Ecologia

ISSN 1996-4021

Academic
Journals Inc.

www.academicjournals.com

Ecologia 5 (2): 43-53, 2015
ISSN 1996-4021 / DOI: 10.3923/ecologia.2015.43.53

Assessment of Ichthyofaunal Assemblage of Erelu Reservoir, Oyo, Nigeria

[1]A.E. Falaye, [1]E.K. Ajani, [1]O.K. Kareem and [2]A.N. Olanrewaju
[1]Department of Aquaculture and Fisheries Management, University of Ibadan, Ibadan, Nigeria
[2]Federal College of Freshwater Fisheries Technology, P.M.B. 1060, Maiduguri, Ibadan, Nigeria

Corresponding Author: O.K. Kareem, Department of Aquaculture and Fisheries Management, University of Ibadan, Ibadan, Nigeria

ABSTRACT

Fisheries of Erelu reservoir, South Western Nigeria was assessed using fleet of gillnets of varied mesh sizes with the intent of generating necessary data that could support sustainable use and management of the resources to enhance the socio-economic status of the riparian communities. The reservoir was stratified into upper, middle and lower zones covering an average of 1000 m each and gillnets was deployed to the shores and open water region in each zones monthly for 21 months covering 2 wet and 2 dry seasons. Fish caught were identified to lowest taxonomic level and morphometric parameters taken following standard procedures. A total of 6,927 samples belonging to 16 species and 8 families were encountered throughout the study period. Seasonally, more fish samples were recorded during the dry season (57.95%) than wet seasons. When catches were compared spatially, lower zone recorded 38.89% followed by the upper zone with 34.29% and the middle zone 26.82%. However, highest catches were recorded at the shore (57.82%). Three families: Cichlidae, Cyprinidae and Clariidae constituted 72% of the total catches and were dominated by *O. niloticus*, *R. senegalensis, C. nigrodigitatus, S. melanotheron, S. mystus* and *T. marie*. The forage-carnivore ratios of 1.9:1 and 1.6:1 by number and weight, respectively, recorded suggests an incongruous ecological balance. The potential fish yield was estimated as 136.55 kg ha^{-1} and catch per unit effort of 8.8 kg per fisherman per day was recorded. Regular monitoring of the fish composition and stocking of more forager species is recommended to balance the community structure.

Key words: Fish diversity, abundance, richness, biomass and reservoir

INTRODUCTION

Nigeria, with a coastline of 853 km, 200 nautical miles Exclusive Economic Zone (EEZ), over 2,658 fish farms as well as 937 dams and reservoirs, 365 lakes and reservoirs and 687 ponds and floodplains covering over 13 million ha of water bodies has an enviable potential for fish production (WRI., 2003). These resources have immensely contributed economically, socially and culturally to the development of the country through hydroelectric power generation, irrigation, recreation, research, fishing and aquaculture. Exploitation of fish resources from inland waters, mostly from rivers has been a very common practice amongst the riparian communities for many years.

The artisanal fishery sector constitutes the most important sector of fisheries as it accounts for the major fish supply in the developing world. Over 90% of domestic fish production in Nigeria comes from this sector (Ogunbadejo *et al*., 2007). Faturoti (2010) also reported that artisanal

fisheries in Nigeria provided more than 82% of the domestic fish supply, giving livelihoods to 1 million fishermen and up to 5.8 million fisher folks in the secondary sector. Within the sector, overfishing and destructive fishing practices are reported to have contributed to reduction in stocks. The sustainability of productions from this important arm of capture fisheries however, is dependent on availability of correct data on the status of the resources being exploited as well as the effect of fishing methods on the stock (Shrestha, 1990). The development of appropriate strategies and policies for sustainable economic and biological exploitation of inland fisheries resources such as Erelu reservoir being studied require adequate information on the lake environment and the targeted resources.

The species composition of lake fish communities and the abundance or biomass of several species or functional groups have been used as descriptors for assessing the human pressures (Mehner *et al*., 2005; Zambrano *et al*., 2006). Although studies on stock assessment of a number of reservoirs and lakes in Nigeria had been conducted (Dan-Kishiya *et al*., 2012; Mustapha, 2010; Komolafe and Arawomo, 2008; Fapohunda and Godstates, 2007; Balogun, 2005), there exist no documented works on Erelu reservoir. Thus, there is a dare need to have a comprehensive baseline data on the ichthyofauna assemblage of this reservoir. This study therefore, investigates composition, distribution and potential fish yield of Erelu reservoir, Oyo, Nigeria.

