A Study on Phytoplanktonic Composition in Dadin-Kowa Dam, Gombe State, Nigeria

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ABSTRACT

This study was carried out to evaluate species composition and distributions of phytoplankton in relation to changes in some physico-chemical characteristics of water in Dadin-Kowa Dam, Gombe State, Nigeria. Samples were collected using plankton net by hauling for five meters. Samples were kept in plastic containers and preserved in 4% formalin and logols iodine solution. 1 ml of sub-sample was observed under microscope. Physico-chemical parameters recorded include water temperature which ranged between 28°C and 31.9°C, pH ranged from 7.1 to 8.9, Transperancy ranged from 0.06m to 0.16m, Dissolved oxygen range from 1.7 to 3.9mg/l and Conductivity ranged from 81 to 100µs/cm. 22 species of phytoplanktons were recorded and the maximum mean density was 92,105 cell/L and minimum was 44,317 cell/L. The dominant phytoplankton was Bacillariophyceae38.1%, followed by order Chlorophyceae 35.4%, Myxophyceae25.3% and Chrysophyceae 1.22%. (The phytoplankton varied significantly with months of sampling.)
INTRODUCTION

Aquatic environment is the most diverse ecosystem in the world. The first life originated in the water and first organisms were also aquatic where water was the principle external as well as internal medium for organisms. Thus water is the most vital factor for the existence of all living organisms. Water covers about 71% of the earth of which more than 95% exists in the oceans; an average depth of 3800 meter (12,500 feet), the volume being about 1370 x 10^28 km^3. A much less amount of water is contained in rivers (0.00015%) and lakes (0.01%) which comprise the most valuable fresh water resources (Tideman, 2000).

The plankton community is a mixed group of tiny plants and animals floating, drifting or feebly swimming in the water mass(Hensen, 1997). Plankton is diverse group of organisms that live in the water column and cannot swim against a current. The name plankton is derived from plantos, meaning errant, and by extension “wanderer” or drifter. Some forms are capable of independent – movement and can swim hundreds of meters vertically in a single day; their horizontal position is primarily determined by the surrounding currents (Hensen,1997).

Phytoplankton

The photosynthetic component of the plankton is known as the phytoplankton. It consists of phytoplankton classes includes: Bacillariophyceae, Cyanophyceae and Dinophyceae. Phytoplankton is microscopic single celled aquatic plants forming the prime component in the food chain of an aquatic ecosystem. The fertility of sea is determined by its bio productivity. Phytoplankton production contributes about 95% of total production in the marine environment (Mani, 1993).

The complex plankton community comprises primary producers, herbivores, carnivores, dentrivores and decomposer organisms. Thus, prokaryotes, plants and animals are the plankton. Primary producers are the basis for the planktonic food web and food energy in other aquatic communities (Porter,1976).

Aim of Study: This study is aimed at providing information on the phytoplankton population in Dadinkowas Dam, by identify the species and distribution of phytoplankton in each sampling site.-Evaluate monthly variations in the abundance and distribution of phytoplankton species among sampling sites.- Determine the physico-chemical characteristics of the water as it influence phytoplankton distribution in the Dam.

Study area: The research work was carried out in Dadinkowas Dam, located at Yamaltu Deba local Government area of Gombe State in Northeast of Nigeria. Its lies between latitude 10° 19’ 10’ N and longitude 11° 28 54’ E with a capacity of 800 million cubic meters of water and a total surface area of 300 km^2. The average annual temperature is about 24°C and mean annual rainfall of 850mm, relative humidity range from 15-80%. The area experiences two seasons, the wet (April-October) and dry season (November-March), with Sudan savanna vegetation.(Mike,2010).

Sample collection: Samples were collected from three different locations: Station A, where fishing activities occurs, Station B, where anthropogenic activities take place and Station C, where irrigation activities occur. Samples were collected from each station using plankton net of mesh size 55µm by hauling the sampler horizontally for five meters according to the method of Anene (2003). The resultant concentrated plankton samples were then transferred to plastic containers, and preserve in 4% formalin solution and Logols iodine solution according to the method of Boney (1983) and Anene (2003) in the field. Samples were collected once a month for six months (July- December 2014).

