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Modern Ichthyofauna of Charvak Reservoir

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Summary. The upper reaches of the Chirchik River experienced an anthropogenic impact, the main factors of which were irrigation construction (the creation of the Charvak reservoir) and the introduction of new fish species for the artificial formation of commercial ichthyofauna. Currently, in the ichthyofauna of the Charvak reservoir, we noted only 15 species of fish belonging to 6 families. Including - 5 native species. There is no fishing in the reservoir.

Keywords: Fish, ichthyofauna, species, Charvak reservoir, Uzbekistan

Introduction

The river basins of the Aral Sea in the 20th century underwent significant anthropogenic impact, which greatly affected the ichthyofauna. The most powerful were two impact factors: large-scale irrigation construction for the needs of irrigated agriculture and acclimatization work (introduction of new fish species from other regions). Irrigation construction also affected the foothill zones, where reservoirs were created to collect fresh water and provide irrigation. Acclimatization work was aimed at the artificial formation of commercial ichthyofauna in newly created reservoirs (Yuldashov, Kamilov, 2018). Thus, modern ichthyofauna represents a stage of formation (transformation) of ichthyofauna in a newly created reservoir. Such reservoirs should be subject to constant research monitoring. However, no research has been carried out in the Charvak reservoir for two decades (Salikhov, Kamilov, 1995). The purpose of this work was to determine the modern ichthyofauna of the Charvak reservoir.

Material and methodology

In 2022, as part of the expeditions of the Institute of Zoology, quarterly research fishing was carried out with fixed nets with a mesh of 16–110 mm, as well as traps, coastal drags with different meshes in the Charvak reservoir (Tashkent region, Uzbekistan) (Fig. 1). Fish were identified to species (Salikhov et al., 2001). The generally accepted indicators of fishery water quality were determined.

Fig.1. Charvak reservoir.

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Characteristics of the research region. The Chirchik River, formed by the confluence of the Chatkal and Pskem rivers, is the largest tributary of the Syr Darya, flowing into the main channel (Syr Darya) within its middle course. Chirchik along its length receives two relatively large tributaries (the Ugam and Aksakatu rivers), the remaining tributaries are small sai. The water of the Chirchik basin is intensively used for irrigation in the Tashkent oasis, for which a network of canals has been built, some of which are richer than the main channel (Zakh, Bozsu, Karasu left bank). Through the irrigation network, the basins of Chirchik and Akhangaran have long been quite closely intertwined.

The mountainous part of the Chirchik river basin is represented by the Pskem and Chatkal rivers. Pskem, Chatkal and all their tributaries are typically mountainous, stormy rivers of snow-glacial feeding type, flowing through deep mountain valleys. The Chatkal River in the upper section also flows through a deep gorge; after the confluence of the Karateke tributary, the river valley expands; below, the flow is calm, although in places there are gorges. Below the village of Burchmulla, Chatkal and Pskem merged, but now this place is flooded with the waters of the Charvak reservoir, the dam of which blocked the Chirchik channel immediately before the Ugam flows into it.

The water in the Pskem and Chatkal rivers is cold; in summer it warms up to a maximum of 8-10°C. The water in both rivers is fresh; water mineralization in our studies varied from 105 to 230 mg/l in different seasons.

The Charvak reservoir is a valley-channel reservoir, put into operation in 1978 and serves the purposes of irrigation, hydropower and water supply to the cities of Tashkent and Chirchik and other settlements of the Tashkent region. The total area of the reservoir at the FSL equal to 890 m is 40.1 km2, the length (along the Chatkal River) is 22 km, the maximum width is 10 km, the maximum depth is 148 m, the average is 50 m. The volume of the reservoir at the FSL is equal to 2006 million m3, useful volume -1580 million m3.

The water in the reservoir is fresh, mineralization varied by season from 168 to 280 mg/l, pH 7.7 to 8.3. The water is rich in dissolved oxygen; in our observations, in different seasons the indicators were 7.6 - 13.1 mg/l.

In January-early March 2023, the Charvak reservoir was covered with ice. The water temperature remained at 2-3°C until mid-March. Then the water (using the example of 2022) warmed up until summer; in July, at a depth of 1.5 m, the water temperature was 13-15°C, at depths up to 4-5 m - 9-10°C, at the surface of the water in shallow bays it warmed up to 21°C. From the second half of August, the water began to cool until December, when the temperature became uniform down to a depth of 8 m, the temperature was 3-4°C (we did not measure deeper).

