

# CHANGES IN THE HABITATS OF THE UNIONIDAE, EUGLESIDAE, PISIDIDAE AND SORBICULIDAE SPECIES WITH THE CONSTRUCTION OF RESERVOIRS IN THE KASHKADARYA BASIN DUE TO CLIMATE CHANGE

Husniddin Boymurodov<sup>1</sup>, Khojamurod Jabborov<sup>2</sup>, Tozagul Jabbarova<sup>2</sup>, Bakhtiyor Aliyev<sup>3</sup>, Omon Mirzamurodov<sup>3</sup>, Azamat Egamqulov<sup>3</sup>

<sup>1</sup>Samarkand Institute of Veterinary and Medicine, Uzbekistan

[boymurodov1971@mail.ru](mailto:boymurodov1971@mail.ru)

<sup>2</sup>Karshi State University, Uzbekistan

[kardu@mail.ru](mailto:kardu@mail.ru)

<sup>3</sup>Samarkand State University, Uzbekistan

[monitor@samdu.uz](mailto:monitor@samdu.uz)

## Abstract

*In the Kashkadarya basin, the destruction of natural zoogeographic barriers under the influence of anthropogenic factors has led to the expansion of the range of invasive species. With the construction of reservoirs in the Kashkadarya basin, the range of Unionidae, Euglesidae, Pisidiidae and Sorbiculidae families has been expanded. There are 9 species and 1 subspecies of bivalve mollusks were found in Pachkamar, 11 species and 2 subspecies in Chimkurgan, 5 species and 1 subspecies in Kamashi, 7 species in Hisorak, 5 species in Dehkanabad, 3 species in Nugayli and 5 species in Yangikurgan.*

**Keywords:** water reservoir, aquatic ecosystems, Unionidae and Corbiculidae families, *Colletopterum cyreum sogdianum*, *C. bacterianum*,

## I. Introduction

The development of agriculture and industrial production in the world is also leading to an increase in demand for water resources. In this context, mollusks, which are an integral part of aquatic ecosystems, are of particular importance, as their diversity has been declining in recent years as a result of water misuse. Accordingly, it is important to determine the species composition of mollusks distributed in reservoirs, to determine the factors affecting their populations, and to develop measures for the conservation of rare species.

Much attention is paid to the inventory of mollusks in the watersheds of natural and geographical regions of the world, the identification of promising species and their introduction into production. In this regard, in particular, the status of the malafauna of water bodies of different continents was determined, their natural-geographical distribution and distribution depending on the characteristics of water bodies were assessed, measures were developed to preserve rare and endangered species. It should be noted that, unlike marine mollusks, the condition of freshwater basin mollusks, including biphasic mollusk populations and their survival are directly dependent on the variability and level of impact of environmental factors. In

particular, the seasonality of the water level in the freshwater basins of the southern continent, the diversity of the source of saturation and their hydrological regimes are one of the main factors determining the distribution, viability and transformation of bivalve mollusks in different biotopes. However, in recent years, the depletion and pollution of freshwater sources has led to the crisis of biota of bivalve mollusks and the loss of species. Accordingly, it is of great scientific and practical importance to assess the status of biphase mollusks distributed in different freshwater basin water types, to identify abiotic factors affecting their populations, and to develop conservation measures.

At present, special attention is paid to the protection and rational use of water resources in the country. In this regard, in particular, the state of the fauna of water bodies was assessed, the sources and scale of anthropogenic pollution were identified and measures to eliminate them were developed. The Action Strategy<sup>1</sup> for the further development of the Republic of Uzbekistan defines the tasks of "... prevention of environmental problems that harm the environment." Based on these tasks, it is important to determine the diversity of bivalve mollusks distributed in different water types of the Kashkadarya coast, to assess the impact of abiotic factors on their distribution, to introduce promising species into production.

Currently, one of the most pressing issues in the Kashkadarya Basin is the study of changes in the habitats of the families Unionidae, Euglesidae, Pisididae and Sorbiculidae with the construction of reservoirs in the context of climate change.