Determination of Physico-Chemical Parameters

Some water quality parameters monitored during period of the study where, Water temperature was measured using thermometer (Model;YXI 550) by dropping the thermometer into the plastic sample bottle. The reading was recorded insitu in the field.

The transparency was measured using black-white Secchi disc. The measurement was done by lowering the disc into the water gradually until it disappeared from sight, then it was removed gently till it appeared. The average depth of its disappearance and reappearance was noted.

Multiphotometer dissolved oxygen analyzer (model;YXI 550) was used to determine the dissolved oxygen. This was done by collecting water sample in a cylindrical bottle and putting the tip of the analyzer to take the reading.

The conductivity of the water was taken using conductivity meter (model;YSI 63) and the reading was recorded.

The pH was determined using pH-meter (model;YSI 63) by inserting the tip soft of the meter in sampling bottle containing water. The corresponding pH values were recorded.

Sample Analysis: Phytoplankton samples were concentrated to 30ml volume before the analysis was done. Sample was homogenized by inverting the container or bottle few times, with a wide mouthed pipette, 1ml of the plankton sub-sample was withdrawn from the field samples, and placed on a sedge-wick raft-couning chamber with cover slip and observed by direct microscopy. keys provided by standard works of Botes,2001,Emi and Catlin,2007, APHA 1998 and various authors were used for species identifications. Counts were made in triplicates and their averages were taken and expressed as cell/ml of water.

Statistical Analysis: The number of organisms per liter of water was calculated from the following relationship.
The volume of the Dam water filtered by the sampler was calculated using the equation:

\[ V = \pi r^2 L, \]

Where \( \pi = 3.1415 \), \( r \) = diameter of the net sampler in \( \text{m} \), and \( L \) = length haul by net in meters (Robert, 2003). ANOVA was used to analyze the data.

RESULTS

The physico-chemical parameters recorded in Dadinkowa Dam indicating various ranges of the parameters; the air temperature range from 26°C to 38°C and water temperature range from 28°C to 31.9°C. The lowest mean water pH value of 7.5 was recorded at Site A and highest pH value of 8.9 was recorded at Site B & C during the sampling periods (Table 1). The lowest mean transparency value of 0.06 m was recorded at Site A & B and the highest value of 0.16 m at Site B & C. The lowest mean dissolved oxygen value of 1.7 mg/l was recorded at Site C and highest value of 3.9 mg/l was recorded at site A (Table 1). The conductivity of the water body recorded its lowest mean water value of 81 µS/cm at site A & B and the highest conductivity value of...
100\mu\text{s/cm} was recorded at site A during the sampling periods (Table 1). A total number of three phytoplankton taxa were identified at Site B and C and four taxa at site A with ten plankton species identified at both sites. A total of phytoplankton crop was 69,475 cell/l recorded in the Month of July in all the site samples. Four Phytoplankton taxa were identified at site B and C and three taxa at site A, with ten plankton species identified at both sites. A total of phytoplankton crop was 69,475 cell/l recorded in the Month of July in all the site samples. Four phytoplankton taxa were identified at site B and C and three taxa at site A, with ten phytoplankton species recorded in August. The number of cells recorded per liter of water sample is 92,105 cell/l. Three phytoplankton taxa were identified at site A and C and four taxa at site B with fourteen species recorded in the Month of September with 89,475 cell/l.

