IDENTIFICATION OF ZOOPLANKTONS AND EVALUATION OF CERTAIN ECOLOGICAL FACTORS OF NUAPOKHARI,A FRESH WATER WATER BODY IN BHUBANESWAR

A

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By

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This is to certify that the thesis entitled,"**Identification of zooplanktons and ecological factors of nuapokhari**"submitted in partial fulfilment of the requirements for the award of the degree of Master of Science in ZOOLOGY of Odisha university of Agriculture and technology, Bhubaneswar, is a faithful record of bona fide research work carried out by master KRUSHNA KUMAR ARYA, Adm. No. 14ZOL/16 under my guidance and supervision and that no part of thesis has been submitted for any other degree or diploma or published in any form.

It is further certified that the help and sources of information availed of during the course of study have been duly acknowledged.

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CERTIFICATE-II

This is to certify that the thesis entitled," **Identification of zooplanktons and evaluation of certain ecological factors of nuapokhari ,a fresh water body in Bhubaneswar** " submitted by master KRUSHNA KUMAR ARYA Adm. No. 14ZOL/16, to the Odisha University of Agriculture and Technology, Bhubaneswar, in partial fulfilment of the requirements for the degree of Master of Science in ZOOLOGY, has been approved by hte students Advisory Committee and the external examiner.

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ABSTRACT

Zooplankton plays an important role in fresh water ecosystems in transfer of energy at the secondary trophic level in an aquatic ecosystem. They are intermediate link between primary producers viz. phytoplankton with higher trophic level organisms. Zooplankton is important in understanding the pond dynamics and the results of the study undertaken at Nuapokhari of Bhubaneswar. It is situated at 20◦15'N Latitude and 85◦85'E Longitude, about 54 meter above sea level. Total area of the pond is 46,114.01m²(496,36709 ft²).and perimeter is 827.02m²(2713.31 ft).Total 8 species of zooplanktons were found. which includes 4 species of Roifers and 4 Speies of Copepods .The zooplankton belonging to phylum Rotifera have same type of genus and those belonging to copepod have different type of genus. The grab samples were collected from ten different sampling sites, enough to accurately represent the whole water body to assess their physical and chemical and biological parameters at monthly intervals in February,March and April months. The physical and chemical parameters namely temperature, pH, conductivity, DO, chloride and alkalinity was recorded in the three months (February, March, April). The pH of water ranged between 7.1 TO 7.5. The DO ranged between3.4mg/L to 5.4 mg/L indicating that site 8 has high level of organic pollution and the site 1 has minimal organic pollution. The temperature ranged between 24◦C to 30.3◦C. The alkalinity ranged between 480.1mg/L to 486.2mgL, the conductivity ranged between 331µS to 383µS and the chloride ranged between 71.3mg/L to 95.5mg/L.To minimize the changes in the sample from collection to laboratory analysis, the sample was preserved soon after the collection by 10 % formalin.The preserved samples were brought to the laboratory for qualitative and quantitative analysis.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

Gm	gram(s)
ml	millilitre
DO	Dissoloved Oxygen
̊c	Degree Celsius
µS	micro Siemen

1.INTRODUCTION

Nuapokhari, the site for present study is a large manmade pond near Bhubaneswar of Odisha. The pond named Nuapokhari by the locals of Matiapara village present about 16 Km of south east of Bhuabneswar. It is situated at 20◦15'N Latitude and 85◦85'E Longitude, about 54 meter above sea level. Total area of the pond is 46,114.01m²(496,36709 ft²).and perimeter is 827.02m²(2713.31 ft). it has its own catchment area. During heavy rain the area of the pond increases and its catchment area becomes filled with water resembling a small lake. The pond has its own perennial underground water fountain due to which the pond has sufficient water during the summer season. Two inlets of sewage water from nearby village pollutes the pond, one outlet removes excess water to nearby field. Two side of the pond has agricultural fields. At some places dense patches of tress of jackfruits, fig, mango and some fruit plants are present on its boundary. One side of the pond has village and the other side has fruit orchid. A small nursery pond is present adjacent to it. During summer season it is about 10 ft deep at middle and during rainy season it is about 18 feet deep at the middle.

According to the locals the pond was constructed by Mukundadev Maharaja, The Gajapati of Odisha or the Great King of the Odisha. In 1897, it was renovated by the local Zamidar. After independence it was handover to three villages and they take care of the pond till now.

