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Bottom Fauna of Water Bodies of Uzbekistan

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Abstract: ***Macrozoobenthos species composition of six lakes from different regions (north, center, south) of the republic have been studied. Total 111 species of bottom animals have been recorded. List of dominant species is presented. Using coefficient of Sörensen-Czekanowski similarity of species composition of macrozoobenthos of the lakes studied have been determined.***

Keywords: macrozoobenthos, lakes, species composition, fauna similarity, Uzbekistan

1. Introduction

The biological productivity of water bodies is determined by the vital activity of hydrobionts, one of the most important link of which in aquatic ecosystem of water bodies is the aquatic bottom fauna (zoobenthos). Benthic animals enter into various, primarily trophic, connections with organisms of practically all ecotopes of water bodies. The most important role of macrozoobenthos organisms play as elements of the fish food. Such important commercial fish species as the carp, crucian carp, bream, roach, black amur, and also such Red Data Book of the Republic of Uzbekistan species as barbels, showel-noses, white-eye bream feed largely on aquatic benthic fauna [5]. In the waterbodies of Uzbekistan and throughout Central Asia, the bottom fauna makes up the bulk of the forage base of most of commercial fish species.

In Uzbekistan the macrozoobenthos of lakes was studied by A.M. Mukhamediev [6], S. Embergenov [2, etc.], B. Bekmurzaev [1, etc.] and other. However, most of these works date back to the 1960-1970s. Also, there are practically no generalizing and comparative works.

2. Material and methods

The material was collected in spring, summer, and autumn in 2000-2018 using Petersen dredging and was processed according to conventional methods [9-12]. Identification of hydrobionts led by modern guides [7, 8, 13, etc.].

To assess the similarities and differences in the species composition of the macrozoobenthos of lakes, the Sörensen-Czekanowsky index was used:

$$K = \frac{2C \times 100\%}{(A+B)}$$

where A and B are number of species in two compared lakes, C is the number of species common to this pair, K is the coefficient of similarity of the species composition.

Seven lakes from different (south, north, west, east, center) regions of the republic were studied: Sarykamysh (Karakalpakstan), Western Karateren (Wetland Sudochie, Karakalpakstan), Ullishorkul (Khorezm viloyat = province), Karakir (Bukhara viloyat), Tuzkan (Jizzakh viloyat), Sarykamysh (Fergana viloyat) (fig. 1).

Figure 1: Location of the lakes studied. 1: Sarykamysh, 2: Western Karateren, 3: Ullishorkul, 4: Karakir, 5: Tuzkan, 6: Sarykamysh, 7: Sichankul

3. Results and Discussion

As can be seen from the table 1, the studied lakes of different areas, depths, water salinity, with different soils. The only freshwater lake is Sarykamysh in the Fergana Valley. The rest of the lakes are brackish.

Table 1: Main abiotic parameters of the studied lakes

Lakes	Area, 10^3 ha	Maximal depths, m	Dominant depths, m	Salinity, g/l	Soils
Sarykamysh (Karakalpakstan)	387.5	40.0	5.0-7.0	11.0-13.0	silt and sand
West Karateren	0.4	1.7	0.8-1.2	4.0-6.0	gray silt
Tuzkan	700.0	20.0	12.0	10.0	gray silt
Sarykamysh (Fergana viloyat)	26.2	7.0	3.0	0.8	gray and black silts
Ullishorkul	1.8	4.5	1.5	5.8	gray silt
Karakir	26.2	5.0	1.5-2.0	10.7	sand
Sichankul	7.5	20.0	9.0	7.0	sand

A total of 187 species of bottom animals were observed, the most diverse was the benthos of freshwater lake Sarykamysh (Fergana viloyat), the least - in brackish lakes (tables 2, 3). As in most of lakes in Central Asia, chironomids were most diverse (86 species = almost half of all species of macrozoobenthos) (table 3). Other groups are represented by a much smaller number of species: Odonata – 15 species, Coleoptera – 7, Diptera (excluding chironomids) – 10, Molluska – 12, Annellida – 10, Ephemeroptera – 11. The rest of the groups of organisms are represented by single species.