### Table 1: Measurement of Physico-Chemical Parameters Sampled in Dadin-kowa Dam from July to December 2014

| Site | Parameters | Mean (\(\bar{x}\)) | Range | Mean (\(\bar{x}\)) | Range | Mean (\(\bar{x}\)) | Range |
|------|------------|---------------------|-------|---------------------|-------|---------------------|-------|
| A    | Air temperature °C | 31.1 | 26-35 | 31.8 | 28-35 | 33.0 | 26-38 |
| B    | Water temperature °C | 28.8 | 28-30 | 29.2 | 28-31.9 | 28.9 | 28-31.6 |
| C    | pH | 8.1 | 7.5-8.8 | 8.3 | 8.0-8.9 | 8.3 | 7.6-8.9 |
|      | Transparency (m) | 0.12 | 0.06-0.15 | 0.13 | 0.06-0.16 | 0.13 | 0.07-0.16 |
|      | Dissolved Oxygen (mg/l) | 3.2 | 2.3-3.9 | 2.7 | 1.8-3.5 | 2.6 | 1.7-3.6 |
|      | Conductivity (\(\mu\text{s/cm}\)) | 91.8 | 81-100 | 90.0 | 81-97.2 | 91.7 | 85-97 |

### Table 2: Phytoplankton taxa and species composition which recorded at different stations during July, 2014

| Site | Phytoplankton taxa | Species | No. of cells/L | Abundance % |
|------|---------------------|---------|---------------|-------------|
| A    | Chlorophyceae:      | Ankistrodesmus sp. | 5789 | 21.1 |
|      |                     | Chlorella sp. | 4211 | 15.4 |
|      |                     | Ulothrix sp | 1581 | 5.8 |
|      | Bacillariophyceae:  | Fragilaria sp | 7895 | 28.8 |
|      |                     | Tabellaria sp | 1052 | 3.8 |
|      | Myxophyceae:        | Aphanocapsa sp | 4211 | 15.4 |
|      |                     | Oscillatoria sp | 526 | 1.9 |
|      |                     | Anabaena sp | 1579 | 5.8 |
|      | Chrysophyceae:      | Synura sp | 526 | 1.9 |
| B    | Chlorophyceae:      | Ankistrodesmus sp | 6842 | 25.5 |
|      |                     | Chlorella | 3684 | 13.7 |
|      | Bacillariophyceae:  | Fragilaria sp | 6842 | 25.5 |
|      | Myxophyceae:        | Aphanocapsa sp | 7894 | 29.4 |
|      |                     | Anabaena sp | 1,579 | 5.8 |
| C    | Chlorophyceae:      | Enteromorpha sp | 1053 | 6.9 |
|      |                     | Chlorella | 2105 | 13.8 |
|      | Bacillariophyceae:  | Fragilaria sp | 5263 | 34.5 |
|      | Myxophyceae:        | Aphanocapsa sp | 6315 | 41.4 |
|      |                     | Oscillatoria sp | 526 | 3.5 |
|      | Chrysophyceae:      | - | - | - |
| Total |                     | - | - | - |

Four phytoplankton taxa identified per each site, with ten species and a total number of cells per liter of water sampled for October recorded as 72,105 cell/l. In November, four phytoplankton taxa were identified each at site A and B and three taxa at site C with 13 species recorded. The number of cells recorded per liter of water sample was 61,580 cell/l. During the Month of December, three phytoplankton taxa were recorded per site with a total number of eight species and the total phytoplankton crop of 44,317 cell/l.
Table 3: Phytoplankton taxa and species composition recorded at different stations during August, 2014

| Site | Phytoplankton taxa | Species          | No. of cells/L | Abundance % |
|------|--------------------|------------------|----------------|-------------|
| A    | Chlorophyceae:     | Chlorella sp     | 6316           | 17.9        |
|      |                    | Ankistrodesmus sp| 9474           | 26.9        |
|      | Bacillariophyceae: | Fragilari a sp   | 11053          | 31.3        |
|      |                    | Navicula sp      | 526            | 1.5         |
|      |                    | Nitzschia sp     | 1053           | 2.9         |
|      | Myxophyceae:       | Aphanizomenon sp | 1579           | 4.5         |
|      |                    | Aphanocapsa sp   | 5263           | 14.9        |