MATERIALS AND METHODS

Study area: Erelu reservoir (Fig. 1), located in Oyo town, North of Ibadan, the capital city of Oyo State was impounded in 1961 (Ufoegbune *et al*., 2011). The reservoir has a surface area of 161.07 ha, maximum height of 13.106 m and a catchment area of 315.86 km. Erelu reservoir lies between latitudes 7°53'0" and 7°55'30"N and longitudes 3°53'30" and 3°56'0"E. Although, it was established for portable water supply, the reservoir currently supports a thriving fishery which

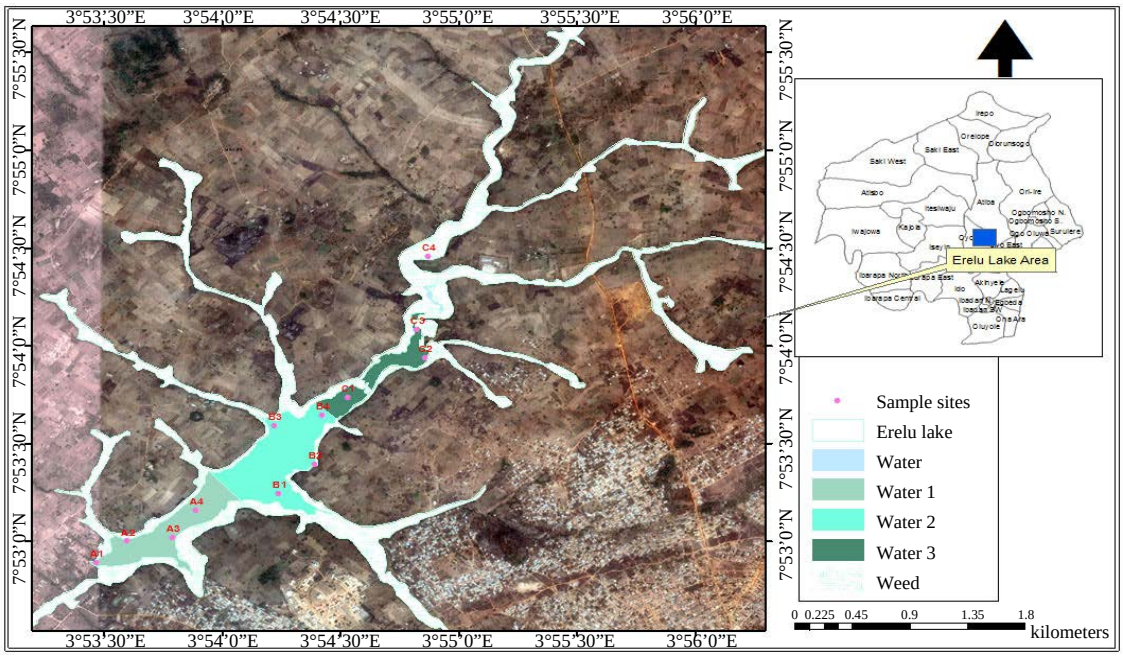

Fig. 1: Map of Erelu reservoir

offers enormous opportunities for increasing freshwater fish production in Nigeria. The two distinct seasons (dry and rainy) are observable in the lake which is typical of the Southwestern part of Nigeria. The average annual temperature was around 27°C and mean annual rainfall of about 591.6 mm.

Selection of sampling points: The lake was spatially stratified into lower, middle and upper zones based on geographical locations and logistical characteristic (Southwood and Henderson, 2000). The distance of about 1000 m separated one zone from the other. In each of the zone, four stations each were randomly selected (Olaniran, 2000; Dan-Kishiya *et al*., 2013). The exact locations of the sampling points were fixed with the aid of Global Positioning System (Garmin's GPSMAP eTrex® 10 type sensors) kit.

Fish sampling: Fishes were sampled monthly for 21 months from July 2013 to March 2015, using static fleets of graded gillnets consisting of seven monofilament nets of 38.1 (1.5"), 50.8 (2.0"), 63.5 (2.5"), 76.2 (3.0"), 88.9 (3.5"), 101.64 (4.0") and 127.0 mm (5.0"). Each net measured 30 m long and 3 m deep while 210/3 twine was used to mount it. Nets were set simultaneously in late afternoon (18:00-20:00) and retrieved the following morning (6:00-8:00) in order to ensure a constant fishing effort. Fish caught were identified according to Olaosebikan and Raji (2013) and measured for Total Length (TL, cm) and total weight (W, g).

Statistical analysis: Catches were analyzed separately for each season and zone, while the total number and weight of specimens per species were recorded. The Shannon Wiener diversity index H', species richness, expressed by Margalef's D index, index of dominance or Simpson's index given by Simpson (1949) evenness measured by Pielou's J index, 'E' Magurran (1988) and the number of species caught per season were calculated and compared by one-way analysis of variance (ANOVA) and Fisher's Least Significant Difference (LSD) procedure using Stata version 12.0 and Microsoft Excel 2010.

RESULTS

The relative abundance of fish fauna by number and biomass in Erelu reservoir throughout the sampling period are shown in Table 1. A total of 6,927 individuals representing 16 species were

Table 1: Relative abundance of fish fauna (by number and weight) in Erelu reservoir from July, 2013 to March, 2015

Species	No.	Percentage	Weight (g)	Percentage
Clarias gariepinus	493	7.12	60665.4	12.77
Clarias anguillaris	202	2.92	20113.9	4.23
Tilapia guinensis	389	5.62	25151.4	5.29
Oreochromis niloticus	893	12.89	77501.7	16.31
Sarotherodon galilaeus	595	8.60	21742.7	4.58
Raimas senegalensis	668	9.64	43603.2	9.18
Labeo parvies	385	5.56	34261.3	7.21
Momyru srume	389	5.62	20839.5	4.39
Chrysichthys nigrodigitatus	628	9.07	19881.0	4.19
Schilbe mystus	551	7.95	36630.9	7.71
Heterotis niloticus	236	3.41	30513.7	6.42
Tilapia marie	507	7.32	16029.0	3.37
Tilapia zilli	322	4.65	12183.2	2.56
Barbus pleuropholes	224	3.24	12263.0	2.58
Parachanna obscura	99	1.43	24909.3	5.24
Oreochromis aureus	346	4.99	18801.9	3.96
Total	6927	100.00	475091.1	100.00

