
()

... *

(// : // :)

() Ephemeroptera

() Trichoptera

() Oligochaeta

() Diptera

Piscicola Chironomus Tubificidae Lumbricidae Lumbriculidae

Valvata Agrion Hydropsyche Piscidium Baetis Glossiphoniidae

pH

()

()

()

()

()

()

()

()

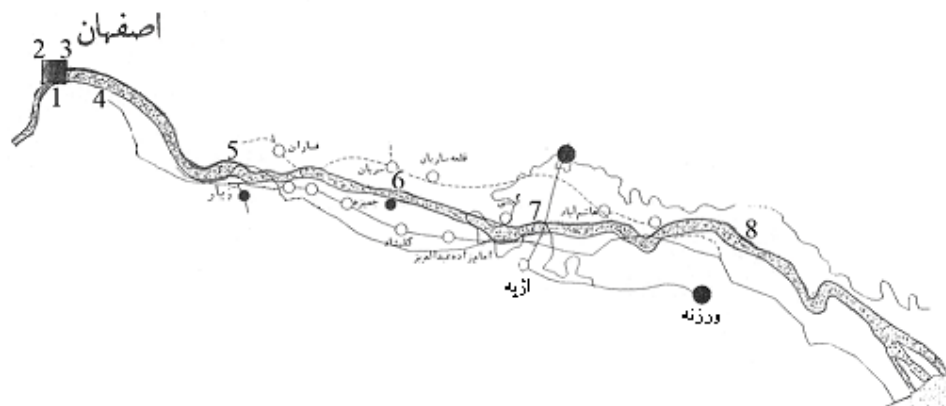
)

(

Archive of SID

Archive of SID

()



Archive of SID

Surber sampler
Ekman

:
 .()
 :
 .()
 pH pH
 Schottgerate
 :
 CIBA, .()
 : CORNING
 :
 USDA ()
 .()
 :(TOM))
 ()
 () () /S
 ()
 .()
 :S
 :N
 ()
 .()

$$H = -\sum P_i \ln P_i$$

$$D = 1 - \sum_{i=1}^s (P_i)^2$$

$$D = S^{-1} / \ln N$$

- Taxa Richness
- Kolmogorov-Smirnov

- Simpson's Diversity Index
- Krabs
- Margalef

...

()

/	/	/	/	/	/	/	/	
/	/	/	/	/	/	/	/	
	/	/	/	/	/	/	/	

()

/	/	/	/	
/	/	/	/	
/	/	/	/	

Archive of SID

()

()

Pearson
Spearman

Order	Family	Genus
Diptera	Chironomidae	Chironomus
	Simuliidae	Simulium
	Ceratopogonidae	
Ephemeroptera	Baetidae	Baetis
	dyonuridae	dyonurus
		Heptogenia
	Caenidae	Caenis
	Ephemerellidae	Ephemerella
Trichoptera	Hydropsychidae	Hydropsyche
	Philopotamidae	Philopotamus
	Polycentropidae	Polycentropus
Coleoptera	Dytiscidae	
Odonata	Agriidae	Agrion
	Gamphidae	Gamphus
Tubificida	Tubificidae	-
	Naididae	-
Haplotaxida	Lumbricidae	-
Lumbriculida	Lumbriculidae	-
Rhynchobdellida	Piscicolidae	Piscicola
	Glossiphoniidae	-
Amphipoda	Gammaridae	Gammarus
Pulmonata	Lymnaeidae	Lymnaea
	Physidae	Physa
Lamellibranchiata	Sphaeriidae	Sphaerium
		Piscidium
Prosobranchiata	Valvatidae	Valvata