Table 4: Phytoplankton taxa and species composition recorded at different stations during September, 2014

| Site | Phytoplankton taxa | Species          | No. of cells/L | Abundance % |
|------|--------------------|------------------|----------------|-------------|
| A    | Chlorophyceae:     | Ankistrodesmus sp| 7895           | 27.3        |
|      |                    | Closterium sp    | 526            | 1.8         |
|      |                    | Eudorina sp      | 1053           | 3.6         |
|      |                    | Ulothrix sp      | 1579           | 5.5         |
|      | Bacillariophyceae: | Cyclorella sp    | 2632           | 9.1         |
|      |                    | Fragilari a sp   | 9474           | 32.7        |
|      |                    | Nitzschia sp     | 526            | 1.8         |
|      | Myxophyceae:       | Aphanocapsa sp   | 5263           | 18.2        |
|      |                    | Anabaena sp      | 7895           | 22.1        |
|      |                    | Mallamonas sp    | 1053           | 2.9         |
| B    | Chlorophyceae:     | Ankistrodesmus sp| 6842           | 19.1        |
|      |                    | Oocystis sp      | 2632           | 7.4         |
|      | Bacillariophyceae: | Cyclorella sp    | 5263           | 14.7        |
|      |                    | Fragilari a sp   | 10526          | 29.4        |
|      |                    | Tabellaria sp    | 526            | 1.5         |
|      | Myxophyceae:       | Aphanocapsa sp   | 7895           | 22.1        |
|      |                    | Anabaena sp      | 1053           | 2.9         |
|      |                    | Mallamonas sp    | 1053           | 2.9         |
| C    | Chlorophyceae:     | Ankistrodesmus sp| 5263           | 21.3        |
|      |                    | Ulothrix sp      | 1053           | 4.3         |
|      |                    | Zygnema sp       | 1053           | 4.3         |
|      | Bacillariophyceae: | Cyclorella sp    | 1053           | 4.3         |
|      |                    | Fragilari a sp   | 8947           | 36.2        |
|      |                    | Cymatopleura sp  | 526            | 2.1         |
|      | Myxophyceae:       | Aphanocapsa sp   | 6842           | 27.7        |

Total 92,105
Total 89,475
Table 5: Phytoplankton taxa and species composition which recorded at different stations during October, 2014

| Site | Phytoplankton taxa | Species               | No. of cells/L | Abundance % |
|------|--------------------|-----------------------|----------------|-------------|
| A    | Chlorophyceae:     | **Ankistrodesmus sp** | 7368           | 27.9        |
|      |                    | **Closterium sp**      | 1053           | 4.0         |
|      |                    | **Microsora sp**       | 1053           | 4.0         |
|      | Bacillariophyceae: | **Fragilaria sp**      | 6842           | 26.0        |
|      |                    | **Nitzschia sp**       | 526            | 2.0         |
|      |                    | **Tabellaria sp**      | 526            | 2.0         |
|      | Myxophyceae:       | **Anabaena sp**        | 1053           | 4.0         |
|      |                    | **Aphanocapsa sp**     | 6316           | 24.0        |
|      | Chrysophyceae:     | **Mallomonas**         | 1053           | 4.0         |
| B    | Chlorophyceae:     | **Ankistrodesmus sp**  | 5263           | 21.3        |
|      |                    | **Closterium sp**      | 526            | 2.1         |
|      |                    | **Microsora sp**       | 1053           | 4.3         |
|      | Bacillariophyceae: | **Fragilaria sp**      | 7895           | 31.9        |
|      |                    | **Navicula sp**        | 526            | 2.1         |
|      |                    | **Tabellaria sp**      | 526            | 2.1         |
|      | Myxophyceae:       | **Anabaena sp**        | 1053           | 4.3         |
|      |                    | **Aphanocapsa sp**     | 7895           | 31.9        |
|      | Chrysophyceae:     | **Mallomonas**         | 526            | 2.2         |
| C    | Chlorophyceae:     | **Ankistrodesmus sp**  | 6842           | 32.5        |
|      |                    | **Closterium sp**      | 526            | 2.5         |
|      |                    | **Microsora sp**       | 526            | 2.5         |
|      | Bacillariophyceae: | **Fragilaria sp**      | 6842           | 32.5        |
|      |                    | **Navicula sp**        | 1053           | 5.0         |
|      | Myxophyceae:       | **Anabaena sp**        | 1053           | 4.3         |
|      |                    | **Aphanocapsa sp**     | 4737           | 22.5        |
|      | Chrysophyceae:     | **Mallomonas sp.**     | 526            | 2.5         |
|      |                    | **Total**              |                | 72,105      |