Table 2: Abundance and seasonal variation of fish species in Erelu reservoir between July, 2013 and March, 2015

	Wet		Dry		Total abundance	
Species	No.	%	No.	%	No.	%
Clarias gariepinus	242	8.31	251	6.25	493	7.12
Clarias anguillaris	95	3.26	107	2.66	202	2.92
Tilapia guinensis	186	6.38	203	5.06	389	5.61
Oreochromis niloticus	340	11.67	553	13.78	893	12.89
Sarotherodon melanotheron	257	8.82	338	8.42	595	8.60
Raimas senegalensis	240	8.24	428	10.66	668	9.64
Labeo parvies	123	4.22	262	6.53	385	5.56
Momyrus rume	206	7.07	183	4.60	389	5.61
Chrysichthys nigrodigitatus	197	6.76	431	10.73	628	9.06
Schilbe mystus	247	8.50	304	7.57	551	7.95
Heterotis niloticus	76	2.60	160	3.98	236	3.41
Tilapia marie	234	8.03	273	6.80	507	7.32
Tilapia zilli	205	7.04	117	2.91	322	4.65
Barbus pleuropholes	87	2.99	137	3.41	224	3.23
Parachanna obscura	43	1.48	56	1.39	99	1.43
Oreochromis aureus	135	4.63	211	5.25	346	4.99
Total	2913	100.00	4014	100.00	6927	100.00
Overall mean abundance	2913	42.05	4014	57.95	6927	100.00

recorded. The most abundant fish species was the *Oreochromis niloticus* (12.89%, 893 specimens), followed by *Raimas senegalensis* (9.64%, 668 specimens), *Chrysichthys nigrodigitatus* (9.07%, 628 specimens), *Sarotherodon galilaeus* (8.60%, 595 specimens), *Schilbe mystus* (7.95%, 551 specimens), *Tilapia marie* (7.32%, 507 specimens) while *Parachanna obscura* (1.43%, 99 specimens) was least in abundance. The percentage fish species composition in terms of weight indicated that the dominant species were *O. niloticus* (16.31%), *Clarias gariepinus* (12.77%), *R. senegalensis* (9.18%), *S. mystus* (7.71%), *Labeo parvies* (7.21%) and *Heterotis niloticus* (6.42%). Nine species had percentage weight compositions ranging between 2 and 6%. These were *Tilapia zilli* (2.56%), *Barbus pleuropholes* (2.58%), *Tilapia marie* (3.36%), *Oreochromis aureus* (3.96%), *C. nigrodigitatus* (4.16%), *Clarias anguillaris* (4.23%), *Momyrus rume* (4.39%), *P. obscura* (5.24%) and *Tilapia guinensis* (5.29%).

Seasonal variation of fish fauna and their percentage composition by number was as presented in Table 2. The catch composition differed seasonally with highest number of fish obtained in dry season (4014) while the lowest was observed in wet season (2913) samples. Nile Tilapia, *O. niloticus* was the most abundant fish fauna in the reservoir during both wet and dry seasons, followed by *R. senegalensis*, *S. mystus*, *S. melanotheron* and *C. nigrodigitatus* while *P. obscura* was the least abundant during both seasons. Overall mean abundance of fish was observed to be significantly higher (57.95%) in the dry season than wet season 42.05%.

Table 3 depicts spatial difference in fish distribution in Erelu reservoir during the period of investigation. Distribution among sites varied as the lower zone had the highest number of fishes (2694), followed by upper zone with 2375 and middle zone recorded the lowest number of fish (1858). All the species found in this study were evenly distributed with *Oreochromis niloticus, Raimas senegalensis*, *Chrysichthys nigrodigitatus*, *Sarotherodon galilaeus, Schilbe mystus* and *C. gariepinus* dominating the catches. In addition, the overall mean abundance was observed to be significantly higher (38.89%) in the lower zone than upper (34.29%) and middle (26.82%) zones mean abundance.

The checklist of fish families in Erelu reservoir indicated eight families as presented in Table 4.

Table 3: Spatial variation in fish assemblage in Erelu reservoir from July, 2013 to March, 2015

	Lower		Middle		Upper	
Species	No.	%	No.	%	No.	%
Clarias gariepinus	150	5.57	151	8.13	192	8.08
Clarias anguillaris	69	2.56	48	2.58	85	3.58
Tilapia guinensis	155	5.75	104	5.60	130	5.47
Oreochromis niloticus	368	13.66	248	13.35	277	11.66
Sarotherodon melanotheron	261	9.69	154	8.29	180	7.58
Raimas senegalensis	258	9.58	188	10.12	222	9.35
Labeo parvies	151	5.60	105	5.65	129	5.43
Momyrus rume	154	5.72	116	6.24	119	5.01
Chrysichthys nigrodigitatus	249	9.24	159	8.56	220	9.26
Schilbe mystus	218	8.09	139	7.48	194	8.17
Heterotis niloticus	75	2.78	66	3.55	95	4.00
Tilapia marie	239	8.87	128	6.89	140	5.89
Tilapia zilli	117	4.34	84	4.52	121	5.09
Barbus pleuropholes	71	2.64	70	3.77	83	3.49
Parachanna obscura	43	1.60	23	1.24	33	1.40
Oreochromis aureus	116	4.31	75	4.03	155	6.53
Total	2694	100.00	1858	100.00	2375	100.00
Overall mean distribution	2694	38.89	1858	26.82	2375	34.29

