

Araştırma Makalesi / Research Article

Zooplankton Fauna of Özlüce Dam Lake (Bingöl - Turkey)

Necla İPEK ALIŞ, Serap SALER*

Fırat University, Fisheries, Elazığ

Abstract

A total of 27 species (19 belong to genus Rotifera, 7 to Cladocera and 1 to Copepoda) were found in Özlüce Dam Lake between March 2013-February 2014 period. All of the zooplanktonic species have been detected for the first time in Özlüce Dam Lake. Rotifera was found as dominant taxonomic group in respect to Cladocera and Copepoda. *Keratella cochlearis* (Rotifera) and *Cyclops vicinus* (Copepoda) were dominant species. The highest numbers of taxa were recorded in spring.

Keywords: Rotifera, Cladocera, Copepoda, Özlüce Dam Lake, Turkey

1. Introduction

Zooplankton is an indicator for eutrophication and pollution levels since their species richness, distribution and composition are closely associated with water quality and based on trophic levels of lakes zooplankton show increasing and decreasing patterns [1]. Some studies were carried out on zooplankton in Turkey dam lakes [2-17]. Studies on zooplanktonic organisms are important for freshwater ecosystem. According to our knowledge, there is no previous study on zooplankton in Özlüce Dam Lake. This study has got an importance as to be the first zooplanktonic research in this lake. So we carried out this study to explain the zooplankton fauna of Özlüce Dam Lake and to discuss the species composition and species richness.

2. Material and Methods

Özlüce Dam Lake is located in East Anatolia on Peri Stream 30 km far away from Kiğı district of Bingöl province. The dam was built between 1992-2000 for generating energy. The area of the lake is 25.80 km² [18]. The samples were taken from 3 stations (Figure 1). Sampling was performed between March 2013-February 2014 in spring, summer, autumn and winter.



Figure 1. Coordinates of stations in Özlüce Dam Lake

* Sorumlu Yazar: ssalerk@firat.edu.tr

Geliş Tarihi: 13.10.2015, Kabul Tarihi: 06.02.2016

Zooplankton samples were collected with a standard plankton net (Hydrobios Kiel, 25 cm diameter 55 µm mesh size) and the specimens were preserved in 4% formaldehyde solution in 100 ml plastic bottles. Zooplankton species were examined and identified under Leitz inverted microscope. Identifying rotifers depends on the features of the loricates, coronas, and trophies of planktonic species. Trophy morphology is used with most rotifers, especially those that have no loricate. A drop of KOH or NaOH (4%) is added to a sample put in a few drops of water. The trophy cleaned this way is ready for diagnosis. Relevant literatures [19-27] were used for identification of zooplankton species.

3. Results and Discussion

In total 27 zooplankton species were identified from Özlüce Dam Lake, including 19 Rotifera, 7 Cladocera and 1 Copepoda species. Species richness of Rotifera was found higher than Cladocera and Copepoda. Based on the number of taxa, rotifers were the dominant group in the lake (70.37%) followed by Cladocera (25.92%) and Copepoda (3.70%). During the study most of the species were recorded in spring (26 species) followed by autumn (24 species). The least numbers of taxa were recorded in winter (18 species). Spring was also most important season in terms of number of species. In the first station of spring, the highest number of species (22 species) were identified. The least number of species were recorded in winter at station 2 (6 species). The dominant Rotifera species was *Keratella cochlearis* followed by *Polyarthra dolichoptera*. Dominant Cladocera species were *Bosmina longirostris*, *Daphnia longispina* and *Ceriodaphnia reticula*. Dominant Copepoda species was *Cyclops vicinus*. The seasonal distributions of species were given in Table 1.

