

The Species Composition and Diversity of the Coastal Waters of Badagry, Lagos State, Nigeria

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ABSTRACT

A study of the socioeconomic status of the fisher folks of Badagry coastal waters as well as species composition, distribution and diversity of the coastal waters was conducted for 12 months (January 2014-December 2014) in Badagry Local government area using two purposively selected prominent fish landing sites of Yovoyan and Gberefu and monthly sampling of catches revealed the presence of 64 species from 39 families in Badagry coastal waters of Lagos State, Nigeria. Eight of the 64 species which were predominant include *Pseudotolithus senegalensis*, *Trachinotus goreensis*, *Tilapia zilli*, *Chrysichthys nigrodigitatus*, *Polydactylus quadrifilis*, *Ethmalosa fimbriata*, *Pomadasy jubelini* and *Sphyraena piscatorum* in the coastal waters of Badagry, Lagos State, Nigeria. The eight most predominant fish families in terms of number were Scianidae (10.4%), followed by Carangidae (9.02%), Cichlidae (8.6%), Polynemidae (7.7%), Pomadasidae (6.7%), Clupeidae (5.2%), Claroteidae (4.1%), Sphyraenidae (3.53%) and others (44.8%). Gberefu lagoon waters was richer in species than Yovoyan marine water front. Lausanne Index of Abundance recorded for Badagry coastal waters was 94.0 while Margalef's index (a measure of species richness) was 8.03. A high level of heterogeneity of stock was observed as revealed by Simpson Index of 0.018 recorded. The value of Diversity indices such as Jaccard's coefficient calculated to be 0.88 showed there was great similarity in species composition between Gberefu and Yovoyan. Shannon-Weiner Index of general Diversity (H_i) value was 0.33 showing dominance of some species in the coastal waters of Badagry. Evenness Index (E) of 0.082 showed all the species were not equally abundant in the waters. The author recommends the need to protect the existing stock especially the mono specific families like the Osteoglosidae and Gymnarchidae through regular monitoring of the physicochemical parameters of the coastal waters which are highly susceptible to industrial pollution, Lagos State being a highly industrialized State. More funds should be committed by the government to researches on population dynamics and biomass estimate of our coastal waters.

Keywords: Species composition, diversity indices, coastal, socioeconomics, predominant.

INTRODUCTION

Fish constitutes the major source of animal protein in Africa. It has the most balanced amino acid profile and its consumption cuts across cultural and religious barriers, hence the high demand for it worldwide. Twenty-one percent of global fish output is consumed by Africans despite the fact that its contribution to global output is the lowest (FAO, 2013).

Nigeria has a rich, varied and diverse ichthyofauna resources which over the years have been mismanaged, hence the large shortfall between supply and demand for fish. According to CBN (2011), there was a shortfall of about 1.4 million tonnes between demand and supply of fish despite the rich and varied ichthyofauna resources. The artisanal fisheries subsector is responsible for over 80% of domestic fish output in Nigeria. Despite their importance as a major contributor to the total domestic fish supply in Nigeria, the Nigerian natural lakes and wetland resources have received little attention (FDF, 2003; FDF, 2015). There is poor knowledge of Nigerian aquatic ecosystem, hence the need for this present study of fish diversity, finfish species composition and distribution of Badagry coastal waters of Lagos State. There are few documented, scientific information on coastal waters of Nigeria in terms of species diversity, nature, distribution and relative abundance of the fauna in

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the thus making it difficult to assess the immense potential of the coastal waters. The ecosystems have enormous biological diversity, indicative of a healthy and productive ecosystem (Egborge, 1993; Akegbejo-Samson, 1995; Bolarinwa, 2015). The limited scientific studies of fisheries resources in the coastal waters of Lagos State coupled with the problems of poor management and conservation calls for a need for well documented and data –based researches. This study would therefore contribute to the much needed information on the species composition and diversity and relative abundance of the coastal areas of Lagos State of Nigeria. The information would guide decision making in utilization, management and conservation of resources.

MATERIALS AND METHODS

Study Area

The study area is located in Badagry local government area of Lagos State of Nigeria. The people of Badagry L.G.A called ‘Eguns are predominantly fisher folks. The study area is delineated into three subzones viz freshwater, brackishwater and saltwater bordering the coastal swamps and creeks.. These areas are along the coastal fringes, consisting the creeks, lagoons, flood plains. The forested swamps are popular fish landing sites where fish purchases by the fish mongers/traders are made. Lagos State has a total area of about 4000 km² out of which 3277 km² is land. It has also a marine shoreline of about 180km and extends inland about 32km (at its farthest points) from the shoreline. It is bounded in the North and the East by Ogun State, on the west by Republic of Benin and on the South by the Atlantic ocean (Kusemiju and Soyinka, 2007).

