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THE ZOOPLANKTON OF SOME STREAMS FLOW INTO THE ZAB RIVER, (NORTHERN IRAQ)

ABSTRACT

Seasonal variations of zooplankton have been carried out at five selected sites on streams flow into the zab river. The present study was conducted to determine zooplankton fauna of five selected sites during Spring 2018 and Winter 2019 seasonally. The zooplankton samples were collected by using plankton net with the mesh size of 55µm horizontally and preserved in 4% formaldehyde. Total 35 taxa (31 species from Rotifera, 3 species from Cladocera, and 1 species from Copepoda) were identified in this study. Dominant groups were Rotifera, Cladocera followed by Copepoda. Zooplankton samples were consisted of 88% Rotifera, 9% Cladocera, and 3% Copepoda.

Keywords: Rotifera, Cladocera, Copepoda, Zab River, Northern Iraq

1. INTRODUCTION

A river is a system comprising both the main course and the tributaries, carrying the one-way flow of a significant load of matter in dissolved and particulate phases from both natural and anthropogenic sources [1]. Zooplankton were heterotrophic small organisms capable of living in various types of aquatic environments, whether a was salty or standing and running freshwater, which their presence depended on environmental conditions [2], and characterized by its propensity on the horizontal and vertical movement in the water they spend all of their life cycles, or part of them in the aquatic environment [3]. In Iraq, several researches have been published papers concerning the ecology, identification and biodiversity of zooplankton in southern and central part of Iraq which covered various water ecosystems [4, 5 and 6]. Some studies have been conducted on the Zab River. Some of them are; Bulut [7] stated that has been carried out river and identified 46 taxa of zooplankton, dominated by in Greater Zab River. 41 species of Rotifera, 3 species of Cladocera, 2 species of Copepoda. The aim of the present study is to give basic primary information about the zooplankton taxonomy on some streams flow into of Zab River.

2. RESEARCH SIGNIFICANCE

In present study, it is aimed to determine zooplankton fauna and seasonal changes of Zab River based on the sources mentioned and the findings to be obtained as a result of area studies.

3. MATERIALS AND METHODS

Zab River is a large river (392 km) in Iraq. This river is one of the main tributary of the Tigris. It is riginated mainly from

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mountainous area of Iran and Turkey. It is situated between 36°-37° North latitudes and 43°-44° east longitude [8]. During this study samples were collected in five sites; the first was located at Sheladiz village second Rezan village third Khalan village fourth Bardarash village and fifth Khazir village (Figure 1). Zooplankton samples were taken between Spring 2018 to 2019 Winter. The zooplankton samples were collected with a standard plankton net (Hydrobios Kiel, 25cm diameter 55µm mesh size) horizontal hauls from five stations and the specimens were preserved in 4% formaldehyde solution in 250ml plastic bottles. Coordinates and map of the stations in Zab River are given Table 1 and Figure 1. The species were identified according to Kolisko [9], Segers [10], Flössner [11], Einsle [12].

Table 1. Coordinates of streams pouring into the zab river

Stations	Coordinates
1. Station (Sheladiz)	37°03'53"N 43°52'57"E
2. Station (Rezan)	36°51'53"N 44°07'20"E
3. Station (Khalan)	36°40'40"N 44°21'53"E
4. Station (Bardarash)	36°29'56"N 43°31'25"E
5. Station (Khazir)	36°18'43"N 43°32'47"E

Figure 1. Sampling Stations in Zab River

4. RESULTS AND DISCUSSION

A total of 35 zooplankton taxa were identified in this study area. The most dominant group was Rotifera (31), followed by Cladocera (3) and Copepoda (1) (Table 2). The highest number of species was observed in spring (22 taxa) and the least number of species winter delete (5 taxa) the seasonal variation of zooplankton in Zab river, *Keratella cochlearis*, *Polyarthra dolichoptera* from Rotifera, *Bosmina longirostris* from Cladocera were observed every station (Table 1). Total number of zooplankton species and taxa species showed an increase in spring and autumn and a decrease in winter (Figure 2). The rotifera recorded the highest density compared to other groups with percentage 88% which is most prevalent among zooplankton groups because of its ability to reproduce parthenogenesis for several generations, high fertility and their response is very rapid for environmental changes that make them are used as a guide to changing

water quality [13]. This is evident from many of the researchs [14, 15, 16, 17 and 18]. A variation of zooplankton distribution was recorded among fsites and during the study. Zooplankton in the present study represented by the Rotifera with 31 species these species belonged to 13 families; Asplanchnidae, Brachionidae, Notommatidae, Lepadellidae, Euchlanidae, Gastropodidae, Lecanidae, Mytilinidae, Dicranophoridae, Synchaetidae, Trichocercidae and Trichotridae, Cladocera 3 species belonged to families; Bosminidae, Daphniidae and Chydoridae, Copepoda 1 species these species belonged to 1 families and Cyclopoidae.