Table 1. Seasonal distribution of zooplankton fauna at sampling stations of Özlüce Dam Lake

Seasons	Autumn			Winter			Spring			Summer		
Stations	1	2	3	1	2	3	1	2	3	1	2	3
Rotifera												
<i>Ascomorpha saltans</i> Bartsch, 1870	+	+	-	-	-	+	+	+	-	-	+	+
<i>Asplanchna priodonta</i> Gosse, 1850	-	-	+	-	-	+	+	-	-	+	+	-
<i>Brachionus angularis</i> Gosse, 1851	-	+	+	-	-	-	+	+	+	+	+	+
<i>Cephalodella gibba</i> (Ehrenberg, 1838)	-	+	-	-	+	-	+	+	+	-	-	+
<i>Euchlanis dilatata</i> Ehrenberg, 1832	+	+	-	-	-	-	+	+	-	-	-	-
<i>Kellicotia longispina</i> (Ehrenberg, 1879)	+	-	+	+	-	-	+	+	-	+	-	+
<i>Keratella cochlearis</i> (Gosse, 1851)	+	+	+	+	-	+	+	-	+	+	-	+
<i>Keratella quadrata</i> (Müller, 1786)	-	+	-	-	-	-	-	+	+	-	-	-
<i>Keratella tropica</i> (Apstein, 1907)	-	+	-	-	-	-	+	-	+	-	+	-
<i>Lapedella ovalis</i> (Müller, 1786)	+	-	-	-	+	-	+	+	+	-	-	-
<i>Lecane luna</i> (Müller, 1776)	-	+	-	-	+	-	-	-	+	+	-	-
<i>Notholca acuminata</i> (Ehrenberg, 1932)	+	-	-	+	-	+	+	-	-	-	-	-
<i>Notholca squamula</i> (Müller, 1786)	-	-	-	+	+	+	-	-	-	-	-	-
<i>Polyarthra dolichoptera</i> Idelson, 1925	-	+	+	+	-	+	+	-	+	+	+	-
<i>Rotaria neptunia</i> (Ehrenberg, 1832)	+	-	+	-	+	-	+	-	+	-	-	-
<i>Synchaeta oblonga</i> Ehrenberg, 1831	-	+	+	-	-	-	+	+	+	-	-	-
<i>Synchaeta pectinata</i> Ehrenberg, 1832	-	-	-	+	-	-	+	-	+	-	+	+
<i>Trichocerca capucina</i> Wierzejski & Zacharias, 1893	+	-	+	-	-	-	+	+	+	-	-	+
<i>Trichotria tetractis</i> (Ehrenberg, 1830)	-	-	-	+	-	-	-	+	+	+	-	-
Cladocera												

<i>Bosmina longirostris</i> (Müller, 1785)	+	-	+	+	-	+	+	+	-	+	-	+
<i>Ceriodaphnia reticulata</i> (Jurine, 1820)	+	+	-	-	+	-	+	-	+	+	+	-
<i>Chydorus sphaericus</i> (Müller, 1776)	+	-	-	-	-	-	-	+	+	-	-	-
<i>Diaphanosoma lacustris</i> Korinek, 1981	-	+	-	-	-	+	+	-	-	+	-	+
<i>Daphnia longispina</i> Müller, 1785	-	+	+	-	-	+	+	+	+	-	+	-
<i>Leptodora kindtii</i> (Focke, 1844)	+	-	+	-	-	-	+	-	+	-	+	-
<i>Leydigia leydigi</i> (Schoedler, 1863)	-	-	+	-	-	-	+	+	+	-	-	+
Copepoda												
<i>Cyclops vicinus</i> Uljanin, 1875	+	+	-	+	-	-	+	+	+	+	+	+

In Cıp [3], Göksu [4], Keban [2], Kesikköprü [8] and Asartepi [12] dam lakes it was recorded that Rotifera was represented in higher number of species compared with Cladocera and Copepoda. In Özlüce Dam Lake Rotifera was recorded as the most observed group as number of species. According to Kolisko [29] all of the recorded rotifer species in the present study are widely distributed around the world. Also many of the recorded species like *Polyarthra dolichoptera*, *Keratella cochlearis* are reported to be found in many aquatic environment and cosmopolite species and have got wide distribution habitats [10, 15]. Only seven species of Cladocera were observed in Özlüce Dam Lake. Among the identified species *Cyhdorus sphaericus* was rarely observed in the Özlüce Dam Lake. *Bosmina longirostris*, *Daphnia longispina* and *Ceriodaphnia reticulata* were observed throughout all seasons. It has been reported that Lecane is generally found in littoral and benthic regions and is not a migratory form [14]. *Lecane luna* was found in every season in this dam lake. Eldredge and Evenhuis [28] stated that *Euchlanis* was found in littoral and vegetated areas of rivers and *Trichocerca* was found in littoral regions of the rivers. Özlüce Dam Lake is poor in terms of vegetation. *Euchlanis dilatata* was observed in autumn and spring and *Trichocerca capucina* observed in all seasons except winter. Some researchers indicated that [14, 28]. *Brachionus angularis* prefers warmer habitats and *N. squamula* is a stenoterm species preferring cold habitats. The findings in our study are generally parallel with the results of these researchers, *B.angularis* was observed in spring, summer in every stations and *N. squamula* was only found in winter.