			pH		
/ *	/	/ *	/	/	
/ **	/	/ *	/	/	
/ **	/	/ *	/ *	/	
/	/	/ **	/ **	/	

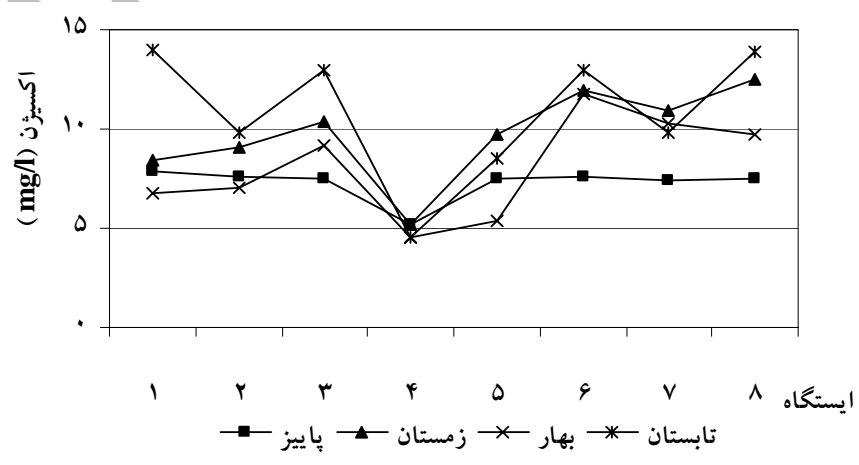
(** /) (* /) (N=)

/ /
 / / /
 / /
 / / /

Archive of SID

(.)

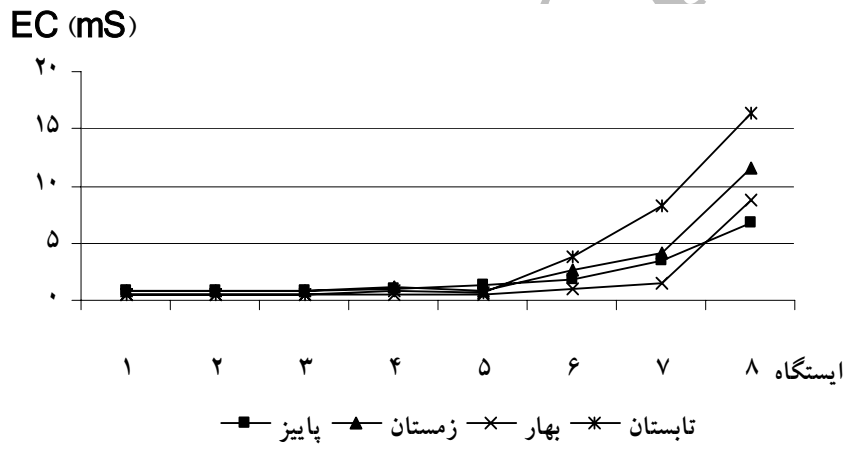
(.)



()

(.)

(.)



Arch

pH

pH

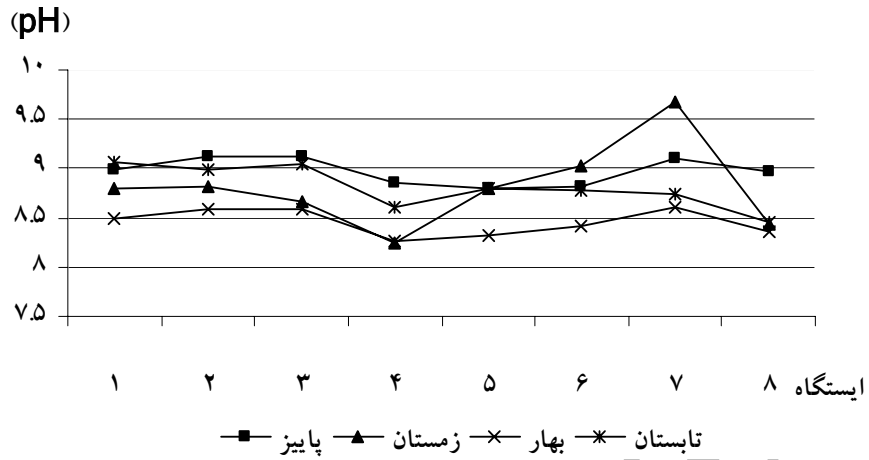
pH

() /

pH

pH

/ /



()
()

()

(.)
(.)