The study area is Badagry lagoon located in Lagos State, the most populous State in Nigeria. Lagos State is located within the southern rain forest zone of the humid tropics between latitude 6 ° and 7 ° North and longitude 3 ° and 4 ° East. Badagry lagoon lies between longitude 30 ° 45' and latitude 6 ° 30'N. It is part of a continuous system of lagoons and creeks lying along the coast of Nigeria from the border with Republic of Benin to Niger Delta with depth of the water ranging from 1m to 3m. It is characterized by the freshwater and brackish water most of the year.

Fresh fish catches from four (4) boats were sampled on a monthly basis in each fish landing site for 18 months (January 2014-December, 2014). Diverse fishing gears used (depending on targeted species and size) were mainly mono filamentous gill nets (25.4mm-50.8mm) to catch migratory species and cast nets(13mm-50.8mm) for mainly the tilapias. The catches were sorted into taxonomic groups (species and families) using standard fish identification keys provided by Adesulu and Syndenham (2007); Boulenger (1916), Fish Base web site and Raji and Babatunde (2013). Personal communications with experience fisher folks on the local names of the fishes were also solicited. The fishes were subsequently counted and weighed.

Species abundance and composition at each sampling site were calculated using Species count, Lausanne Index of Abundance while the Species Diversity was calculated using Margalef's Index(d) of taxa richness, Simpson's Index of Heterogeneity (D), Reciprocal of Simpson, Index(*Dr), Shannon-Weiner index of General Diversity(H¹). The level of similarity of species composition of the sampling sites of the coastal waters was calculated using Jacard,s coefficient, Sorensen index and Evenness index.

RESULTS AND DISCUSSIONS

Table 1 shows that 64 species from 39 families were identified. The most predominant fish family in terms of number was Scianidae (10.4%), followed by Carangidae (9.02%), Cichlidae (8.6%), Polynemidae (7.7%), Pomadasidae (6.7%), Clupeidae (5.2%), Claroteidae (4.1%), Sphyraenidae (3.53%), Mormyridae (3.37%) and others (41.4%). The eight major fishes commonly found in the coastal waters of Lagos State of Nigeria were *Pseudotolithus senegalensis*, *Trachinotus goreensis*, *Tilapia zilli*, *Polydactylus quadrifilis*, *Pomadasy jubelini*, *Ethmalosa fimbriata*, *Chrysichthys nigrodigitatus* and *Sphyraena piscatorum*. Gberefu lagoon waters was richer in species diversity than Yovoyan marine water front.

Fish abundance by number was higher at the brackish water of Gberefu (1310) as against the marine front of Yovoyan which was 1240. 26 families out of the 39 families identified were represented by just one species in the coastal waters of Badagry, Lagos State, Nigeria. A total number of 65 species belonging to 39 families were observed across Badagry coastal waters of Lagos State. Species count of 63 was recorded Gberefu while that of Yovoyan was 57. This shows Gberefu was more species-

Bolarinwa Josef Bamidele & Okeowo, Timothy O “The Species Composition and Diversity of the Coastal Waters of Badagry, Lagos State, Nigeria”

rich than marine front of Yovoyan. The nine major fishes commonly found in Badagry coastal waters of Lagos State of Nigeria were *Pseudotolithus senegalensis*, *Trachinotus goreensis*, *Tilapia zilli*, *Polydactylus quadrifilis*, *Pomadasy jubelini*, *Ethmalosa fimbriata*, *Clarias gariepinus*, *Chrysichthys nigrodigitatus* and *Sphyraena piscatorum*.

The study revealed that Gberefu landing site was more species-rich than the marine front of Yovoyan probably due to the fact that there were more creeks where the hardy and predominant catfishes like the clariids and the snakeheads (*Parachanna* spp) hide in Gberefu than in Yovoyan. Gberefu waters are brackish and richer in euryhaline fishes. Extraneous fishes like *Elops lacerta* and *Megalops atlanticus* move into the brackish water of Gberefu from marine environment for breeding and feeding purposes. However, the more salt-tolerant fishes like *Tilapia guineensis*, *Sarotherodon melanotheron*, mullets and the bonga which respond with salinity occurred more during the higher salinity of the dry season from January-April (Bolarinwa, 1984; Agboola and Anetekhai, 2008;). The onset of rainy season in May brings in young *Heterotis niloticus* called ‘Pete’ and the clariids.

