

Influence of water hydrochemical parameters on the biodiversity and populations of endemic and rare species of the Kashkadarya coast

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Abstract. The article presents information on the biodiversity of endemic and rare species of the Kashkadarya coast and changes in the composition of their populations as a result of the influence of hydrochemical parameters. These data are the first results for the Kashkadarya River, which serve to develop measures to preserve the biological diversity of the river and protect endemic and rare species.

Keywords: river, mollusk, rare, endemic, population, hydrochemistry.

Introduction. As a result of the changes in natural water ecosystems as a result of climate changes, anthropogenic and environmental factors, in particular, river and water ecosystems, large-scale scientific research is being carried out on the species composition and distribution, systematics, and protection of bivalve molluscs. In this regard, the study of the biodiversity of natural water bodies, registration of faunal species composition, determination of their current status, conservation of mollusk species composition, analysis of the state of freshwater mollusk populations, including bivalve molluscs, and the impact of direct environmental factors on their viability, determining regional diversity of bivalve molluscs, taxonomic structure and signs of variation in them, their characteristics of distribution depending on water bodies, effective use of water bodies and the use of scientifically based methods to prevent the decline of molluscs is becoming an important priority [1-8].

Based on the above, we aimed to evaluate the impact of water hydrochemical parameters on the biodiversity and populations of endemic and rare species of the Kashkadarya coast in our research.

Materials and research methods. The objects of the study are representatives of the Unionidae, Pisididae, Euglesidae and Corbisulidae families of the Bivalvia class distributed in the natural and artificial water bodies of the Kashkadarya coast. When performing experiments, ecological (monitoring of natural water bodies), zoological (determining shell size, obtaining shell dimensions, shell height, shell length, shell width, studying shell variability), malacological (statistical analysis of morphometric indicators), statistical (Excel and STATISTICA) and comparative analysis methods were used.

Results. In the experiments, it was found that abiotic factors affect the distribution, areas, and density of bivalves in the water ecosystems of the Kashkadarya River. In order to compare the population conditions of bivalve molluscs distributed on the coast of Kashkadarya, included in the "Red Book" of the Republic of Uzbekistan, we studied in two areas. The first area was the Chimkurgan reservoir (Khimkurgan district), the second area was the exit from the city of Karshi (Beshkent district). The Chimkurgan reservoir (Khimkurgan district) is located in the middle reaches of the Kashkadarya, the amount of O₂ (oxygen) dispersed in the water is 4.8±0.9 mg, Cl₂ is 262±23 mg, mineralization is around 870±62 mg, and the amount of these elements in the water is allowed it was found to be within the established norm (Table 1).

Table 1.

Effect of water hydrochemical parameters on the age and density of bivalve molluscs included in the "Red Book" distributed on the coast of Kashkadarya (n=10)

| № | Моллюска турлари | Chimkurgan reservoir area (Chimkurgan district) | | | | | | Exit from the city of Karshi (Beshkent district) | | | | | | | |
|---|-------------------------------------|---|---------------------|--------------------|---------------------------------|---------|---------|--|--------------------------|---------------------|--------------------|---------------------------------|---------|---------|---------|
| | | The composition of water | | | Age and density, m ² | | | | The composition of water | | | Age and density, m ² | | | |
| | | O ₂ m/g | Cl ₂ m/g | Mineralization m/g | 2-3 | 4-5 | 6-7 | 8-9 | O ₂ m/g | Cl ₂ m/g | Mineralization m/g | 2-3 | 4-5 | 6-7 | 8-9 |
| 1 | <i>Colletopterumbactrianum</i> | 4,8 | 262 | 870 | 0,8±0,4 | 0,7±0,3 | 0,5±0,2 | 0,3±0,2 | 5,9 | 297 | 1010 | 0,4±0,1 | 0,5±0,1 | 0,8±0,2 | 0,9±0,1 |
| 2 | <i>Colletopterumcyreumsogdianum</i> | | | | 2,4±0,3 | 2,2±0,3 | 1,2±0,2 | 0,9±0,1 | | | | 0,6±0,1 | 0,7±0,1 | 0,9±0,2 | 1,1±0,3 |
| 3 | <i>Corbicula cor</i> | | | | 2,4±0,4 | 1,8±0,2 | - | - | | | | 0,5±0,2 | 0,9±0,1 | - | - |
| 4 | <i>Corbicula purpurea,</i> | | | | 2,8±0,3 | 1,6±0,2 | - | - | | | | 0,9±0,1 | 1,3±0,2 | - | - |
| 5 | <i>Corbicula fluminalis</i> | | | | 2,6±0,3 | 1,2±0,1 | - | - | | | | 1,1±0,1 | 1,4±0,3 | - | - |

