

## **Zooplankton Composition and Abundance In Goronyo Reservoir, Sokoto State, Nigeria**

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**Abstract:** Anthropogenic activities affect water quality and biological resources such as zooplankton community. A survey on the taxonomic composition and relative abundance of zooplankton groups was conducted in goronyo reservoir between the periods of May and August 2013. A total of 20 and 17 zooplankton species in May and August belonging to three (3) major taxonomic groups namely; cladoceran, copepods and rotifers were identified from goronyo reservoir. These include three(3) species of copepods, four(4) species of cladoceran and thirteen (13) species of rotifers were recorded in May, while three(3) species of copepods, three (3) species of cladoceran and eleven (11) species of rotifers were identified in August. Species present in May but Absent in August include *Bosmina Sp*, *Trichocera Elongata*, *Branchinous falcatus*, *Branchinous Angularis* and *Keratella Cochlearis*. While those present in August but absent in May include *brachinous patulus* and *Ptyra Melicerta*. The percentage relative abundance of Zooplankton in Goronyo Reservoir for both sampling months indicates that the rotifers has the highest dominant species with (39.7% and 59.3%) for both season, followed by the copepods (39.5% and 24.7%) and the least dominated are the cladoceran(20.8% and 16.0%).

**Key words:** Zooplankton, Goronyo Reservoir, Cladocera, Copepoda, Rotifa.

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### **I. Introduction**

The goronyo reservoir created by the Dam is the second largest man-made lake in Nigeria and covers an area of 200km<sup>2</sup> (20,000ha), has a full storage level of +287.50 m.a.s.l. and capable of storing nine hundred and forty two million cubic meters (942 x 10<sup>6</sup>m<sup>3</sup>) (http 1,2019).

The two hundred kilo meter square (200km<sup>2</sup>) Lake formed by the dam has boosted the fishing activities and tourism in this area, The Goronyo dam used for Water supply of Sokoto & Kebbi States, Irrigation, Recharging of aquifer, Flood Regulation, Fisheries and Tourism (http 1,2019).

Zooplankton plays important roles in the energy and material transfer in waterbodies as the consumers of phytoplankton (Welch, 1992; Garesoupe 1982; Kibria *et al.*, 1997 and Adedeji *et al.*, 2013). Zooplankton are also known as a valuable source of protein, amino acids, lipids, fatty acids and essential minerals and enzymes needed by aquatic organisms for effective normal growth and survival. Several studies have also indicated improved performance of fish larvae fed natural indigenous live zooplankton (Lubzen, 1987; Ovie *et al.*, 1993; Adeyemo *et al.*, 1994 and Adedeji *et al.*, 2013). while according to (Alam and Cheah, 1993 and Adedeji *et al.*, 2013), both live and frozen zooplankton have also been used in commercial and experimental aquaculture. Zooplankton consists of macro and microscopic animals, comprising representatives of almost all major taxa particularly the invertebrates (Gosswami, 2004; Anamunda, 2015). Zooplankton can also be categorized as herbivorous and carnivorous based on their nature of feeding, and in turn makes up an important food item to other aquatic animals in the higher trophic levels (Haven, 2002 and Anamunda, 2015). Studies have also shown that zooplankton species have different tolerance limits towards the physico-chemical parameters; Balakrishna *et al.* (2013) reported changes of zooplankton species densities as affected by changes in physico-chemical parameters in different seasons. According to Waikato Environmental Technical Report (2008), presence of rotifers can be used to grade eutrophic status of the lakes. Several studies have revealed that both quality and quantity abundance of plankton communities in fishponds vary from location to location and pond to pond within the same location even under similar ecological conditions (Boyd, 1982; Chowdhury and Mamun, 2006; Bhuiyan *et al.*, 2008). Factors that affect plankton distribution and abundance include season, physical and chemical parameters, water movement, soil, and biological factors (Davies *et al.*, 2009). The present study is aimed at evaluating seasonal (wet and dry) variations of zooplankton taxonomy, species compositions and abundance in goronyo reservoir for a period of one year.

## II. Materials and Method

### Study Area

The study area, Goronyo Reservoir, is located between latitudes 13°30'N to 14°N and longitudes 5°30'E to 6°E (Ita *et al.*, 1982; sheikh *et al.*, 2017). The Reservoir has a length of about 20km with a width of about 10km and an area of about 200km<sup>2</sup> with a storage capacity of 942 million cubic metres (Ita *et al.*, 1982; sheikh *et al.*, 2017). The study area is located in Goronyo Local Government Area, Sokoto State, Northwest Nigeria. The study area is part of the Sokoto-Rima basin, which has a total catchment area of about 193,000km<sup>2</sup> distributed in Nigeria and the Niger Republic (Gill, 1974; sheikh *et al.*, 2017).