Table 2. The seasonal variation of zooplankton in Zab River by stations

Rotifera	Spr.	Sum.	Aut.	Win.
Asplanchna girodi de Guerne, 1888	-	-	-	5
Brachionus angularis Gosse, 1851	-	3,4	-	-
Brachionus caudatus Barrois & Daday, 1894	-	-	-	2,5
Cephalodella forficula (Ehrenberg, 1830)	-	-	2,5	-
Cephalodella gibba (Ehrenberg, 1830)	4	-	-	-
Cephalodella ventripes (Dixon-Nuttall, 1901)	4	-	-	-
Cephalodella intuta Myers, 1924	4	-	-	-
Colurella adriatica Ehrenberg, 1831	4	-	-	-
Dipleuchlanis propatula (Gosse, 1886)	4	-	-	-
Euchlanis dilatata Ehrenberg, 1832	4	-	-	-
Euchlanis lyra Hudson, 1886	4	-	-	-
Gastropus stylifer (Imhof, 1891)	-	-	-	5
Keratella cochlearis (Gosse, 1851)	4,5	-	1,2,3	-
Keratella tecta (Gosse, 1851)	4	-	-	-
Keratella tropica (Apstein, 1907)	-	-	-	5
Keratella valga (Ehrenberg, 1834)	3,4	-	-	-
Lecane luna (Müller, 1776)	-	-	5	-
Lecane hastata (Murray, 1913)	-	-	5	-
Lecane ohiensis (Herrick, 1885)	5	-	-	-
Lophocharis sp.	4	-	-	-
Notholca acuminata (Ehrenberg, 1832)	3	-	-	-
Notholca squamula (Müller, 1786)	-	-	-	1
Notommata glyphura Wulfert, 1935	3,4	-	-	-
Paradicronophorus hudsoni (Glascott, 1983)	-	2	-	-
Polyarthra dolichoptera Idelson,1925	1,4	2,3,5	-	-
Synchaeta oblonga Ehrenberg, 1832	4	3	-	-
Synchaeta pectinata Ehrenberg, 1832	4	-	-	-
Trichocerca capucina (Wierzejski & Zacharias, 1893)	-	-	5	-
Trichocerca similis (Wierzeski, 1893)	4	-	-	-
Trichotria tetractis (Ehrenberg, 1830)	4	2,3,5	-	-
Trichotria pocillum (Müller, 1776)	4	-	-	-
Cladocera				
Bosmina longirostris (Müller, 1785)	4,5	1,2,3	-	-
Daphnia sp.	-	-	5	-
Chydorus sphaericus (Müller, 1776)	-	-	5	-
Copepoda				
Cyclops vicinus Uljanin, 1875	4	-	-	-
Total	22	6	7	5

Our result recorded highest zooplankton variation during the spring season and this may be due to the increased of phytoplankton density, increase the photosynthesis of algae, increase aquatic plants and increase dual gas consumption dioxide [19, 20 and 21]. *Polyarthra dolichoptera* and *Keratella cochlearis* from the Rotifera have appeared in all stations. This result is parallel with the previous study in this region [7]. *Keratella cochlearis* and *Polyarthra dolichoptera*, indicators of productive habitats, were found in all seasons and

Notholca squamula, an indicator of cold waters, was observed in the cold seasons, i.e. winter, in current study. Kolisko 1974 reported that *K. cochlearis* and *P. dolichoptera* are perennial species while *N. squamula* is a winter species.

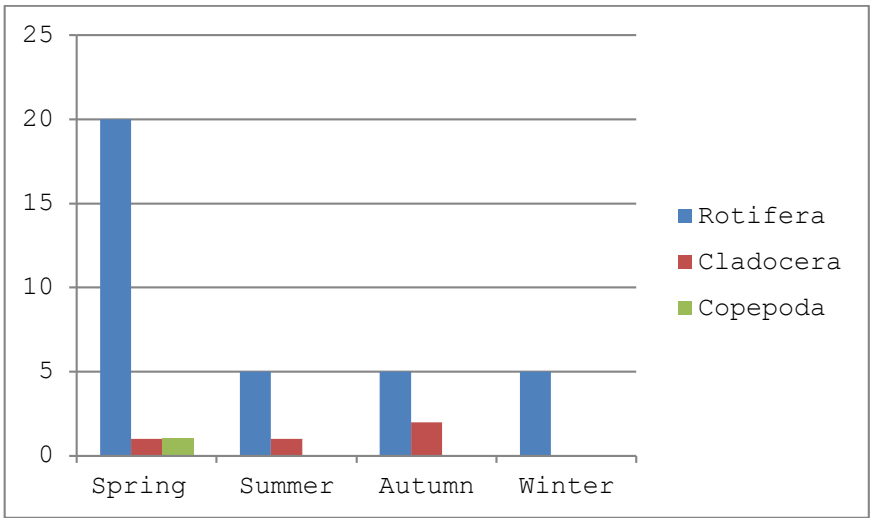

Figure 2. The Seasonal distribution of zooplankton groups

REFERENCES

[1] Shrestha, S., Kazama, F., and Nakamura, T., (2008). Use of Principal Component Analysis, Factor Analysis and Discriminate Analysis to Evaluate Spatial and Temporal Variations in Water Quality of The Mekong River. Journal of Hydroinformatics. 10(1):43-56.

