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# Biodiversity of Zooplanktons Found in Three Freshwater Bodies in Baramati City, Pune District, Maharashtra

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**Abstract:**

The present study examined the diversity of zooplanktons found in three different freshwater bodies Nira Left Bank Canal (S1), Karha River (S2), and Krantisurya Mahatma Phule water storage tank (S3), which are present in Baramati city, Maharashtra (India). As cosmopolitan organisms, zooplankton serve as crucial ecological indicators in water quality assessment and facilitate sewage disposal. Our research revealed a diverse array of zooplankton, comprising five groups: Rotifera, Cladocera, Copepoda, Ostracoda, and Protozoa. The observed zooplanktons comprised 13 Rotifera, 03 Cladocera, 06 Copepods, 02 Ostracods, and 05 Protozoans. Among five groups of Zooplanktons, the Rotifera group was found to be the most dominant group. From three selected sampling sites, it was found that sampling site 3(S3), Krantisurya Mahatma Phule water storage tank, has a high zooplankton diversity., it can be concluded that the Rotifers were dominant zooplankton in the S3 sampling site, with Cladocera as compared to the other two sites, while sites S1 and S3 have equal diversity of Copepods. Ostracods were distributed uniformly in all three sites, S1, S2, and S3. In site S3, protozoan diversity is more than other two sites (S1&S2). It can also be observed that the Rotifer was the dominant zooplankton group from all five groups, viz Rotifera, Cladocera, Copepoda, Ostracoda, and protozoa (Rotifera> Copepoda> Protozoa> Cladocera> Ostracoda).

**Keywords:** Zooplanktons, Rotifers, Cladocerans, Copepods, Protozoa, Ostracods, Occurrence, Baramati city.

**Introduction:**

Freshwater ecosystems, which cover approximately 2.5% of the earth's surface (Downing, 2010<sup>1</sup>), support a disproportionate amount of biodiversity (Strayer and Dudgeon, 2010<sup>2</sup>). The word 'ZOOPLANKTON' originates from the Greek language, where 'Zoon' refers to animals and 'Plankton' refers to drifting or wandering organisms. Zooplanktons are nothing but the organisms that can be found freely floating in the waters of lakes, rivers, and oceans. As a being heterotrophs, zooplanktons consume phytoplanktons, which facilitates nutrient regeneration and energy transfer to subsequent trophic levels.(Steinberg and Robert,2009)<sup>3</sup>. They serve as the primary natural food source for fish, playing a critical role in their survival and growth. They form the foundation of food chains and food webs in aquatic ecosystems. (Miah et al., 2013; Murugan et al., 1998; Dadhick and Saxena, 1999<sup>6</sup>; Sinha and Islam, 2002<sup>7</sup>; Park and Shin, 2007<sup>8</sup>). Zooplanktons play a key role in monitoring the ecological status of freshwater ecosystems, including water quality, eutrophication, and productivity (Mikschi, 1989). As they are sensitive to PH, Water temperature, and nutrient availability. Zooplankton communities are composed of a wide range of organisms including Protozoa, Rotifers, Cladocera, Copepoda, and Ostracoda (Rajagopal et al, 2010).

**Protozoa:**

Protozoans are also referred to as the First animals. These are the unicellular members of the zooplankton community. Planktonic protozoans are primarily composed of ciliates, flagellates, and amoebae. Due to their minute size, many protozoans are not sampled.

**Rotifers:**

Rotifers are also known as "Wheel bearers. Their name is derived from the rotating wheel of cilia, known as the Corona, which facilitates movement and sweeps food particles towards the mouth. Their body consists of the head, trunk, and foot. Some species have a body covered with a tough structure called as 'Lorica', such organisms are known as 'Loricated forms', while some species body is not covered by Lorica, they are known as 'illoricated forms'.

**Cladocera:**

They are referred to as 'Branched Horns'. Typically, Cladocera have a chitinous covering called 'Carapace'.

They are filter feeders because they capture organisms by filtering water. At low pollutant concentrations, they are extremely sensitive. Smaller zooplanktons, bacterioplanktons, and algae are the food source of this group.

#### Copepoda:

Copepods have a tough exoskeleton and stronger appendages, which enable them for powerful movement and allow them to navigate their environment with greater ease.

