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Analysis of the Diversity Indicators of Macrozoobenthos Fauna Found in Water Bodies of the Fergana Region

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Abstract The Sariqqamish, Yozyovon, and fish-farming lakes are located in the western and eastern parts of the Fergana region. The aim of this study was to determine the diversity of the fauna in these water bodies. This research was conducted based on samples collected four times in 2024. Qualitative samples of benthic invertebrates were collected using standard hydrobiological methods and the species composition of macrozoobenthos was studied. Organisms belonging to the classes Oligochaeta, Hirudinea, Bivalvia, Crustacea, and Insecta were identified in the samples collected from the water bodies.

Keywords Fergana, Sariqqamish Lake, Yozyovon Reservoir, Macrozoobenthos, Oligochaeta, Hirudinea, Bivalvia, Water bodies

1. Introduction

The biological productivity of water bodies is determined by the life activities of hydrobionts, with aquatic ecosystems being the most important link in aquatic ecosystems. Macrozoobenthos are one of the main components of aquatic ecosystems, and their composition and abundance provide essential information about the ecological state, water quality, and biodiversity of water bodies [11]. Benthic animals interact with various organisms in almost all water body ecotopes, primarily through trophic relationships. They occupy lower levels of the food chain and serve as food sources for organisms at higher trophic levels [2]. Macrozoobenthos include organisms belonging to the phyla Annelida, Mollusca, Crustacea, and Insecta. Benthic animals are indicators of the ecological state of water bodies. In Uzbekistan, the state of aquatic animal communities is used in the Uzbekhydromet system to assess the water pollution and ecological conditions. Because benthic animals are relatively sedentary, they remain in active contact with the aquatic environment and respond to pollution levels. Therefore, bottom-dwelling animals are excellent indicators of water pollution. Macrozoobenthic organisms play a crucial role in providing food to fish. Commercially important fish species such as blackfish, common carp, black carp, and crucian carp primarily feed on bottom fauna [5].

In Uzbekistan, the macrozoobenthos of water bodies have been studied by Mukhamediev [4], Bekmurzaev [1], Embergenov [3], and other researchers. Most studies in Uzbekistan have focused on the macrozoobenthos of the Aral Sea. The macrozoobenthos of the southern Aral Sea region were studied by Embergenov (1967-1999) and Bekmurzaev (1965-1986), while Filippov (1995) examined the salt tolerance of benthic organisms in the Aral Sea. Additionally, Filippov et al. (1994) provided data on the zoobenthos of the Berg Strait. However, most of these studies date back to the 1960s-1970s. In recent years, the species composition of macrozoobenthos in Uzbek lakes has been studied by M. Matmuratov and N. Mirzambetov (2020). Research on benthic organisms in other Uzbek water bodies has been discontinued for many years and comparative studies are scarce. The objective of this study was to determine the species diversity, composition, and ecological significance of macrozoobenthos inhabiting Sariqqamish Lake, Yozyovon Reservoir, and fish-farming lakes in the western and eastern parts of the Fergana region.

2. Materials and Methods

The study was conducted from the spring of 2024 until late autumn in Sariqqamish Lake, Yozyovon Reservoir, adjacent canals, and fish-farming lakes. Standard hydrobiological methods were used for sample collection. Specifically, Petersen's grab method was used to collect samples from the bottom, and hand nets were used to collect samples from depths up to 2 m. The samples were processed using conventional methods [8-11]. Sampling points were selected based on the different parts of the water bodies, depth, and substrate type. Each point was sampled three times. The collected macrozoobenthos samples were fixed in a 70% ethanol solution and transported to the laboratory. In the laboratory, the organisms in the samples were separated

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using a stereomicroscope and taxonomically identified. The identification keys compiled by Weinstein [10] and Zhadanova [9] were used for species identification. The number and species composition of the organisms were determined and their taxonomic structures were established.

3. Results and Discussion

Table 1. Studied water body (Sl-Sariqqamish lake; YR-Yozyovon reservoir; FL- Fishery Lake) species composition of macrozoobenthos

Species/Water bodies	SK	YR	FL
ANNELIDA			
Tubifex sp.	+	+	+
Nereis diversicolor O.F. Müller	-	+	-
P. littoralis O.F. Müller	-	-	-
Paranais simplex Hrabe	-	-	+
MOLLUSKA			
Colletopterum cyreum (Kobelt)	+	+	-
Corbicula fluminalis O.F.Müller	+	+	+
Physella acuta Drapamaud	+	+	-
Cerastoderma isthmicum Issel	+	+	+
Lymnaea truncatula O.F. Müller	+	+	-
Caspiohydrobia conica Logvin. va.bStarobog.	+	-	-
CRUSTASEA			
Macrobrachium nipponense De Haan	+	+	-
Mesomysis kowalevskii Czerniavsky	+	+	-
Paramysis lacustris (Czerniavsky)	+	+	-
Gammarus subaequalis Martynov1935	-	+	-
INSECTA			
Anax imperator Leach	+	+	+
Cloen dipterum L	+	+	-
Caenis macrura Stephens	+	+	-
Ch. Halophilus Kieffer	-	-	+
Ch. thummi Kieffer	+	+	-
Chyronomus salinarius Kieffer	-	-	+
Ecnomus tenellus Rambur	+	+	-
Endochyronomus tendens (Fabricius)	+	+	-
G. glaucus (Meigen)	+	+	+
Glyptotendipes barbipes (Staeger)	+	+	+
Cricotopus tenellus Fabricius	+	-	-
Procladius ferrugineus Kieffer	+	+	-
Polypedilum aberrans Tschern.	+	+	-
C. silvestris (Fabricius)	+	-	+
Number of species	22	21	11
Water bodies	**SL**	**YR**	**FL**

