

Analysis of Zooplankton Diversity and Limnological Parameters of Salchakra Anua, an Oxbow Lake in Silchar, Assam

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Abstract: Zooplankton diversity and Limnological parameters are the most important criteria for determining the suitability of an aquatic ecosystem for any kind of aquacultural programme. Water quality of the freshwater habitats provides information about the existing resources which depend on physico-chemical parameters and biological features. Some of the limnological parameters and Zooplankton composition of Salchakra Anua was studied for a period of six months from October, 2016 to March, 2017. The limnological parameters of the study site was found to be highest during the month of October, 2016. A total of 15 taxa belonging to three groups were recorded during the investigation of which 5 taxa were from Cladocera group, 4 from Copepoda and 6 taxa from Rotifera group. The highest Zooplankton abundance was recorded from the site during the month of October, 2016 and lowest during the month of February, 2017. Cladocera contribute highest percentage of 43% of the total Zooplankton composition followed by 42% of Rotifera and 15% of Copepoda. Presence of highest percentage of Cladocera again depicts the better condition of the water body and can be used for aquacultural program.

Keywords: Zooplankton, Limnology, Cladocera, Anua, Aquaculture.

I. Introduction

Limnology is the study of all aquatic system, both lentic and lotic fresh, fresh and saline including lakes, wetlands, marshes, bogs, ponds, reservoirs, streams, rivers, oceans etc. with regard to their physical, chemical and biological characteristics(Kar,2007).Wetlands being one of the most productive ecosystems are crucial for biodiversity conservation.Wetlands of Northeast India is a house to diverse kind of biota living in it and a support a large range of organism living in it. Among these Zooplankton are minute aquatic free floating microscopic organism, which are grazers on phytoplankton and act as larger food source of larval and higher vertebrates and invertebrates including carnivorous and omnivorous fishes (Goswami and Mankodi 2012). They are related to the growth of juvenile fishes and are also play important role in the transfer of energy from the primary phytoplankton to higher trophic levels (Ismail and Zaidin, 2015). Physico-chemical parameters are one of the most appropriate source to measure the water quality of a aquatic body. A slight change in physico chemical aspect of a water body brings about a corresponding change in the relative composition and abundance of the organisms on that water body. The Zooplankton community fluctuates according to the physico-chemical parameters and the relative environment of the water body especially the Rotifers as they are known to change immediately along with the change in water quality (Dede and Deshmukh, 2015).

Information on Zooplankton diversity of the country is scanty. Some reports from Khan(2002,2003); Ganesen and Khan(2008) from Southern Bengal;Sharma(2005,2010); Sharma and Sharma(2002,2008); Nimbalkar *et al.*, (2013); Bhat *et al.*, (2014); Dede and Deshmukh,(2015);Balakrishna *et al.*(2013); Sharma *et al.*, (2015); But the studies on zooplankton in north-east part of the country, especially in South Assam is scanty except some worth mentioning works in recent years that Kar (2007,2013); Kar and Barbhuiya (2004); Kar and Kar (2013,2016a,b);Das *et al.*,(2014);Das and Kar (2013,2016); Kar *et al.*, (2015); Kar *et al.*,(2016). Since, recent years, the Salchakra Anua has been a victim of different problems like sedimentation, urbanization and growth of various small scale mills; thereby, leading to its siltation, eutrophication, including health problems to fishes, notably, Epizootic Ulcerative Syndrome or EUS (Kar,2013)The present investigation has been undertaken to determine the diversity and abundance of Zooplankton community in relation to the physico-chemical parameters of the study site.

II. Material And Methods

Study site: The present study was conducted on Salchakra Anua (area,1125000m² at FSL and 525000m² at DSL) lying between 24°49'28.8" N and 92°39'43.9" E and situated 20k.m from the Silchar main town. The name of the Anua is the '66 number Barak Nadi Anua' at Salchakra part-II. The Anua is formed about 100 years ago by the meandering portion of the river Barak. The average depth of the Anua is about 7m-9m, maximum depth is 12m at the deepest zone during rainy season.

