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An estimation of zooplankton population of Savitri River with reference to pollution

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Abstract
The study area of savitri river district of Raigad in Maharashtra state was estimate of zooplankton abundance and impact of natural calamities and behaviors, function and size of zooplankton. The judgement of quality of water from May 2018 to April 2019. The qualitative and quantitative evaluation of the variation in river water showed high quality of zooplankton population throughout the study period. Rotifers formed dominated group over other group of organism. The present study revealed that the water of River. Savitri is contaminated of sewage and various chemical industrial effluents at stations A and B Savitri river at Raigad.

Keywords: *Zooplankton, Pollution, Savitri river*

Introduction
Zooplankton has short life span and they respond more quickly to environment leads to change in plankton communication in terms of tolerance, abundance, diversity and dominance in the habitat. Therefore, zooplankton communities of numerous reservoirs, lakes and shallow water bodies have been used as indicators for the status of the lake. The variability observed in the distribution of zooplankton is due to abiotic parameters. (Kolhe BG, *et al*, 2013) [1].

Hence the present investigation was carried out on the surface zooplankton population in the aquatic ecosystem of savitri river. The industrial effluents from various industries in and around the MIDC area of downstream and sewage discharge at shirgaon area affecting the water quality as a consequence; the zooplankton population of savitri river has been affected in terms of abundance and diversity. In the present paper qualitative and quantitative studies of zooplankton in savitri river of were carried out for one annual cycle May 2018 to April 2019. Using microscopic revealed that belonging to three major groups i.e rotifers, cladocera and copepodwere present.

Materials and Methods
Zooplankton samples were collected for qualitative and quantitative analysis in between 8 a.m. to 10 a.m. by standard methods (APHA, 1985) [2] two sampling sites over period of May 2018 to April 2019. The collected samples were fixed in 3-4 % formalin and brought to the laboratory for zooplankton analysis; counting and identification were done as per, (1992) Species diversity index was obtained by following Shannon were methodology (Nath, 1997) [3].

Discussion
In the present investigation, the zooplankton fluctuates monthly and its productivity was according to the composition and relative abundance of species in the aquatic communities is influenced by the variation in tropic state and seasonal changes of physicochemical variables of water body (Dirican *et al.,* 2009) [4]. Permanent dominancy of rotifer species such as Brachionus and Keratella are indicative of eutrophic condition of lake. They studied Camligoze dam lake, Turkey and stated that rotifer are more abundant than other zooplankton groups and account for major portion of food chain (Chattopadhyay and Barik 2009) [5]. Studied composition and diversity of net zooplankton from Krishnasayar lake and recorded high scores of species diversity and low scores of species richness amongst net zooplankton. They also recorded maximum relative abundance for rotifer and minimum for Decapoda.

According to Sousa *et al*., (2008) [6] changes in water quality of water body have significant effect on structure of zooplankton assemblages that canpotentially affect the functioning of ecosystem. Seasonal distribution of the population structure of zooplankton in connection with physicochemical parameters Sarkar and Chaudhary (1999) [7]. Hence, Zooplankton communities of numerous reservoirs, lakes and shallow water bodies have been used as indicators for the status of the and related with the concentration of total nitrogen, total phosphorus, algal biomass and the density and size of individuals (in the Central American lakes, (Giselle and Bruce, 2007) [8].

The variability observed in the distribution of zooplankton is due to abiotic parameters (e.g. climatic or hydrological limitation) and biotic parameter (predation, competition) or combination of both Hence, the use of zooplankton for environmental characterization of water body is potentially advantageous as the quality of water affects the species composition, abundance, productivity and physiological conditions. (Ferdous and Muktadir 2009) [9].