#### Ostracods:

Ostracods are the shell-like, bivalve organisms that belong to the phylum Arthropoda. They mainly dwell on the lake bottom and among the macrophytes. They consume dead organic matter and other plankton.

Indian zooplankton research began over a century ago (Edmondson, 1959; Battish, 1992). There is a notable absence or lack of studies on the diversity and variability of zooplankton at a regional level. Some research has been carried out on zooplankton diversity from various parts of India (Sharma and Sharma, 1998<sup>13</sup>; Khan, 2003; Kar, 2007; Sharma and Sharma, 2008; Khan, 1987; Rai and Datta, 1988; Khan, 2002; Kar and Barbhuiya, 2004<sup>20</sup>; Sharma, 2009; are existing. The present study aimed to assess the diversity of zooplankton in three freshwater bodies in Baramati city, Maharashtra. As there is a scarcity of literature from Baramati city on the Diversity of zooplankton. There is no work has been carried out in Baramati city. Thus, the present work was an attempt to study the diversity of zooplankton from Baramati city.

#### Materials and Methods

##### Study area:

Baramati is a city, a tehsil, and a municipal council in Pune district in the state of Maharashtra, India. Baramati lies on the Deccan plateau, southwest of Pune, at 18.15°N 74.58°E. The average elevation of Baramati is 538 meters (1,765 feet).

##### Selection of sampling sites:

The study involved the random selection of three sampling sites within Baramati city, specifically: Nira Left Bank Canal (S1) Lat 18.163619° Long 74.577568°, Karha River (S2) Lat 18.157645° Long 74.566927°, and Krantisurya Mahatma Phule water storage tank (S3) Lat 18.165474° Long 74.575641° for the purpose of investigating zooplankton diversity.

##### Collection of water sample:

Water samples were collected weekly from the three sites from October 2024 to March 2025, with sampling conducted between 9:00 and 11:00 am on each collection day. Sampling involved filtering water through a plankton net with a pore size of 25µ, followed by transportation of the collected samples to the laboratory for subsequent analysis.

##### Analysis of Zooplanktons:

The zooplanktons were examined under a light microscope at an initial magnification of 10X, with subsequent higher magnification. The photograph was taken of that observed specimen.

##### Identification of zooplanktons:

The zooplanktons were identified through the use of standardized keys and relevant published studies, viz. Battish, 1992; Edmondson, 1959; Sharma and Sharma, 2008, and through [https://cfb.unh.edu/cfbkey/html/groups\\_copepoda.html](https://cfb.unh.edu/cfbkey/html/groups_copepoda.html) link.

##### Sampling sites from Baramati city:



Fig 1. Nira left bank canal(S1)



Fig 2. Karha River(S2)



Fig 3. Krantisurya Mahatma Phule Water storage tank(S3)

#### Results:

In total 29 Zooplanktons were recorded in the three freshwater bodies from Baramati city. The observed zooplanktons comprised of 13 Rotifera, 03 Cladocera, 06 Copepods, 02 Ostracods and 05 Protozoans. This comprises of 44.82% of rotifers, 10.34% of Cladocera, 20.68% of Copepods, 6.89% of Ostracoda and 17.24% of Protozoans. The present study revealed the presence of 22 genera in the selected sampling sites from Baramati city. The recorded genera consist of Philodina, Philodinavus, Lecane, Cephalodella, Trichocerca, Brachionus, Tripleuchlanis, Monostyla of rotifer (13 genera), Daphnia, Bosmina and Moina of Cladocera (3 genera), Tropicyclopes, Mesocyclopes, Heliodiaptomus, Macrocylopes, Diacyclopes of Copepoda (5 genera), Cypridopsis

and Hemicypris of Ostracods (2 genera), Paramoecium, Vorticella, Stentor and Eploites of Protozoa (4 genera). It was found that a Total of 11 species of Rotifers, including roseola, paradoxus, bulla, luna, rotunda, similis, falcatus, calyciflorus, havanaensis, variabilis, and plicata. 2 species of cladocera includes longirostris and macrocopa. 5 species of copepods include prasinus, edax, viduus, fuscus, and thomasi. 1 species of ostracoda includes anomala. (Table no 1, 2, 3, 4, and 5) The protozoan population consists of 3 species, namely caudatum, bursaria, and campanula.