Sample collection and analysis: The study was carried out in Salchakra Anua for a period of six months from October, 2016 to March, 2017. Water quality of the wetland was studied following standard method of APHA, 2005. The sample was collected weekly from the site following the standard methods and literature of Battish, 1992. The Zooplankton sample was collected from the site during early in the morning (6am to 7am) for a period of six months following standard methods and literature of Battish, 1992. The sample were then brought to laboratory for further qualitative verification and quantitative estimation. Quantitative samples were collected by filtering 100ml water. The collected species were then filtered and preserved in 5% formalin solution for taxonomic identification and kept in cold and dark place. Analysis was done on a Sedgwick Rafter Counting cell, under a light microscope. The zooplanktons were then identified following standard literature of Edmondson 1959; Battish, 1992; Michael and Sharma, 1998; Sharma, 1998; Sharma and Sharma, 2008.

III. Results And Discussion:

During the study period, water temperature, pH, Dissolved Oxygen (DO), Free Carbon Dioxide (FCO₂), Total Alkalinity were measured monthly for six months. Their values are depicted in Table 1. The limnological parameters of the study site was found to be highest during the month of October, 2016. pH of the Anua was found to be at par during the six months study period. DO and FCO₂ were found to be highest during the month of October and lowest during the winter months i.e, December, 2016 – January, 2017. This depicts that the water body used as our study site is very much good for an aquacultural programme to carry on.

Table 1: Physico-chemical parameters of Salchakra Anua during the study period

PARAMETERS	OCT-16	NOV-16	DEC-16	JAN-17	FEB-17	MAR-17
Water Temperature (°C)	25	23	20	19	21	24
pH	6.9	6.8	6.8	6.9	6.8	6.8
Dissolved Oxygen, DO (mg/l)	7.3	7.1	7	7	7.1	7.1
Free Carbon Dioxide, FCO ₂ (mg/l)	0.9	0.7	0.6	0.5	0.6	0.5
Total Alkalinity (mg/l)	57	56	53	55	56	57

The present study reveals the Zooplankton composition and diversity of Salchakra Anua during the study period (Table 2). A total of 15 taxa belonging to three groups were recorded during the investigation of which 5 taxa were from Cladocera group, 4 from Copepoda and 6 taxa from Rotifera group. The highest Zooplankton abundance was recorded from the site during the month of October, 2016 and lowest during the the month of February, 2017. On a similar study in three different kind of freshwater waterbodies in Penang Island, Ismail and Zaidin, 2015 reported highest Zooplankton abundance on the month of November while the lowest in the month of February. Among all the Zooplankton groups, Rotifera was reported to be dominant among other groups during the period of investigation consisting of 6 taxa of which *Filinia* sp. shows highest abundance and *Keratella* sp. shows the lowest abundance all throughout the six months study. In Cladocera group, *Moina* sp. shows highest and *Bosmina* sp. shows lowest abundance while Copepoda group, *Mesocyclops* sp. shows highest abundance and *Microcyclops* sp. shows lowest abundance throughout the study period. Compared to all other taxa, *Filinia* sp. of Rotifera group were found to dominate the population of Zooplankton. Abundance of Rotifera group may indicate the presence of dissolved solids in the study site, as they are known to increase the growth of minor phylum of Zooplankton in the water body (Goswami and Mankodi, 2012).

Fig 1 shows the percentage composition of Zooplankton in the study during the period of investigation. Cladocera contribute highest percentage of 43% of the total Zooplankton composition followed by 42% of Rotifera and 15% of Copepoda. Presence of highest percentage of Cladocera again depicts the better condition of the water body and can be used for aquacultural program. Fig 2 depicts the graphical representation of the abundance of three different groups during the study period. Cladocera shows highest abundance among other groups of Zooplankton present in the study site. Cladocera were found to be abundant during the month of October, 2016 whereas Copepoda and Rotifera was also found abundantly during the month of October, 2016. Lowest abundance of Zooplankton composition were found to be during the month of February, 2017.

