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ZOOPLANKTON DIVERSITY OF KALWATI RESERVOIR NEAR AMBAJOGAI, MAHARASHTRA

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INTRODUCTION

The zooplankton is an important component of secondary production provides a link between producers and secondary consumers. The fry of juvenilesof aquatic organisms first fed on the phytoplankton because of direct gain of energy and easy to digestion. This chain of food ingredients further accelerates the growth of javelinsform of aquatic organisms. The fishery is directly proportional to the plankton production upwelling of sea.

The total development of zooplanktons completely depends upon the values of environmental parameters of lake water. The paramount number of zooplanktons was recorded due to availability of varieties of nutrients due to natural percolation of water. In the global aquatic ecosystem contains various types of organisms which are dependent on the substratum or free from it. All Types of aquatic ecosystems except for fast moving rivers containing planktonic organisms. In any water body along with large organisms' plants smaller microscopic phytoplankton and zooplankton occurs.

Plankton including phytoplankton and zooplankton forms base for food chain in aquatic ecosystems and has played a vital role in aquaculture practices (Woznaik and Marshall, 2009).

Zooplanktons as tiny animals found in all aquatic ecosystem particularly the pelagic and littoral zones in oceans, lakes ponds and rivers. The zooplanktons played an integral role and served as bio-indicators with best tool for understanding water pollution status (Ahmed, 1996 and Contreras, *et.al* 2009). According to Pace (1990), planktonic community structure and fate of bacterial production in a temperate lake. Zooplankton is an important constituent of pelagic ecosystem. It feed on phytoplankton, bacteria and micro organisms. On the other hand zooplankton serves as a food material for some aquatic fauna.

The most interesting feature of zooplankton is its monumental diversity and variation. Thus aquatic ecosystem which may seem similar may have dissimilar assemblage of organisms both in spacious composition and biomass (Sehgal, *et.al* 2013). Furthermore, in spite of convergent similarities observed, zooplanktons species have variable life history, dominated by seasonal alternations of abiotic factors, food and feeding ecology, predation pressure.

Zooplankton diversity hence is one of the most worthy of note of ecological parameters in the assessment of water quality various in indices can be applied such as richness, diversity and evenness index on the data and taxonomy of the zooplanktons of water body.

Table 1: Morphometric features of Kalwati Reservoir

1	Name of Reservoir	Kalwati
2	Tear of Construction	2001
3	Length of Dam	202 meter
4	Catchment Area at Site	3185^2/mile

5	Yield per square mile	15.742 mcft/² mile
6	Total yield at Site	50.1363 mcft/² mile
7	Capacity at Seal	5.9255 mcft/² mile
8	Maximum height of dam	17.04 meter
9	FTL	575.4
10	Gross Command Area	359 hectare
11	Maximum Flood discharge	153.720 m³/square

MATERIALS AND METHODS

Zooplankton collection was made by towing a net made up of bolting silk Net No. 25 for 5 minutes sedimentation of zooplankton was made in 5% formaldehyde. Zooplankton monographs of Prescott (1982), Tripathy and Pandey (1995), Arvind Kumar (2015) were followed to identify the zooplankton. Drop count method of Trivedy and Goel (1984) was followed for enumeration of zooplankton and expressed as organisms per liter. The studies on zooplankton diversity and density were carried out for a period of two years 2013-14 and 2014-15in Kalwati reservoir.

Table 2:Species composition of Zooplankton (density: organisms/liter) during Year 2013-14

Species/Month	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Total
I.ROTIFERA													
Brachionus quadridentatus	10	5	4	6	15	5	4	10	5	5	0	0	**69**
Brachionus calyciflorus	0	4	0	5	12	9	8	0	5	5	0	2	**50**
Brachionus angularis	5	0	2	5	9	5	8	6	0	0	2	5	**47**
Brachionus diversicornis	6	5	10	10	5	8	10	6	4	4	0	5	**73**
Brachionus falcatus	2	2	5	6	0	0	6	8	0	0	5	4	**38**
Keratella tropica	0	0	5	4	5	10	4	10	0	0	5	5	**48**
Monostyla quadridentata	1	2	0	0	0	0	4	5	4	10	0	3	**29**
Monostyla bulla	2	5	0	0	10	0	0	15	0	0	10	5	**47**
Asplanchna intermedia	4	0	0	0	4	0	0	0	5	0	0	0	**13**
Total	**30**	**23**	**23**	**36**	**60**	**37**	**44**	**60**	**23**	**24**	**22**	**29**	**414**
II. CLADOCERA													
Moina micrura	6	10	5	6	10	20	10	30	0	5	10	5	**117**
Daphania lumholtzi female	0	5	8	0	0	0	20	25	10	15	0	0	**83**
Diaphanosoma sarsi	0	0	0	5	10	25	0	30	0	0	0	0	**70**
Ceriodaphnia cornuta	0	8	6	8	0	10	15	20	0	0	5	5	**77**
Alona rectangular	0	5	8	0	5	0	0	0	0	0	0	0	**18**
Total	**6**	**28**	**27**	**19**	**25**	**55**	**45**	**105**	**10**	**20**	**15**	**10**	**365**