Generally, Gberefu brackish waters was also richer in all the freshwater species like *Heterotis niloticus*, *Gymnarchus niloticus*, *Chrysichthys nigrodigitatus*, the cichlids (except *T. guineensis* and *S. melanotheron*) apart from the clariids and the channids. Ornamental fishes like *Gnathonemus* spp, Red tilapia, *Psetta sebae*, *Malapterurus electricus*, *Erpetoichthys* spp (reed fish) are more tolerant of the less saline waters of Gberefu. Extraneous fishes like the *Ethmalosa* spp (bonga), *Elops lacerta* (ten-pounder) and *Megalops atlanticus* (tarpon) stray from the salty waters into brackish waters for breeding purposes especially in June. Various workers have recorded the clariids and cichlids as most dominant families in different coastal waters and reservoirs (Adeosun, 2007; Imaobong, 2012; Oboh, 2013). Olopade *et al*,(2006) observed the dominance of the scianids in selected coastal waters of Sieraleone. Otobokere (2012) also reported the predominance of the scianids (*Pseudotolithus typus*, *Pseudotolithus elongatus* and *Pseudotolithus senegalensis*) in Brass River area of Niger Delta.

Despite the fact that most fisher folks of Badagry coastal waters fish all-year-round, there was more intense fishing and more fish output during the dry seasons. Araoye (2005) and Akegbejo-Samsons (1995) reported higher catches during the dry seasons in Asa Dam, Ilorin, Nigeria and Ondo State coastal waters respectively probably due to more intense fishing activities in the dry season. Olawusi-Peters (2008) also observed higher catches in Agboyi Creek, Lagos State during the dry season. Bolarinwa (2015) observed higher catches in the coastal waters of Ondo State during the dry season. However, workers like Odulate (2010) recorded higher catches in the rainy month of July in Ode-Omi coastal marine waters of Ogun State, Nigeria. Oginni (2004) in Iwo reservoir and Bello-Olusoji (1998) in Asejire Dam, Nigeria observed higher fish catches during the wet season attributing it to the draw-down effect of water volume in Lakes and reservoirs to be responsible for the higher catches. The dry season is a period of high volume draw-down in reservoirs and lakes.

Table 1 shows the various diversity indices of the sampling sites. A total number of 64 species belonging to 39 families were observed across the two sampling sites in Badagry coastal waters of Lagos State. Species count of 63 was recorded for Gberefu while that Yovoyan, a strictly marine water area had 58 showing Gberefu to be the more species-rich fishing site.

The high number of species recorded in the present study did not correspond with the findings of Akegbejo-Samsons (1995) who recorded 25 species from the coastal waters of Ondo State.

Table 1. Diversity Indices of the Two Landing Sites Representing the Coastal Waters of Badagry, Lagos State, Nigeria.

DIVERSITY INDICES	YOVOYAN	GBEREFU	TOTAL
Species Count.	58	63	64
Fish Abundance by No	1240	1310	2550
Index of Abundance	90.1%	98.4%	94.3%
Simpson,s Index(D)	0.018	0.019	0.019
Margalef Index(d)	8.85	8.77	8.03
Jaccard Index(Yovoyan &Gberefu)	0.88	0.88	0.88
Evenness Index(E)	0.082	0.085	-
Shannon-Weiner Index of General Diversity(H ¹)	0.33	0.35	0.34

Source: Field Survey (January 2014-December 2014).

Previous workers like Ogaga (2012) reported a drastic drop in species diversity in Warri River from 91 species to 34 species within a period of 5 years (1989-1994). The lower number of fish species was attributed to extinction, pollution and overfishing (Adeyemo, 2004).

The Index of Abundance according to Lauzanne (1983) was higher in Gberefu (98%) followed than in Yovoyan (89%). The highest fish abundance observed in Gberefu might be due to the fact that its waters are not as saline as that of Yovoyan, a salt-laden marine fishing site.

The value of Simpson’s Index recorded for Badagry coastal waters was lowest at 0.018 showing a high degree of heterogeneity of species composition. Margalef Indices (a measure of species Richness or Taxa Richness ‘d’) was 8.03 reflecting the coastal waters was still rich in biodiversity. This was attested to by majority of the fisher folks who claimed high degree of satisfaction in their catches. The values of Diversity indices like Jaccard Coefficients (0.88), Shannon-Weiner Index (H) and Evenness Index calculated showed there was a high level of similarity in species composition between Yovoyan and Gberefu. Value obtained for Evenness Index (E), a ratio of observed diversity (H) to maximum diversity Hmax showed all the species are not equally abundant.

CONCLUSION AND RECOMMENDATIONS

From the study, it is obvious that the artisanal fisher folks have been neglected in terms of infrastructural facilities despite their immense contribution to the domestic fish output. There is therefore a need for governmental intervention in the area of provision of fishing inputs and credit at concessionary rates. The high level of illiteracy among the fisher folks might have been responsible for the lack of awareness of fishing laws and regulations which could result in overfishing of the waters, there is therefore a need for training and sensitisation of the rural populace. By and large, there is a need for more in depth study of the species composition and diversity of Badagry coastal waters over a longer period in view of the nearness to industrial areas of Lagos metropolitan to ascertain the water quality of the aquatic ecosystem as this could affect aquatic flora and fauna.

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