Zooplankton of Sevsak Stream (Elazıg-TURKIYE)

ABSTRACT:

The zooplankton and its seasonal distribution of Sevsak Stream has been investigated in 2021. A total of 31 zooplankton species have been recorded in the stream. Among the zooplankton 19 species identified from Rotifer 9 species from Cladocera and 3 species from Copepoda. In every season zooplankton species were recorded in various number. Highest number of taxa were recorded in spring. In this season also an increase occurred in the individual numbers of species. *Keratella cochlearis*, *Polyarthra dolichoptera* and *Cyclops vicinus* were the most recorded species in the stream. As in the other aquatic habitat, rotifera group was determined as the most recorded species in terms of taxa and number of individuals.

Key words: *Zooplankton, Rotifera, Copepoda, Cladocera, Sevsak Stream*

1.INTRODUCTION

Rotifera, Cladocera and Copepoda are the largest groups of zooplankton, which are the main links of the food chain in the aquatic environment. Species diversity and abundance in unit volume provide information about the biological characteristics of reservoirs and ponds. Zooplanktonic organisms constitute the main food source of fish in freshwater sources and they constitute the main food of many pelagic-fed fish species and young periods of demersal-fed fish [1,2].

In addition, zooplankton species are also used to determine water quality, trophic status of the lake and water pollution. With the increasing importance of zooplanktonic organisms, researches on Rotifera, Cladocera and Copepoda, which constitute an important part of zooplankton in our country as well as in the world, have been started. Zooplankton of stagnant waters has great attention by the scientists in Turkey but researches on the streams are relatively few. By some of these researches, the rotifer fauna of Gümüldür Stream [3], diversity of Rotifera in Tigris River [4], the rotifer fauna and its seasonal variations of Fırat River [5], the rotifer fauna and its seasonal variations of Zıkkım Stream [6], the rotifer fauna of Asi River [7], the zooplankton fauna of some rivers in Mediterranean Region [8], the Copepoda and Cladocera fauna of Asi River [9], the Rotifera fauna of Euphrates River basin [10] zooplankton structure of Karaman Stream [11] zooplankton succession of the Asi River [12] were determined. In this research, we aim to identify the zooplankton fauna and its seasonal composition of Sevsak Stream, where no previous relevant data are available.

2. MATERIALS AND METHODS

Hazar Lake, which is an important water source, within the borders of Elazig province, 22 km from the city center. It is a tectonic lake. Its average depth is 93 m, its maximum length is 20 km, It has a maximum width of 5.4 km and an altitude of 1248 m. The streams feeding the Hazar Lake are called "fur streams" together with Sevsak Stream, Zıkkım Stream, Kürk Stream, Behramaz Stream and Mogal Stream. Sevsak Stream is located in the north east of the lake. The stream born from the high hills is poured into the lake through a channel after passing the

state highway. Sevsak Stream is a small stream and can dry out completely in the hot months of some years [13,14,15]. Sampling stations in Sevsak Stream is given in Fig 1.

Fig 1. Sampling stations in Sevsak Stream

Zooplankton samples were collected Hydro-Bios plankton net (25 cm in diameter, 100 cm in length, with a 55-µm mesh size) and immediately fixed with a 4% solution of formalin. Samples were taken from stagnant or slow-running, vegetation-rich areas of the stream basin. To identify zooplankton species, various resources were used [16-22].

Some physicochemical parameters, such as water temperature, electrical conductivity, pH, dissolved oxygen were measured on-site simultaneously with the sampling time.

3. RESULTS AND DISCUSSION

During the study 31 zooplankton species have been recorded in the stream. Among the zooplankton 19 species identified from Rotifer 9 species from Cladocera and 3 species from Copepoda. The list of the species and their seasonal distribution was given in Table 1.

