Available online at www.pelagiaresearchlibrary.com

Pelagia Research Library

European Journal of Experimental Biology, 2012, 2 (2):436-439

ISSN: 2248 –9215
CODEN (USA): EJEBAU

Distribution Variables in Macroinvertebrates from Ashvi Reservoir, Sangamner, Maharashtra, India

Anant J. Dhembare

Dept of Zoology, P. V. P. College, Pravaranagar, Ahmednagar, MS, India

---

ABSTRACT

The present work records distribution variables as frequency accurance, relative density, relative frequency, relative abundance and important value among macroinvertebrates from Ashvi reservoir. These variables varied species to species. A total 17 species of macroinvertebrates belonging to Mollusca, Arthropoda and Annelida were noticed. They constituted dominant Mollusca [48.1%], followed by Arthropoda [39.7%] and Annelida [12.2%]. The class wise density followed as Gastropoda-27.5%, Bivalvea-21.4%, Insecta-22.6%, Malacostraca-15.9% and Polycheta-12.6%. The distribution variables and water parameters were discussed.

Key Words: Distribution variables, macroinvertebrates, water parameters.

INTRODUCTION

Aquatic invertebrates are important components of aquatic food web. They act as decomposers, detritus, an indicator and primary food for others [1]. Although some data available have been documented from a wide variety of inland aquatic biotopes of India but currently there is limited information. The community structure [2], density [3], diversity [4], ecology and seasonal variation [5], water chemistry, substrate, depth and pollution were documented. They tolerate to pollutant and well documented with biological indices [6] and integrated over the environment [7].

When we are looking at a particular population, selecting samples to make inferences, need to record observations or the characteristics of the data. A variable is in the term used to record a particular characteristic of the population. Some workers have demonstrated their performance amongst macroinvertebrates by various variables [8,3]. It was the objective of this study to examine the distribution variables which influenced on distribution and abundance. However, no such type of work is available from Ashvi dam water. In additions observations were made on water chemistry.

The study area was Ashvi dam reservoir, 2 TMC man made located 19^0 5' N latitude and 74^0 40' E at Ashvi, Sangamner, Ahmednagar district Maharashtra. The maximum depth is 11.97 m and means is about 9.9 m. It experiences an average rain fall 58 cm. The bottom is composed of detritus-mud layer in the littoral zone.

MATERIALS AND METHODS

Benthic microinvertibrates were collected from littoral zone of ten sites according both to an equidistance and accessibility bimonthly from Jan-Dec-2009. The qualitative sampling was performed using a hand net [0.5mm] and preserved with 5% formaldehyde stained with rose Bengal. Samples were filtered, washed and identified using standard key [9,10]. The quantization of species per liter of water was done by Sedgwick-Rafter cell method. The distribution variables such as frequency accurance, relative density, relative frequency, relative abundance and important value are evaluated [Table 1].

The pH and temperature of water samples were recorded on the spot with the help of gun [pen] pH meter and thermometer respectively. The analysis of filtered water samples was carried out for the parameters, as Electrical Conductivity [EC], Total Dissolved Solids [TDS], Total Hardness [TH], Major Constituents [(cationic- Calcium (Ca), Magnesium (Mg), Sodium (Na), Potassium (K) & anionic- Chloride (Cl), Total Alkalinity (TA), Sulphates (SO_4)], Minor Constituents [(Phosphate (PO_4) and Nitrate (NO_3)]. The samples were done according to standard methods [11].

RESULTS AND DISCUSSION

The present study is a part of Limnological survey mainly worked on invertebrate species and water chemistry. A total 17 individuals representing from 3 phylla such as Mollusca, Arthropoda and Annelida were noticed. Out of 17 species Mollucans represents 8 species from classes as Bilvalvea and Gastropoda, Arthropoda encompassing 7 species from two classes as Insecta and Malacostraca while 2 species belonged to Annelida representing a single class Polycheta. The dominants class was Gastropoda representing 5 species and Insecta 5 species, where as noticed lower Polycheta and Malacostraca reporting 2 species each.