The density of *Colletopterum bactrianum* is 0.8 ± 0.4 at 2-3 years old, 0.7 ± 0.3 at 4-5 years old, 0.5 ± 0.2 at 6-7 years old, and 0.3 ± 0 at 8-9 years old. 2, the density of *Colletopterum cyreum sogdianum* at the age of 2-3 is 2.4 ± 0.3 , at the age of 4-5 it is 2.2 ± 0.3 , at the age of 6-7 it is 1.2 ± 0.2 , and at the age of 8-9 it is 0.9 ± 0.1 , *Corbicula cor* at the age of 2-3 its density is 3.4 ± 0.4 , at the age of 4-5 1.8 ± 0.2 *Corbicula purpurea* at the age of 2-3 its density is 2.8 ± 0.3 , Its density was found to be 1.6 ± 0.2 in 4-5 years old, 2.6 ± 0.3 in *Corbicula fluminalis* 2-3 years old, and 1.2 ± 0.1 in 4-5 years old.

In the population, the density of 2-3, 4-5-year-olds is higher, and the density of 6-7, 8-9-year-olds is lower. The high density of juveniles indicates that this population has the potential to recover in the future. The reason is that young molluscs reproduce quickly and restore themselves in the population. The amount of O_2 (oxygen) is 5.9 ± 0.8 mg, Cl_2 is 297 ± 32 mg, mineralization is around 1010 ± 42 mg, and the amount of these elements in the water is more than the permissible norm.

This affects the density of molluscs. The density of *Colletopterum bactrianum* is 0.4 ± 0.1 at 2-3 years old, 0.5 ± 0.1 at 4-5 years old, 0.8 ± 0.2 at 6-7 years old, and 0.9 ± 0 at 8-9 years old. 1, *Colletopterum cyreum sogdianum* its density at 2-3 years old is 0.6 ± 0.1 , at 4-5 years old 0.7 ± 0.1 , at 6-7 years old 0.9 ± 0.2 , and at 8-9 years old it is 1.1 ± 0.3 . Its density is 0.5 ± 0.2 when *Corbicula cor* is 2-3 years old, and 0.9 ± 0.1 when it is 4-5 years old. *Corbicula purpurea* has a density of 0.9 ± 0.1 at the age of 2-3, 1.3 ± 0.2 at the age of 4-5, *Corbicula fluminalis* has a density of 1.1 ± 0.1 at the age of 2-3, 1 at the age of 4-5, It was found to be 4 ± 0.3 . The effect of water hydrochemical parameters on the age and density of bivalve mollusc populations distributed in the "Red Book" distributed on the coast of Kashkadarya was analyzed.

Among the species belonging to the families Unionidae, Pisididae, Euglesidae and Corbisulidae distributed on the river bank, there are rare and endemic rare species. Endemic and rare species included in the "Red Book" of Uzbekistan *Colletopterum cyreum sogdianum*, *C. bactrianum*, and from the Corbiculidae family: *Corbicula purpurea* *C. cor*, *C. purpurea* and *C. fluminalis* species are included.

These molluscs are generally endemic and subendemic species of the water bodies of the river plains of Uzbekistan, and in terms of numbers, they were found to be greatly reduced. 3 last species and *Colletopterum bactrianum*. Before that, *C. bactrianum* was included in the 2019 edition of the "Red Book" of the Republic of Tajikistan as a unique, rare species.

Conclusion. We recommend the introduction of protective measures to protect molluscs in Kashkadarya water types, to preserve their biodiversity in nature, and to restore species and populations that are declining:

Pay attention to the rules of fishing in the Kashkadarya water ecosystems, stop hunting during their breeding season (from April 1 to May 31 in the Kashkadarya river basin), this time also corresponds to the spawning time of bivalve molluscs. Fish are of great importance in the distribution of bivalve molluscs;

Protection of habitats of bivalve molluscs in Yakkabog, Kashkadarya and Guzordaryas, keeping the hydro-regime of rivers and reservoirs in balance, protecting water from pollution;

Protection of populations of *Colletopterum bactrianum*, *C. cyreum sogdianum*, *Corbicula cor*, *C. purpurea* and *C. fluminalis* belonging to the Unionidae and Corbiculidae families distributed in Kashkadarya water types.

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