Ephemeroptera

() Trichoptera ()

() Coleoptera () Odonata

() Diptera

Simuliidae

)

(

Chironomus

Tubificida

Archive of SID

Haplotaxida Naididae Tubificidae
Lumbriculida Lumbricidae
 Lumbriculidae

(.)

Naididae

Tubificidae

(.)

Lumbriculidae Lumbricidae

Lamellibranchiata

Sphaeriidae

Piscidium

Sphaerium

)

(.)

)

(

(

Rhynchobdellida

Piscicolidae

Glossiphoniidae

(.)

Gammaridae

Amphipoda

(.)

Pulmonata

(Gastropoda)

Lymnaeidae

Physidae

...

()

Tubificidae Chironomus

(P< /)

()

Tubifex Chironomus

()

Archive of SID

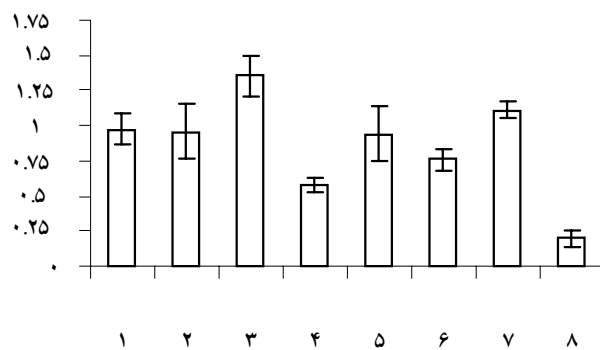
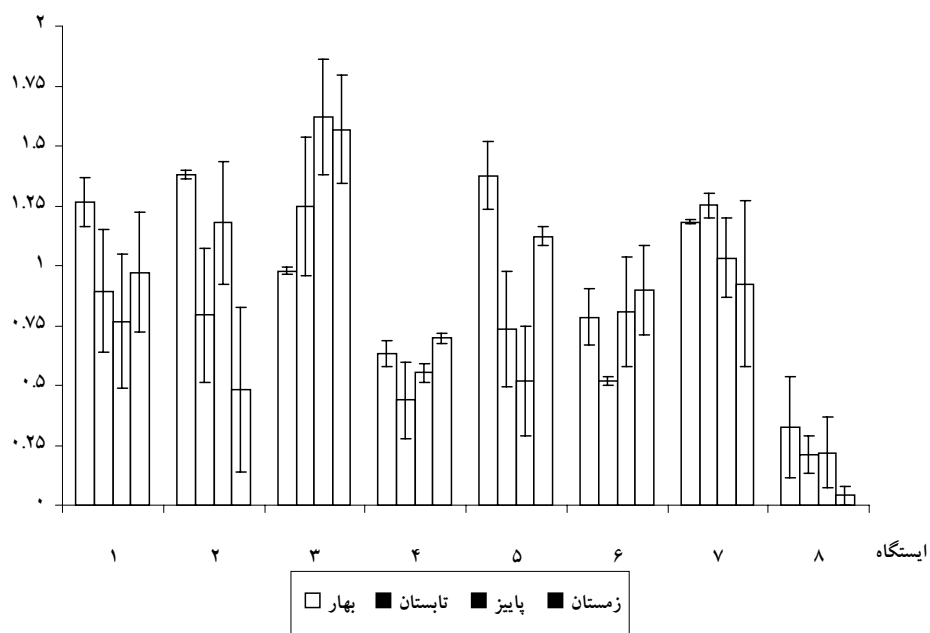
()

()

()