Zooplankton (Greek: Zoon, animal; planktos, wandering) are the diverse, delicate and often very beautiful assemblages of animals that drift in the waters (Molly Varghese et al,2015). Majority of them are microscopic, unicellular or multicellular forms with size ranging from a few microns to a millimeter or more. In addition to size variations, there are differencesin morphological features and taxonomic position.The zooplankton play an important role to study the faunal bio diversity of aquaticecosystems. They include representatives of almost every taxon of the animalkingdom and occur in the pelagic environment either as adults (holoplankton) oreggs and larvae (meroplankton). By sheer abundance of both types and theirpresence at varying depths, the zooplankton are utilized to assess energy transferat secondary trophic level. They feed on phytoplankton and facilitate the conversionof plant material into animal tissue and in turn constitute the basic foodfor higher animals including fishes, particularly their larvae. The

zooplanktonoccurrence and distribution influence pelagic fishery potentials. The fishes mostlybreed in areas where the planktonic organisms are plenty so that their youngones could get sufficient food for survival and growth. Certain planktonic organismsare capable of concentrating radioisotopes and can act as indicator of certainpollutants, the study of which is important to marine environmental science.The planktonic forms with calcareous or siliceous shells or tests contribute tothe bottom sediments. The zooplankton are more varied as compared to phytoplankton,their variability in any aquatic ecosystem is influenced mainly bypatchiness, diurnal vertical migration and seasons.Evaluation of zooplanktonproduction in any particular area will largely depend on use of correct zooplanktonmethodology that involves collection of samples, fixation, preservation, analysisand computation of data. Members of Zooplankton including the marine and the freshwater planktonic community that drifts according to the water currents. The term plankton refers to any small biota living in the water and drifting at the mercy of currents, ranging from bacteria to jellyfish. Planktonic plants are called phytoplankton and planktonic animals are called Zooplankton. Zooplanktons are microscopic animals which do not possess the power of locomotion and move against the water currents. The major groups of Zooplankton are Rotifera, Cladocera, Copepoda and Ostracoda (M Dhanasekaran et al 2015). The Zooplankton is a fundamental character in the significance of an aquatic ecosystem and plays a key role in the energy transfer. Zooplankton mediates the transfer of energy from lower to higher trophic level1.Ecology and a common study on Zooplankton is the central trophic link between primary and higher trophic levels. The freshwater Zooplankton comprise of Rotifera, Cladocera, Copepoda and Ostracoda. Most of them depend to a large extent on various bacterioplankton and phytoplankton for food. Many of the larger forms feed on smaller Zooplankton forming secondary consumers. Some of them are detritivore feeders, browsing and feeding on the substrate and attached on the organic matter, phytoplankton or concentrating on the freely suspended organic matter. Zooplankton communities respond to a wide variety of disturbances including nutrient loading, acidification and sediment of input in an ecosystem. Many of these organisms are food organisms for fish and are also consumed by other aquatic macro-fauna. The distribution of aquatic organisms, particularly plankton, has long been known to be heterogeneous. Spatial heterogeneity is a common feature in all ecosystems and is the result of many interacting physical and biological processes. The physicochemical and biological characteristics of water are play an important role in plankton productivity and final yield of

aquaculture products 3-14. This is particularly so with freshwater Zooplankton, which plays a key role in preservation and maintenance of ecological balance and its basic study is wanting and is absolutely necessary.

Water quality parameters

WQI (Water quality index) was first proposed by Horton(1965). WQI is the most effective arithmetical tools to communicate information on overall quality status of water to the concerned user community and policy makers to shape sound public policy and implement the water quality improvements programmes efficiently (Kalavathy *et al*.,2011) and can assess a stream/river's ability to host life and whether the overall quality of water bodies possess a potential threat to various use of water(Kumar and Dua,2009).

physical- chemical-biological parameters of water

It is very essentialand important to test the water before it is used for drinking, aquaculture,domestic, agricultural or industrial purpose. Selection of parameters for testing of water is solely depends upon for what pupose we are going to use that water and what extent we need its quality and purity.

Water does content different types of floating, dissolved, suspended and microbiological as well as bacteriological impurities. S ome physical test should be performed for testing its physical appearance such as temperature, colour, pH, TDS, etc. While chemical tests should be performed for its BOD, COD, dissoloved oxygen, alkalinity, nitrate, phosphate. Etc.