## II. The level of the studied issue

In Uzbekistan, there is insufficient information on the distribution, morphology and resources of bivalve mollusks in different water bodies. This information is reflected only in the research of Z.I. Izzatullaev [1-5], H.T. Boymurodov [6-12] in which information on certain species in some water bodies of Uzbekistan can be found. These data could not provide sufficient conclusions on the modern species composition of mollusks of the families *Unionidae*, *Corbisulidae*, *Pisididae* and *Euglesidae*, which are ecologically important among the organisms of water basins macrobenthos, the influence of abiotic factors on their distribution. In this regard, an inventory of bivalve mollusks found in the aquatic ecosystems of the Kashkadarya coast, to determine the impact of abiotic factors on their distribution in water bodies and to study the prospects for their use in economic sectors is of great scientific and practical importance.

Today, the detection of new species in coastal marine, brackish and freshwater ecosystems around the world has increased significantly. In 1970, Starobogatov conducted research on the distribution and zoogeographic direction of species under the influence of anthropogenic factors. In addition to the natural causes of the distribution of different groups of mollusks in mainland watersheds, the importance of anthropogenic factors has also been highlighted. The presence of geographical barriers and zones influences the distribution of species, anthropogenic factors play a major role in the historical period in overcoming them mechanically.

## III. Materials and learning methods

The study of mollusks and collection of materials from the aquatic ecosystems of the Kashkadarya Reservoir began in 2004. Changes in the habitats of the *Unionidae*, *Euglesidae*, *Pisididae* and *Sorbiculidae* families with the construction of reservoirs in the Kashkadarya basin in the context of climate change have not been sufficiently studied. Materials for research were

---

<sup>1</sup>Decree of the President of the Republic of Uzbekistan dated February 7, 2017 No. PF-4947 "On the Action Strategy for further development of the Republic of Uzbekistan".

collected in spring, summer and autumn of 2004-2021. A total of 2162 mollusks were studied. Specimens of these mollusks were studied by the methods given by different authors.

#### IV. Analysis and results

Reservoirs, fisheries and canals built under the influence of anthropogenic factors in the Kashkadarya basin have led to the destruction of natural zoogeographic barriers under the influence of anthropogenic factors and the expansion of the range of invasive species. With the construction of reservoirs in the Kashkadarya basin, the expansion of the range of species of the families Unionidae, Euglesidae, Pisididae and Sorbiculidae was revealed. Chimkurgan Reservoir was built in 1960 on the territory of Karshi and Chirakchi districts of Kashkadarya region, on the Kashkadarya River, the area of the reservoir is 49,2 km<sup>2</sup>, length 17,5 km, width 7 km. The total capacity of 500 million m<sup>3</sup> of water surface level varies throughout the year.

Irrigated area is 38 thousand h. forms. Chinese complex fish are *Colletopterum ponderosum volgense* and Chinese toothless mollusks with fish in the reservoir as a result of acclimatization of white amur (*Ctenopharyngodon idella*) and white-tailed deer (*Hypophthalmichthys molitrix*) to the Chimkurgan Reservoir.

*Sinanodonta gibba*, *S. orbicularis*, *S. ruerorum* are widespread and habitats are expanded. *Sinanodonta orbicularis*, *S. puerorum*, *Colletopterum cyreum sogdianum* from the Unionidae family, *Euglesa hissarica* from the Euglesidae family, *Odhneripisidium terekense* from the Pisididae family, *Corbicula cor*, *C. fluminalis*, *C. purpurea*, *Corbiculina tibetensis*, *C. ferghanensis* were found in the Corbiculidae family. The long existence of the reservoir has had an impact on species diversity. With the waters and fish of the Chimkurgan Reservoir, the distribution of species of the Unionidae and Sorbiculidae families to fisheries, canals and ponds receiving water from this reservoir and the expansion of the range of these species was observed. Pachkamar Reservoir was built in 1967 on the Guzar River. The reservoir area is 16,8 km<sup>2</sup>, the water volume is 260,0 million m<sup>3</sup>, the irrigated area is 15,5 thousand h. Currently in the ecosystems of the reservoir *Sinanodonta gibba* from the family Unionidae, *S. orbicularis*, *S. puerorum*, *Colletopterum bactrianum*, *C. cyreum sogdianum*, *C. ponderosum volgense*, *Euglesa obliquata* from the family Euglesidae, *Odhneripisidium sogdianum* from the family Pisididae, *Odhnerip* from the family Pisididae, *C. purpurea*, *Corbiculina tibetensis*, *C. ferghanensis* from the Corbiculidae family species distribution are studied.

