

# Aquatic ecosystems of the lower reaches of the Zarafshan River. Diversity and ecological groups of molluscs

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**Abstract.** Aquatic ecosystems of the lower reaches of the Zarafshan River revealed the distribution of 49 species and 2 subspecies of molluscs. They are distributed over aquatic ecosystems as follows: in the lower reaches of the Zarafshan River, 32 species and 2 subspecies are distributed, in the Navbakhorsky fish farm - 22 species and in the Khatyrehinsky fish farm - 15 species, in the Nurbuloksaysky fish farm - 22 species and in the Maidonsoysky - 18 species of mollusks. Their belonging to pelolymnophilic, peloreophilic, rheophilic, crenophilic, phytophilic, madicol, limno-crenophilic and telmatophilic ecological groups was considered.

## 1 Topic relevance

The study of the fauna of aquatic ecosystems in the lower reaches of the Zarafshan River creates important prerequisites for a comprehensive solution of theoretical and practical problems [1,2,4]. The diversity of the environment in aquatic ecosystems has created conditions for the distribution of many rare, endemic and relic animals [3,5,6]. At present, one of the urgent problems is the study of the diversity of mollusks and ecological groups of aquatic ecosystems in the lower reaches of the Zarafshan River.

## 2 Research object and methods

Below is a comprehensive analysis of the distribution, ecological groups of mollusks, their habitat and the expansion of their ranges [7,8,9]. These mollusks were studied by V.I.Zhadin (1938, 1952), Ya.I. Starobogatov, Z.I. Izatullaev (1984), Z.I. Izatullaev, Kh.T. Baimurodov (2009) and we used the system developed by Z. Izatullaev for Central Asian molluscs.

## 3 Research results

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Aquatic ecosystems in the lower reaches of the Zarafshan River, hydrographic conditions are complex. There are such sources of water as large and small rivers, lakes, springs and reservoirs, ponds. They differ from each other in a variety of hydrological, physicochemical and hydrobiological regimes. Each type of water is inhabited by molluscs, and each of them has its own ecological groups. It was found that 51 species and 2 subspecies of mollusks inhabit the aquatic ecosystems of the lower Amu Darya (Table 1).