TEMPERATURE

Water temperature is one of the most basic physical parameter because it varies temporally and spatially, affects any other factors such as conductivity, DO, etc. I n an established system the water temperature controls the rate of all chemical reactions, and affects aquatic organisms.

pH

pH value of water is determined by the relative concentrations of H+ ion and OH- ion. Water with a pH of 7 has equal concentrations of H+ ion and is considered to be a neutral solution. If a solution is acidic (pH<7), the concentrations of H+ ion and OH- ion and is considered to be a

neutral solution. If a solution is acidic (pH<7), the concentration of H+ ion is greater than the concentration of OH- ion. If a solution is basic (pH>7), the concentration of H+ ion is less than the concentration of OH- ion.

$$HCO_3^- + H_2O \longrightarrow H_2CO_3 + OH^-$$

The pH which represents of H+ ion concentration, is an important parameter in determining the corrosive nature of water. pH was positively correlated with electrical conductance and toatal alkalinity(Gupta 2009). The reduced rate of photosynthetic activity, the assimilation of carbon dioxide and bicarbonates which are ultimately responsible for increase in pH, the low oxygen values coincided with temperature during the summer month.

EC (Electrical Conductivity)

Conductivity estimates the amount of total dissolved salts or the total amount of dissolved ions in the water. Electrical Conductivity (EC) is a measure of the ability of water to pass electric current through it in water is affected by the presence of dissolved solids such as chloride, nitrate, sulphide, phosphate, sodium, magnesium, calcium, iron and alminium.

Electrical Conductivity also is affected by water temperature with warmer the water, the higher would be the EC. EC is also affected by water temperature with warmer water, the higher would be the EC.

Dissolved oxygen

DO is one of the most important parameter , Its correlation with water body direct and indirect information e.g. photosynthesis, bacterial activity, availability of nutrients and stratification etc. (Premlata Vikal, 2009). The high DO in summer is due to increase in temperature and duration of bright sun light has influence on the % of soluble gases (oxygen and carbondioxide).

sources of DO

Diffusion from atmosphere and water at surface

Aeration as water over rocks and uneven surfaces

Aerartion through churning action of wind and waves

Photosynthesis from aquatic plants

2. REVIEW OF LITERATURE

Zooplankton are free floating microscopic heterogenous assemblage of aquatic micro-organism found in aquatic ecosystem. They are represented by wide array of taxonomic groups viz, Protozoa, Cladocera, Copepoda and Rotifera in a freshwater ecosystem which are often armoured by different organs like pines for protecting themselves from the predator (Verma *et al*., 2013). They are cosmopolitian in nature and inhabit all freshwater habitats of the world. Zooplankton are important link in the transformation of energy in an aquatic food web because of their drifting nature, large density, high species diversity and tolerance to the stress (Bhat *et al*., 2014). It forms a major link in transfer of energy at secondary level between autotrophs and heterotrophs in an aquatic food web. They are the integral part of aquatic food web and contribute significantly to aquatic biological productivity in freshwater ecosystem (Nimbalkar *et.al*., 2013). Diversity and density of zooplankton refers to the variety within the community. As a major element in aquatic biota, the zooplankton exhibits drastic changes in response to the changes in aquatic environment such as physico-chemical properties (Koli and Muley, 2012). Study of community structure of freshwater zooplankton is significantly potential for assessing aquatic ecosystem. They are not only useful as bio-indicators but also helpful for ameliorating polluted water in an aquatic ecosystem (Jose and Sanalkumar, 2012). It has great significance as pollution indicators and hence, its association, abundance, richness and diversity can be used for the assessment of water pollution. Zooplankton study is necessary to evaluate the ecological status of the freshwater reservoirs as they are important in nutritive level and evaluating as well as ameliorating pollution status and thus used for determining the health of an aquatic ecosystem (Dede and Deshmukh, 2015). Zooplankton constitute important food item of fishes as the larvae of carps are known to feed mostly on zooplankton (Dewan *et al*., 1977). Zooplankton having higher protein contents are found to be essential for fish larval growth as they contain broad spectrum of digestive enzymes that are able to serve as exo-enzymes in the gut of fish larvae (Miah et al., 2013). For aquaculture development and increase in production level proper knowledge on zooplankton diversity of the pond is very much important. Both quantitative and qualitative diversity and density of zooplankton in an aquacultural pond are of great importance in management of successful aquaculture operation as they vary from pond to pond within the same location even within similar ecological conditions. The presence of healthy zooplankton

