Research Article

The Trend in Fish Species Diversity and Abundance at Asejire Reservoir South Western Nigeria

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Abstract

The upsurge of population and industries around Asejire area necessitated a study into the fish species diversity and abundance for managerial purposes to determine the trend in the availability of fresh water fisheries resources in Asejire Reservoir within boundary of Oyo and Osun States in Nigeria. This consequently necessitated the study of the trend in fish stock composition, comparing it with the fisheries scientists’ previous research findings.

Four sampling zones namely back of reservoir wall, littoral area, middle of reservoir and industrial effluent discharge site were identified. Grated fishers folk gillnet of 50.8 mm, 63.0 mm, 76.2 mm, 114.0 mm and 127.0 mm mesh sizes were used for fish sampling, carried out during the wet and dry seasons. The catches collected were identified using morphometric and meristic features. The water was assessed, for physico-chemical parameters as described by American Public Health Association, compared with previous findings. The data collected were subjected to Analysis of Variance (ANOVA). It showed changes in physico-chemical parameters with significant difference in relation to fish availability in zones (p>0.05). A total of 620 fish specimens were caught Chrysichthys nigrodigitatus was the most abundant single species totalling 30.5 %, while the Family of Cichlidae was most divergent with 3 genera and 4 species. The fish weight and mesh sizes of gillnet used showed significant difference while the seasonal fish catch were not significant (p>0.05). The fish catches of gillnet with mesh size of 50.8mm were most effective with 23 % catches of the total catch. The wet season fish catches were 70.0 % against 30.0 % of dry season. Eighteen fish species from 12 families identified, showed that the catch per unit effort on zonal sampling was 1.9 kg/ha using 375 m² gillnet mesh effort while few species such as Synodontis clarus, Hemichromis bimaculatus and Alestes baremose were not encountered at Asejire Reservoir during this research while, Labeo senegalensis and Mormyrus hasselquisti are newly introduced into the Asejire reservoir. The Maximum Sustainable Yield (MSY) was 1.8 kg. The study shows that the state of Asejire Reservoir reflected a depletion of fish species, mostly juvenile sizes were caught as a result of increased human activities of over-fishing and probably caused by increase in the physico-chemical parameters data obtained.

Keywords: Asejire reservoir; Biodiversity; Fish diversity; Fisheries; Gillnets; Maximum sustainable yield; Mophometric features; Species abundance; Sustainability

Introduction

Inland waters constitute important sources of food, employment and income to the population of riparian community meanwhile, it thus serve as recreation and educational research purposes across the continents in the entire world and fish represent one of the best and main sources of dietary animal protein in Nigeria and Africa. This research tend to look into the richness of Asejire reservoir biodiversity trend over period of yeras, Adadu et al. [1], stated that species richness and relative abundance are a key element of biodiversity. Because of the geomorphic processes governing river form, river systems in all climatic zones tend to resemble one another and in fact, many features are common. The diversity of natural populations is partially dependent on the environmental variables which always affect the competing populations [2]. Human activities have modified rivers worldwide [3]. According to Suter [4], species richness and relative abundance studies have been recommended as ecological risk assessment in the aquatic system Similar trends are occurring in tropical, sub-tropical and arid-zone systems [5]. Fish species distribution varies strongly with depth, niche of the fish and the ecosystem. The physical and chemical characteristics of any aquatic system, acting together, determine the nature of the aquatic organizations inhabiting it and that change in water quality from the loading of water with a range of organic and in-organic substances [6].

Nigeria lies between Longitudes 2°49’ E and 14°37’ E and Latitudes 4°16’ N and 13°52’ North of the Equator and Nigeria is blessed with a vast expanse of inland freshwater and brackish ecosystem [7]. River Oshun is one of a series of West African Rivers that do not drain into the Niger System but discharge into coastal lagoons and creeks bordering the Atlantic Ocean. Sustainable management of reservoir necessitate regular or periodic stock composition checklist. Lawson and Olusanya [8], also noted that for the sustainability of fish resources, an adequate knowledge of species composition, diversity and relative abundance of the water bodies must be understood and vigorously pursued. Thus, the avoidable decline of fisheries resources in an area...
due to overexploitation and inadequate management of inland waters could be checked through the availability of relevant information of various parameters of species in the river. These researches tend to look into the trend of fish abundance and diversity of Asejire reservoir since 1986.

