result only limited information is available. Most of the fish species recorded in our study are not only important economically, but also are important ecologically being an integral part of the freshwater riverine system in the foothills of Hindu Kush. Some of the species of larger size *e.g., Racoma labiata, Schizothorax plagiostomus, Carassius auraus, Tor Putitora, Cyprinus carpio* and two exotic species of trout *i.e., Salmo trutta fario* and *Oncorhynchus mykiss* are liked as food hence considered more important commercially as described as Mirza and Sandu (2007) and Hasan *et al*. (2013).

Chitral is the only part of Khyber Pakhtunkhwa where fauna and flora depict natural virginity of the environment that's why each species deserve respect in terms of conservation and IUCN status. The most important aspect of this work is the reporting of four species namely *Acanthocobitis uropthalmus, Lepidopygnosis typus, Horalabiosa palaniensis, Horalabiosa joshuai* for the first time from Pakistan. Hence this work will contribute to update the existing checklist of cold water fishes of Pakistan. The status of *Shistora nasseri* is considered as endangered in the upper parts of river Chitral although one specimen is collected but the local fishermen are of the view that this species has almost been extinct. Important thing about the trout species was noted that rainbow trout stock in natural environment is less in comparison to brown trout, which is a call to the fisheries department to re-stock it in the remote rivers, *e.g.* Yarkhoon River and Laspur River which have a great potential to harbor it.

As recommended by Hasan *et al.* (2013) and Rafique and Javed (2002), *Schizothorax plagiostomus* need to be cultured in race ways for its abundant stock and commercial likeability. This step has been taken by the Department of Zoology, Shaheed Benazir Bhutto University, Sheringal Dir Upper recently.

Some of the samples in our collection belonged to endemic genera Triplophysa, has been adapted to live under stones in the fast running turbulent waters. Such species have acquired and maintained distinct, isolated reproductive and feeding areas which warrant protection of their habitat. For instance we observed effluents discharges form the ongoing Lawari tunnel construction. The water is completely unsuitable for fish breeding and livelihood, neither in terms of its physical nor chemical properties. Such species could be used as a model to understand the evolutionary plasticity of fishes in accordance with their environment (Jayaram, 1982). Further work is hoped to done on this effluent water to biochemically assess its unsuitability. We recommend the Lawari tunnel effluents are not to be discharged in the main river.

References

Akhtar, N., 1991. Report for Project PAK/91/008. FAO, Rome, pp. 29.

Ali, M., Hussain, S., Mehmood, J. A., Iqbal, R. and Farooq, A., 2010. *Pakistan J. Zool*., **42**: 285-289.

Hasan, Z., Ahmad, I., Yousuf, M., Rehman, L. and Khan, J., 2013. *Pakistan J. Zool*., **45**: 283-289.

IUCN-CCS Support Unit Chitral, 1999. *Aquatic biodiversity in Chitral*. (Accessed on 17 June, 2014).

Jalal, M., 1995. *The fish fauna of District Chitral and their systematics*. PhD thesis, University of Peshawar.

Jayaram, K.C., 1982. *Rec. Zool. Surv. India, Occ.* Paper No. 37: 41.

Jayaram, K.C., 1999. *The freshwater fishes of the Indian Region*. Narendra Publishing House, Delhi-6, pp. 551. ISBN-13: 978-8190795210

Mirza, M.R. and Sandhu, A.A., 2007. *Fishes of the Punjab Pakistan*. Polymer Publications: Lahore.

Mirza, M.R., 1990. *Pakistan ki taaza pani ki machlian* (Urdu). Urdu Science board, Lahore.

Nelson, J.S., 2006. *Fishes of the world*. (4th edition). John Wiley & Sons, N.Y. ISBN-13: 978-0-471-25031-9

Petr, T., 1999. *Coldwater fish and fisheries in Pakistan*. FAO Fisheries Technical Paper. No. 385: pp. 122-137.

Rafique, M. and Khan, N. U., 2012. *Rec. zool. Surv. Pakistan*, **21**: 90-95.

Rafique, M. and Javed, H.I., 2002. Rec. *zool. Surv. Pakistan*, **14**: 43-48. ISSN 0375-152X.

Rafique, M., 2007. *Biosystematics and distribution of the freshwater fishes of Pakistan with special references to the subfamilies Noemacheilinae and Schizothoracinae*. Ph.D. thesis. University of Arid Agriculture, Rawalpindi Pakistan.

Regnier, C., Fontaine, B. and Bouchet, P., 2009. *Conserv. Biol.*, **23**: 1214–1221.

Talwar, P.K. and Jhingran, A.G., 1991. *Inland fishes of India and adjacent countries*, Vol. 1 and 2. Oxford & IBH Publishing Co. Pvt. Ltd, New Delhi.