Table 4: Percentage composition of fish families by number and weight in Erelu lake from July, 2013 to March, 2015

Family	No.	Percentage	Weight (g)	Percentage
Clariidae	695	10.03	80779.3	17.00
Cichlidae	3052	43.67	171409.9	36.08
Cyprinidae	1267	18.29	90127.5	18.97
Momyridae	393	5.67	20839.5	4.39
Claroteidae	628	9.07	19881.0	4.19
Schilbidae	561	8.10	36630.9	7.71
Osteoglossidae	236	3.41	30513.7	6.42
Channidae	95	1.40	24909.3	5.24
Total	6927	100.00	475091.1	100.00

Among these, Cichlidae was the most dominant family constituting (43.67%), followed by Cyprinidae (18.29%, 3 species), Clariidae (10.03%), Claroteidae (9.07%), Schilbidae (8.10%), Momyridae (5.67%), Osteoglossidae (3.41%) and Channidae (1.40%). The family Cichlidae had the highest representative with six species (*O. niloticus, T. guinensis, S. melanotheron, T. marie, T. zilli* and *O. aureus*). Cyprinidae were next with three species representation (*R. senegalensis*, *L. parvies* and *B. pleuropholes*), followed by Clariidae with two species representation (*C. gariepinus and C. anguillaris*) while others had one species representation each. As regard percentage weight, the most weighted family was the Cichlidae (36.08%), followed in order of abundance by the families Cyprinidae (18.77%), Clariidae (17%), Schilbeidae (7.71%), Osteoglosidae (6.42), Channidae (5.24%), Momyridae (4.39%) and Claroteidae (4.19%).

Based on habitat distribution of fish assemblage in Erelu reservoir throughout the study period (Fig. 2), there were more fishes at the shore (4005) representing 57.82%, followed by the open water with 1418 (20.48%) while, the inlet was the least with 349 fishes representing 5.03% of the total catch. In all the habitats, a distinct variation was observed with more specimens recorded in the shores than other habitat in the reservoir (Fig. 2).

Table 5 depicts diversity indices of fish families of Erelu lake during the period of investigation. The diversity indexes of Cichlidae indicated highest diversity as follows: species richness (6), Shannon-Wiener (1.72), Shannon-Evenness (0.96), Margalef (0.62), Simpson (0.80), Simpson Inverse (2.54) and Berger-Parker (0.29). The family Cichlidae was followed by Cyprinidae (species richness (3), Shannon-Wiener (1.00), Shannon-Evenness (0.91), Margalef (0. 27), Simpson (0.60),

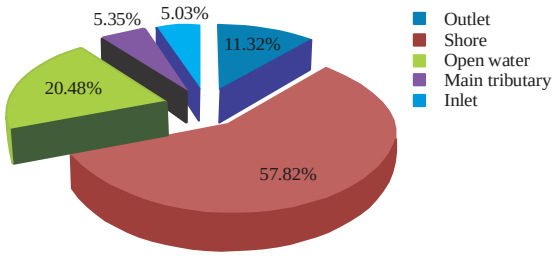

Fig. 2: Habitat distribution of fish species in Erelu reservoir from July, 2013 to March, 2015

Table 5: Estimated diversity indices of fish families in Erelu lake from July, 2013 to March, 2015

	Index of diversity						
Fish family	Richness	Shannon-Weiner	Shannon-evenness	Margalef	Simpson	Simpson-inverse	Berger-parker
Clariidae	2	0.6027	0.8696	0.1528	0.4129	1.703	0.7094
Cichlidae	6	1.723	0.9617	0.6232	0.8088	5.231	0.2926
Cyprinidae	3	1.009	0.918	0.2799	0.6072	2.546	0.5193
Momyridae	1	0.0568	0.082	0.1674	0.0202	1.021	0.9898
Claroteidae	1	0	-	0	0	1	1
Schilbidae	1	0.0895	-	0.158	0.0351	1.036	0.9822
Osteoglossidae	1	0	-	0	0	1	1
Channidae	1	0	-	0	0	1	1
Overall	16	2.667	-	1.703	0.9245	13.24	0.1335

Table 6: Spatial diversity indices for fish species in Erelu lake from July, 2013 to March, 2015

	Index of diversity			
Diversity indices	Lower	Middle	Upper	Overall
Richness	16.00	16.00	16.00	16.00
Margalef	1.930	1.993	1.899	1.696
Shannon	2.684	2.657	2.639	2.665
Shannon evenness	0.9682	0.9583	0.9517	0.9613
Simpson inverse	13.78	13.14	12.70	13.25
Berger-parker	0.1166	0.1335	0.1365	0.1289

Simpson-Inverse (5.23) and Berger-Parker (0.51)) and Clariidae (species richness (2), Shannon-Wiener (0.60), Shannon-Evenness (0.86), Margalef (0.15), Simpson (0.41), Simpson-Inverse (1.70) and Berger-Parker (0.70)) in diversity while others had low diversity index value.