Prior to the construction of the reservoir, it was noted that only species of the Corbiculidae family were distributed in the aquatic ecosystems of this area of the Guzar River. Kamashi Reservoir was built in 1957 in the Shurchasoy natural basin, 4 km from Kamashi city. The total volume is 17,3 million m<sup>3</sup> and the useful volume is 16 million m<sup>3</sup>. The maximum depth is 12,0 meters and the average depth is 6,0 meters. The surface area is 1,5 km<sup>2</sup>. Irrigated area is 1,6 thousand h. After the construction of the reservoir, *Sinanodonta gibba* from the Unionidae family, *Colletopterum cyreum sogdianum*, *Corbicula cor*, *Corbiculina tibetensis*, *C. ferghanensis* from the Sorbiculidae family led to the spread in the waters of this region. Hisorak Reservoir was built on the Aksuv River, a tributary of the Kashkadarya River in the Kashkadarya region. Built in 1983-1988. The total volume is 170 million m<sup>3</sup>, useful volume is 161,6 million m<sup>3</sup>. The length of the rocky dam is 666 m. height 138 m, water surface 4,2 km<sup>2</sup>, water discharge capacity 200 m<sup>3</sup>/s, drainage structure 130 m<sup>3</sup>/s. It is not indicated that species of the Unionidae and Sorbiculidae families were distributed before the construction of the reservoir on the Aksu River. Currently, the reservoir is home to *Sinanodonta orbicularis*, *S. puerorum* from the Unionidae family, *Euglesa turkestanica* from the Euglesidae family, *Kuiperipisidium sogdianum* from the Pisididae family, *Corbicula fluminalis*, *C. purpurea*, *Corbiculina tibetensis* species from the Corbiculidae family.

The Dehkanabad Reservoir was established to ensure a certain flow of the Uradarya River. The reservoir was established in 1981 and has a total capacity of 27,2 million m<sup>3</sup>. The maximum

height of the dam is 36,2 m, the maximum discharge capacity is 12,0 m<sup>3</sup>/sec. *Euglesa hissarica*, *E. turkestanica* from the family Euglesidae, *Corbicula fluminalis*, *C. purpurea*, *Corbiculina tibetensis* from the family Corbiculidae are distributed in aquatic ecosystems.

Nugayli reservoir is located in the Kashkadarya basin and has an area of 0,587 km<sup>2</sup> and a volume of 0,50 million m<sup>3</sup>. Founded in 1975, the irrigated area is 1,8 thousand h. forms. The species *Corbicula cor*, *C. fluminalis*, *Corbiculina ferghanensis* from the family Corbiculidae are widespread in the reservoir and their habitats have expanded. Yangikurgan Reservoir - The Yangikurgan Reservoir was built in 1975 on the banks of the Yakkabogdarya River and covers an area of 1,5 km<sup>2</sup>. The annual water volume is 1,62 million m<sup>3</sup>. The construction of the reservoir led to the spread of *Euglesa obliquata* from the family Euglesidae, *Kuiperipisidium terekense* from the family Pisididae, *Corbicula purpurea*, *Corbiculina tibetensis*, *C. ferghanensis* from the family Corbiculidae. With the establishment of artificial water types in the Kashkadarya basin, the distribution of the distribution areas of bivalve mollusks of the families Unionidae, Euglesidae, Pisididae and Corbiculidae is expanding under the influence of anthropogenic factors. Seed species of *Sinanodonta*, *Colletopterum*, *Euglesia*, *Kuiperipisidium*, *Corbicula* and *Corbiculina* are distributed in canals, fisheries and ponds with water and fish from reservoirs in the river basin. Reservoirs and canals Unionidae and Corbiculidae families are reservoirs that are suitable for the distribution of species. The canals that flow into and out of the reservoir are the source and route of interfacial distribution of bivalve mollusks in the Unionidae, Euglesidae, Pisididae, and Sorbiculidae.

The disturbance of the balance of the aquatic ecosystem of the Kashkadarya basin, in particular, the disturbance of the water regime, to some extent affects the number and density of bivalve mollusk species studied in new areas. Under unstable ecosystem conditions, natural changes in the number of typical species of mollusks are observed. Changes in the taxonomic composition of the fauna of bivalve molluscs (stenobiosis prone to anthropogenic factors and a decrease in the number of rare, endangered species in a narrow range) are observed under changing environmental conditions.