Table 6: Phytoplankton taxa and species composition recorded at different stations during November, 2014

| Site | Phytoplankton taxa | Species               | No. of cells/L | Abundance % |
|------|--------------------|-----------------------|----------------|-------------|
| A    | Chlorophyceae:     | **Ankistrodesmus sp**  | 4211           | 18.6        |
|      |                    | **Closterium sp**      | 1053           | 4.7         |
|      |                    | **Oocystis sp**        | 2632           | 11.6        |
|      |                    | **Ulotaix sp**         | 526            | 2.3         |
|      | Bacillariophyceae: | **Cyclorella sp**      | 1579           | 6.9         |
|      |                    | **Fragilaria sp**      | 7895           | 34.9        |
|      |                    | **Navicula sp**        | 526            | 2.3         |
|      | Myxophyceae:       | **Anabaena sp**        | 1053           | 4.3         |
|      |                    | **Aphanocapsa sp**     | 4211           | 18.6        |
|      | Chrysophyceae:     | **Mallomonas sp.**     | 1053           | 4.0         |
| B    | Chlorophyceae:     | **Ankistrodesmus sp**  | 5263           | 27.0        |
|      |                    | **Eudorina sp**        | 526            | 2.7         |
|      |                    | **Oocystis sp**        | 1579           | 8.1         |
|      | Bacillariophyceae: | **Fragilaria sp**      | 7368           | 37.8        |
|      |                    | **Tabellaria**         | 526            | 2.7         |
|      | Myxophyceae:       | **Anabaena sp**        | 526            | 2.7         |
|      |                    | **Aphanocapsa sp**     | 3158           | 16.2        |
|      | Chrysophyceae:     | **Mallomonas sp.**     | 526            | 2.7         |
| C    | Chlorophyceae:     | **Ankistrodesmus sp**  | 2632           | 13.5        |
|      |                    | **Oocystic sp**        | 2632           | 13.5        |
|      |                    | **Microsora sp**       | 1053           | 5.4         |
|      |                    | **Zygnema sp**         | 526            | 2.7         |
|      | Bacillariophyceae: | **Cyclorella sp**      | 2632           | 13.5        |
|      |                    | **Fragilaria sp**      | 4737           | 24.3        |
|      | Myxophyceae:       | **Anabaena sp**        | 1053           | 5.4         |
|      |                    | **Aphanocapsa sp**     | 3684           | 18.9        |
|      |                    | **Oscillatoria sp**    | 526            | 2.7         |
|      |                    | **Total**              |                | 61,580      |
Table 7: Phytoplankton taxa and species composition recorded at different stations during December, 2014