**Photo plate No.1**



**Photo plate No.2**



Photo plate No.3

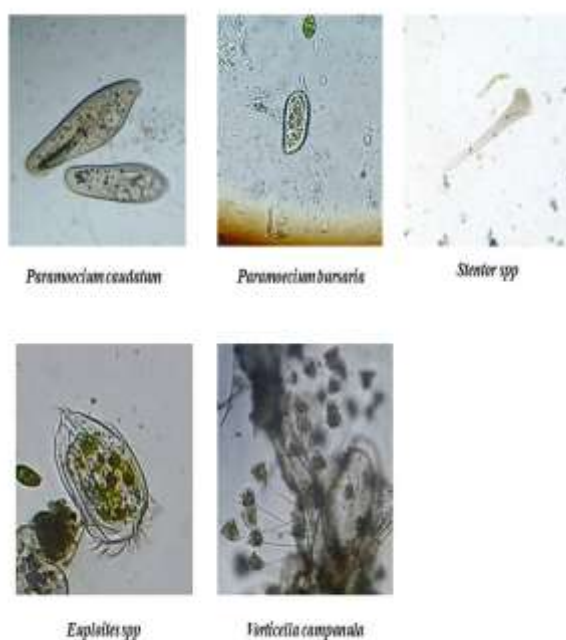


Table 1: List of group Rotifera species recorded in Baramati city

Class	Order	Family	Genus	Species
Eurotatoria	Bdelloidea	Philodinidae	<i>Philodina</i>	<i>roseola</i>
Eurotatoria	Bdelloidea	Philodinavidae	<i>Philodinavus</i>	<i>paradoxus</i>
Monogononta	Ploima	Lecanidae	<i>Lecane</i>	<i>bulla</i>
Monogononta	Ploima	Lecanidae	<i>Lecane</i>	<i>luna</i>
Eurotatoria	Ploima	Notommatidae	<i>Cephalodella</i>	<i>rotunda</i>
Eurotatoria	Ploima	Trichocercidae	<i>Trichocerca</i>	<i>similis</i>
Monogononta	Ploima	Lecanidae	<i>Lecane</i>	-
Eurotatoria	Ploima	Brachionidae	<i>Brachionus</i>	<i>falcatus</i>
Monogononta	Ploima	Brachionidae	<i>Brachionus</i>	<i>calyciflorus</i>
Monogononta	Ploima	Brachionidae	<i>Brachionus</i>	<i>havaensis</i>
Monogononta	Ploima	Brachionidae	<i>Brachionus</i>	<i>variabilis</i>
Monogononta	Ploima	Euchlanidae	<i>Tripleuchlanis</i>	<i>plicata</i>
Monogononta	Ploima	Lecanidae	<i>Monostyla</i>	<i>bulla</i>

Table 2: List of group Cladocera species recorded in Baramati city.

Class	Order	Family	Genus	Species
Branchiopoda	Anomopoda	Daphniidae	<i>Daphnia</i>	-
Branchiopoda	Anomopoda	Bosminidae	<i>Bosmina</i>	<i>longirostris</i>
Branchiopoda	Diplostraca	Moinidae	<i>Moina</i>	<i>macrocopa</i>

Table 3: List of group Copepod species recorded in Baramati city.

Class	Order	Family	Genus	Species
Copepoda	Cyclopoida	Cyclopidae	<i>Tropocyclopes</i>	<i>prasinus</i>
Maxillopoda	Cyclopoida	Cyclopidae	<i>Mesocyclopes</i>	<i>edax</i>
Copepoda	Calanoida	Diaptomidae	<i>Heliodiaptomus</i>	<i>viduus</i>
Maxillopoda	Cyclopoida	Cyclopidae	<i>Macrocylopes</i>	<i>fuscus</i>
Copepoda	Cyclopoida	Cyclopidae	<i>Cyclopes</i>	<i>crassicaudis</i>
Copepoda	-	-	Nauplius larva	-

Table 4: List of group Ostracoda species recorded in Baramati city.