The estimated spatial diversity indices for fish species (Table 6) showed that the values of all the diversity indices, namely species richness (D), Shannon-Wiener, Shannon-Evenness, Margalef, Simpson, Simpson-Inverse and Berger-Parker were lower for upper station (16, 1.89, 2.63, 0.95, 12.70 and 0.13) and medium station (16, 1.99, 2.65, 0.95, 13.14 and 0.13) compared to lower station (16, 1.93, 2.68, 0.96, 13.78 and 0.11), respectively. Furthermore, the Catch-per Unit Effort (CPUE) for the investigated period was 8.8 kg per fisherman per night. Meanwhile, based on the feeding inter-relationship exhibited among the species in Erelu reservoir (Table 7), the forage to carnivore (F/C) ratios was estimated to be 1.91-1 and 1.60-1 in terms of number and weight, respectively. The potential fish yield of Erelu reservoir revealed by this study is 136.55 kg ha^{-1} (Table 8).

DISCUSSION

Assessment studies on many Southwestern Nigerian lakes and reservoirs had been documented but little is known about Erelu reservoir fish fauna composition, diversity and distribution.

Table 7: Fish trophic levels and forage to carnivore (F/C) ratio in experimental gillnet catches in Erelu reservoir between July, 2013 and March, 2015

Forager			Carnivore		
Species	No.	Biomass (g)	Species	No.	Biomass (g)
Tilapia guinensis	389	25151.4	*Clarias gariepinus*	493	60665.4
Oreochromis niloticus	839	77501.7	*Clarias anguillaris*	202	20113.9
Sarotherodon galilaeus	595	21742.7	*Momyrus rume*	389	20839.5
Heterotis niloticus	236	30513.7	*C. nigrodigitatus*	628	19881.0
Tilapia marie	507	16029.0	*Schilbe mystus*	551	36630.9
Tilapia zilli	322	12183.2	*Parachanna obscura*	99	24909.3
Barbus pleuropholes	224	12263.0	Total	2362	183040.0
Raimas senegalensis	668	43603.2			
Labeo parvies	385	34261.3			
Oreochromis aureus	346	18801.9			
Total	4511	292051.1			

Table 8: MEI and PFY of Erelu lake

Variables	Value
Mean conductivity (μS cm^{-1})	150.10
Mean depth (m)	3.04
MEI	52.33
PFY (kg ha^{-1})	136.55

MEI: Morpho-edaphic index, PFY: Potential fish yield

Studies on species composition and community structure of fish populations in a water body are essential in predicting populations yielding annual harvestable crops (Swingle, 1950). According to Tang (1970), such predictions provide the basis for improved management of impoundments. The ichthyofaunal composition of Erelu reservoir is similar to that of other reservoirs in South Western Nigeria. Mustapha (2010) recorded 18 fish species in Oyun reservoir, Olaniran (2003) documented 17 species in Eleyele reservoir while Fapohunda and Godstates (2007) found 14 species in Owena reservoir. However, this results differ from Asejire with 41 species (Akinyemi, 1985), Oyan with 38 species (Ikenweiwe *et al*., 2006). There is preponderance of Tilapia (especially *O. niloticus*) in Erelu reservoir traceable to availability of plant based food in the reservoir and the suitability of the environment for successful reproduction. Similar observations were reported by Balogun (2005) and Mustapha (2010) in Kangimi and Oyun reservoir, respectively.

Fish identified were evenly distributed in the dry and wet seasons but more individual species in number were recorded in dry season. Several abiotic (water temperature, water fluctuation, dissolved oxygen, transparency) and biotic (predation, food availability, maturation state) parameters (Craig *et al*., 1986; Linlokken and Haugen, 2006) as well as operational (mesh sizes, net length, set time) factors (Jensen, 1986; Minns and Hurley, 1988) are well known to drive this temporal variability suggesting that certain species become more or less catchable by gillnets in the course of the year (Grant *et al*., 2004; Olin *et al*., 2009). Wet season in south west Nigeria is a period characterized by high turbidity, overflow, low temperature and high wind disrupting fishing activities hence, low catch recorded during this period. The same pattern of more fish abundance during the dry season was observed by several authors (Ita, 1978; Elliot, 1986; Araoye, 1997; Mustapha, 2010). Also, Ayoola and Ajani (2009) recorded higher catches in number and biomass during dry season in Eleyele Wetland while Omitoyin and Ajani (2007) reported more catches during the dry seasons at Asejire and Eleyele lakes and attributed it to low level of water at that time. However, this result contradicts the findings of Olopade and Rufai (2014) who reported more catch in wet season in Oyan dam. The spatial differences recorded in fish species showed a much higher number of fish in lower and upper part of the reservoir. According to Olawusi-Peters and

Bello-Olusoji (2014), the ideal free distribution model predicts that fish will occupy the highest and best rich natural food production habitat, until the density of individual reduces the benefit per individual. The lower part of the reservoir gave the highest quantity of fish, indicating that the mostly populated area has the highest quality living areas for fish.