Table 2: Monthly composition of Zooplankton groups in Salchakra Anua during the study period.

ZOOPLANKTON	OCT-16	NOV-16	DEC-16	JAN-17	FEB-17	MAR-17
CLADOCERA						
<i>Diaphanosoma</i> sp.	12	10	11	8	10	10
<i>Sida</i> sp.	8	8	9	7	6	7
<i>Moina</i> sp.	21	17	20	14	10	10
<i>Chydorus</i> sp.	5	3	3	1	1	3
<i>Bosmina</i> sp.	2	3	2	1	1	2
TOTAL	48	41	45	31	28	32
COPEPODA						
<i>Mesocyclops</i> sp.	8	7	8	5	3	7
<i>Microcyclops</i> sp.	2	1	0	1	0	0

<i>Thermocyclops</i> sp.	3	2	2	2	2	3
<i>Neodiaptomus</i> sp.	7	5	2	1	1	5
TOTAL	20	15	12	9	6	15
ROTIFERA						
<i>Brachionus</i> sp.	4	3	3	5	3	2
<i>Lecane</i> sp.	2	1	0	2	2	1
<i>Keratella</i> sp.	2	0	0	1	1	1
<i>Asplanchna</i> sp.	7	5	8	6	4	9
<i>Testudinella</i> sp.	6	8	8	9	7	5
<i>Filinia</i> sp.	22	19	16	15	18	15
TOTAL	43	36	35	38	35	33

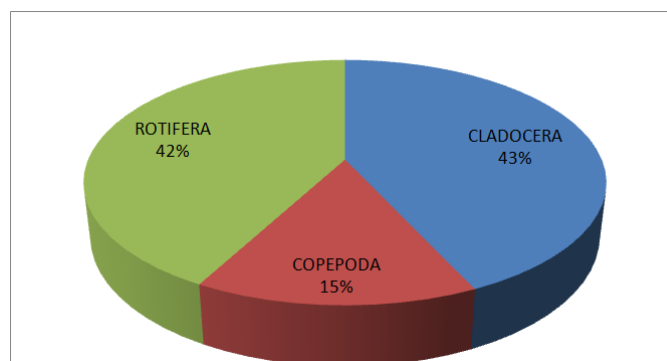


Fig 1: Percentage Composition of Zooplankton in Salchakra Anua during the study period

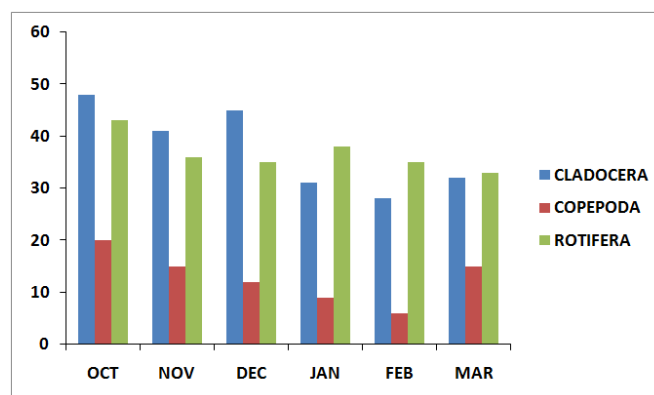


Fig 2: Abundance of different groups of Zooplankton in Salchakra Anua during the study period

IV. Conclusion

Salchakra Anua is a river-formed wetland of Cachar, Assam. It is also used for various aquacultural program as well as carries a great scenic beauty and thus can be used for tourism. Though the present study was of small duration but it was able to slightly depict the recent scenario of the Anua. Presence of good abundance of Cladocera is very much appreciable as they are known to be the staple food of larvae of various culturable fishes. But increasing abundance of Rotifera may be an indication to the increase of pollutants to the water body. Thus, the inhabitants and the authority should take care and educate peoples residing nearby to preserve and maintain the authenticity of the Anua.

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