Bosmina longirostris, *Cyclops vicinus*, *Polyarthra dolichoptera*, *Keratella cochlearis* are well known indicators of eutrophy [14, 28, 29]. *P. dolichoptera*, *K. cochlearis* and *C. vicinus* were dominant in Özlüce Dam Lake. *C. vicinus* was recorded virtually throughout the sampling period.

Blancher [30], reported that cyclopoids could be more abundant in eutrophic lakes when compared with calanoids. In Özlüce dam lake only one species of Copepoda, the cyclopoid species *C. vicinus* was recorded in every season.

Some of the recorded species in the lake as *A. priodonta*, *B. angularis*, *B. longirostris*, *C. gibba*, *C. sphaericus*, *K. cochlearis*, *K. quadrata*, *N. squamula*, *P. dolichoptera*, *S. pectinata* are cosmopolite and appear in pelagic area and aquatic macrovegetation [28, 31, 32]. In the dam lake important decreases in total zooplankton species richness in winter and increases in spring and autumn were recorded.

References

- 1 Canfield T. J., Jones J. R. 1996. Zooplankton Abundance, Biomass, and Size-distribution in selected Midwestern Waterbodies and Relation with Trophic State. *Journal of Freshwater Ecology*. 11: 171-181.
- 2 Şen D., Özdemir Y. 1994. Keban Baraj Gölü Uluova Bölgesi Zooplanktonunun Mevsimsel Dağılımı. *Fırat Üniversitesi Fen ve Mühendislik Bilimleri Dergisi*. 6(2):154-162.
- 3 Saler (Emiroğlu) S., Şen D. 2000. Cıp Baraj Gölü (Elazığ) Rotifera Faunasının Taksonomik