A total of 28 macrozoobenthos species were recorded during the study, with the highest diversity found in Sariqqamish Lake and the lowest in fish-farming lakes (Table 1). Chironomids were the most abundant macrozoobenthos collected. Macrozoobenthos belong to four groups: Annelida, Mollusca, Crustacea, and Insecta. The highest species richness was observed in the class Insecta, which plays a crucial role in the biological diversity of water bodies. Other groups were represented by fewer species. A comparison of the species composition of macrozoobenthos in the studied water bodies revealed that the macrozoobenthos of Sariqqamish Lake resembled that of the Yozyovon Reservoir. Four species belonged to the Annelida group, six to Mollusca, four to Crustacea, and 14 to the Insecta class. Several water bodies in the Fergana Valley, including those in the Fergana region, were analyzed. The samples collected from these water bodies contained Chironomidae family larvae, Tubifex sp. from the Oligochaeta family, and other benthic organisms. These macrozoobenthic species serve as an essential food source for fish. Among the identified macrozoobenthos species, the larvae of the dragonfly genera Anax and Anax imperator Leach 1518 were widely distributed in the bottom sediments of the water bodies, forming dense populations.

Place and time of material collection: The locations and coordinates of the study sites were identified. Samples were collected from various areas in the Fergana region.

Table 2

Name of Collection Site	Date	Coordinates
Beshariq district, Sariqamish lake	21.04.2024 22.05.2024 18.06.2024 15.08.2024	N 40° 36' 15.4" E 71° 28' 41.8" N 40° 36' 13.7" E 71° 28' 34.4"
Yozyovon district, Yozyovon reservoir	05.05.2024 02.06.2024 08.07.2024	N 40° 36' 15.4" E 71° 28' 41.8" N 40° 36' 13.7" E 71° 28' 34.4"
Fishery Llke	05.05.2024 02.06.2024	N 40° 36' 15.4" E 71° 28' 41.8" N 40° 36' 13.7" E 71° 28' 34.4"

4. Conclusions

A total of 28 macrozoobenthos species were identified in Sariqqamish Lake, including four species from the Annelida group, six from Mollusca, four from Crustacea, and 14 from the Insecta class. Gammarus subaequalis Martynov 1935 is a new species in the Fergana Valley.

REFERENCES

[1] Bekmurzaev B. Bentos Karazharskoi sistemy ozer delty Amudari [Benthos of the Karazhar Lake System in Amudarya river delta] // Uzbek biol. Zhurn. 1969. 2 (in Russian).

[2] Covich, A.P., Palmer, M.A., & Crowl, T.A. (1999). The Role of Benthic Invertebrate Species in Freshwater Ecosystems. BioScience, 49(2), 119-127.

[3] Embergenov S., Khusainva N.Z. O zoobentose ozera Vostochnyi Karateren (delta Amudarii) [On the zoobenthos of lake Eastern Karateren (Amudarya river delta)] // Vestnik Karakalpak. Filiala AN UzSSR. 1970. № 2 (in Russian)

[4] Mukhamediev A.M. Gidrobiologia vodoemov Ferganskoi doliny [Hydrobiology of waterbodies of the Fergana Valley]. – Tashkent: Fan, 1967. – (in Russian).

[5] Матмуратов Муратбай Алламуратович (2022). Современное состояние макрозообентоса разнотипных водоёмов каракалпакстана. Universum: химия и биология, (1 (91)), 9-11.

[6] Opredelitel zooplanktona i zoobentosa presnych vod Evropeiskoi Rossii [Key to zooplankton and zoobenthos freshwaters of European Russia]. V. 2 Zoobenthos. – M. - SPb.: Tovar. nauch. izdat. KMK, 2016. (in Russian).

[7] Opredelitel presnovodnykh bespozvonochnykh Rossii i sopredelnykh territoriy [Key to freshwater invertebrates of Russia and adjacent lands]. – SPb.: Zool Inst. RAS, 1994-2004. V. 1-6. (in Russian).

[8] Shannon, C.E. (1948). A Mathematical Theory of Communication. Bell System Technical Journal, 27, 379-423.

[9] Tachet, H., Richoux, P., Bournaud, M., & Usseglio-Polatera, P. (2010). Invertébrés d'Eau Douce: Systématique, Biologie, Écologie. CNRS Editions.

[10] Thorp, J.H., & Covich, A.P. (2010). Ecology and Classification of North American Freshwater Invertebrates. Academic Press.

[11] Wetzel, R.G. (2001). Limnology: Lake and River Ecosystems. Academic Press.