Table 2: Dominant species of macrozoobenthos of studied lakes (SKK – Sarykamysh, Karakalpakstan), KT – West Karateren, TZ – Tuzkan, SKF – Sarykamish (Fergana Valley), US – Ullishorkul, KK – Karakir, SI – Sichankul)

Taxa / Lakes	SKK	KT	TZ	SKF	US	KK	SI
ANNELIDA							
Paranais simplex Hrabe	+	+	+	-	-	+	+
P. littoralis O.F. Müller	+	-	+	-	-	+	+
Tubifex sp.	-	+	-	+	+	-	-
Nereis diversicolor O.F. Müller	+	+	-	-	-	-	-
MOLLUSCA							
Colletopterum cyreum (Kobelt)	-	-	-	+	-	-	-
Corbicula fluminalis O.F.Müller	-	-	-	+	-	-	-
Physella acuta Drapamaud	-	+	+	+	-	-	+
Cerastoderma isthmicum Issel	+	-	-	-	-	-	-
Lymnaea truncatula O.F. Müller	-	+	+	+	-	-	-
Caspiohydrobia conica Logvin. et Starobog.	-	+	-	-	-	-	-
CRUSTACEA							
Macrobrachium nipponense De Haan	+	+	+	+	+	+	+
Turkogammarus aralensis (Uljanin)	+	+	-	-	-	-	-
Mesomysis kowalevskii Czerniavsky	-	-	+	+	+	-	+
Paramysis lacustris (Czerniavsky)	+	+	-	+	+	-	+
INSECTA							
Anax imperator Leach	-	-	-	-	-	+	+
Cloen dipterum L.	-	-	+	+	+	+	-
Caenis macrura Stephens	-	+	+	+	+	-	-
Ecnomus tenellus Rambur	-	-	+	+	-	-	-
Chyronomus salinarius Kieffer	+	+	+	-	+	+	+
Ch. Halophilus Kieffer	+	+	-	-	-	+	+
Ch. thummi Kieffer	+	+	+	+	+	+	-
Cricotopus tenellus Fabricius	-	-	-	+	-	-	-
C. silvestris (Fabricius)	-	+	+	+	+	+	+
Procladius ferrugineus Kieffer	+	+	+	+	+	+	-
Polypedilum aberrans Tschern.	+	+	-	+	+	-	+
Endochyronomus tendens (Fabricius)	+	-	-	+	+	-	-
Glyptotendipes barbipes (Staeger)	-	-	-	+	-	-	-
G. glaucus (Meigen)	-	-	-	+	-	-	-
Total number of species	33	30	25	75	28	28	31
Lakes	SKK	KT	TZ	SKF	US	KK	SI

The remains of the Aral Sea aquatic fauna have been preserved in the lakes of Sarykamysh (Karakalpakstan) and Western Karateren: polychaete *Nereis diversicolor,* mollusks *Cerastoderma isthmicum, Caspiohydrobia cf. conica, Theodoxus pallasi,* amphipod *Turkogammarus aralensis* (included in the Red Data Book of the Republic of Uzbekistan [3]).

Table 3: Taxonomic diversity (number of species) of macrozoobenthos of the lakes studied (legend as in table 2)

Taxa / Lakes	SKK	KT	TZ	SKF	US	KK	SI	Number of species / %
Annelida	5	4	3	6	4	4	5	10 / 5.3
Mollusca	3	1	1	7	1	1	1	12 / 6.4
Crustacea	2	1	1	1	1	1	3	5 / 2.7
Chironomidae	20	19	17	49	18	18	19	86 / 46.0
Other Diptera	5	5	4	5	9	5	5	15 / 8.0
Odonata	4	3	2	8	3	3	4	15 / 8.0
Coleoptera	1	2	2	3	1	1	2	7 / 3.7
Ephemeroptera	2	2	2	7	3	2	3	11 / 5.9
Trichoptera	1	2	1	4	2	1	2	6 / 3.2
Hemiptera	3	2	3	5	2	2	2	9 / 4.8
Plecoptera	2	2	2	4	3	3	2	7 / 3.7
Hydracarina	1	1	1	2	2	1	1	4 / 2.1
Total species	49	44	39	101	49	42	49	187

Comparison of the species composition of zoobenthos in the studied lakes revealed that the species composition of brackish water lakes is the most similar. The species composition of the macrozoobenthos of the freshwater lake Sarykamysh of the Fergana Valley is sharply different from the species composition of the brackish lakes studied (table 4) and more similar to the bottom fauna of reservoirs [4].

Table 4: The similarity of the species composition of macrozoobenthos of the lakes studied according to the Sörensen-Czekanowski coefficient (legend as in table 2)

Lakes	SKK	KT	TZ	KK	US	SKF	SI
Sarykamysh (Karakalakstan)		80	75	69	77	20	77
Western Karateren	80		68	70	78	21	66
Tuzkan	75	68		75	71	18	70
Karakir	81	70	75		68	19	67
Ullishorkul	77	78	71	68		22	56
Sarykamysh (Fergana)	20	21	18	19	22		23
Sichankul	77	66	70	67	56	23	

As practical recommendations, it is possible to propose the introduction of some invertebrates of the Aral Sea fauna such as *Nereis diversicolor*, *Turkogammarus aralensis*, *Theodoxus pallasi*, and *Cerastoderma isthmicum* into the brackish-water lakes Ullishorkul, Karakir, Tuzkan, Sichankul, and other brackish waterbodies of the republic.

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