populations are able to determine success in commercial fisheries (Manickam et al., 2014). Study of zooplankton diversity contribute significantly to the understanding of the basic nature and general economy of an aquatic habitat. Community distribution of zooplankton depends on some of the complex factors viz, climatic conditions, physical and chemical parameters and vegetation cover of the waterbody (Shivashankar and Venkataramana, 2013). Several works on freshwater zooplankton composition and distribution are carried out throughout the country in recent years, worthmentioning that of Nimbalkar *et al*., 2013; Bhat *et al*., 2014; Dede and Deshmukh, 2015.

Objectives

-To collect water samples from different sampling sites of Nuapokhari in February,march and april months.

-Identification of zooplanktons and evaluation of chemical-biological parameters of water samples.

3.MATERIALS AND METHODS

study area

The Nuapokhari is a large man made pond near Bhubaneswar of Odisha. The physico-chemical characteristics of water and faunal diversity were studied in this Nuapokhari pond is present 16 Km of south east of Bhubaneswar. It is situated at 20◦15'N Latitude and 85◦85'E Longitude, about 54 meter above sea level. Total area of the pond is 46,114.01m²(496,36709 ft²).and perimeter is 827.02m²(2713.31 ft). the pond has its own perennial underground water fountain due to which the pond has sufficient water during the summer season. Two inlets of sewage water from nearby village pollutes the pond, one outlet removes excess water to nearby field. Two side of the pond has agricultural fields.

Materials and methods for zooplankton collection

Plastic mug,Water pump,Nets,Van Dorn bottles (sampling bottles) were used for collection of samples.Zooplanktons are collected from the different sites of the nuapokhari which is situated near Bhubaneswar . Collection of zooplankton was carried out by using water bottles, pumps or nets over the past years. Water Bottles are used mainly for collecting smaller forms or microzooplankton (Molly Varghese et al,2015) . Water is collected at the sampling site in water samplers of 1 litre capacity. Surface water can be collected by scooping water into the bottle of suitable size. While collecting the water samples, there should be minimum disturbance of water to prevent avoidance reaction by plankton. The Von Dorn bottles or water samplers with closing mechanisms are commonly used for collecting samples from the desired depths. These bottles, named after Dr. William Van Dorn of Scripps Institute of Oceanography can be used to obtain composite samples from several depths or to pool samples from one depth and thus can be used for both horizontal and vertical sampling (Goswami et al ,2014) . Horizontal bottles are often used for sampling at the thermocline, at other stratification levels, or just above the bottom. Because they collect whole water samples, all size classes of plankton are obtained. Zooplankton collected in the bottle are concentrated by allowing them to settle, centrifuging or through fine filtration. Pumps are normally used on board the vessel/boat. The inlet pipe is lowered into the water and the outlet pipe is connected to a net of suitable mesh size. The zooplankton is filtered

through the net. This method is used for quantitative estimation and to study the small scale distribution of plankton. The advantage of this method is that the volume of the water pumped is known and continuous sampling is possible. However, the sampling depth is limited to a few meters and it is difficult to obtain samples from deeper layers. Plankton Nets are the most common method of zooplankton collection. The plankton nets used are of various sizes and types and can be broadly categorized as the open type used mainly for horizontal and oblique hauls and closed netswith messengers for collecting vertical samples from desired depths. Despite minor variations, the plankton net which is usually made of bolting silk, nylon or other synthetic material is conical in shape consisting of a ring (rigid/flexible and round/square), the filtering cone and a collecting bottle. The collecting bottle should be strong and easily removable from the net. In this method the amount of water filtered is more and the gear is suitable both for qualitative and quantitative studies. The mesh size of the netting material will influence the type of zooplankton collected. Different mesh sizes are available from the finest to the coarse pore sizes. The mesh size of 0.2 mm of monofilament nylon is usually used for collecting zooplankton for taxonomic and productivity studies. In addition to the mesh size, the type, length and mouth area of the net, towing speed, time of collection and type of haul will determine the quality and quantity of zooplankton collected.First the water was collected from the surface of water body and the filtered it through the nets to got the zooplanktons.That process was repeated for 50 times to got more diversity and more number of zooplanktons.Then water is collected from a depth of 10 cm by using water pump from the surface level of water and that process was also repeated for 50 times. After completing this process then water is collected from a distance of 20 cm from the surface of water bt using the water pump and then filtered it through another net and the processing was continued for 50 times.after collection of zooplanktons from different depths then these samples are kept inside a plastic container and was capped.