Materials and Methods

Study area

Asejire Reservoir is a man-made reservoir constructed on River Oshun at about 30 km East of Ibadan within the boundary of Oyo and Osun States, Nigeria. The reservoir is Y-shaped with many fishing villages around it (Figure 1). These areas are surrounded by villages mostly farmers and fisher folks. It has both wet and dry seasons, April to October and November to March, respectively. Water discharges from River Oba at the stream ganging stations of Iwo, which is about 40 km North of Asejire, having higher monthly discharge during late wet season [9,10].

Sampling techniques

Fish sampling was based on stratification with time and space. Dry season: (December-May). Wet season: (June-November) (Department of Geography, University of Ibadan).

Space stratification

The study area was divided into four sampling Zones: (a) Back of the dam (b) Along the littoral zone of the dam (c) Middle of the dam site (d) Site of waste discharge

Experimental fishing equipment

A grated fisherman gillnets with stretched mesh sizes of 50.8 mm (2”), 63 mm (2.5”), 76.2 mm (3”), 114 mm (4.5”) and 127 mm (5”), each measuring 25 m long by 3 m deep. The nets were set overnight at 16.00 hrs and catches was collected by 07.00 hrs on the following day from year 2001 to year 2003 and reviewed 2016 to 2018.

Fish Identification

Fish sample caught was identified at the landing site using taxonomic keys prepared by Lowe McConnel and Holden and Reed [11,12].

Gill Net Selectivity

Gill net selectivity and efficiency for dominant fish sample caught was determined based on the methods of Holt [13], cited by Sparre et. al. [14].

Potential Fish Yield /Maximum Sustainable Yield/Annual Catch: Calculations was based on Mopho-Edaphic Index (MEI) as described by Ryder [15], Henderson and Welcome [16] and Welcomme [6]. The maximum sustainable yield was calculated using Schaefer and Fox model [14]; MEI = TDS/d

\[
\text{MEI} = \frac{\text{Conductivity \ \muhoscm}^{-1}}{\text{Mean dept (m)}}
\]

\[
\text{Y} = 14.3136 \cdot \text{MEI}^{0.4681}
\]

Where: Y = yield in kg/ha

Water Quality Assessment

The water physical parameters such as water level, transparency and temperature were taken on site using the water level gauge, Secchi disc, Mercury in glass thermometer, were calculated respectively based on Reish and Oshida [17]. Data collection was carried out at the last week of every month from August 2001 to July 2003 and 2016 to 2018 in all zones sampled, as used by Enell et. al. [18] in the water sampling carried out in Sweden.

Statistical Analysis

Catches were analyzed using Analysis of Variance (ANOVA) to determine sizes of meshes seasonal catch and catch/ fishing effort according to Montgomery [19]. The physio-chemical data and fish sampled were subjected to correlation test and regression analysis for testing of their dependency and goodness of fit [20].

Results

Fish stock assessment

Fish species abundance and diversity is as presented in tables 1 & 2, the catches across the zones shown in figures 2 & 3. This study revealed that 18 species were caught with the family Cichlidae accounting for 58.5 % as in occurrence by number followed by the family Mormyridae, represent 3%. The family Characidae (Tiger fish) was next by classification based on species diversity. The other Family was Bagridae having the highest single species of 30.5%, by number, among others.