[2] Ann, S.C., Carmela, D.C., Aquino, R.Y., Angelica, G.S., and Papa D.S., (2008). Zooplankton Composition and Diversity in Paoay Lake, Luzon Is, Philippines. Philippine J. of Sci., 137(2):169-177.

[3] Neves, I.F., Rocha, O., Roche, K.F., and Pinto, A.A., (2003). Zooplankton community structure of two marginal lakes of the river Cuibá (Mato Grosso, Brazil) with analysis of Rotifera and Cladocera diversity. Braz. J. Biol 63, 329-343.

[4] Abbas, E.K. and Al-Lami, A.A., (2001). Qualitative and Quantitative Composition of Cladocera in Tigris River, Iraq. J. Coll. Educ. For Women, 12(4):477-480. (In Arabic).

[5] Al-Lami, A.A. and Abbas, E.K., (2001). Seasonal and temporal variation of Cladocera in Tigris river, Iraq. Al-Fateh J., 10:383-391. (In Arabic).

[6] Al-Nimrawee, A.M.R., (2005). The Biodiversity of Zooplankton and Benthos Invertebrates in Tigris and Euphrates Rivers, Central Iraq. Ph.D. Thesis. Univ. of Baghdad. Iraq. (In Arabic).

[7] Bulut, H., Rashid, R.F., and Saler, S., (2019). The Seasonal Distribution of Zooplankton in Greater Zab River, North Iraq, 2nd International Symposium on Limnology and Freshwater Fisheries, 3-5 September, 2019. Elazıg-Turkey, 136s.

[8] Susa, A., (1960). Iraqi geographic index. Diar Al-tamadun press, Baghdad. 61p.

[9] Kolisko, W.R., (1974). Planktonic Rotifers: Biology and Taxonomy. Biological Station. Lunz of The Austrian Academy of Science, Stuttgart, 1974.

[10] Segers, H., (1995). The Lecanidae (Monogononta). In: Nogrady T. (ed) Rotifera 2. In: Dumont HJ (Ed) Guides to the Identification

of the Continental Waters of the World 6. SPB Academic, The Hague, The Netherlands, 226 p.
[11] Flössner, D.K., (1972). Crustacea. Kiemen and Blattfüsser Brachiopoda Fischlause, Branchiura, Tierwelt-Deutschlands, 60. Tiel Veb. Gustav Fischer Verlag, Jena, 501 pp.
[12] Einsle, U., (1996). Copepoda: Cyclopoida, Genera Cyclops, Megacyclops, Acanthocyclops, Guides to the Identification of the Microinvertebrates of the Continental Waters of the World No.10 SPB Academic Publishing, London, 82 p.
[13] Rajashekar, M., Vijaykumar, K., and Parveen, Z., (2009). Zooplankton Diversity of Three Freshwater Lakes in Relation to Trophic Stats, Gulparga District, North-East Karnataka, South India. Inter. J. of systems Biology. 1(2):32-37.
[14] Shekha, Y.A., (2008). The Effect of Erbil City Wastewater Discharge on Water Quality of Greater Zab River, and the Risks of Irrigation. Ph.D. Thesis, College of Science-University of Baghdad. 139 pp.
[15] Nashaat, M.R., (2010). Impact of Al-Durah Power Plant Effluents on Physical, Chemical and Invertebrates Biodiversity in Tigris River, Southern Baghdad, PH.D. Thesis, University of Baghdad, Iraq. 183 pp.
[16] Rasheed, K.A., Flayyh H.A., and Dawood, A.T., (2017). The Biological Indicators Studies of Zooplankton in the Tigris River at the City of Baghdad. International Journal of Environment, Agriculture and Biotechnology (IJEAB), 2(1):138-148.
[17] Bulut, H. and Saler, S., (2019). Effect of Physicochemical Parameters on Zooplankton at a Freshwater Body of Euphrates Basin (Elazıg-Turkey), Cell. Mol. Biol. 65(1):8-13.
[18] Bulut, H. and Saler, S., (2020). Monthly Distribution of Zooplankton in Kapikaya Reservoir, Turkey, Maejo Int. J. Sci. Technol, 14(01):1-10
[19] AL-Shami N.J.M., (2016). Ecological Study on Zooplankton community and the Impact of Kut Dam on its Biodiversity in Tigris River, Iraq.
[20] Sivakumar, K. and Karuppasamy, R., (2008). Factors Affecting Productivity of Phytoplankton in a Reservoir of Tamilnadu, India. Amer. Eur. J. Bot., 1(3):99-103.
[21] Bulut, H. and Saler, S., (2016). Assesment of the Zooplankton Community by the Index Analysis in Kaldırım and Halikan Ponds, Malatya Turkey, Biological Diversity and Conservation, 9(3):70-77.