Fixation and Preservation

Zooplankton for taxonomic study should be fixed and preserved immediately after collection to prevent degradation due to bacterial action, cannibalism or chemical deterioration. Fixation is done to kill an organism by maintaining its morphological characteristics and preservation is done for maintenance of the fixed condition for long periods of time (Steedman et al 1976) . The

most common fixing and preserving reagent is formaldehyde (10%) and the zooplankton samples can be stored for several years.

Observation of zooplankton

few drops of collected samples poure don a petridish through the help of a eye dropper.Then the sample was observed with a dissecting microscope. Since the plankton can move up and down in the drop, I need to refocus on microscope to see plankton at different levels. Many of the organisms are too small to be seen with the dissecting microscope. So i prepared a slide of the sample and observe it under a compound scope with low and high power objectives.

physico-chemical study

Sampling sites for the water pond are selected to represent the water quality at different points and depth. Sampling points were decided by keeping in mind that the considered sampling points must include shallow and deep regions of the water body, points of inflow, and outflow of water in the pond and anthropogenic activities. The grab samples were collected from ten different sites, enough to accurately represent the whole water body to assess their physical and chemical monthly intervals in the February, March and April month. From each sites, samples were collected in thoroughly cleaned 1L litre inert plastic containers, which were rinsed with distilled and1L BOD bottles.Water to avoid contamination for the analysis of physic-chemical properties of water. Water samples were collected in a sampling bottle avoiding floating materials. The closed plastic bottles were dipped into the lake at the depth of 10 cm below the surface, and then a bottle was opened inside and was closed again to bring it out at the surface (Verma *et al.,* 2011).From the time of sample collection to the time of actual analyses, many physical, chemical reactions would change the quality of the water sample. Therefore to minimize this change the sample were preserved soon after the collection. The stoppers of the sample containers were closed properly to prevent outside contamination. The container was labelled describing the name of the water body, date, time, sampling point and conditions under which it was sampled.

The important physico-chemical parameters such as temperature, pH, dissolved oxygen(DO), conductivity and chloride were analysed in these three months

Temperature was measured using digital thermometer.

pH and conductivity of water sample were measured using digital pH and conductivity meter. (Spectronic India)

Dissolved oxygen was measured by the method of Wrinkler's method.