Catch - effort relationship

Monthly catches calculated from the fishermen gill nets used in all the strata of catchment’s area is presented in table 3. Showing the average catch per season to be 10 and 18 fishes of 3 and 5 kg, respectively for dry and wet seasons. While the Catch per Unit Effort (CPUE) is presented in tables 4 & 5 using the 375 m² gillnets area set.
Table 1: The Summary of Fish catches by Number in the study area.

| Family           | Season   | DRY No. | %   | WET No. | %   | Total % Composition | Minimum WT (gm) | Maximum WT (gm) |
|------------------|----------|---------|-----|---------|-----|---------------------|-----------------|-----------------|
| Bagridae         | DRY      | 39      | 20.6| 150     | 35  | 30.5                | 45              | 1475            |
|                  | WET      | 39      | 20.6| 150     | 35  |                      |                 |                 |
| Centropomidae    | DRY      | 0       | 0   | 4       | 0.9 | 0.6                 | 50              | 140             |
|                  | WET      | 0       | 0   | 4       | 0.9 |                      |                 |                 |
| Characidae       | DRY      | 0       | 0   | 3       | 0.5 | 0.5                 | 50              | 70              |
|                  | WET      | 2       | 1.1 | 2       | 0.6 |                      | 40              | 175             |
| Characidae       | DRY      | 2       | 1.1 | 5       | 1.2 | 1.1                 | -               | -               |
|                  | WET      |         |     |         |     |                      |                 |                 |
| Cichilidae       | DRY      | 7       | 3.7 | 47      | 11  | 8.7                 | 75              | 1500            |
|                  | WET      | 9       | 4.8 | 24      | 5.6 | 5.3                 | 125             | 1500            |
|                  | DRY      | 61      | 32.3| 68      | 16  | 20.8                | 100             | 1500            |
|                  | WET      | 57      | 30.2| 90      | 21  | 23.7                | 75              | 2050            |
|                  | DRY      | 134     | 71.0| 229     | 10.4| 58.5                |                 |                 |
|                  | WET      |         |     |         |     |                      |                 |                 |
| Claridae         | DRY      | 1       | 0.5 | 3       | 0.7 | 0.6                 | 600             | 600             |
|                  | WET      | 1       | 0.5 | 3       | 0.7 |                      |                 |                 |
| Cyprinidae       | DRY      | 0       | 0   | 3       | 0.7 | 0.5                 | 150             | 400             |
|                  | WET      | 0       | 0   | 3       | 0.7 |                      |                 |                 |
| Hepsetidae       | DRY      | 0       | 0   | 1       | 0.2 | 0.2                 | 120             | 120             |
|                  | WET      | 0       | 0   | 1       | 0.2 |                      |                 |                 |
| Mochokidae       | DRY      | 4       | 2.1 | 3       | 0.7 | 1.1                 | 50              | 300             |
|                  | WET      | 4       | 2.1 | 3       | 0.7 |                      |                 |                 |
| Mormyridae       | DRY      | 2       | 1.1 | 5       | 1.2 | 1.1                 | 200             | 450             |
|                  | WET      | 5       | 2.6 | 1       | 0.2 | 1.3                 | 500             | 725             |
|                  | DRY      | 2       | 1.1 | 6       | 1.4 | 0.6                 | 500             | 750             |
|                  | WET      | 9       | 4.8 | 12      | 2.8 | 3.0                 |                 |                 |
| Osteoglossidae   | DRY      | 0       | 0   | 2       | 0.5 | 0.3                 | 125             | 200             |
|                  | WET      | 0       | 0   | 2       | 0.5 |                      |                 |                 |
| Polypteridae     | DRY      | 0       | 0   | 2       | 0.5 | 0.3                 | 200             | 200             |
|                  | WET      | 0       | 0   | 2       | 0.5 |                      |                 |                 |
| Schilbeidae      | DRY      | 0       | 0   | 17      | 3.9 | 2.7                 | 25              | 80              |
|                  | WET      | 0       | 0   | 17      | 3.9 |                      |                 |                 |
|                  | DRY      | 139     | 100 | 431     | 100 | 100                 |                 |                 |