III. COPEPODA													
Mesocyclops hyalinus	20	10	0	0	35	35	40	55	35	25	40	25	**320**
Mesocyclops leuckarti	25	30	15	20	30	35	55	55	15	10	15	10	**315**
Cyclops vicinus uljanin	5	10	0	0	25	20	30	25	0	20	25	10	**170**
Macrocyclops distinctus	5	10	5	15	30	25	35	20	15	20	25	15	**220**
Paracyclops poppei	0	0	0	5	10	15	20	15	5	0	0	0	**70**
Microcyclops varicans	50	30	30	35	35	40	45	50	25	20	10	5	**375**
Total	**105**	**90**	**50**	**75**	**165**	**170**	**225**	**220**	**95**	**95**	**115**	**65**	**1470**
IV. OSTRACODA													
Stenocypris major	15	20	25	0	30	35	40	50	35	25	20	15	**310**
Cyclocypris globosa	20	25	0	10	25	30	35	45	25	15	10	0	**240**
Candocypria osborni	15	10	20	25	30	35	45	55	50	40	0	20	**345**
Total	**50**	**55**	**45**	**35**	**85**	**100**	**120**	**150**	**110**	**80**	**30**	**35**	**895**

Table 3:Species composition of Zooplankton (density: organisms/liter) during Year 2014-15

Species/Month	**Oct**	**Nov**	**Dec**	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Total**
I.Rotifer													
Brachionus quadridentatus	3	0	4	6	8	12	5	8	0	0	0	10	**56**
Brachionus calyciflorus	5	0	0	5	8	10	6	5	5	0	4	5	**53**
Brachionus angularis	3	2	0	0	5	6	5	2	0	2	0	0	**25**
Brachionus diversicornis	**6**	**8**	**5**	**0**	**0**	**5**	**0**	**0**	**8**	**0**	**0**	**0**	**32**
Brachionus falcatus	5	4	0	0	0	0	0	5	0	0	5	0	**19**
Keratella tropica	0	0	0	6	8	5	7	8	5	0	2	0	**41**
Monostyla quadridentata	5	0	0	2	0	0	0	0	5	2	0	0	**14**
Monostyla bulla	0	0	0	0	0	0	5	0	0	5	0	0	**10**
Asplanchna intermedia	0	0	0	5	0	0	5	4	0	0	0	5	**19**
Total	**27**	**14**	**9**	**24**	**29**	**38**	**33**	**32**	**23**	**9**	**11**	**20**	**269**
II. CLADOCERA													
Moina micrura	0	0	0	0	0	0	0	10	10	0	8	5	**33**
Daphania lumholtzi female	0	0	5	5	0	0	0	0	0	0	0	0	**10**
Diaphanosoma sarsi	5	0	0	0	5	0	0	0	0	0	0	3	**13**
Ceriodaphnia cornuta	0	0	0	0	0	0	8	0	0	0	0	0	**8**
Alona rectangular	0	0	0	5	5	0	0	0	5	0	0	0	**15**
Total	**5**	**0**	**5**	**10**	**10**	**0**	**8**	**10**	**15**	**0**	**8**	**8**	**79**
III. COPEPODA													
Mesocyclops hyalinus	30	15	20	30	25	30	45	50	20	30	15	10	**320**
Mesocyclops leuckarti	30	25	20	10	30	45	35	55	30	0	0	20	**300**

Cyclops vicinus uljanin	10	15	0	0	20	25	30	35	15	20	10	0	**180**
Macrocyclops distinctus	15	20	25	30	35	40	55	65	0	0	25	10	**320**
Paracyclops poppei	0	0	20	10	20	25	20	30	0	0	0	10	**135**
Microcyclops varicans	30	35	40	25	30	35	30	40	35	20	0	5	**325**
Total	**115**	**110**	**125**	**105**	**160**	**200**	**215**	**275**	**100**	**70**	**50**	**55**	**1580**
IV. OSTRACODA													
Stenocypris major	0	15	20	25	0	30	40	45	35	25	15	10	**260**
Cyclocypris globosa	10	20	25	0	35	40	45	50	30	20	0	15	**290**
Candocypria osborni	10	25	0	30	35	45	50	50	25	0	20	10	**300**
Total	**20**	**60**	**45**	**55**	**70**	**115**	**135**	**145**	**90**	**45**	**35**	**35**	**850**

