



## Biodiversity of Fishes of River Ecosystems of the Western Tyan-Shan

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### ABSTRACT

The paper cites data on the biological diversity of fishes in the river ecosystems of the Western Tien Shan. Data on the diversity and distribution of species are presented and analyzed. The role of various factors affecting the variability of species numbers and their range is discussed, which is important for development of a number of measures on conservation of rare and vanishing fish species.

**KEYWORDS:** Biodiversity, Fishes, Fauna, Species, Western Tian Shan

### INTRODUCTION

The western Tian Shan is a vast part of the Tian Shan mountain system. The spurs of the W Tian Shan stretch from the Talass Alatau (Kyrgyzstan) and only the western slopes of the ridge are situated in Uzbekistan. The ridges of the W Tian Shan are separated by deep valleys of numerous rivers, namely, the Ugam, the Pskem, the Kuksu and the Akhangaran, which run in the basins of the rivers Chirchik and Akhangaran. Charvak Reservoir was built in Charvak depression lying between the spurs of the Chatkal, Karzhantau and Pskem mountain ridges.

The biodiversity of fishes of the aquatic systems in the W Tian Shan is great and unique, but yet poorly studied. There are specific families in the fish fauna inhabiting this region. There is one endemic genus – *Capoetobrama* there. The fish fauna in the W Tian Shan, including introduced species, reaches 20 species of 19 genera, 8 families and 5 orders. The highest number of species (subspecies) is in the family Cyprinidae. Of the total number of species, 2 are endemics to the basin of the Aral Seas and 4 are endemics to the W Tian Shan (Mirzaev, 2000a).

### THE MAIN PART

Hence, water bodies of the W Tian Shan shelter relatively few systematic groups. As noted above, the total number of fishes reaches 20 species and subspecies, about 40% of the fish fauna consisting of the introduced species. The endemic fish fauna amounts to 55% of the fish composition.

The fish fauna of the upper streams (mountain zone) is characterized mainly with a considerable decrease in the composition and a significant growth in endemism.

The mountain part of the community comprises cold-loving fishes (*Glyptosternon oschanini*, *Cottus jaxartensis*, species of the genus *Triplophysa*) exclusively resistant to a

hard and varying effect of the external factors. Most of these fishes are capable of attaching themselves to substratum, moving in jerks, pressing themselves to the bed, digging into the sand and hiding amongst the rocks from powerful currents. These streams are also inhabited by good swimmers with the streamlined bodies, strong tail stem and fins, which are capable of flowing against a high velocity and small waterfalls (*Schizothorax eurystomus*, *Gymnodiptychus kessleri*). They all are more or less settled species and migrations are not characteristic of them. However, every season they move to bigger (*Schizothorax eurystomus* and *Gymnodiptychus kessleri*) or smaller distances (*Glyptosternon oschanini*, *Cottus jaxartensis*, species of the genus *Triplophysa*) due to breeding and wintering. Movements of fishes in search for food are made within the limited stations (Turdakov, 1963; Amanov, 1985; Mirzaev, 1997; Mirzaev, 2000b).

The species composition in various biotopes is heterogeneous. The shallow zone with pebble beds (pebble-sandy zone) is inhabited by the loach (*Iskandaria kuschakewitschi*, *Triplophysa elegans*). Sometimes a few individuals of *Glyptosternon oschanini* move to this zone. Deeper parts of the river beds (under the waterfalls) and beds with heaps of rocks are mainly inhabited by fishes with different levels of the migrating activity (*Schizothorax eurystomus* and *Gymnodiptychus kessleri*). Besides, most fishes overwinter in these deep parts.

The constant inhabitants of rocky beds (*Cottus jaxartensis*) can be recorded under the heaps of rocks, in crevices, under interlacing roots of trees forming a peculiar cavernous wall in the water. During the whole day *Glyptosternon oschanini* hides in this zone.