Fish specie/Mesh size  2  2.5  3  4.5  5  2  2.5  3  4.5  5

- Labeo senegalensis  3  -  -  -  -  -  -  -  -  -
- Heterotis niloticus  2  -  -  -  -  -  -  -  -  -
- Synodontis batensoda - 1  1  1  -  3  1  -  -  -
- Oreochromis niloticus 15 16 19 13 5 5 7 39 2 8
- Tilapia zillii 9 9 18 6 5 1 - 4 - 2
- Mormyrus hasselquisti - - - 1 - - 1 - 4 -
- Sarotherodon galilaeus 1 4 3 12 4 1 1 5 - 2
- Oreochromis aureus 4 13 27 27 19 12 6 19 13 7
Table 2: Fish catches in seasons by mesh sizes in the study area.

| Fish species                   | 1'' | 1.5'' | 2'' | 2.5'' | 3'' | 4.5'' | 5'' |
|--------------------------------|-----|-------|-----|-------|-----|-------|-----|
| Gnothomus tenuis               | 1   | 1     | 1   | -     | -   | -     | -   |
| Hydrocynus forskali            | -   | 2     | -   | -     | -   | -     | -   |
| Hepatus adoe                   | -   | -     | 1   | -     | -   | -     | -   |
| Sclerop nystus                 | 16  | -     | 1   | -     | -   | -     | -   |
| Polysticus endlicheri          | -   | 1     | 1   | -     | -   | -     | -   |
| Clarias gariepinus             | -   | -     | 2   | 1     | -   | -     | 1   |
| Laton atlanticus               | -   | 2     | 2   | -     | -   | -     | -   |
| Mormyrus rune                  | -   | 1     | 1   | 3     | -   | -     | 1   |
| Alistes macrocephalus          | 5   | -     | -   | -     | -   | -     | -   |
| Chrysichthys nigroatitans      | 90  | 44    | 8   | 1     | 7   | 22    | 13  |
| Total                          | 142 | 96    | 83  | 69    | 41  | 45    | 32  |
| Percentage (%)                 | 23  | 15.4  | 13.4| 11.1  | 6.6 | 7.3   | 5.2 |

Table 3: Mean Monthly catch in the study area from the Fishermen gillnet sampling data in seasons during study period.

| Sampling Month | Fish No Wt (gm) | Fish No Wt (gm) |
|----------------|----------------|----------------|
| 1              | 16             | 4              |
| 2              | 24             | 7              |
| 3              | 24             | 11             |
| 4              | 21             | 11             |
| 5              | 50             | 10             |
| 6              | 44             | 34             |
| 7              | 37             | 34             |
| 8              | 25             | 18             |
| 9              | 16             | 25             |
| 10             | 91             | 35             |
| 11             | 83             | X              |
| Total          | 431            | 189            |
| Average catch (2 seasons)     | 39             | 11.1 kg        |
| Average catch/month            | 15             | 4.3 kg         |

Table 4: Fish catch (gm) and fishing effort (gillnet m²) assessment in the study area during sampling period.

| Month       | 2'' | 2.5'' | 3'' | 4.5'' | 5'' |
|-------------|-----|-------|-----|-------|-----|
| Aug         | 1000| 1505  | 1005| 5025  | 20,100|
| Sep         | 1095| 1055  | 2000| -     | 2020 |
| Oct         | 1010| 425   | 2850| 1400  | -    |
| Nov         | 200 | 1050  | 1050| 325   | 3210 |
| Dec         | 910 | 980   | 2085| 1150  | 900  |
| Jan         | -   | -     | -   | -     | -    |
| Feb         | 1000| 525   | 2125| 2010  | 5410 |
| Mar         | 375 | 1575  | 1450| 1400  | -    |
| Apr         | -   | 1375  | 2425| 4100  | 3050 |
| May         | 1895| -     | 8340| 1260  | -    |
| June        | 1605| 4350  | 3420| 15160 | 2000 |
| Jul-02      | 4900| 3900  | 2775| 4850  | 3900 |