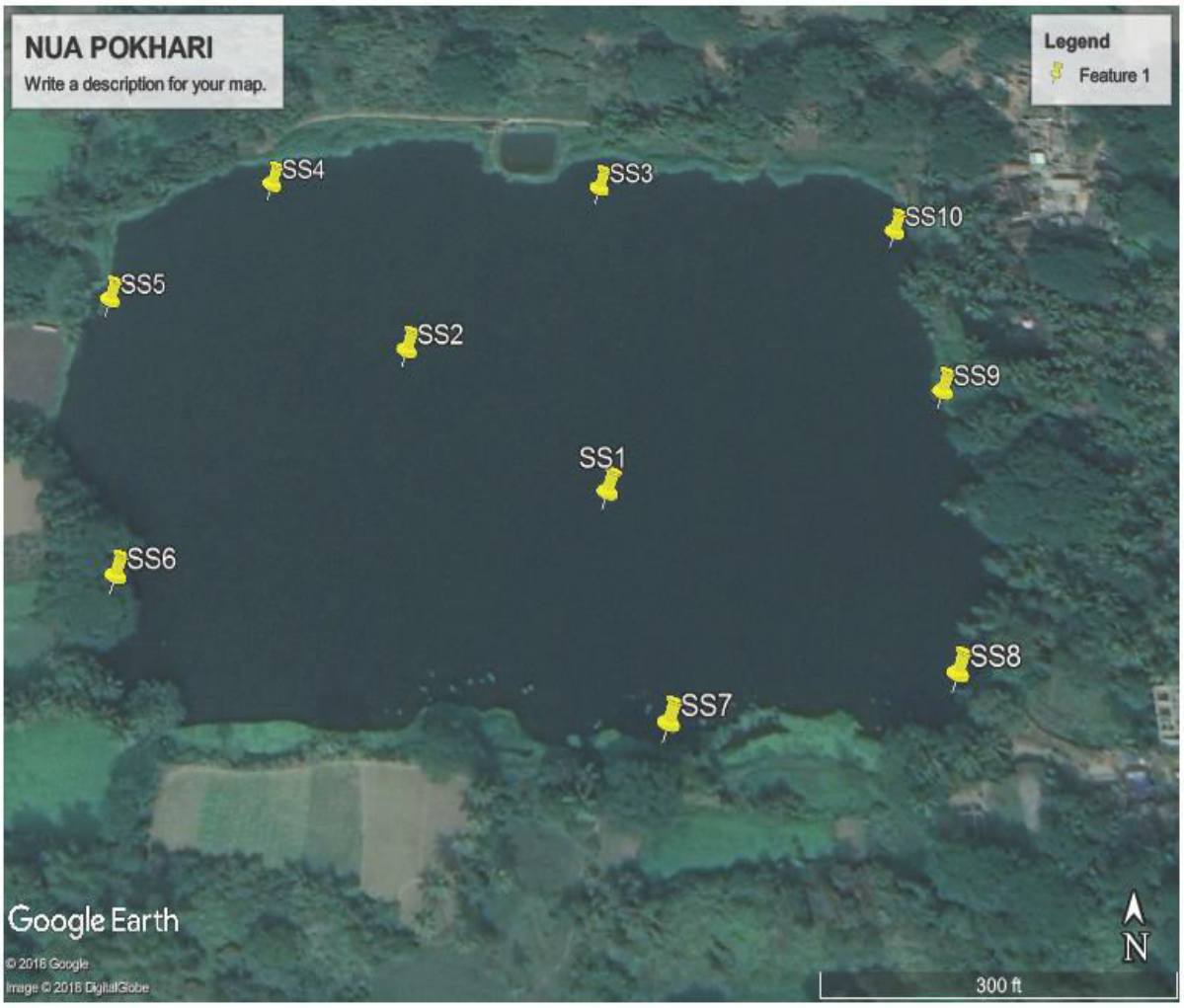

Figure 3.1: satellite image of Nuapokhari

Figure 3.2: Study site-3 of Nuapokhari

Figure 3.3 :Study site-4 of Nuapokhari

Figure 3.4:Studysite-5 of Nuapokhari

Figure 3.5:studysite-6 of Nuapokhari

Figure 3.6:Studysite-7 of Nuapokhari

4.RESULT AND DISCUSSION

The collected zooplankton species during this study period was utilised to estimate the zooplankton diversity in the Nuapokhari pond. A total 8species are recorded. which includes 4 species of Roifers and 4 Speies of Copepods .The zooplankton belonging to phylum Rotifera have same type of genus and those belonging to copepod have different type of genus.