Hence, the ecological differentiation of the fishes, within the limits of separate biotopes, plays an important

part in the functioning and sustaining the stability of the mountain-river community. Most of the fishes are restricted mainly to the rocky-pebble beds. This type of habitat in mountain rivers is dominant and serves as a fattening, breeding, hiding and wintering ground.

The aquatic ecosystems of W Tian Shan have undergone significant changes due to the growing effect of diverse anthropogenic factors, such as the construction of hydrotechnical facilities, contamination of rivers, the impact of the introduced species, overfishing, etc.

Unique endemic species are now under the threat of extinction. On the brink of extinction are *Alburnoides oblongus* and *Squalius squaliusculus*. *Cottus jaxartensis* and *Glyptosternon oschanini* are most endangered species.

It is noteworthy that several factors can influence simultaneously and the adverse effect can be exposed gradually, first affecting some biological features, e.g. changes in size, growth, breeding success, etc., and then affecting fishes to a greater degree, e.g. violating breeding, causing the vanishing of separate populations, etc. The regulation of the flow of small and big rivers inflicted damages to the rheophylous fishes, which are restricted to the rocky beds. Violations of vital and migratory processes, as well as population stress, are observed in them. Besides, rheophylous fishes to a different extent are exposed to changes in water temperatures, growth in their contamination, changes in velocity, pH, salt content, etc.

Introduced fishes and undesirable, trash species, which once accompanied the introduction of the new species (in Uzbekistan they constitute 33% of the fish fauna), as well as dissemination of the exogenous parasites and diseases also cause a dwindling of the range and numbers of local fish species as a result of competition, predation and epizootics.

However, no matter what the adverse factors are, they all undermine fish stock, cause a loss of genetic diversity, violate ecological balance and deprive fish species of an opportunity to exist.

Hence, 10% of the fish community in this area is under the threat of extinction; a number of species and subspecies require an in-depth study of their state. Therefore, it is essential to find a different approach to the solution of a number of relevant problems of the conservation of diversity of fishes and fish communities. Also important is the adjustment of borders of strictly protected areas. It is noteworthy that for the conservation of rare and vanishing fish species there is a vital necessity to set up waterbodies-reserves, for nature reserves situated in W Tian Shan are not intended for the special protection of any fish species.

## CONCLUSION

The priority task in this situation is a development of integrated action plans that enable the conservation of rare and vanishing fish species. For the conservation of such

species it would be necessary to introduce a regime of protection and expansion of their range, provide protection and create sparing environmental conditions during the breeding period. It is also necessary to develop methods of the artificial reproduction, maintaining and breeding of fishes in captivity, as well as the methods of genome conservation. It is also important to implement control of the introduced species and for the conservation of species requiring special measures of protection it is necessary to set up aquatic nature reserves and develop programs of fish rehabilitation.

## REFERENCES

1. Amanov, A.A. Ekologiya ryb vodoyomov yuga Uzbekistana i sopredel'nyh respublik. [The Ecology of Fishes in Waterbodies of Southern Uzbekistan and Adjoining Republics]. Tashkent, Fan Publishers, 1985, 160 pp.
2. Mirzaev, U.T. Tog' daryosi baliqlari. [Fishes of Mountain Rivers]. Tashkent, Agriculture in Uzbekistan. 1997, 2: 18-19. [In Uzbek].
3. Mirzaev, U.T. Bioraznoobraziya ryb Uzbekistana: vidovoe bogatstvo i stepen endemizma. [Biodiversity of fishes in Uzbekistan: species diversity and levels of endemism]. Doklady Akademii Nauk Respubliki Uzbekistan, 2000a. N 8. 49-52 pp.
4. Mirzaev, U.T. A Review of Ecological Features of Fishes Inhabiting Chatkal Biosphere Reserve in Uzbekistan Turkish Journal of Zoology, 2000b. Vol. 24. N 3. 327-331 pp.
5. Turdakov, F.A. Ryby Kirgizii. [Fishes of Kirgizia]. Frunze, Publishing House of Kyrgyz Academy of Sciences, 1963, 283 pp.