| Site | Phytoplankton taxa | Species             | No. of cells/L | Abundance % |
|------|--------------------|---------------------|----------------|-------------|
| A    | Chlorophyceae:     | Ankistrodesmus sp   | 2632           | 17.1        |
|      |                    | Closterium sp       | 1053           | 6.9         |
|      |                    | Oocystis sp         | 2105           | 13.7        |
|      |                    | Microspora          | 526            | 3.4         |
|      | Bacillariophyceae: | Cyclotella sp       | 632            | 4.1         |
|      |                    | Fragilaria sp       | 4736           | 30.8        |
|      | Myxophyceae:       | Anabaena sp         | 1053           | 6.9         |
|      |                    | Aphanacapsa sp      | 1632           | 17.1        |
| B    | Chlorophyceae:     | Ankistrodesmus sp   | 3158           | 19.4        |
|      |                    | Microspora          | 1053           | 6.5         |
|      | Bacillariophyceae: | Cyclotella sp       | 2105           | 12.9        |
|      |                    | Fragilaria sp       | 5789           | 35.5        |
|      | Myxophyceae:       | Anabaena sp         | 1053           | 6.5         |
|      |                    | Aphanacapsa sp      | 3158           | 19.4        |
| C    | Chlorophyceae      | Ankistrodesmus sp   | 2632           | 20.8        |
|      |                    | Closterium sp       | 526            | 4.2         |
|      |                    | Oocystis sp         | 1579           | 12.5        |
|      | Bacillariophyceae: | Cyclotella sp       | 2632           | 20.8        |
|      |                    | Fragilaria sp       | 2632           | 20.8        |
|      | Myxophyceae:       | Aphanacapsa sp      | 2105           | 16.7        |
|      |                    | Anabaena sp         | 526            | 4.2         |
|      | Total              |                     | 44317          |             |

Table 8: Mean percentage distributions of phytoplankton classes at the different sites during the study period, 2014.

| % Distribution |
|----------------|
| % Distribution |
| Chlorophyceae  | A   | B   | C   | Average |
|                | 40  | 32.1| 33.3| 35.1    |
| Baccillariophyceae | 37.7| 38.2| 38.4| 38.1    |
| Myxophyceae    | 21.3| 28.2| 27.0| 25.5    |
| Chrysophyceae  | 1.0 | 1.4 | 1.3 | 1.2     |

DISCUSSION

A total number of twenty two species of phytoplankton, were identified during the study period. Out of these 10 were Chlorophyceae, 6 Bacillariophyceae, 4 Myxophyceae and 2 Chrysophyceae. This is similar with the finding of Mohamed et al 2009 and Anago et al 2011 who reported phytoplankton and zooplankton taxa in a study of phytoplankton diversity on Koli Coastal waters India and Awa Reservoir Ibadan Nigeria. Dike and Adedolapo (2012) reported that Bacillariophyceae (53.25%), Cyanophyceae (21.25%), Chlorophyceae (10.33%), Chrysophyceae (4.84%), Pyrrophyceae (4.57%), Xanthophyceae (3.39%), and Euglenophyceae (2.42%) in studies of seasonal dynamics in plankton abundance and diversity of freshwater body in Nigeria. As compared to the findings of present study, Bacillariophyceae (38.1%), Chlorophyceae (35.4%), Myxophyceae (25.3%), and Chrysophyceae (1.22%). Their distributions might be due to availability of nutrients in water. This also agreed with the findings of Kolo et al(2010), Jerling and Wooldridge (1995) who recorded that the zooplankton was dominated by Copepoda and phytoplankton with Bacillariophyceae (diatoms) which were more abundant after flood.

The Bacillariophyceae and Chlorophyceae had the highest mean population in all the three stations during the rainy season. This could be attributed to availability of more nutrients, which favour their growth.
during that period as a result of agricultural and irrigation activities and nutrients might have washed up into the water by runoff. In term of planktonic populations between the months of study. High population of phytoplankton were observed during the month of August (92,105 cell/L and the minimum recorded in November and December (44,317 cell/L) Mohamed et al.(2009) reported this results with a maximum of137,800 cell/L in the Month of May and a minimum of 76,150 cell/L. This could be attributed to the changes in temperature, pH, nutrients levels during the period.

The rainy periods recorded the highest phytoplankton abundance than the dry season. The result of this study also agrees with findings of Khan and Ejike (1984) who observed greater plankton population density in the rainy season as compared to the dry season.