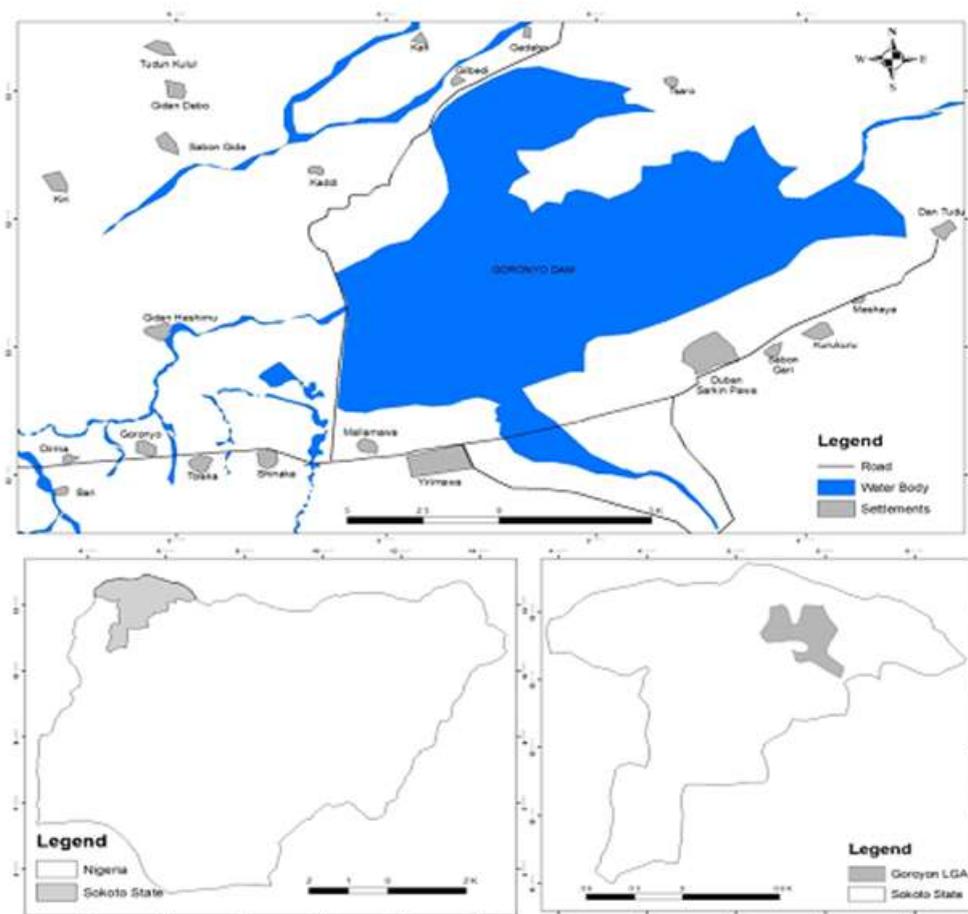


Figure 1: The Study Area (Goronyo Reservoir); Source: NASRDA, 2012

### Sampling

Zooplankton samples were collected from four sampling stations in May and August, 2013. Using a zooplankton net with mesh sieve of 50µm and preserved in 10% formalin Samples were allowed to stand undisturbed for over 24 h on a flat surface to enable settling of organism. Thereafter, the sample volume was reduced to about 10 ml by siphoning with a pipette fitted with a flexible rubber tubing of 5 mm diameter. The tip of the pipette was also fitted with a 50µm mesh size zooplankton net to prevent accidental loss of organisms during siphoning (Ovie, 1997)

### Identification of Zooplankton

Zooplankton species were identified under an Olympus inverted compound microscope with the aid of Jeje and Fernando (1986). The quantitative estimation was done according to Ovie (1991). Taxonomic identification of the copepods was restricted to the two major groups of cyclopoids and calanoids for lack of appropriate dissecting facilities to accomplish their identification even to the genus level.

## III. Result Discussion

A total of 22 zooplankton genera, (20) species in May and seventeen (17) in August belonging to three(3) major taxonomic groups namely; cladoceran, copepods and rotifers were identified from goronyo reservoir. These include three species of copepods, four species of cladoceran and 13 species of rotifers which

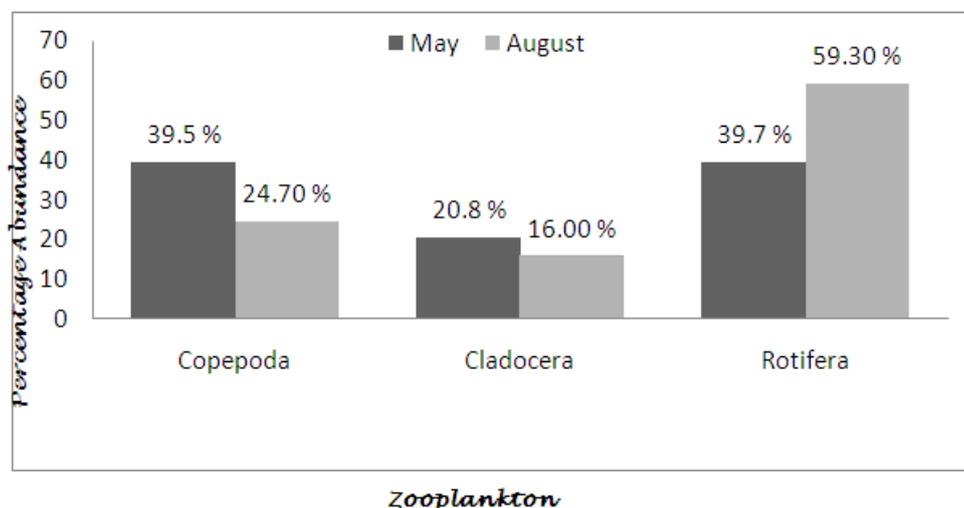
were recorded in May, while two(2) species of copepods, three (3) species of cladoceran and eleven (11) species of rotifers were identified in August. Species present in May but Absent in August include *Bosmina Sp*, *Trichocera Elongata*, *Branchinous falcatus*, *Branchinous Angularis* and *Keratella Cochlearis*. While those present in Augustbut absent in May include *brachinous patulus* and *Ptyra Melicertaas* shown in checklist of zooplankton species (TABLE 2).