The family Cichlidae was the most dominant family in terms of number and biomass (43.67, 36.08%, respectively) in the present study. This dominance of Cichlidae in Nigerian lakes and reservoirs has been well documented by various workers including Edward (2013), Dan-Kishiya *et al*. (2012), Olopade and Rufai (2014), Mustapha (2010), Komolafe and Arawomo (2008), Ikenweiwe *et al*. (2007), Balogun (2005) and Oso and Fagbuaro (2004). These authors attributed the preponderance of Cichlids to their ability to thrive on a wide range of food items and their prolific breeding nature. *Oreochromis niloticus* was undoubtedly the most abundant of the Cichlidae family. This is consistent with the work of Offem *et al*. (2009) and Edward (2013) who reported the dominance of *O. niloticus* in Wetland of Cross river and Egbe reservoir in Ekiti state, respectively. Most of the fishes were caught at the shore (57.82%) and open water (20.48%) area of the reservoir. This could be attributed to the well-established littoral zone as Oti (1995) observed in the Ehoma floodplain. This result agreed with Basavaraja *et al*. (2014) findings where maximum numbers of species were recorded at the low land areas of Anjanapura reservoir, India. The occurrence of a greater number of the species at the swamp zone could be attributed to the detritus-rich bottom as observed in lake Kariba by Mitchell (1976). Daddy *et al*. (1988) made similar observation on Tatabu floodplain in Niger state, Nigeria.

In terms of diversity of species, the family Cichlidae was the most diversified with 6 species (*O. niloticus*, *S. melanotheron*, *T. mariae*, *T. guineensis*, *T. zilli* and *T. aureus*). The result in the present study was similar to that of Ikenweiwe *et al*. (2007), who recorded six species of Cichlids in Oyan dam. Several other authors such as Dan-Kishiya *et al*. (2012), Mustapha (2010), Komolafe and Arawomo (2008), Balogun (2005) and Olaniran (2003) equally reported similar findings with variation in the number of species encountered. The spatial diversity indices values was slightly higher for lower and middle part of the lake than the upper part. This finding was same as Mwangi *et al*. (2012), who reported that species diversity, richness and evenness were generally higher in the middle and lower reaches of River Kisian. Shaikh *et al*. (2011) also made a similar observation in Awach, Kenya where fish diversity was found to be very high in low and middle land areas of the lake. The forage to carnivore ratio both in number and biomass was observed to be low as this is harmful to the fishery. There is therefore, the need to introduce more forager such as *Tilapia zilli* that are more vigorous macrophyte feeder to increase the foragers/carnivores to 4:1 or 6:1 (Swingle, 1950) for a more balanced community structure and to reduce macrophyte abundance. Adams *et al*. (2015) also reported that, intensity of fishing could also lead to low forager/carnivore ratio.

The potential fish yield was estimated to be 136.55 kg ha^{-1}. When compared with the findings from Oyun (125.75 kg ha^{-1}), Ureje (112.59 kg ha^{-1}) and Egbe (413.9 kg ha^{-1}) reservoirs as reported by Mustapha (2010), Edward *et al*. (2014) and Edward (2013) respectively, this was relatively higher. Since higher productivity is characterized with high conductivity and low mean depth (Ovie and Ajayi, 2009), the high potential fish yield recorded in this study may be as a result of high conductivity (150.10 µS cm^{-1}) as well as low mean depth (3.04 m). This finding is in line with the reports of Kapetsky and Petr (1984), who reported that a small or shallow lake with mean depth between 3 and 10 m supports high productivity. This could also be explained by the fact that the depth stratum of a shallow lake allows adequate light penetration for the growth of planktonic algae which is fish food (Boyd, 1979).

CONCLUSION

The study revealed that the fish fauna resource of Erelu reservoir is highly dynamic and diverse like other shallow reservoir in Nigeria where Cichlids and Cyprinids dominated the overall catch. In Erelu reservoir, 16 species belonging to 8 families were encountered and the net productivity was higher in rainy season than dry season. Three families, namely Cichlidae, Cyprinidae and Clariidae constituted almost 72% of the fishery and mainly dominated by *O. niloticus*, *R. senegalensis*, *C. nigrodigitatus*, *S. melanotheron*, *S. mystus* and *T. marie*. Estimated forage carnivore ratio is indicative of distorted ecological balance. The potential fish yield was comparable with that of other reservoirs of similar sizes in the same geo-climatic area. Some interventions that may be considered to improve the potential fish yield of Erelu reservoirs include regular monitoring, stocking with more foragers, management of habitat to prevent sedimentation, clearing of vegetative cover, regulation of water levels, fishing regulations and control and education of all the stakeholders to ensure sustainable management.

REFERENCES

Adams, A., R.S. Duwa, H. Ali Mohd and C. Wala, 2015. Analysis of some aspects of biology on selected fish species in river Hadejia, Jigawa State Nigeria. J. Nat. Sci. Res., 5: 109-119.

Akinyemi, O., 1985. A preliminary assessment of the post-impoundment fisheries of Lake Eleyele and Lake Asejire, Oyo State, Nigeria. Lake Kainji Research Institute Annual Report, Oyo State, Nigeria, pp: 44-51.