**Table 1.** Aquatic ecosystems of the lower reaches of the Zarafshan River. Diversity and ecological groups of molluscs

| No | Family and species   | Lower course of the Zarafshan river | Navbakhorsky fish farm | Khatyrchimsky fish farm | Sources | Springs | Ecological groups |
|----|--|-------------------------------------|------------------------|-------------------------|---------|---------|-------------------|
|    | <b>Bivalvia class</b><br><b>Unionidae family</b><br><b>Sinanodonta genus</b> |                                     |                        |                         |         |         |                   |
| 1  | <i>Sinanodonta gibba</i>   | +                                   | +                      | -                       | -       | -       | Peloreophile      |
| 2  | <i>Sinanodonta orbicularis</i>   | +                                   | -                      | +                       | -       | -       | Peloreophile      |
| 3  | <i>Sinanodonta puerorum</i>  | +                                   | -                      | +                       | -       | -       | Peloreophile      |
|    | <b>Colleopterum genus</b>  |                                     |                        |                         |         |         |                   |
| 4  | <i>Colleopterum bactrianum</i>   | +                                   | -                      | +                       | -       | -       | Rheophile         |
| 5  | <i>Colleopterum cyreum sogdianum</i>   | +                                   | -                      | +                       | -       | -       | Rheophile         |
| 6  | <i>Colleopterum ponderosum volgensis</i>                                     | +                                   | -                      | +                       | -       | -       | Pelolimnophile    |
|    | <b>Corbiculidae family Corbicula genus</b>                                   |                                     |                        |                         |         |         |                   |
| 7  | <i>Corbicula cor</i>   | +                                   | +                      | +                       | -       | -       | Peloreophile      |
| 8  | <i>Corbicula fluminalis</i>  | +                                   | +                      | -                       | -       | -       | Peloreophile      |
| 9  | <i>Corbicula purpurea</i>  | +                                   | -                      | +                       | -       | -       | Peloreophile      |
|    | <b>Corbiculina sort</b>  |                                     |                        |                         |         |         |                   |
| 10 | <i>Corbiculina tibetensis</i>  | +                                   | -                      | +                       | -       | -       | Peloreophile      |
| 11 | <i>Corbiculina ferghanensis</i>  | -                                   | +                      | +                       | -       | -       | Peloreophile      |
|    | <b>Sphaeriidae family Musculium genus</b>                                    |                                     |                        |                         |         |         |                   |
| 12 | <i>M.hungarica</i>   | +                                   | -                      | -                       | +       | -       | Pelolimnophile    |
|    | <b>Euglesidae family Euglesa genus</b>                                       |                                     |                        |                         |         |         |                   |
| 13 | <i>Euglesa hissarica</i>   | -                                   | -                      | -                       | +       | -       | Pelolimnophile    |
| 14 | <i>Euglesa heldreichi</i>  | -                                   | -                      | -                       | -       | +       | Peloreophile      |
| 15 | <i>Euglesa turkestanica</i>  | -                                   | -                      | -                       | +       | -       | Pelolimnophile    |
| 16 | <i>Euglesa obliquata</i>   | -                                   | -                      | -                       | -       | +       | Pelolimnophile    |
| 17 | <i>Euglesa turanica</i>  | -                                   | -                      | -                       | -       | +       | Pelolimnophile    |
|    | <b>Pisidiidae family Odhneripisidium genus</b>                               |                                     |                        |                         |         |         |                   |
| 18 | <i>Odhneripisidium behningi</i>  | -                                   | -                      | -                       | +       | +       | Crenophile        |
|    | <b>Kuiperipisidium genus</b>   |                                     |                        |                         |         |         |                   |
| 19 | <i>Kuiperipisidium terekense</i>   | -                                   | -                      | -                       | +       | +       | Crenophile        |
| 20 | <i>Kuiperipisidium issykkulense</i>  | -                                   | -                      | -                       | +       | -       | Crenophile        |