In the Kashkadarya reservoirs, the density of mollusks has been observed to increase over the years. The scientific results of the distribution of bivalve mollusks in the Kashkadarya basin and their use in various sectors of the economy are important. *Corbicula corbicula*, *Corbicula fluminalis*, *Corbicula purpurea*, *Solletopterum bactrianum*, *Colletopterum cureum sogdianum*, distributed in the Kashkadarya basin, are included in the Red Data Book of Uzbekistan as endemic and rare species.

## V. Conclusions

Reservoirs, fisheries and canals built under the influence of anthropogenic factors in the Kashkadarya basin have led to the destruction of natural zoogeographic barriers under the influence of anthropogenic factors and the expansion of the range of invasive species. With the construction of reservoirs in the Kashkadarya basin, the range of Unionidae, Euglesidae, Pisididae and Corbiculidae families has been expanded. There are 9 species and 1 subspecies of bivalve mollusks were found in Pachkamar, 11 species and 2 subspecies in Chimkurgan, 5 species and 1 subspecies in Kamashi, 7 species in Hisorak, 5 species in Dehkanabad, 3 species in Nugayli and 5 species in Yangikurgan are studied first time by us.

## References

[1] Izzatullaev Z.I., Boymurodov X.T. Results of the development of two-limbed preservative mollusks (Bivalvia: Unionidae, Anadontinae) in Uzbekistan // Journal of the Moscow Society of Experimental Nature. – Moscow, 2016. p.16-19.

- [2] Izzatullaev Z.I., Boymurodov H.T., Egamqulov A.N., Otaqulov B.N., Hojiyev M.B., Bobomurodov Z.A., and Suyarov S.A., Freshwater Bivalve Molluscs in Artificial Reservoirs of Uzbekistan // International journal of current microbiology and applied sciences 2019.-2184-2188.
- [3] Izzatullaev Z.I. Mollyuski vodnikh ekosistem Sredney Azii. // Monografiya. – Toshkent: Lessonpress, 2018. 109-121 c.
- [4] Izzatullaev Z.I. Fauna mollyuskov vodnykh ekosistem Sredney Azii i sopredel'nikh territoriy. Monografiya. Toshkent: «LESSON PRESS», 2019. – 420 s. (v pechati).
- [5] Boymurodov X.T., Izzatullaev Z.I., Egamqulov A.N., Otaqulov B.N., Hojiev M.B., Bobomurodov Z.S., Sovremennoe sostoyanie populyatsii Colletopterum baktrianum rolle 1897 v vodoemax Uzbekistana // Bulletin of Science and Practice Scientific Journal.- 2020.-28-34 b.
- [6] Boymurodov Kh.T., Khasanov N. Influence of abiotic factors on biodiversity of the populations of bivalve molluscs of the Lower Zarafshan reservoirs. E3S Web of Conferences 265, 01012 2021 <https://doi.org/10.1051/e3sconf/202126501012> RUDN 2021
- [7] Baymurodov Kh. T. Advanced studies in science: theory and practice, The Collection of Scholarly Papers Materials of the International Scientific Conference, 239-242 (2016)
- [8] Baymurodov Kh. T. The Significance of Dicotyledonous Mollusks of the Unionidae Family in the Aquatic Ecosystems of Uzbekistan in Food and Economy Bulletin of Pure and Applied Sciences. Vol.40 B (Botany), No.1. January-June 2021: P.8-12. Orginal Research Article
- [9] Baymurodov Kh. T., Suyarov S.A. Bivalve mollusk fauna and ecological groups of Unionidae and Corbiculidae families in natural and artificial reservoirs of Uzbekistan E3S Web of Conferences 265, 01014 (2021) <https://doi.org/10.1051/e3sconf/202126501014>. RUDN 2021.
- [10] Boymurodov X.T. Ikkipallali mollyuskalarning inson tomonidan barpo etilgan suv havzalarida tarqalishi va biologik xilma-xilligi // O'zbekiston biologiya jurnali. –Toshkent, 2010.– №6.–B.41-44.
- [11] Boymurodov X.T. Ikkipallali mollyuskalarning adir mintaqasida barpo etilgan suv omborlarida tarqalishi va biologik xilma-xilligi // O'zbekiston biologiya jurnali. –Toshkent, 2013.– №2. –B.29-32.
- [12] Boymurodov X.T. Amudaryo sohili suv omborlari ikkipallali mollyuskalari faunasining shakllanishi, biologik xilma-xilligi va ekologik komplekslari // O'zbekiston biologiya jurnali. – Toshkent. 2013. –№ 4. –B. 38-41.