Araoye, P.A., 1997. Bio- Ecology of a Mochokid, *Synodontis schall* (Bloch and Schneider 1801) in Asa lake, Ilorin, Nigeria. Ph.D. Thesis, University of Ibadan, Nigeria.

Ayoola, S.O. and E.K. Ajani, 2009. Seasonal variation in fish distribution and physico-chemical parameters of wetland areas in Oyo State, Nigeria. Int. J. Biol. Chem. Sci., 3: 107-116.

Balogun, J.K., 2005. Fish distribution in a small domestic water supply Reservoir: A case study of Kangimi Reservoir, Kaduna, Nigeria. J. Applied Sci. Environ. Manage., 9: 93-97.

Basavaraja, D., J. Narayana, B.R. Kiran and E.T. Puttaiah, 2014. Fish diversity and abundance in relation to water quality of Anjanapura reservoir, Karnataka, India. Int. J. Curr. Microbiol. Applied Sci., 3: 747-757.

Boyd, C.E., 1979. Water Quality in Warmwater Fish Ponds. Auburn University Agricultural Experimental Station, Auburn, UK., Pages: 359.

Craig, J.F., A. Sharma and K. Smile, 1986. The variability in catches from multi-mesh gillnets fished in three Canadian lakes. J. Fish Biol., 28: 671-678.

Daddy, F., M. Wari and A. Mohammed, 1988. Wetland studies: Natural resources evaluation of Lake Tatabu (Ndakolowu) Nigeria State, Nigeria. New Bussa Nigeria, National Institute for Freshwater Fisheries Reseach Report, pp: 50-60.

Dan-Kishiya, A.S., A.A. Olatunde and J.K. Balogun, 2012. Fish species distribution in a domestic water supply reservoir: A case study of lower Usuma Reservoir, Bwari, Nigeria. Researcher, 4: 56-60.

Dan-Kishiya, A.S., A.A. Olatunde and J.K. Balogun, 2013. Variation in the concentration of Dissolved Oxygen (DO) and hydrogen ion (pH) at the surface of a tropical reservoir: A case study of lower Usuma Reservoir in Bwari, Abuja, Nigeria. Am. J. Res. Commun., 1: 204-214.

Edward, J.B., 2013. Evaluation of the fisheries potentials of egbe Reservoir, Ekiti State, Nigeria. Greener J. Biol. Sci., 3: 260-267.

Edward, J.B., E.O. Idowu, J.A. Oso and M.I. Kadri, 2014. Fish productivity of Ado-Ekiti water reservoir in relation to physicochemical characteristics and mopho-edaphic index. Int. J. Multidisciplin. Res. Dev., 1: 11-17.

Elliot, O.O., 1986. Some aspects of the biology of fishes of Asejire Reservoir. Ph.D. Thesis, University of Ibadan, Nigeria.

Fapohunda, O.O. and R. Godstates, 2007. Biometry and composition of fish species in Owena reservoir, Ondo State, Nigeria. J. Central Eur. Agric., 8: 99-104.

Faturoti, E.O., 2010. Fisheries contribute N126.4 billion to Nigeria economy. FishNetwork, FISON Quarterly Publication, Nigeria, pp: 8-9.

Grant, G.C., Y. Schwartz, S. Weisberg and D.H. Schupp, 2004. Trends in abundance and mean size of fish captured in gill nets from Minnesota lakes, 1983-1997. N. Am. J. Fish. Manage., 24: 417-428.

Ikenweiwe, N.B., S.O. Otubusin and M.O.O. Oyatogun, 2006. Fisheries of Oyan Lake, South West Nigeria and potential for ecotourism development. Proceedings of the Annual Conference of the Fisheries Society of Nigeria, (FSN`06), Lagos, pp: 183-192.

Ikenweiwe, N.B., S.O. Otubusin, M.A.A. Akinwale and S.A. Osofero, 2007. A comparison of the composition and abundance of fish species caught with experimental gillnet with that of Artisanal Fishermen at Oyan Lake, South West Nigeria. Eur. J. Scient. Res., 16: 336-346.

Ita, E.O., 1978. An analysis of fish distribution in Kainji lake Nigeria. Hydrobiologia, 58: 233-244.

Jensen, J.W., 1986. Gillnet selectivity and the efficiency of alternative combinations of mesh sizes for some freshwater fish. J. Fish Biol., 28: 637-646.

Kapetsky, J.M. and T.O. Petr, 1984. Status of African reservoir fisheries. CIFA Technical Paper/Doc, Technique CPCA, 10, Blantyre, Malawi, pp: 326-326.

Komolafe, O.O. and G.A.O. Arawomo, 2008. Preliminary observations on fish species in a newly impounded Osinmo Reservoir. Turk. J. Fish. Aquat. Sci., 8: 289-292.

Linlokken, A. and T.O. Haugen, 2006. Density and temperature dependence of gill net catch per unit effort for perch, *Perca fluviatilis* and roach, *Rutilus rutilus*. Fish. Manage. Ecol., 13: 261-269.

Magurran, A.E., 1988. Ecological Diversity and its Measurement. 1st Edn., Princeton University Press, Princeton, ISBN: 0691084858.