As shown in the Table 1 in spring in every station the highest number of species were recorded. The highest number of taxa were recorded in the second station of spring period (18 species), the least taxa were recorded in the first station of the stream in winter. *K. cochlearis* and *P. dolichoptera* from Rotifera were determined in 10 samplings. *C. retikulata* from Cladocera and *C. vicinus* from Copepoda were recorded the dominant species. *C lacustris* recorded only the last stations. *D. forcipatus, T. tetractis* recorded only in one sampling. In every season zooplankton species have been identified from the stream.

Rotifera was found as the dominant group in terms of number of species and individuals The relative density of Rotifera was 61.3% followed by Cladocera 29% and Copepoda 9.7%.

Table 1. The seasonal distribution of zooplankton in Sevsak Stream

	Seasons											
	Winter			Spring			Summer			Autumn		
	Stations											
	1	2	3	1	2	3	1	2	3	1	2	3
ROTIFERA												
Asplanchna priodonta Gosse, 1850		+		+	+	+		+	+		+	+
Brachionus angularis Gosse, 1851					+	+	+		+		+	
Brachionus calyciflorus Pallas, 1766				+				+			+	+
Colurella obtusa (Gosse, 1886)												
Dicranophorus forcipatus (O.F.Müller, 1786)				+								+
Euchlanis dilatata Ehrenberg, 1832					+	+		+	+	+	+	+
Kellicottia longispina (Kellicott, 1879)								+	+			
Keratella cochlearis (Gosse, 1851)	+		+	+	+	+	+	+		+	+	+
Keratella quadrata (Müller, 1786)					+	+		+	+		+	
Lecane bulla (Gosse, 1886)				+	+							
Lecane closterocerca (Schmarda, 1859)	+							+				
Lecane flexilis (Gosse, 1886)		+			+			+				
Lecane luna (O.F.Müller, 1776)					+		+					
Lecane lunaris (Ehrenberg, 1832)				+		+						
Lepadella ovalis (O.F.Müller, 1786)				+	+							
Notholca squamula (O.F.Müller,1786)				+	+			+		+		
Polyarhtra dolichoptera Idelson, 1925	+		+		+	+	+	+	+	+	+	+
Synchaeta oblonga Ehrenberg, 1831						+	+					
Trichotria tetractis (Ehrenberg, 1830)					+							
CLADOCERA												
Bosmina longirostris (O.F.Müller, 1785)		+	+		+		+					
Chydorus sphaericus (O.F. Müller, 1776)					+							+
Ceriodaphnia reticulata (Jurine, 1820)				+	+	+	+	+	+			+
Coronetalla rectangula Sars, 1862					+		+					+
Cornigerius lacustris (Spandl1923-1924)			+			+			+			+
Daphnia longispina O.F. Müller 1875				+	+	+		+				+
Diaphanosoma lacustris Korinek, 1981							+	+				
Macrothrix laticornis (Fischer, 1851)						+					+	
Pleuroxus aduncus (Jurine, 1820)		+						+		+		
COPEPODA												
Acanthopdiaptomus denticornis (Wierzejski, 1887)		+	+	+						+		
Cyclops vicinus Uljanin, 1875	+		+	+	+				+		+	+
Nitokra hibernica (Brady, 1880)						+			+		+	
TOTAL	**4**	**5**	**6**	**11**	**18**	**13**	**9**	**14**	**10**	**6**	**10**	**11**

In the stream pH values were changed between 7.1-7.6, dissolved oxygen 6.9-.2 mg/L, electrical conductivity, 298-345 µS/cm and temperature 5.5.-16 ℃ (Table 2).