Observation Table

Table 1: Population composition and monthly fluctuation of Zooplankton (Oraganism/ ml) at Station 'A' (Nangalwadi river Downsream) (Oraganism/ ml) from May 2018 to April 2019

Months	Rotifers	Cladocera	Copepods	Total
May	25	09	22	56
June	23	17	20	60
July	29	12	28	69
August	27	13	20	60
September	17	19	16	52
October	10	22	17	49
November	13	21	19	53
December	20	14	18	52
January	23	20	13	56
Febuary	11	13	20	44
March	38	12	17	67
April	10	11	13	34
Mean	20.5 (37.73%)	15.25 (28.06%)	18.58 (34.19%)	

Table 2: Population composition and Monthly fluctuation of Zooplankton (Oraganism/ ml) at Station 'B' (Shirgaon river Downstream) May 2018 to April 2019

Months	Rotifers	Cladocera	Copepods	Total
May	30	08	12	50
June	35	09	20	64
July	25	15	10	50
August	25	13	15	53
September	57	14	14	73
October	38	11	17	66
November	43	07	19	69
December	40	05	13	58
January	53	15	13	81
Febuary	61	13	09	83
March	58	12	12	82
April	40	11	13	64
Mean %	42.08 (63.52%)	10.25(15.47%)	13.91(20.99%)	

Results

1. **Station A (Nangalwadi river Downsream):** Species encounter at station A and their month wise distribution were presented in table 1 and graph fig.1. A total no of species were recorded from this station, of which 13 species belongs to rotifer, 6 species belongs to cladocera and 2 species of copepoda. The maximum population density 113 was observed in June and minimum September. The annual mean percentage composition of different groups of zooplankton shows the rotifer contribute 37.73 %, copepod 28.06 % and cladocera 34.19%.
2. **Station B (Shirgaon river Downstream):** A total 23 species encounter from this station of which 12 to rotifera, 4 belongs to cladocera, 2 belongs to copepoda the monthly variation of various zooplankton species during the present study were shown in table 2 and fig. 2 total zooplankton population density varied from 26, during septmber to 174, during Dec. The annual mean percentage composition of zooplankton groups showed that rotifer contributed 63.52 %, cladocera 15.47% copepod 20.99%

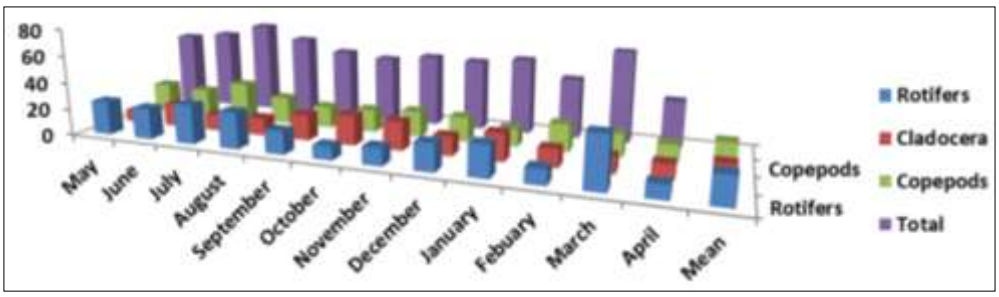

Fig 1: Month wise Zooplankton population in Savitri River at Station "A" (Nangalwadi river Downsream) from May 2018 to April 2019.

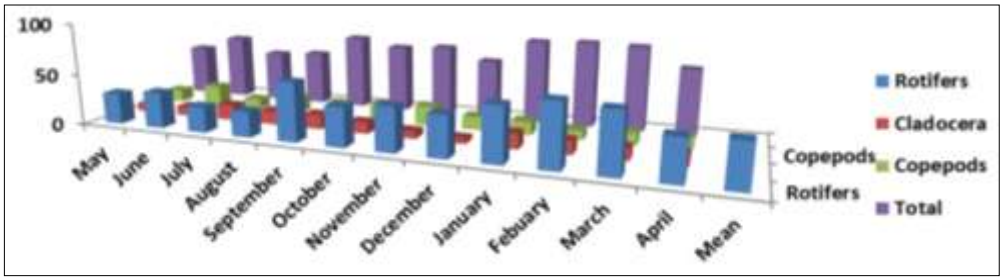

Fig 2: Month wise Zooplankton population in Savitri River at Station "B" (Shirgaon river Downstream) from May 2018 to April 2019

Conclusion

It is concluded from this study that the zooplankton population of savitri River at raigad Distict is highly influenced by the discharge from different industrial effluents. The shift in the zooplankton community structure and dominance of pollution tolerant forms at discharge zone indicated deterioration of water quality in this stretch of the river. In the present paper qualitative and quantitative studies of zooplankton in savitri river of were carried out for one annual cycle May 2018 to April 2019. Using microscopic revealed that belonging to three major groups i.e rotifers, cladocera and copepodwere present.

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