Class	Order	Family	Genus	Species
Ostracoda	Podocopida	Cyprididae	<i>Cypridopsis</i>	-
Ostracoda	Podocopida	Cyprididae	<i>Hemicypris</i>	<i>anomala</i>

**Table 5: List of group Protozoa species recorded in Baramati city**

Class	Order	Family	Genus	Species
Oligohymenophorea	Peniculida	Paramaecidae	<i>Paramoecium</i>	<i>Caudatum</i>
Oligohymenophorea	Peniculida	Paramaecidae	<i>Paramoecium</i>	<i>bursaria</i>
Ciliata	Peritrichida	Vorticellidae	<i>Vorticella</i>	<i>campanula</i>
Heterotrichea	Heterotrichida	Stentoridae	<i>Stentor</i>	-
Spirotrichea	Euplotida	Euplotidae	<i>Euplotes</i>	-

**Table 6: Showing the Abundance of Rotifer species from different sampling sites in Baramati city.**

Species Name	Nira left bank canal (S1)	Karha River (S2)	Krantisurya Mahatma Jyotiba Phule water storage tank (S3)
<i>Philodina roseola</i>	-	+	-
<i>Philodinavus paradoxus</i>	-	+	-
<i>Lecane bulla</i>	-	+	-
<i>Lecane luna</i>	+	-	-
<i>Cephalodella rotunda</i>	+	+	-
<i>Trichocerca similis</i>	+	-	-
<i>Lecane spp</i>	-	-	+
<i>Brachionus falcatus</i>	-	+	+
<i>Brachionus havanesis</i>	-	-	+
<i>Brachionus calyciflorus</i>	-	-	+
<i>Brachionus variabilis</i>	+	+	+
<i>Tripleuchlanis plicata</i>	-	-	+
<i>Monostyla bulla</i>	+	-	+

**Table No. 7: Showing the Abundance/occurrence of Cladocera species from different sampling sites in Baramati city.**

Species Name	Nira left the bank canal (S1)	Karha river (S2)	Krantisurya Mahatma Jyotiba Phule water storage tank (S3)
<i>Daphnia sps</i>	-	+	-
<i>Bosmina longirostris</i>	+	-	+
<i>Moina macrocopa</i>	-	-	+

**Table No. -8: Showing Abundance/occurrence of Copepod species from different sampling sites in Baramati city.**

Species Name	Nira left the bank canal (S1)	Karha river (S2)	Krantisurya Mahatma Jyotiba Phule water storage tank (S3)
<i>Cyclops sps</i>	-	+	-
<i>Mesocyclops edax</i>	+	-	+
<i>Heliodiaptomus viduus</i>	-	-	+
<i>Cyclopes crassicaudis</i>	+	-	-
<i>Macrocyclus fuscus</i>	+	-	-
<i>Nauplius larva</i>	-	+	+

**Table No 9: Showing Abundance/occurrence of Ostracoda species from different sampling sites in Baramati city.**

Species Name	Nira left bank canal (S1)	Karha river (S2)	Krantisurya Mahatma Jyotiba Phule water storage tank (S3)
<i>Cypridopsis</i>	+	-	-
<i>Hemicypris anomala</i>	-	+	+

**Table No. 10: Showing the Abundance of Protozoa species from different sampling sites in Baramati city.**

Species Name	Nira left bank canal (S1)	Karha river (S2)	Krantisurya Mahatma Jyotiba Phule water storage tank (S3)
<i>Paramoecium caudatum</i>	+	+	-
<i>Paramoecium bursaria</i>	-	+	-
<i>Vorticella campanula</i>	+	-	+
<i>Stentor sps</i>	-	+	-
<i>Euplotes sps</i>	-	+	-



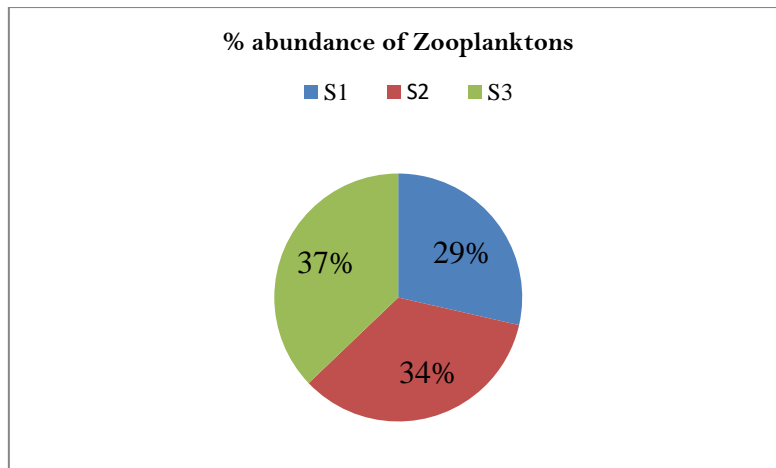


Fig 1: Showing % abundance of zooplanktons in three sampling sites i.e S1, S2 and S3 from Baramati city