RESULTS AND DISCUSSION

During the present study period (2013-14 and 2014-15) 23 species of zooplankton are found in the Kalwati reservoir. Zooplankton represented four groups namely- Rotifera(9 species), Cladocera (5 Species), Copepoda (6 species) and Ostracoda (3 Species). Among the zooplankton rotifera was dominant with 9 species followed by Copepoda (6 species) then Cladocera (5 Species) and Ostracoda (3 Species).

Rotifer > Copepoda > Cladocera > Ostracoda

Rotifera: In the first year (2013-14) of present study 9 species were observed. The minimum numbers were (22 organisms/Liter) in May 2014while the maximum numbers (60organisms/Liter) recorded in August 2014. During 2014-15, the minimum numbers were (9 organisms/Liter) The months of December 2014 and July 2015 while the maximum number (38 organisms/Liter)in March 2015.

Throughout the study period Rotifer was dominant with the species *Brachionus quadridentatus*, *Brachionus calyciflorus*, *Brachionus angularis*, *Brachionus diversicornis*, *Brachionus falcatus*, *Keratella tropica*, *Monostyla quadridentata*, *Monostyla bulla*and*Asplanchna intermedia*were observed which might be due to the large particulate matters (Sarwar and Parveen,1995).

During the study period zooplankton population increasing slightly in pre-monsoon and start to decline post monsoon to monsoon. Similar findings were reported by Sharma (1992); Jaya Raju *et.al* (1994); Mehra (2003 b); Sakhare and Joshi (2006/07) and Sharma *et.al*(2010).

Tanapi (1980) reported that higher population of Ostracods during monsoon seasons were due to abundance of fine detritus available during this period but contrary to this due to animal washing, car washing, clothes washing and other activities. Due to this, water vigorously disturbed and it might be resulted in organic degrading fast in the lake basin subsequently developing the ostracods.

The Rotifer group was with most abundant species in the reservoir. Sheshagiri Rao and Khan (1984) reported that Rotifers species are governed by the nutrition ecology of each species. Several species of Brachionus are recorded from highly polluted Hussainsagar Lake of Hyderabad city by Malathi *et.al* (1998).

Cladocera: There were 5 species of Cladocera found in Kalwati reservoir. *Moina micrura, Daphania lumholtzi female, Diaphanosoma sarsi ,Ceriodaphnia cornuta*and*Alona rectangular.*

In the present investigation, the minimum numbers of Cladocera were 6 organisms/Liter in October 2013 where the maximum was 105 organisms/Liter in The month of May 2014 during 2013-14. In the second year (2014-15), the minimum numbers were 5 organisms//liter in the months of October and December 2014 while the maximum was 15 organisms /Liter in June 2015. Cladocera can tolerate the fluctuations in physico-chemical factors pH, carbonate, bicarbonate, phosphate and chloride except carbonic alkalinity.

Copepoda: Copepods were represented by 6 species in Kalwati reservoir i.e.,*Mesocyclops hyalinus, Mesocyclops leuckarti, Cyclops vicinus uljanin, Macrocyclops distinctus, Paracyclops poppei* and *Microcyclops varicans.*

In the first year (2013-14), the minimum numbers of copepoda were 50 in December 2013 and maximum were 225organisms/Liter in April 2014 where during second year (2014-15) the minimum were 50 organisms/Liter in the month of August 2015 and maximum were 275 organisms/ Liter organisms/Liter in May 2015. In this study copepods were second largest group of zooplankton.

Ostracoda: In Kalwati reservoir 3 species of Ostracoda were found i.e, *Stenocypris major, Cyclocypris globosa*and *Candocypria osborni.*

During 2013-14, the minimum numbers of Ostracoda were 30 O/l in August 2014 and maximum were 150 organisms/Liter in the month of May 2014. In the period of the second year (2014-15) of research the minimum were 20 organisms/Liter in the month of October 2014 while maximum were 145 organisms/Liter in May 2015. In the present study three species of ostracoda were found. Peak of ostracoda were found in premonsoon season. Similar findings were represented by Mirgane *et.al.*(2015); Sakhare and Joshi (2006); Sakhare *et.al*(2011).

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