Phylum-Rotifera

Family-Brachionidae

Figure 4.1 : *Brachionus diversicornis*

Figure 4.2 *Brachionus rubens*

Figure 4.3 *Brachionus falcatus*

Figure 4.4 *Brachionus budapestinis var punctatus*

Phylum-Copepoda

Subphylum-crutacea
Family-cyclopidae

Figure 4.5 *Cyclops nauplii*

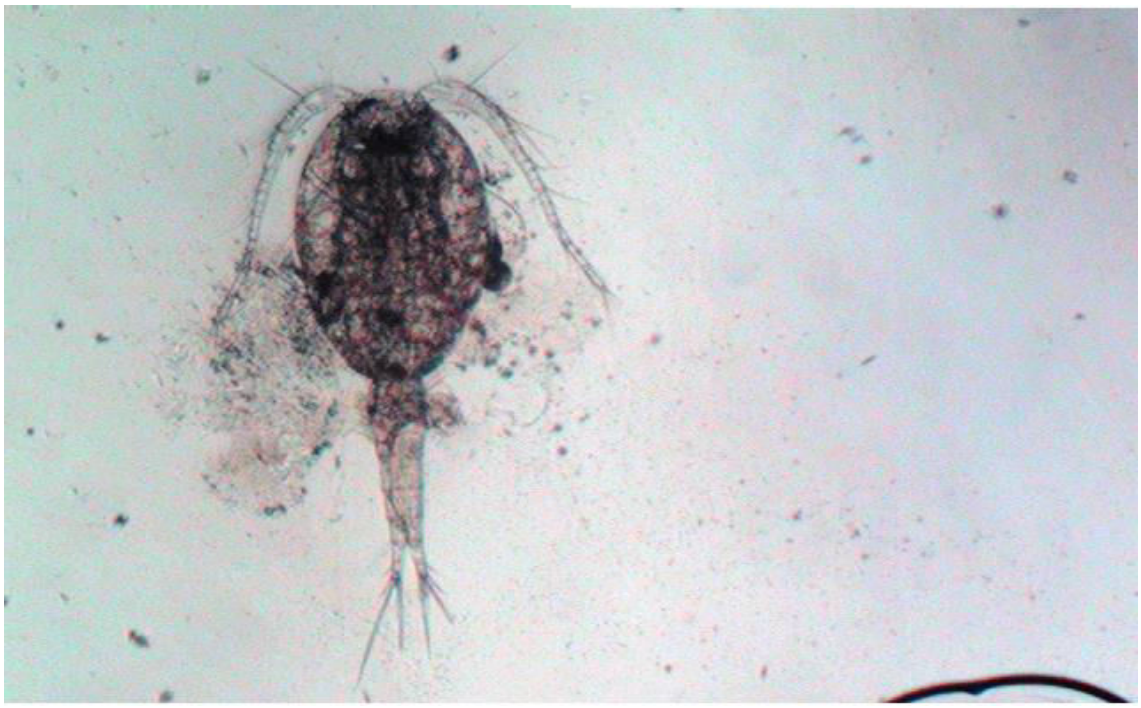

Figure 4.6**:** *Mesocyclops leukarti*

Figure 4.7 *Eucyclops speratus*

Figure 4.8 *Thermocyclops hyalinus*

Rotifer

From the above identification I found rotifers belong to genus Brachionus.The rotifers (Rotifera, commonly called wheel animals) make up a phylum ofmicroscopic and near-microscopic pseudocoelomate animals .They were first described by John harris in 1696, and other forms were described by Leeuwenhoek in 1703. Most rotifers are around 0.1–0.5 mm long (although their size can range from 50 μm to over 2 mm),and are common in freshwater environment species.Some rotifers are free swimming and truly planktonic others move by inchworming along a substrate, and some are sessile living inside tubes or gelatinous holdfasts that are attached to a substrate.. Rotifers are an important part of the freshwater zooplankton, being a major foodsource and with many species also contributing to the decomposition of soil organic matter. Most species of the rotifers are cosmopolitan, but there are also some endemic.

Brachionus diversicornis (Daday,1883)

Brachionus is a genus of planktonic rotifers occouring in fresh water. One anterior flagella is slightly longer than other one.

Brachionus rubens

Juncture between anteromedian and anteromediate spines acutely notched.

Brachionus falcatus

The body structure is nearly similar with *B.diversocornis*. Anterior flagella are same in length.

Brachionus budapestinesis var punctatus

It is fresh water zooplankton belongs to group brachionus.

Copepod

From the above identification I found copepods belong to genus Cyclops and sinodiptomus.copepod; meaning "oar-feet") are a group of small crustaceans found in the sea and nearly every freshwater habitat. Some species are planktonic , some are benthic, and some continental species may live in limnoterrestrial habitats and other wet terrestrial places, such as swamps, under leaf fall in wet forests, bogs, springs, ephemeral ponds, and puddles, damp moss, or water-filled recesses (phytotelmata) of plants such as bromeliads and pitcher plants. Many live underground in marine and freshwater caves, sinkholes, or stream beds. Copepods are sometimes used as biodiversity indicators.

Cyclops nauplii

It is the most common genera of fresh water copepods having the sigle large eye which may be either red or black in Cyclops.

Mesoocyclops leukarti(Claus 1857)

It is easily distinguished from other copepods by the last pair of legs. It is mainly found in fresh water bodies.