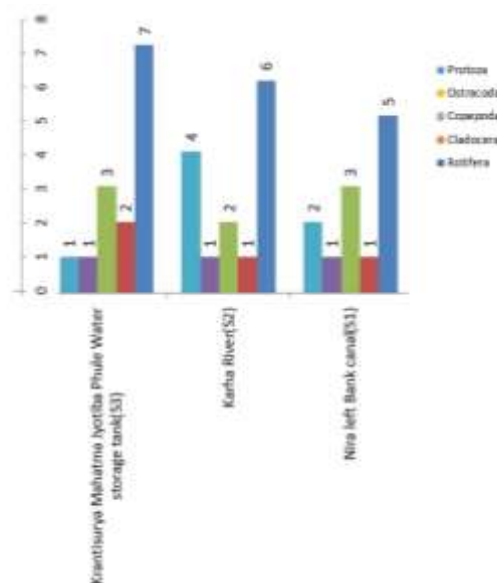


Fig.2 Occurrence of Five groups (Protozoa, Ostracoda, Copepoda, Cladocera, Rotifera) in three sampling sites (S1, S2, and S3) in Baramati city.

#### Discussion:

This study found that Rotifera was the dominant zooplankton group. The same report was observed by Mwebaza and Nadwula, 2005 out of 13 rotifers 4 rotifers *Lecane luna*, *Cephalodella rotunda*, *Trichocerca similis*, and *Monostyla bulla* found in S1 site. 4 rotifers *Philodina roseola*, *Phiodinavus paradoxus*, *Lecane bulla*, *Cephalodella rotunda* found in S2 site. 6 rotifers found in S3 site namely *Brachionus sps*, *Brachionus falcatus*, *Brachionus havanaensis*, *Brachionus calyciflorus*, *Tripleuchlanis plicata* and *Monostyla bulla* (Table no. 6). From 3 cladocera species 1 genus *Daphnia* is found in S2 site and 2 genus and 2 species found in S3 site i.e *Bosmina longirostris* and *Moina macrocopa* (Table no-7). 3 species of Copepods were observed in S1 site namely *Mesocyclops edax*, *Cyclops crassicaudis*, *Macrocylops fuscus*. 2 species were observed from S2 site, which are *Cyclops sps* and *Nauplius larva*. 3 Species of copepoda such as *Mesocyclops edax*, *Heliodyptomus viduus*, and *Nauplius larva* were found in S3 site (Table no-8). 1 Species of cypridopsis found in S1 site, 1 species which is *Hemicypris anomala* found from S2 site and S3 site. *Paramoecium caudatum* and *Vorticella campanula* found in S1 site. 4 Protozoans which are *Paramoecium caudatum*, *Paramoecium bursaria*, *Vorticella campanula* and *Stentor spp.* found in S2 site. only one species of Protozoa, *Vorticella campanula* found in S3 site.

#### Conclusion:

Among the three selected sampling sites from Baramati city, namely Nira left canal (S1), Karha river (S2), and Krantisurya Mahatma Jyotiba Phule water storage tank (S3). From the above study, it can be concluded that the Rotifers were dominant zooplankton in the S3 sampling site, with Cladocera as compared to the other two sites, while sites S1 and S3 have equal diversity of Copepods. Ostracods were distributed uniformly in all three sites, S1, S2, and S3. In site S3, protozoan diversity is more than other two sites (S1 & S2). It can also be observed that the Rotifer was the dominant zooplankton group from all five groups, viz Rotifera, Cladocera, Copepoda, Ostracoda, and protozoa (Rotifera > Copepoda > Protozoa > Cladocera > Ostracoda).

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Nil.

### Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

### References:

1. Downing, J. A. (2010). Emerging global role of small lakes and ponds: little things mean a lot. *Limnetica*, 29(1), 0009-24.
2. Strayer, D. L., & Dudgeon, D. (2010). Freshwater biodiversity conservation: recent progress and future challenges. *Journal of the North American Benthological Society*, 29(1), 344-358.
3. Steinberg, D. K., & Condon, R. H. (2009). Zooplankton of the York River. *Journal of Coastal Research*, (10057), 66-79.
4. Miah, M. F., Roy, S., Jinnat, E., & Khan, Z. K. (2013). Assessment of Daphnia, Moina and Cyclops in freshwater ecosystems and the evaluation of mixed culture in laboratory. *American International Journal of Research in Formal, Applied & Natural Sciences*, 4(1), 1-7.
5. Murugan, N., Murugavel, P., & Koderkar, M. S. (1998). Freshwater cladocera. *Indian Associ of Aqua Biologists (IAAB)*, Hyderabad, 1-47.
6. Dadhich, N., & Saxena, M. M. (1999). Zooplankton as indicators of trophic status of some desert waters near Bikaner (NW Rajasthan). *Journal of Environment and Pollution*, 6(4), 251-254.
7. Sinha, B., & Islam, M. R. (2002). Seasonal variation in zooplankton population of two lentic bodies at Assam State Zoo cum Botanical Garden, Guwahati, Assam. *Ecology Environment and Conservation*, 8, 273-278.
8. Park, K. S., & Shin, H. W. (2007). Studies on phyto-and-zooplankton composition and its relation to fish productivity in a west coast fish pond ecosystem. *Journal of Environmental Biology*, 28(2), 415.
9. Mikschi, E. (1989). Rotifer distribution in relation to temperature and oxygen content. In *Rotifer Symposium V: Proceedings of the Fifth Rotifer Symposium, held in Gargnano, Italy, September 11-18, 1988* (pp. 209-214). Springer Netherlands.
10. Rajagopal, T., Thangamani, A., Sevarkodiyone, S. P., Sekar, M., & Archunan, G. (2010). Zooplankton diversity and physico-chemical conditions in three perennial ponds of Virudhunagar district, Tamilnadu. *Journal of Environmental Biology*, 31(3), 265-272.
11. Edmondson, W. T. (1959). *Fresh-water Biology*.
12. Battish, S. K. (1992). *Freshwater zooplankton of India*. Oxford & IBH Publishing Company.
13. Sharma, B. K., & Sharma, S. (1998). *Freshwater Rotifers (Rotifera: Eurotatoria)*. Fauna of West Bengal. State Fauna Series, 3(11), 341-461.
14. Khan, R. A. (2003). Faunal diversity of zooplankton in freshwater wetlands of Southeastern West Bengal.
15. Kar, D. (2007). *Fundamentals of Limnology and Aquaculture Biotechnology: A Treatise on the Limnology and Fisheries of the Water Bodies in Southern Assam, Mizoram and Tripura*. Daya Books.
16. Sharma, S., & Sharma, B. K. (2008). *Zooplankton diversity in floodplain lakes of Assam*. (No Title).
17. Khan, M. A. (1987). Observations on Zooplankton Composition, Abundance and Periodicity in two Flood-plain Lakes of the Kashmir Himalayan Valley. *Acta hydrochimica et hydrobiologica*, 15(2), 167-174.
18. Rai, D. N., & Dutta-Munshi, J. M. (1982). Ecological characteristics of chauras of North Bihar. *Wetlands-ecology and management*, 2, 89-95.
19. Khan, R. A. (2002). The ecological and faunal diversity of two ox-bowlakes of southeastern West Bengal. *Record Zoological Survey of India. Occasional paper*, (194), 1104.
20. Kar, D., & Barbhuiya, M. H. (2004). Abundance and diversity of zooplankton in Chatla Haor, a floodplain wetland in the Cachar district of Assam. *Environment and ecology*, 22(1), 247-248.
21. Sharma, B. K. (2009). Diversity of rotifers (Rotifera, Eurotatoria) of Loktak lake, Manipur, North-eastern India. *Tropical Ecology*, 50(2), 277.
22. Mwebaza-Ndawula, L. S. B. K., Sekiranda, S. B. K., & Kiggundu, V. (2005). Variability of zooplankton community along a section of the Upper Victoria Nile, Uganda. *African Journal of Ecology*, 43(3), 251-257.