- Yönden İncelenmesi. Fırat Üniversitesi Fen ve Mühendislik Bilimleri Dergisi. 12(1): 329-339.
4. Bekleyen A. 2003. A Taxonomical study on the Zooplankton of Göksu Dam Lake (Diyarbakır). *Turk Journal of Zoology*. 27: 95-100.
 5. Saler S. 2004. Observations on the Seasonal Variation of Rotifera Fauna of Keban Dam Lake Çemişgezek Region. *Fırat Üniversitesi Fen ve Mühendislik Bilimleri Dergisi*. 16:4. 695–701.
 6. Saler S. 2009. Rotifers of Kepektaş Dam Lake. (Elazığ-Turkey), *Iranian Journal of Science and Technology*. 33: A1. 121-126.
 7. Telliöđlu A. Yılmaztürk Y. 2005. Keban Baraj Gölü Pertek Bölgesi'nin Kladoser ve Kopepod Faunası Üzerine Taksonomik Bir Çalışma. *Ege Üniversitesi Su Ürünleri Dergisi*. 22: 3-4. 431-433.
 8. Yiğit S. 2006. Analysis of the Zooplankton community by the Shannon-Weaver Index in Kesikköprü Dam Lake. Turkey. Ankara Üniversitesi Ziraat Fakültesi. *Tarım Bilimleri Dergisi*. 12(2): 216-220.
 9. Telliöđlu A., Akman F. 2007. A Taxonomical Study on the Rotifera Fauna in Pertek Region of Keban Dam Lake. *Ege University. Journal of Fisheries & Aquatic Sciences*. 24(1-2): 135-136.
 10. Kaya M., Altındağ A. 2007. Zooplankton Fauna and Seasonal changes of Gelingülü Dam Lake (Yozgat, Turkey). *Turkish Journal of Zoology*. 31: 347-351.
 11. Dirican S., Musul H. 2008. Çamlıgöze Baraj Gölü zooplankton faunası üzerine bir çalışma. *Sakarya Üniversitesi Fen Bilimleri Dergisi*, 12: 1. 17-21.
 12. Buyurgan Ö., Altındağ A., Kaya M. 2010. Zooplankton community structure of Asartepe Dam Lake (Ankara,Turkey). *Turkish Journal of Fisheries and Aquatic Sciences*, 10: 135-138
 13. Saler S., İpek N., Erođlu M. 2010. Karakaya Baraj Gölü Battalgazi Bölgesi rotiferleri. *e-Journal of New World Sciences Academy, Ecological Sciences*. 5: 3, 216-221.
 14. Bozkurt A., Akın Ş. 2012. Zooplankton fauna of Yeşilirmak (between Tokat and Black Sea) Hasan Uğurlu and Suat Uğurlu Dam Lakes. *Turkish Journal of Fisheries and Aquatic Sciences*. 12: 777-786.
 15. Bulut H., Saler S. 2014. Zooplankton of Beyhan Dam Lake (Elazığ-Turkey). *Turkish Journal of Science & Technology*, 9: 1, 23-28
 16. Saler S., Haykır H., Baysal N. 2014. Zooplankton of Uzunçayır Dam Lake (Tunceli-Turkey). *Journal of fisheriessciences.com*, 8(1): 1-7
 17. Saler S., İpek Alış N. 2014. Zooplankton of Hancağız Dam Lake (Gaziantep-Turkey). *Journal of Survey in Fisheries Sciences*. 1(1): 45-54.
 18. URL1. <http://www2.dsi.gov.tr/bolge/dsi9/bingol.htm#ozluce>
 19. Edmondson W. T. 1959. *Fresh Water Biology*, Second edition. University of Washington. Seattle
 20. Scourfield D. J., Hardig J. P. 1966. *Freshwater Biology*. As. Science Publication. New York.
 21. Dussart B. 1969. *Les Copepodes des Eaux Continentales d'Europe Occidentale Tale II Cyclopoides et Biologie*. N.Boubee et Cie. Paris.
 22. Flössner D. 1972. *Krebstier Crustacea Kiemen and Blatffussar Brachiopoda Fischlause. Branchiura. Tierwelt-Deutsch*. 60 Veb. Gustav Fischer Verlag. Jena.
 23. Harding J. P., Smith W. A. 1974. *A Key to the British Freshwater Biological Association Scientific Publication*. No: 18. Westmorland.
 24. Kiefer F. 1978. *Das Zooplankton der Binnengewasser*. 2. Teil. Freilebende Copepoda. Binnengewasser Band XXVI. Stuttgart.
 25. Koste W. 1978a. *Die Radertiere Mitteleuropas I. Textband*. Berlin.
 26. Koste W. 1978b. *Die Radertiere Mitteleuropas II. Tafelband*. Berlin.
 27. Reedy, R. Y. 1994. *Copepoda: Calanoida: Diaptomidae*. SPB Academic Publication. Leiden.
 28. Eldredge L. G., Evenhuis N. L. 2003. *Hawaii's Biodiversity: a Detailed Assessment of The Numbers of Species in The Hawaiian Islands*. Bishop Museum Occasional Paper No 76, Bishop Museum Press, Honolulu, 28 p.

29. Kolisko W. R. 1974. Planktonic Rotifers Biology and Taxonomy Biological Station. Lunz of The Austrian Academy of Science. Stuttgart.
30. Ryding S.O., Rast W.1989. The Control of Eutrophication of lakes and reservoirs. Man and Biosphere Series. Parthenon Publication Group. Vol 1. USA.
31. Blacher, E.C. 1984. Zooplankton trophic state relationships in North and Central Florida Lakes, Hydrobiologia. 109: 251-263.
32. Hutchinson G. E. 1967. A Treatise on Limnology. Vol. 2: Introduction to Lake Biology and the Limnoplankton. Wiley, New York, 1115 p.