Grand total: 137.525 kg, Zone daily catch; 2.83 kg, Average daily catch; 12.6 kg, No of night sampled; 11, Zone sampled; 4, Surface area of net fleet set/zone/night: 375 m², Zone area of net set-month: 1500 m², Total area of net sampled/year: 16500 m², Number of fisherman per sampling: 1, Catch /1000 m² of fleet: 8.3 kg/ha
The fish catch (gm) against effort (Gillnet m²) was 8.3 kg/ha for 2001/2002 and 3 kg/ha for year 2002/2003/2018. The comparison of the catches by different mesh sizes were examined using the length distribution and log ratio of catches of pairs of gill nets (2”, 2.5”, 3”, 4.5”) as presented in tables 4 & 5. The catches of 3” mesh size net showed highest of 60 fishes within the length range of 16 - 18 cm of Family Cichlidae, while, the smallest 2” mesh size net caught 8 fishes in the same length range. The yield estimate is found in table 6. As calculated from conductivity and mean depth (Figures 4 & 5). The statistical analysis of variance of the water chemical test parameters is as shown in tables 7 & 8.

**Table 5:** Fish catch (gm) and fishing effort (gillnet m²) assessment in the study area during sampling period.

| Month | 2” | 2.5” | 3” | 4.5” | 5” |
|-------|----|------|----|------|----|
| Aug   | 75 | 125  | 65 | 100  | 145|
| Sep   | 90 | 280  | 60 | 2000 | 1025|
| Oct   | 25 | 70   | 420| 1550 | 350|
| Nov   | -  | -    | - | -    | -  |
| Dec   | 1000| 1010 | 810| 50   | 400|
| Jan   | 1000| 75   | 1050| 150 | -  |
| Feb   | 47 | -    | 300| 100  | 990|
| Mar   | 1000| 2120 | 400| 1000 | 800|
| April | 515| 200  | 100| 740  | 3010|
| May   | -  | -    | - | -    | -  |
| June  | 300| 1100 | 1460| 3000 | 3655|
| July  | 5900| 2000 | 3000| 90   | 1500|

**Discussion**

**Fish trend assessment**

The water chemical parameters during this study showed that pH, NO₃ (Mg/l), BOD (Mg/l) and NH₃ (Mg/l) were significantly (P>0.05) different, which means that the fish that could tolerate this change in the critical condition of water will survive these areas at this particular period, this also influences biodiversity. The Catch Per Unit Effort (CPUE) of 3 kg/ha and 8.3 kg/ha during this period of study indicates low catches. The conductivity observed at Asejire Reservoir in the zones was moderate, with higher values in the wet periods; having sparsely high nutrient and more fish species abundance and diversity; but low conductivity value and low fish species during the dry season, but higher than Aransiola [21] observation was that conductivity ranged from 111 µhoscm⁻¹ in June to 140 µhoscm⁻¹ in July with an average of 127.04 µhoscm⁻¹.

The study shows that 18 fish species belonging to 12 families were identified and classified according to Holden and Reed [12] and Lowe - McConnel [11] as against 23 fish species from 13 families identified in Lake Asejire [9] while Akinyemi [22] identified 14 families comprising a total of 41 fish species.

The family Cichlidae was the most divergent family with 3 genera and 4 species, which supports the observation of Elliott [9] that Cichlidae was most encountered but identified 4 genera with eight species. Supported by Akinyemi [22] who observed the same Cichlidae family of 4 genera with 8 species. Daddy et. al. [23] also found Cichlidae to be the dominant family in Tatabu Lake in Niger State of Nigeria. Olaniran [24] also observed Cichlidae as the dominant family in International Institute of Tropical Agriculture Lake, Nigeria.

The littoral area and the middle of the reservoir had greater number of fish species against other sampled zones of Asejire Reservoir, as a result of food abundance along with the escaping possibilities areas.