|   |                                      |           |           |           |           |           |                  |
|---|--------------------------------------|-----------|-----------|-----------|-----------|-----------|------------------|
| 21  | <i>Kuiperipisidium sogdianum</i>     | -         | -         | -         | +         | -         | Crenophile       |
| 22  | <i>Kuiperipisidium polytimiticum</i> | -         | -         | -         | +         | -         | Crenophile       |
| <b>Gastopoda class Neritidae family Theodoxus genus</b> |                                      |           |           |           |           |           |                  |
| 23  | <i>Theodoxus.pallasi</i>             | +         | -         | -         | +         | -         | Peloreophile     |
| <b>Valvatidae family Cincinna genus</b>                 |                                      |           |           |           |           |           |                  |
| 24  | <i>Cincinna.pamirensis</i>           | +         | -         | -         | -         | -         | Pelolimnophile   |
| 25  | <i>Cincinna.piscinalis</i>           | +         | -         | -         | -         | -         | Pelolimnophile   |
| <b>Belgrandellidae family Bucharamnicola genus</b>      |                                      |           |           |           |           |           |                  |
| 26  | <i>Bucharamnicola.vucharica</i>      | +         | +         | -         | +         | -         | Crenophile       |
| <b>Martensamnicola genus</b>                            |                                      |           |           |           |           |           |                  |
| 27  | <i>Martensamnicola. Brevicula</i>    |           | +         | -         | +         | -         | Crenophile       |
| 28  | <i>Martensamnicola.hissarica</i>     | +         | +         | -         | +         | -         | Crenophile       |
| <b>Horatiidae family Sogdamnicola genus</b>             |                                      |           |           |           |           |           |                  |
| 29  | <i>Sogdamnicola. Pallida</i>         |           | +         | -         | +         | -         | Crenophile       |
| 30  | <i>Sogdamnicola.shadini</i>          | +         | -         | -         | +         | -         | Crenophile       |
| <b>Lymnaeidae family Lymnaea genus</b>                  |                                      |           |           |           |           |           |                  |
| 31  | <i>Lymnaea. Stagnalis</i>            | +         | +         | -         | -         | -         | Phytophile       |
| 32  | <i>Lymnaea.impura</i>                | +         |           | -         | -         | -         | Phytophile       |
| 33  | <i>Lymnaea.oblonga</i>               | +         | +         | -         | -         | +         | Madikol          |
| 34  | <i>Lymnaea.goupili</i>               |           | +         | -         | +         | +         | Madikol          |
| 35  | <i>Lymnaea.thiesseae</i>             | +         | +         | -         | -         | +         | Madikol          |
| 36  | <i>Lymnaea.truncatula</i>            | +         | +         | +         | +         | +         | Madikol          |
| 37  | <i>Lymnaea.subangulata</i>           |           | +         | -         | -         | +         | Madikol          |
| 38  | <i>Lymnaea.almaatina</i>             | +         | +         | -         | +         | -         | Limno-crenophile |
| 39  | <i>Lymnaea.bowelli</i>               | +         | +         | -         | +         | -         | Limno-crenophile |
| 40  | <i>Lymnaea.tenera</i>                | +         | +         | +         | -         | +         | Phytophile       |
| 41  | <i>Lymnaea.rectilabrum</i>           | +         | -         | +         | -         | +         | Phytophile       |
| 42  | <i>Lymnaea.psilia</i>                | +         | +         | +         | -         | +         | Phytophile       |
| 43  | <i>Lymnaea.fontinalis</i>            | +         | +         | +         | -         | +         | Phytophile       |
| 44  | <i>Lymnaea.lagotis</i>               | +         | -         | +         | -         | -         | Telmatophile     |
| <b>Phisidae family Costatella genus</b>                 |                                      |           |           |           |           |           |                  |
| 45  | <i>Costatella. Acuta</i>             | +         | +         | -         | +         | -         | Phytophile       |
| <b>Planorbidae family Planorbis genus</b>               |                                      |           |           |           |           |           |                  |
| 46  | <i>Planorbis. Planorbis</i>          | +         | +         | -         | -         | +         | Phytophile       |
| 47  | <i>Planorbis.tangitarensis</i>       | +         | -         | -         | -         | +         | Phytophile       |
| <b>Anisus genus</b>                                     |                                      |           |           |           |           |           |                  |
| 48  | <i>Anisus. Acronicus</i>             | -         | +         | -         | +         | +         | Phytophile       |
| 49  | <i>Anisus.albus</i>                  | -         | -         | -         | -         | +         | Phytophile       |
| 50  | <i>Anisus.centralis</i>              | +         | -         | -         | +         | -         | Pelolimnophile   |
| 51  | <i>Anisus.albopersicus</i>           | +         | -         | -         | +         | -         | Phytophile       |
| <b>Total species</b>                                    |                                      | <b>34</b> | <b>22</b> | <b>15</b> | <b>22</b> | <b>18</b> |                  |

Note: + species present, - species not present

In the middle of the XX century, the anthropogenic destruction of zoogeographic barriers on land caused the penetration of invasive species into the fauna of most territories, in particular, into the hydrofauna, which remained unchanged for a long time.

Aquatic ecosystems of the lower reaches of the Zarafshan River revealed the distribution of 49 species and 2 subspecies of molluscs. They are distributed over aquatic ecosystems as follows: in the lower reaches of the Zarafshan River, 32 species and 2 subspecies are distributed, in the Navbakhorsky fish farm - 22 species and in the Khatyrchinsky fish farm - 15 species, in the Nurbuloksaysky fish farm - 22 species and in the Maidonsoysky - 18 species of mollusks. Their belonging to pelolymnophilic, peloreophilic, rheophilic, crenophilic, phytophilic, madicol, limno-crenophilic and telmatophilic ecological groups was considered.

The shell size of the mollusk species does not directly affect their distribution over the river sections. Representatives of the family Unionidae, which includes large species, and the family Corbiculidae, which includes small species, mean that the accumulation of rivers in the middle reaches is important for the hydrological regime of rivers in the distribution of bivalve molluscs along river beds.

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