Table 1 and Figure 1 shows the Taxonomic Group Abundance of Zooplankton in Goronyo Reservoir for both sampling month which indicates that the rotifers has the highest relative abundance of (39.7% and 59.3%) for both season of the reservoir sampling, followed by the copepods (39.5% and 24.7%) and the least dominated are the cladoceran (20.8% and 16.0%) of the relative abundance of the zooplankton community

**Table 1:** Taxonomic group abundance of zooplankton in Gonyoro Reservoir

| Month  | Station | Taxonomic Group | Total species/ litre | Percentage composition (%) |
|--------|---------|-----------------|----------------------|----------------------------|
| May    | 1       | Rotifera        | 2.15                 | 39.7                       |
|        | 3       | Cladocera       | 1.13                 | 20.8                       |
|        | 4       | Copepoda        | 2.14                 | 39.5                       |
| August | 1       | Rotifera        | 2.04                 | 59.30                      |
|        | 3       | Cladocera       | 0.55                 | 16.00                      |
|        | 5       | Copepoda        | 0.85                 | 24.70                      |

hints: stations 1; Damsite  
3; Midstream  
4; Inlet  
5; Downstream



**Figure 2:** Taxonomic group abundance of zooplankton in Gonyoro River

**Table 2:** Check List of Zooplankton Species of May and Augustin Goronyo Reservoir

| Zooplankton Species              | May | August |
|----------------------------------|-----|--------|
| <b>Copepoda</b>                  |     |        |
| <i>Copepodite</i>                | +   | +      |
| <i>Cyclopodite copepods</i>      | +   | +      |
| <i>Calanoid copepods</i>         | +   | +      |
| <b>Cladocera</b>                 |     |        |
| <i>Nauplii Sp.</i>               | +   | +      |
| <i>MoinaMicrura</i>              | +   | +      |
| <i>DiaphanosomaExcisum</i>       | +   | +      |
| <i>Bosmina Sp.</i>               | +   | -      |
| <b>Rotifera</b>                  |     |        |
| <i>Polyartha Sp.</i>             | +   | +      |
| <i>Filina Opoliensis</i>         | +   | +      |
| <i>KeratellaTropica</i>          | +   | +      |
| <i>Branchinous Diversiconis</i>  | +   | +      |
| <i>Trichocera Cylindrica</i>     | +   | +      |
| <i>Branchionus Calyciflorous</i> | +   | +      |
| <i>Asplanchna Sp.</i>            | +   | +      |
| <i>Filinia Longiseta</i>         | +   | +      |
| <i>Branchionus Patulus</i>       | -   | +      |

|                              |           |           |
|------------------------------|-----------|-----------|
| <i>Ptygra Melicerta</i>      | -         | +         |
| <i>Trichocera Elongata</i>   | +         | -         |
| <i>Branchinous Falcatus</i>  | +         | -         |
| <i>Branchinous Angularis</i> | +         | -         |
| <i>Keratella Cochlearis</i>  | +         | -         |
| <i>Lecane Sp.</i>            | +         | +         |
| <b>Total</b>                 | <b>20</b> | <b>17</b> |

**Key; += present. - = absent**

#### IV. Conclusion

The present study reports on the survey of taxonomical composition and relative abundance of zooplankton which was conducted between the periods of May and August 2013 in goronyo reservoir. The results suggest/indicated that (22) zooplankton genera belonging to three major taxonomic group were identified. The average zooplankton densities were 1.81(Ind/m<sup>3</sup>) and 1.15(Ind/m<sup>3</sup>) for the period of May and August respectively. The rotifers (39.7% and 59.30%) had the highest number of dominance spices in terms of relative abundance for both period of sampling, followed by the copepods (39.5% and 24.70%) while the cladocerans (20.8% and 16.0%) were the least dominated of the relative abundance of the zooplankton community. The difference in dominance of species in both sampling could be attributed to the reservoir physico-chemical parameters such as salinity, temperature, turbidity and dissolve oxygen.

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