**Table 6:** The potential yield estimate as calculated from conductivity and mean depth.

| Months   | Conductivity (µhos/cm) | Mean depth (m) | Morpho-Edaphic Index | Potential Fish Yield kg/ha |
|----------|------------------------|----------------|----------------------|----------------------------|
| Aug 2001 | 240.0                  | 11m            | 21.8                 | 60.6                       |
| Jan 2002 | 215.6                  | 11m            | 9.6                  | 57.6                       |
| June 2002| 225.0                  | 11m            | 23.2                 | 62.4                       |
| Dec 2002 | 140.4                  | 11m            | 12.8                 | 47.2                       |
| July 2003| 210.0                  | 11m            | 19.1                 | 56.9                       |

**Figure 4:** Monthly rainfall trend during the research study.

**Figure 5:** Monthly rainfall trend during the research study.
against pollutant and blockage caused by the dam wall. Welcomme [25], stated that in African lakes, the littoral zone which fishermen exploit was almost entirely colonized by Cichlids because of their specific tolerance of the elevated temperature found there.

It has been observed that amongst the fish species identified at Asejire lake by Elliott [9], Hydrocyon forskali, Labeo senegalensis, Mormyrus hasselquisti, Gnathonemus tanganu and Heterotis niloticus were absent, though, fish species such as Xenomystus niger, Alestes baremose, Labeo coubie, Chrysichthys auratus, Hemichromis fasciatus, Hemichromis biculatus, Chromidotilapia guentheri, Channa obscura and Ctenopoma kingisleyae had disappeared from the identified fish species in this study. Some fish species caught at Asejire Reservoir by Akinyemi [22] that were not encountered at the present study were Tilapia dagetti, Hemichromis fasciatus, Pelmatochromis guentheri, Alestes leuciscus, Alestes nurse, Alestes imberi and Alestes lineatus others were Clarias anguillaris, Bagrus bayad, Auchenoglanis, Occidentalis, Gnathonemus abadii, Gnathonemus pictus, Petrocephalus bane, Marcusenius psittacus, Mormyrus deliciosus, Eutropius niloticus, Silurandodon auratus, Phargo locicatus, Synodontis clarias, Synodontis gambiaensis, Synodontis nigrta and Synodontis sorex; so also were Channa obscura, Ctenopoma kingisleyae, Distichodus brevipinus, Distichodus nostrasturus, Macrobachium sp and Barbus occidentalis. However, Polypterus endlicheri, Labeo senegalensis, Mormyrus hasselquisti and Synodontis batensoda were not observed in the study of Akinyemi [22].

Akinyemi [22] acknowledged the absence of Labeo spp and Alestes spp but attributed it to the limited upstream habitat and absence of a fish pass in the barrier across this lake, which may account for the disappearance of Alestes spp in the Lake Asejire in 1987. The reason for the less number of encountered fish may be due to ageing of the reservoir as reported by Welcomme [25], that rivers tend to decrease in number of fish species as it increases in age.

This could be similar to the cause of disappearance of fish species from 41 species earlier identified by Akinyemi [22] to the present 18 species as identified in this research. Though, this reservoir is not that aged, but the activity of man around Asejire Reservoir of late could have activated this fact.

It could be that the unidentified species in this study may have undergone an annual downstream migration during this period. Mass movements of fish from one place to another is common, on a regular basis, this could be in seasonal or daily occurrence. The daily migrations are typically for feeding and/or predator avoidance; while most species migration is for spawning and often do not feed this period [26].

Faturi [27] stated that the fish catches at Ogunpa River in Ibadan are relatively non-significant because it is heavily polluted due to inflow of pollutants from streams and rivers. Supported by Stirn cited by Oben [28] that environmental stress frequently reduces community diversity. This is an implication of unimplemented enacted edict of inland Fisheries laws and regulations as in the case of Edo, Delta and Ondo States in Nigeria [29].