Baetis

Simulium



-
- 19- Krebs, C.J. 1994. Ecology: The Experimental Analysis of Distribution and Abundance, 4th ed. Harper Collins, New York. p.705-706.
- 20- Mandaville, S.M. 2002. Benthic Macroinvertebrates in Freshwater – Taxa Tolerance Values, Metrics, and Protocols. Chapter III. Project H - 1. (Nova Scotia: Soil & Water Conservation Society of Metro Halifax).
- 21- Odum, E.P.1971. Fundamentals of Ecology, 3rd ED. Saunders Company. London.,574pp.
- 22- Pimental, R.A. 1967. Invertebrate Identification manual. Reinhold Publishing Corp.
- 23- Savage, A.A. 1989. Adults of the British Aquatic Hemiptera and Heteroptera: a Key with Ecological Notes. Freshwater Biological Association Scientific Publication No. 59.
- 24- Shannon, C.E. and Weaver, W. 1949. The mathematical theory of communication, pp 19-27, 82-83, 104-107. the University of Illinois press, urbana, It.
- 25- Usinger, R.L.1956. Aquatic Insects of California. University of California Press.
- 26- Page, A.L, Miller, R.H. and Keeney, D.R. 1992. Methods of Soil Analysis, Part 2: Chemical and Mineralogical Properties. 2nd ed. SSSA Pub. Madison.
- 27- Washington, H.G. 1984. Diversity, biotic and similarity indices. A review with special relevance to aquatic ecosystems. Water Research 18. pp: 653-694]
- 28- Wetzel, R.G. 2002. Limnology: Lake and River Ecosystems. Third Edition. Academic Press.
- 29- Zar, J.H. 1999. Biostatistical Analysis (4th ed.), Prentice Hall, Upper Saddle River, NJ.

Archive of SID

Seasonal variation of macrobenthic organisms in relation to the substrate type in Zayandeh Rud river (from Isfahan to Varzaneh)

E. Ebrahimi^{*1}, N. Mahboubi Soofiani², and Y. Keivany¹

¹ Assistant Professor, Faculty of Natural Resources, Isfahan University of Technology, I. R. Iran

² Associate Professor, Faculty of Natural Resources, Isfahan University of Technology, I. R. Iran

(Received: 10 January 2006, Accepted: 24 May 2008)

Abstract

Between Birds Garden and Varzaneh town, a distance of approximately 140 km, eight stations were selected to sample and identify the macrobenthos of Zayandeh Rud, for a full year commencing fall 2002. Sampling was carried out twice at each season, using a Surber, an Ekman sampler and a PVC tube. The specimens were sorted out, counted and identified to the nearest genus, and some to a family level, using the appropriate identification keys. Identified specimens were classified into 19 genera, 17 families, 13 orders, and 5 classes. Amongst the 13 identified orders, Ephemeroptera and Trichoptera were the most diverse groups and were mostly distributed in Isfahan region and upstream. Oligochaeta with 3 orders and 4 families, and Diptera with 3 families and 2 genera were mostly distributed in east of Isfahan. At the same time, Lumbriculidae, Lumbricidae, and Tubificidae and the genus *Chironomus* were present in all the stations and throughout the year, though they showed a wide range of differences in density. In contrary, Glossiphoniidae and *Baetis*, *Piscidium*, *Hydropsyche*, *Agrion*, *Valvata* were present only in some stations and seasons. Statistical analysis of the data indicated that Shannon, Simpson, Margalef richness index wear significantly and negatively correlate with EC and substrate content of organic matter. The Shannon index was lower in muddy-sloughy stations, while Margalef richness index positively correlated with water pH. The differences in benthic population structure could be attributed to physical changes in the river substrate, chemical properties of the water and/or their life cycle or the interactions between them.

Keywords: Benthos, Biodiversity, River substrate, Macrobenthos, Shannon index, Zayandeh-Rud,

* Corresponding author: Tel: +98 311 3913565 , Fax: +98 311 3912840 , E-mail: e_ebrahimi@cc.iut.ac.ir