

Case Study

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**Populations Density of Bivalve Molluscs of the Family Unionidae and Corbiculidae in Reservoirs on the Banks of the Zarafshan River and their Influence of Aquatic Environment Factors on Distribution**

**Boymurodov Husniddin\*, Khajiev Murodjon, Jalilov Farrukh and Jumaboyev Bakhadir**

*Department of Ecology and Life Safety at Samarkand State University, Uzbekistan*

*\*Corresponding author*

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In the populations of the aquifer of the Kattakurgan reservoir 6 species and 2 subspecies are spread, 9 species and 1 subspecies are distributed in the populations on the banks of the reservoir. There are 6 species and 1 subspecies in the populations of the aquifer of the Shurkul reservoir. 7 species and 1 subspecies live in the populations on the banks of the reservoir. There are 2 species of bivalve molluscs in rocky biotopes, 5 in sandy soils, and 8 in mud.

**Introduction**

One of the theoretically and practically relevant problems is the study of the fauna, species diversity, bioecological features and distribution patterns of species in biogeocenoses in the reservoirs of the Zarafshan river basin. A comprehensive study of the fauna of bivalve mollusks on the banks of the Zarafshan River is crucial. The diversity of natural conditions has led to the proliferation of many rare, endemic and relict animals. Here, along with the complex

distribution of individual species, a whole faunistic complex, the existing differences in different populations of the same species are also reflected (1).

Underwater biocenoses are changing radically as a result of pollution, native species are being replaced by other common new species. Bivalve mollusks play an important role in the purification of contaminated water among invertebrates. They completely pass water through the body and filter it, i.e. these mollusks are natural water purifiers.

References Rolle, 1897; Kobelt, 1899; Jadin, 1938, 1952; Izzatullaev, 1980; Starobogatov, Izzatullaev. According to 1984 data, we had information on some taxonomic conditions and ecological features of large bivalve mollusks on the banks of the Zarafshan River (2,3).

### **Object and methods of research**

To analyze the systematic composition of these mollusks, in this study used the books including Starobogatov, 1970, 1977., Alimov, Starobogatov, 1974., Stadnichenko, 1984., Izzatullaev, Korniyushen, 1993., Korniyushen, 1996., Izzatullaev, 2002., Izzatullaev, Boymurodov, 2009, 2019.

N.A. Stepanova, (1951, 1961), A.M. Muzaffarov (1967); AM Muhammadiev (1967) and others made significant contributions to study the fauna and flora of Central Asian reservoirs. The species composition and distribution of bivalve mollusks in the reservoirs of the Zarafshan River Basin have not been studied.

### **Research results**

Species composition, populations, distribution of bivalve molluscs belonging to the Unionidae and Corbiculidae families in the Kattakurgan reservoirs in the middle reaches of the Zarafshan basin and in the lower reaches - Shurkul and reservoirs were studied.

### **Population in Kattakurgan reservoir**

The Zarafshan valley is located 5.5 km south of Kattakurgan, Samarkand region, at a natural depth between the Zirabulak hills. Kattakurgan Reservoir receives water from the Kara-Darya. The biological regime of the Kattakurgan reservoir and benthos organisms were studied by N.A. Stepanova (1951, 1961), Kh. Nuriev (1967), Z.I. Izzatullaev

(1980). N.A. Ctepanova (1961) showed the species called *Coletopterus cyreum sogdianum* from this reservoir. Previous studies have shown that 6 species and 2 subspecies live in the reservoir (4,5,6). As a result of our research, 10 species and 2 subspecies of bivalve mollusks were found in the Kattakurgan reservoir (Table 1). The Kattakurgan Reservoir is the first to be built on the banks of the Zarafshan River and occupies a larger area than other reservoirs.

### **Population in the reservoir area**

In this population, the Chinese toothless *Sinanodonta gibba* and *S. orbicularis* are distributed, which came to this region as a result of acclimatization of Chinese complex fish - white amur, khumbosh. *Sinanodonta gibba* and *S. orbicularis* are found in 1.6-1.7 per 1 m<sup>2</sup> in muddy biotopes of the reservoir (5). *Coletopterus ponderosum volgensis*, *C. syreum sogdianum* and *C. cocandicum* are distributed in the muddy biotopes where canal water is discharged into the reservoir, with a density of 0.6-1.8. The density of *Coletopterus* seed species is higher than that of the river. They live at depths of 0.5–2 m and more in the reservoir, but they are also accompanied by empty shells on the shore. *Sinanodonta puerorum* and *Coletopterus bastrianum* are not found in the biotopes of the watershed part of the reservoir. *Corbicula fliminalis*, *Corbiculina tibetensis* and *C. ferghanensis* from bivalve mollusks of the family Corbiculidae are distributed in the sandy biotopes of the reservoir. *Corbicula cor*, *Corbicula purpurea* species are not found.