Analysis of numerical superiority of macroinvertebrates revealed that Mollusca was dominant [48.1%] followed by Arthropoda [39.7%] and Annelids [12.2.4%]. Dominant species were reported to be the most important ecological indicators as they received the full impact of the habitat for the over longer period and manifest different level of sensitivity [12]. In the present study Gastropoda reported 27.5%, Bivalvea 21.4%, Insecta 22.6%, Malacostraca 15.9% and Polycheta 12.6%. The dominant species were geological indicators which are the effective tools in environmental monitoring which are required to asses the changes cause by various activities [13].

Although the present work dose not cover the sphere of invertebrates. It has been though very relevant to reproduce a statement reported by Zoological Survey of India [ZSI]. According to ZSI in India Gastropod are 3.52%, Mollusca 6.30% and Arthropoda 6.04%. But in the study it showed variations which might be due to water chemistry, sediments, pollutions, locations, predators, location, etc.

In the study various water parameters are evaluated. Water sample temperature ranged from 22.3 to 27.2 ^{0}C. Electric conductivity [EC] ranged from 71 to 128 µmho cm^{-1}. The value of Dissolved Oxygen ranged from 3.28 to 4.52 mg/L, free Carbon dioxide from 0.6 to 0.9 mg/L, alkalinity from 98.1 to 182.2 mg/L, calcium from 80.1 to 86.6 mg/L, magnesium from 54.2 to 63.7 mg/L, potassium from 0.98 to 1.53 mg/L, hardness from 256.2 to 386.3 mg/L, chloride from 112.2 to 154.9 mg/L and phosphate 0.51 to 0.77 mg/L were recorded during study. Nitrates were detected in between 0.58 to 0.95 ppm.

The individual species variables with their groups were evaluated and presented in Table 1. In the studied species frequency occurrence varied from 66.7% to 100% during the study. The minimum value [66.7%] of frequency occurrence was found in *Robertsiella* sp. of class Bivalvea and maximum value [100%] was reported ten species of different classes. However it depends on the sample size and the time spend on searching [14].

The distribution variables indicate that the all species in a sample are equally dominant or not. In the study the relative density values varied from 0.30 to 1.40 during the study. The minimum value of relative density was revealed from *Robertsiella* sp. and maximum in *Bulimus* sp. from the class Gastropoda.

The species are also sensitive to relative abundance. In the study relative abundance varied between 0.40 to1.45. The

maximum value of abundance [1.45] was recorded from *Modilus metacafel* of class Bilvalvea and minimum value [0.40] from *Robertsiella* sp. of the same class. The relative frequency varied from 0.32 to 1.40. The maximum value revealed [1.40] from *Bulimus* sp. of class Gastropoda and minimum [0.32] from *Rabertsiella* sp, of Gastropoda. The importance values ranged from 1.05 to 3.89. The maximum value [3.89] recorded from *Modiolus metcalfel* of the class Bivalvea and minimum [1.05] from the mosquito species of the class Insecta.

The macroinvertebrates were observed and studied mainly constituted the net macroinvertibrate groups of the fresh water. The species increased their abundance during summer probably corresponding to the water quality, decaying vegetation, increased levels of organic matter in the sediment and higher abundance of bacteria in the water during this time [14]. The abundance of the species decreased in rainy, probably corresponding to low water temperature and high alkalinity of water [15]. The composition of the invertebrate species, however, demonstrated some similarity with those recorded for other tropical freshwater lakes. But the relative abundance and frequency of occurrence of the macroinvertebrates species in the present investigation differed. Which may due to shallowness and muddy nature of water [15]. As this water passed through years with little drying-up, some species were more abundant than others and their frequency of occurrence reached the maximum.

The population was comparatively lower in this water, due to their ability and survives with immunological conditions prevailing at different seasons. Some of the species were reported as secondary consumers that fed on various primary consumers, while others were raptorial predators that fed on bacteria and detritus matters [16,17] Larger proportions of the species or group assemblages in this water may be corresponded to the persistent alkalinity of' water [15]. It also depends upon the water chemistry.