Eucyclops speratus(Lill Jeborg1901)

Its taxonomy is based on latest scientificconsensus and the organism mainly found in fresh water bodies and also in brackish water

Thermocyclops hyalinus

It is a genus of crustaceans in family cyclopidae. It was first described by F.Kiefer. This species are found in both brackish and fresh water

The mean values of various water quality parameters have been The mean values of various water quality parameters have been depicted:

Table 4.1 : water quality parameters of February month

	TEMP. (◦C)	**pH**	**CONDUCTIVITY (µS)**	**DO (mg/L)**	**BI-CARBONATE (mg/L)**	**FREE CO2 (Mg/L)**	**CHLORIDE (mg/L)**
1	25	7.27	352	5	246.7	483.3	71.3
2	24.5	7.35	338	4.9	247.1	484.2	74.2
3	27.5	7.28	356	4.2	236.7	482.1	71.4
4	27	7.24	370	4.1	248.7	484.2	72.4
5	24	7.33	343	4.8	239.3	485	79.3
6	24.5	7.2	335	4.8	238.1	484.5	75.1
7	26	7.21	341	4.1	242.2	484	73.2
8	26	7.3	362	3.4	253.3	485.1	91.5
9	27	7.34	357	3.5	251.1	484.9	90.4
10	26.5	7.2	349	3.9	240	483.4	76.4

Table 2: water quality parameters of March month

	TEMP. (◦C)	**pH**	**CONDUCTIVITY (µS)**	**DO (mg/L)**	**BI-CARBONATE (mg/L)**	**FREE CO2 (Mg/L)**	**CHLORIDE (mg/L)**
1	**27.5**	**7.1**	**367**	5.2	2445.2	484.2	72.3
2	**27**	**7.3**	**358**	4.9	244.1	483.2	73.2
3	**29**	**7.21**	**370**	4.1	233.7	482.1	71.4
4	**30**	**7.16**	**383**	4.4	245.6	483.2	72
5	**27**	**7.25**	**349**	4.6	238.3	485.1	75.3
6	**26.5**	**7.18**	**348**	4.4	237.1	483.5	74.1
7	**27**	**7.2**	**356**	4	242.4	483.9	81.2
8	**28**	**7.2**	**370**	3.7	254.3	486.2	94.5
9	**28.5**	**7.3**	**371**	3.4	252.2	485.9	92.4
10	**27**	**7.2**	**356**	4	240.3	482.4	76.4

Table 3: water quality parameters of April month

	TEMP. (◦C)	**pH**	**CONDUCTIVITY (µS)**	**DO (mg/L)**	**BI-CARBONATE (mg/L)**	**FREE CO2 (Mg/L)**	**CHLORIDE (mg/L)**
1	**29.9**	**7.2**	**369**	5.4	245.3	483.2	72.2
2	**27.3**	**7.05**	**359**	4.5	243.9	482.2	72.2
3	**30.1**	**7.1 2**	**371**	4.2	233.6	480.1	73.4
4	**30.3**	**7.33**	**383**	4.1	244.6	483.4	73
5	**28.2**	**7.21**	**355**	4.7	238.5	485.3	76.3
6	**27.5**	**7.1**	**353**	4.5	238.1	484.2	74.2
7	**28.6**	**7.2**	**352**	4.1	242.4	482.8	81.2
8	**29.9**	**7.31**	**373**	3.5	254.5	456.2	95.5
9	**30.1**	**7.3**	**372**	3.6	252.2	484.9	93.4
10	**28.5**	**7.2**	**359**	4.3	241.3	483.4	77.3

The pH of water ranged between 7.1 TO 7.5. The DO ranged between3.4mg/L to 5.4 mg/L indicating that site 8 has high level of organic pollution and the site 1 has minimal organic pollution. The temperature ranged between 24◦C to 30.3◦C. The alkalinity ranged between 480.1mg/L to 486.2mgL, the conductivity ranged between 331µS to 383µS and the chloride ranged between 71.3mg/L to 95.5mg/L.To minimize the changes in the sample from collection to laboratory analysis, the sample was preserved soon after the collection by 10 % formalin.The preserved samples were brought to the laboratory for qualitative and quantitative analysis.

5.CONCLUSION

The present study indicated a minimal variation in water quality between the different sampling points. This minimal variation is likely due to presence of organic and inorganic pollutants in the pond. Among the zooplankton diversity, four species of Rotifers and four species of Copepods were found.

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