### **Population on the banks of the reservoir**

The population of bivalve mollusks in this region is characterized by a large number of species and a large density in biotopes. In this population, *Sinanodonta orbicularis*, *S. gibba*,

and *S. puerorum* are distributed from *Sinanodonta* seeds, with an average of 1.4-2.2 per 1 m<sup>2</sup>.

*Colletopterum bastrianum* and *Colletopterum cyreum sogdianum* are widespread 0,7 and 2,1 relatively. *Colletopterum ponderosum* volgense and *Colletopterum cocandicum* are not found in this population. The abundance of sandy biotopes on the banks of the Kattakurgan Reservoir has created biotopes that are suitable for the distribution of species of the family Corbiculidae. *Corbicula cor*, *C. rurpurea*, *Corbicula fluminalis*, *Corbiculina tibetensis*, *Corbiculina ferghanensis* are found 1,2; 1,4; 1,8; 2,6 and 2,8 relatively. These species live on the banks of the reservoir. In the Kattakurgan Reservoir, however, sharp water level fluctuations have a limiting effect on the distribution of these species.

In the reservoir, *Corbiculina tibetensis* and *C.ferghanensis* are distinguished by their high density compared to other species. For example, the density of *Corbicula cor* and *C. fliminalis* is 1.2-1.8, while that of *Corbiculina tibetensis* and *C. ferghanensis* is 2.6-2.8. There are 8 species in the populations of the reservoir and 10 species in the populations on the banks of the reservoir.

In the reservoir there are 9 species of peloreophiles (*Sinanondonta gibba*, *S. orbicularis*, *S. puerorum*, *Colletopterum kokandicum*, *Corbicula cor*, *C. purpurea*, *C.fluminalis*, *Corbiculina tibetensis*, *C. ferghanensis*) (75%), pelolimnofil (*Colletopterum ponderos*). 8%) and 2 species of rheophiles (*Colletopterum bastrianum*, *C. syreum sogdianum*) (17%).

### **Population in the Shurkul Reservoir**

It is located in the lower reaches of the Zarafshan River. Shurkul was commissioned in 1977 with a total capacity of 170 million

m<sup>3</sup>. The reservoir receives water from the Zarafshan River. The maximum height of the reservoir dam is 14.5 m. The maximum discharge capacity of the reservoir is 350 m<sup>3</sup> / sec.

To date, the effects of abiotic factors on bivalve mollusks of the Shurkul Reservoir have not been fully studied. Specimens were collected from the reservoir and surrounding waters to study the species composition, distribution, and habitat of bivalve mollusks in the basin. Studies have shown that the number of species of bivalve mollusks in the Shurkul Reservoir is low.

### **Population in the reservoir area**

The reservoir will be supplied with water from the Zarafshan River and the Amu-Bukhara Canal. In the populations of the reservoir, 6 species and 1 subspecies of bivalve mollusks belonging to 2 families and 4 genera were identified (Table 1).

In the Lower Zarafshan Shurkul reservoir, only *Sinanodonta orbicularis* and *S. gibba* are distributed from *Sinanodonta* seeds. They occur in muddy biotopes from 0.9 to 1.2 per 1 m<sup>2</sup>. Of the representatives of the genus *Colletopterum*, only *Colletopterum cyreum sogdianum* is a species specific to Lower Zarafshan, but it is distributed in reservoir populations at 1.4 per 1 m<sup>2</sup>.

Species with a wide range of distribution in bivalve mollusks - *Corbiculina tibetensis*, *C. ferghanensis* are distributed in Shurkul. The density of these species, which are distributed in sandy biotopes, is high 2.2-2.3.