Table 2. Some physical and chemical parameter values of Sevsak Stream

Parameters	**Winter**	**Spring**	**Summer**	**Autumn**
El. Conductivity (µS/cm)	315	298	345	302
pH	7.1	7.3	7.6	7.2
Dissolved oxygen (mg/L)	8.9	9.2	6.9	7.6
Temperature ℃	5.5	9	16	12

In recent years, many studies [23-37] showed that rotifers are the dominant species in running waters. The reason is that rotifers are less affected than other groups by the deterioration of water quality and display better adaptation to these conditions [1]. The importance of rotifers

increases in comparison to cladocerans when the abundance of the latter is low [38] Furthermore, rotifers are known as an opportunistic species in extreme conditions [39]. Within the last decade, because of the degradation of water quality of many wetlands for a variety of reasons (pollution, eutrophication, etc., and the effect of global warming), rotifers have become dominant species in many aquatic habitats [40]. In line with that finding, this study identified that most of the zooplankton species belonged to phylum Rotifera.

It was observed that seasonal changes are important factors effecting seasonal distribution of zooplanktonic groups in Sevsak Stream. It is thought that water temperature effects the distribution and amount of zooplankton in the stream. The fact that zooplankton is more abundant in spring and summer supports this data.

There are also zooplankton researches carried out in previous years in other streams flowing into the Hazar Lake, such as the Sevsak Stream. In Kürk Stream *Keratella cochlearis* from Rotifera *Cyclops vicinus* from Copepoda and *Ceriodaphnia reticulata* from Cladocera were took the first places according to frequency of occurence [27]. In Behramaz Stream *Kellicottia longispina*, *K. cochlearis* and *C. vicinus* were recorded as dominant species [29]. In Hoşrük Stream [41] *Polyarthra dolichoptera* from rotifers has been detected in 10 months and is the most common species among all zooplankton species. *Cyclops vicinus* from Copepoda was the second dominant species observed for 9 months.

A one-year comprehensive zooplankton survey was conducted in Lake Hazar. As a result of the survey, 52 zooplankton species were found in the lake. In Hazar Lake *Brachionus quadridentatus Keratella quadrata* and *Synchaeta verrucosa* has been most recorded Rotifera species. *Cyclops vicinus* from Copepoda was observed every month. *Alona rectangula, Cornigerus lacustris* and *Diaphanosoma lacustris* from Cladocera were the most abundant cladoceran species [42].

The common species in Hazar Lake and the streams flowing into the lake (Kürk, Behramaz Hoşrük Streams*) K. cochlearis, P. dolichoptera* and *C. vicinus* species [27,29,41]. These species have also been recorded in Sevsak Creek. Another common finding is that rotifers are the most common species of all zooplankton in these wetlands. In addition, in these studies, it was reported that the most abundant zooplankton species in terms of the number of species and the number of individuals were in spring and summer. This finding is consistent with the zooplankton distribution of the Sevsak Stream.

Cornigerius species are endemic to the Ponto-Caspian, with the exception of *Cornigerius lacustris,* which is endemic to freshwater Lake Hazar in the Euphrates basin [43]. This species was recorded only in the last station next to Hazar Lake. This species living habitat known as Hazar Lake. The fact that the species was found at the last station connected to the lake indicates that this species is not a species belonging to this stream. This species was not recorded in the researches carried out before in the Hoşrük Stream [41] Zıkkım Stream [37] and Behramaz Stream [29] which spills into the lake. In Hazar Lake *C. lacustris* was found every month [42].

The QB/T index shows the rate of the number of Brachionus to the number of Trichocerca. The Q index is evaluated in three groups for the lake's trophic state, that Q=1 means oligotrophy, Q = 1.0-2.0 means mesotrophy, and Q>2 means eutrophy. In this study, Sevsak Stream was determined (2 species of Brachionus, *B. angularis* and *B*. *calyciflorus* and 1 species of Trichocerca, *T. tetractis*) QB/T 2/1=2. According to this, the Sevsak Stream showed mesotrophic property.

CONCLUSION

The zooplankton species found during the research are important as they are the first record for Sevsak Creek. Hazar Lake has got a blue flag. Sevsak Stream, which is one of the streams pouring into the lake, should be protected in order not to be affected by pollutants and not to pollute the lake.

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