The Month of August recorded the highest plankton value of 21.9% as compare to the least value of December as 11.4%.The abundance of plankton in the rainy season might be attributed to the availability of more nutrients, suitable temperature range, conductivity, pH and dissolved oxygen that allow plankton to reproduce. This findings agrees with the work of Jerling and Wooldridge(1995) in Sunday River, South Africa who recorded high abundance of both phytoplankton and zooplankton during rainy periods. This also agrees with the findings of Rabi’u et al.(2007) in Kusalli Reservoir, Kano who revealed that phytoplankton was generally more numerous during rainy season than in dry season and dominated by Chlorophyceae (36.25 %) and Cladoceran in zooplankton.

Spatial distribution of planktons were very abundant in site A (37.8%) than site B (33.9%) and site C appeared to have the least value of (28.3%). Analysis of variance showed significance of abundance between the sites. The variation between the sites might be attributed to the different activities such as fishing, bathing, washing, irrigation, watering ground for animals and so on occurring in the sites, which might have been contributed to the abundance of plankton with one site harbouring the plankton than others. This agrees with the findings of Adeyemi-Ale et al.,2014, in study of physico-chemical properties and plankton diversity in Osere, Ilorin with sites and one harbouring the plankton than the rest. There were great significance differences of plankton abundance between the sites.

**Relationship between physico-chemical parameters and plankton abundance**

Temperature is an important factor that influences primary production in water (Lewis, 2000). Also, Wetzel (1983) observed that increasing of the temperature led to increasing the rate of molting and brooding. The temperature of air increased from 26°C to 38°C while that of water temperature ranged from 28°C to 31.9°C. This study shown gradual increase in temperature during the sampling periods and might be a driving factor responsible for plankton abundance in the water shown by its significant difference in the period of study. Therefore water temperature increases the rate of reproduction in water bodies. Dissolved oxygen; this is a crucial factor that help in the survival of aquatic organisms. The dissolved oxygen concentrations ranged from 1.7 mg/L to 3.9mg/L and thus, the concentrations were within the acceptable range. McNeely et al., (1979) reported that natural surface water has dissolved oxygen less than 10mg/L. Low dissolved oxygen affect the growth of many aquatic life, helps in metabolic activities(Charles,2003), therefore, adequate dissolved oxygen is necessary element to all processes of life. The relationship between temperature and oxygen is that, as the temperature increases, the oxygen level decreases, in other word, cold water hold more oxygen than warm water. Conductivity (µs/cm), referred to the ability of liquid to transmit heat, electrical charges or sound from one area to another. Conductivity ranged from 81 to 100µs/cm and ANOVA showed significant difference between the Months of study. The mean value was 91.2 µs/cm this showed that the conductivity level was intermediate. Conductivity levels below 50 are considered as low, those between 50 – 600 are medium and above 600 µs/cm are high (Adeleke,1982).

Transparency is referred to the clarity of water or the measure of how clear the water is. The transparency ranged from 0.06m to 0.16m. This range indicated that the water was not very turbid, therefore, all the stations received relatively equal amount of light from the sun, and this might be responsible for the presence of plankton in all the stations. The relationship between conductivity and transparency is that, an increased in transparency, increases suspended materials in water and subsequently, decreases conductivity which results in a decrease in light penetration and phytoplankton growth. pH; this is the measure of hydrogen ions concentration. The pH range from 7.5 to 8.9 which was within the normal range for aquatic life, therefore, this indicated that various anthropogenic activities inputs did not alter the ambient pH. High water pH can affect reproduction, cause death to many aquatic organisms, inability to dispose metabolic wastes and low pH can cause shock and sudden increase in number of some plankton species (LCAA).

In conclusion, about twenty two species of phytoplankton were identified. In terms of phytoplankton population, the bacillariophyceae was dominated with 38.1%from the total of phytoplankton classes. Phytoplankton abundance were influenced by seasons and by sites and species composition was significantly influenced by seasons not sites. Thus, plankton abundance and distribution were closely associated with environmental conditions. Hence, the present study provides the baseline information on plankton population which could be useful for further assessment of the water.

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