This study revealed that the effectiveness and efficiency of mesh size of 51mm (2") was dominant. It is therefore deduced that the mesh sizes between 51mm (2") - 76 mm (3") were effective and this goes on to say that the present state of the fish species at Asejire Reservoir is dominated by juvenile species and that the larger ones are gradually disappearing. The fish species caught also decreases as mesh size net increases, as 2" mesh size had 12 fish species as against 6 fish species caught by 5" mesh size, this is an indication of fish size

| Parameter                  | DI | MS  | F   | Remark |
|----------------------------|----|-----|-----|--------|
| (a) NH3 (mg/l) Zone Error   | 3  | 44.8441 | 1.7732 | 25.29  |
| (b) PO4 (mg/l) Zone Error   | 3  | 0.0546 | 0.0218 | 2.51   |
| (c) Conductivity (cm-1) Zone Error | 3  | 8.645 | 6.396 | 1.36   |
| (d) BOD (mg/l) Zone Error   | 3  | 101.929 | 13.844 | 7.36   |
| (e) NO3 (mg/l) Zone Error   | 3  | 21.1933 | 4.3258 | 4.9    |
| (f) DO (mg/l) Zone Error    | 3  | 0.3968 | 0.1444 | 2.75   |
| (g) Ph Zone Error           | 3  | 0.09  | 0.0114 | 7.89   |

Table 7: Result of analysis of variance for water chemical test parameters for the Zones.

*Significant (p>0.05)

| Zone | pH   | BOD  | NO3  | NH3  |
|------|------|------|------|------|
| A    | 5.8000 a | 18.9000 a | 16.9750 a | 17.1300 a |
| B    | 5.7875 a | 19.8000 a | 18.3250 a | 18.6750 a |
| C    | 5.8400 a | 30.0250 b | 22.1750 b | 24.5500 b |
| D    | 5.5125 b | 22.6000 a | 17.8250 a | 18.1250 a |

Table 8: Result of follow up (Post Hoc) LSD Tests.

Means with the same letter (within each column) are not significantly different from each other at p< 0.05.
availability during this study period. The highest single fish species of *Chrysichthys nigrodigitatus* caught was with 51 mm (2") followed by 64 mm (2.5"). However, this research had revealed that the catches by 2" gillnets was highest, and that it was more effective at the middle of the lake. The gillnet size correlates to the length group of fish caught and vice versa. The highest frequency occurred in the length group of 16-18 cm. The Family Cichlidae and *Chrysichthys nigrodigitatus* fishes showed effectiveness of 3" and 2" mesh sizes, respectively.

The Fishes caught during wet seasons were more, both in species, number and weight than the fishes caught during the dry periods. Fish species composition and numerical abundance statistical analysis had revealed no significant difference of catches at the zones (p<0.05). This situation could be caused by over exploitation or by seasonal migration of these fishes. Moreover, this could be as a result of higher water level at the middle of the reservoir, revealing the abundance of food washed into this area, supported by Moyle and Cech [26] that water levels are extremely important clues to many tropical fishes, because reproduction and growth are often strongly related to rising water levels, as a result of the flushing of terrestrial nutrients into the rivers during flooding. This could also account for the fish species and their numerical abundance during the wet season than the dry seasons in this study. Though, the statistical analysis showed no significant difference (p> 0.05).

Contrary to the statement of Welcomme [25], Ita [30] cited by Akinyemi [22] that more catches were made during dry season, as a result of low water period, but agreed that the total weight of fish may be larger during the floods.

However, in the discussion on gear selectivity and seasonal catch of Akinyemi [22], he acknowledged that if periods of good catch are to be predicted on monthly basis from the flood patterns of the lakes investigated, Asejire and Eleyele, that it seems sporadic high catches are to be expected in Lake Asejire between July - September when there is increased drawdown in water level. Similarly, Balogun [31], cited Ita, that they observed the lowest catch during the low water period. Similarly, Balogun [31], cited Ita, that they observed the lowest catch during the low water level.

Jinadu [32-36] in the research study carried out on coastal artisanal fishing operation in Lagos State, Nigeria. Observed that the average monthly landing in the seasons confirm the wet season as more active of the two seasons with 60.72 percent as opposed to 39.28 per cent for the dry season. The wet season therefore summarises the abundance of the food, pollutant dilution, less activities by the fishermen thereby increasing the fish availability by number and species during this study.

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