In the present study the macroinvertebrates population revealed Mollusca, Arthropoda and Annelida respectively. The greater species diversity means larger food chain and more cases of inter-specific interactions and greater possibilities for negative feedback control which reduces oscillations and hence increases.

Table 1. Seasonal distribution in macroinvertebrates

Phylum	Class	Genes. species	Frequency occurrence	Relative Density	Relative Frequency	Relative abundance	Important Value
Mollusca	Bivalvea	1. *Pholas orientalis*	91.7	138	1.20	1.23	3.33
		2. *Modiolus metcalfei*	100	1.28	1.28	1.45	3.89
		3. *Meretrix meretri*	75.0	0.79	0.72	1.12	2.23
	Gastropoda	1. *Robertsiella* sp.	66.7	0.30	0.32	0.40	1.42
		2. *Bithynia* sp.	100	0.72	0.72	0.72	1.76
		3. *Iravadia* sp.	83.3	0.54	0.54	0.69	1.37
		4. *Bulimus* sp.	100	1.40	1.40	1.28	3.89
		5. *Lymmnaea* sp.	100	1.15	1.15	1.25	3.05
Arthropoda	Insecta	1. *Culex & Anaphels* sp	100	1.05	1.00	1.05	3.60
		2. *Chironomous* sp.	75.0	0.50	0.50	0.73	1.33
		3. *Rnatra* sp.	100	0.78	079	0.75	1.94
		4. *Diplonychus* sp.	83.3	0.44	0.44	0.59	1.05
		5. *Agriocnemis* sp.	91.7	0.68	0.68	0.88	1.82
	Malaco straca	1. *Asellus* sp.	100	1.23	1.23	1.35	3.41
		2. *Gemmarus* sp.	100	1.24	1.21	1.25	3.32
Annelida	Polycheata	1. *Cepitella* sp.	100	1.11	1.05	1.28	3.23
		2. *Namalycastis* sp.	100	1.20	1.20	1.25	3.20

REFERENCES

[1] Basaguren, A., Elosegui, A., Pozo, J., 1996, *Hydrobiologia*, **1996**, 81, 79.
[2] Boss, D., Pottrs, C., *Proc. Okla, Acad. Sci*. **2001**, 81, 21.
[3] Sharma, C., Rawat, J. S., *Eco. Indicators*, **2009**, 9, 118.
[4] Dhembare, A. J., *J. Exp. Zoo. India*, **2007**, 10, 149.
[5] Leunda, P. M., Oscoz, J., Miranda, R., Arino, A. H., *Ecol. Indicators*, **2009**, 9, 52.
[6] Jeffries, M., Milla, D., *Freshwater Ecology, Principles and Applications*. Belhaven Press. London, **1990.**
[7] Strayer, D. L., *J. North Am. Benthol. Soc*. **2006**, 25, 271.

[8] Kazanci, J. B., Dugal, M., *Water Sci. Techno*., **2000**, 47, 7.
[9] Edmondson, W. T., *Ward and Whipple's Fresh Water Biology*. 2nd Ed John Willy and Sons, New York, **1993.**
[10] Pennak, R. W., *Fresh invertebrate of the United State*: Protozoa to Mollusca. John Willy and Sons INC, **1989.**
[11] APHA, *American Public Health Association Standard Methods for the Examination of Water and Wastewater*. 20th Ed, Washington DC, **1998,** 90.
[12] Sharma, P. D., *Environmental Biology*, National Press, Meerut, India, **1975**, 41.
[13] Gannon, J. E., Stemberger, R. S., *Trans, Amer. Micros, Soc.* **1978**, 97, 1.
[14] Comman, F. E., Connolly, R. M., Preston, N. P., *Aqua. Res*., **2003**, 34, 359.
[15] Chattopadhyay, C., Banerjee, T. C., *Turk. J. Bot*. **2007**, 37, 287.
[16] Boulin, V.V., Niluline, V. N., Paveljeva, E. B., Stepanova, L. A., *J. Gen. Bio*. **1999**, 60, 431.
[17] Hajeanson, L., Boulin, V. V., Ostapenia, A., *Aqua. Eco*. **2003**, 37, 47.