Currently, in the ichthyofauna of the Charvak reservoir, we have noted only 15 species of fish, including 5 native species belonging to 6 families (Table 1). There is no fishing in the reservoir. The main reason for the lack of fishing in this region located close to the largest metropolis (Tashkent) is the absence of any noticeable concentrations of fish of all living species.

Chirchik River. Below the dam, the Chirchik flows through a deep canyon to the Khodzhikent dam, which formed the reservoir of the same name, then along a wide floodplain to the Gazalkent dam. In both dams, distribution structures have been created that distribute the flow of Chirchik along the riverbed and through large canals that are more water-bearing than the riverbed. After the Gazalkent dam, the flow of Chirchik during low-water periods largely consists of groundwater and return waste water. The discharge of Chirchik water into the Syr Darya is carried out along the riverbed, the Bozsu canal and, partially, along the Kalgan-Chirchik branch. Conventionally, the Yumalak dam near the city of Chirchik can be considered the border between the foothill-plain and flat areas.

Table 1. Ichthyofauna of the Charvak reservoir and adjacent areas of the Chirchik River, 2022.

№	Family, species	Flowing rivers	Charvak Reservoir	Predgorno plain area
	Salmonidae			
1	*Salmo ischchan Kessler*	-	+	-
2	*Oncorhynchus mykiss Walbaum*	+	+	+
	Coregonidae			

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3	*Coregonus peled (Gmelin)*	-	+	-
3	*Coregonus sardinella Valenciennes*	-	+	-
4	*Coregonus lavaretus (L.)*	-	+	-
	Cyprinidae			
4	*Leuciscus squaliusculus (Kessl.)*	+	-	-
5	*Pseudorasbora parva (Schlegel)*	-	+	-
6	*Gobio gobio lepidolaemus Kessler*	-	-	+
7	*Abbotina rivularis (Basilewsky)*	-	+	-
8	*Schizothorax curvifrons Heckel.*	+	+	-
9	*Gymnodiptychus dybowskii (Kessler)*	+	+	-
10	*Alburnoides taeniatus (Kessler)*	-	-	+
11	*Alburnoides oblongus Bulgakov*	-	-	+
12	*Hemiculter leucisculus (Basilewsky)*	-	+	-
14	*Cyprinus carpio L.*	-	+	+
	Cobitidae			
16	*Triplophysa stolickai (Steindachner)*	+	+	-
17	*Iskandaria kuschakewitschi (Herzenstein)*	+	+	-
18	*Noemacheilus strauchi (Kessler)*	-	-	+
19	*Cobitis aurata aralensis Kessler*	-	-	+
	Sisoridae			
20	*Glyptosternum reticulatum McClelland*	-	-	+
	Poecilidae			
	Gobiidae			
21	*Rhinogobius similis Gill*	-	+	-
	Cotiidae			
22	*Cottus spinulosus Kessler*	+	+	+

Ichthyofauna of the river Chirchik from the Charvak dam to the Gazalkent hydroelectric complex includes inhabitants of the foothills of the basin (common marinka, Kushakevich char, Turkestan sculpin and Syrdarya dace). In recent years, in connection with the development of trout farming in the Tashkent region, rainbow trout, which leave cages and basin fish farms, have often begun to be caught in this area.

Discussion

In the rivers of the upper reaches of Chirchik in the flood zone of the Charvak reservoir, the common marinka, naked osman, Kushakevich char, Tibetan char, and Turkestan sculpin lived. According to the results of our control fishing in 2200, the common marinka is distributed almost throughout the entire water area of the reservoir, the remaining native species (rheophiles) remained only in the estuary areas of rivers and sais (and higher, entering adjacent areas in the reservoir.

Taking into account the altitudinal zone of the eastern part of the Aral Sea basin (cold water all year round in the mountain and foothill regions), attention was directed to the introduction of cold-water species in the Charvak reservoir. In the 1970s, the reservoir was stocked with larvae of Sevan trout - Salmo ischchan, which were imported from Lake Issykkul. In the 1980s, the peled from Lake Son-Kul (Kyrgyzstan) - Coregonus peled - was introduced - and two more species of whitefish were accidentally introduced. Also in the 1980s, underyearlings of carp fish from the Tashkent fish hatchery were introduced into the reservoir one time, and with the underyearlings from the pond farm, a number of small weedy Chinese fish were accidentally introduced, which took root in heated areas throughout the reservoir. The hawk belly has become especially numerous. In 1986, a batch of fingerlings of rainbow trout (Oncorhynchus mykiss) from the Tavaksay trout farm (Tashkent region) was released into the Charvak reservoir on an initiative basis. Thus, the powerful

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anthropogenic impact on the ichthyofauna of the Charvak reservoir and adjacent river sections is clearly visible.

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