### **Population on the banks of the reservoir**

The intermittent variation of the water level on the banks of the reservoir has an impact on the density in hydrabiont populations. In these

populations, *Sinanodonta gibba* and *S. puerorum* are distributed from 1.0 to 1.2. Of the Colletopterum seeds, only *Colletopterum cyreum sogdianum* is distributed, with a density of 0.8. *Colletopterum baxianum*, *C. ponderosum volgense*, and *C. kokandicum* do not thrive in reservoir coastal populations. *Corbicula cor*, *C. purpurea*, *C. fluminalis*, *Corbiculina tibetensis* and *C. ferghanensis* occur in reservoir biotops from 0.9 to 1.9 per

1 m<sup>2</sup>. The density of these species is lower in coastal areas than in the part where water is deposited in the reservoir. In the reservoir there are 8 species of peloreophiles (*Sinanodonta gibba*, *S. orbicularis*, *S. puerorum*, *Corbicula cor*, *C. purpurea*, *C. fluminalis*, *Corbiculina tibetensis*, *C. ferghanensis*) (89%) and 2 types of rheophiles (*Colletopterum baxianum*, *C. cyreum sogdianum*) (11%).

**Table.1** Density, distribution in biotopes and ecological group (density, m<sup>2</sup>) of bivalve mollusks in the reservoirs of the Zarafshan river bank

№	Species	Population of Kattakurgan reservoir		Population of Shurkul reservoir		Biotopes			Ecological groups
		Population in the reservoir area	Population on the banks of the reservoir	Population in the reservoir area	Population on the banks of the reservoir	Rocky	Sandy	Mud	
1.	<i>Sinanodonta orbicularis</i>	1,6±0,2	2,0±0,3	0,9±0,2	-	-	-	+	Peloreophilus
2.	<i>Sinanodonta gibba</i>	1,7±0,4	2,2±0,5	1,2±0,2	1,6±0,3	-	-	+	Peloreophilus
3.	<i>Sinanodonta puerorum</i>	-	1,4±0,3	-	1,2±0,2	-	-	+	Peloreophilus
4.	<i>Colletopterum baxianum</i>	-	0,7±0,1	-	-	-	-	+	Rheophilus
5.	<i>Colletopterum cyreum sogdianum</i>	1,8±0,4	2,1±0,3	1,4±0,3	0,8±0,2	-	-	+	Rheophilus
6.	<i>Colletopterum ponderosum volgense</i>	0,7±0,2	-	-	-	-	-	+	Peloreophilus
7.	<i>Colletopterum kokandicum</i>	0,6±0,1	-	-	-	-	-	+	Peloreophilus
8.	<i>Corbicula cor</i>	-	1,2±0,6	-	0,9±0,2	-	+	-	Peloreophilus
9.	<i>Corbicula purpurea</i>	-	1,4±0,3	1,1±0,2	1,2±0,3	+	+	-	Peloreophilus
10.	<i>Corbicula fluminalis</i>	1,3±0,2	1,8±0,3	1,2±0,3	1,3±0,2	-	+	-	Peloreophilus
11.	<i>Corbiculina tibetensis</i>	2,4±0,5	2,6±0,4	2,2±0,3	2,3±0,2	-	+	+	Peloreophilus
12.	<i>Corbiculina ferghanensis</i>	2,6±0,3	2,8±0,3	2,3±0,3	2,6±0,3	+	+	-	Peloreophilus
<b>Total species:</b>		<b>8</b>	<b>10</b>	<b>7</b>	<b>8</b>	<b>2</b>	<b>5</b>	<b>8</b>	

There are 6 species and 2 subspecies in the populations of the Kattakurgan reservoir, 9 species and 1 subspecies in the populations on

the banks of the reservoir. There are 6 species and 1 subspecies in the populations of the Shurkul reservoir, 7 species and 1 subspecies

in the populations on the banks of the reservoir.

There are 2 species of bivalve molluscs in rocky biotopes, 5 in sandy and 8 in mud. From the species composition of bivalve mollusks distributed in the reservoirs in the middle and lower parts of Zarafshan, it can be said that the reservoirs located there affect the distribution of mollusks in terms of their size, water source and use.

Located in the middle of Zarafshan and receiving water directly from the river, Kattakurgan Reservoir is characterized by a high number of species. 70-80% of the species found in the Zarafshan River are distributed in it. The lowest species in the Zarafshan basin reservoirs were observed in the Shurkul reservoirs in its lower reaches.

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