Mehner, T., M. Diekmann, U. Bramick and R. Lemcke, 2005. Composition of fish communities in German lakes as related to lake morphology, trophic state, shore structure and human-use intensity. Freshwater Biol., 50: 70-85.

Minns, C.K. and D.A. Hurley, 1988. Effects of net length and set time on fish catches in gill nets. N. Am. J. Fish. Manage., 8: 216-223.

Mitchell, S.A., 1976. The marginal fish fauna of Lake Kariba. Trustees of the National Museums and Monument of Rhodesia, Kariba Studies Paper, 8, Kariba, Zimbabwe.

Mustapha, M.K., 2010. Fish fauna of Oyun Reservoir, Offa, Nigeria. J. Aquat. Sci., 25: 106-114.

Mwangi, B.M., M.A. Ombogo, J. Amadi, N. Baker and D. Mugalu, 2012. Fish species composition and diversity of small riverine ecosystems in the Lake Victoria Basin, Kenya. Int. J. Sci. Technol., 2: 675-680.

Offem, B.O., Y.A. Samson and I.T. Omoniyi, 2009. Trophic ecology of commercially important fishes in the cross river, Nigeria. J. Anim. Plant Sci., 19: 37-44.

Ogunbadejo, H.K., T. Alhaji and S. Otubusin, 2007. Productivity of labor in Artisanal fish farming in Nigeria. Afr. J. Applied Zool. Environ. Biol., 9: 74-77.

Olaniran, T.S., 2000. Ecological evaluation and sustainable management of fish production in IITA lake, Ibadan. Ph.D. Thesis, University of Ibadan, Ibadan, Nigeria.

Olaniran, T.S., 2003. Fishing activities and fish species diversity assessment in Eleiyele Lake, Ibadan, Nigeria. Afr. J. Livestock Extens., 2: 72-74.

Olaosebikan, B.D. and A. Raji, 2013. Field Guide to Nigerian Freshwater Fishes. Federal College of Freshwater Fisheries Technology, New Bussa, Niger State, Nigeria, Pages: 144.

Olawusi-Peters, O.O and O.A. Bello-Olusoji, 2014. Environmental changes on the fish fauna of Old and New Owena Reservoirs, Nigeria. J. Sustain. Dev. Afr., 16: 12-23.

Olin, M., T. Malinen and J. Ruuhijarvi, 2009. Gillnet catch in estimating the density and structure of fish community-Comparison of gillnet and trawl samples in a eutrophic lake. Fish. Res., 96: 88-94.

Olopade, O.A. and O.P. Rufai, 2014. Composition, abundance and diversity of the Family Cichlidae in Oyan Dam, Ogun State, Nigeria. Biodiversitas, 15: 195-199.

Omitoyin, B.O. and E.K. Ajani, 2007. Feeding habits and heavy metal accumulation in fishes of Lake Eleyele, Nigeria. J. Afrotropical Zool., 2: 165-170.

Oso, J.A. and O.A. Fagbuaro, 2004. Fish Fauna of Ero reservoir, Ekiti State, South Western Nigeria. J. Biol. Phys. Sci., 3: 20-23.

Oti, E.E., 1995. Studies on the Ichthyo Fauna of Ehoma Flood Plain. Afikpo Eastern Nigeria, Nigeria.

Ovie, S.I. and O. Ajayi, 2009. Preliminary studies on the limnological stock assessment, productivity and potential fish yield of Ojirami Reservoir, Edo State, Nigeria. Trop. Freshwater Biol., Vol. 18.

Shaikh, H.M., S.M. Kamble and A.B. Renge, 2011. The study of ichthyofauna diversity in Upper Dudhna project water reservoir near Somthana in Jalna district (MS) India. J. Fish Aquat., 2: 8-10.

Shrestha, T.K., 1990. Resource Ecology of the Himalayan Waters. Curriculum Development Centre, Tribhuvan University, Kathmandu, Nepal.

Simpson, E.H., 1949. Measurement of diversity. Nature, 163: 688-688.

Southwood, T.R.E. and P.A. Henderson, 2000. Ecological Methodology. Blackwell Science Ltd., Oxford, UK., Pages: 464.

Swingle, H.S., 1950. Relationships and dynamics of balanced and unbalanced fish populations. Bulletin No. 274, Alabama Polytechnic Institute, Agricultural Experiment Station, Alabama.

Tang, Y.A., 1970. Evaluation of balance between fishes and available fish foods in multispecies fish culture ponds in Taiwan. Trans. Am. Fish. Soc., 99: 708-718.

Ufoegbune, G.C., O.C. Oparinde and A.O. Eruola, 2011. Municipal water supply planning in Oyo metropolis, Oyo State, South Western Nigeria. J. Geography Region. Plann., 4: 392-400.

WRI., 2003. EarthTrends: Environmental information. World Resources Institute (WRI), Washington, DC., USA. http://www.wri.org/our-work/project/earthtrends-environmental-information.

Zambrano, L., M.R. Perrow, C.D. Sayer, M.L. Tomlinson and T.A. Davidson, 2006. Relationships between fish feeding guild and trophic structure in English lowland shallow lakes subject to anthropogenic influence: Implications for lake restoration. Aquat. Ecol., 40: 391-405.