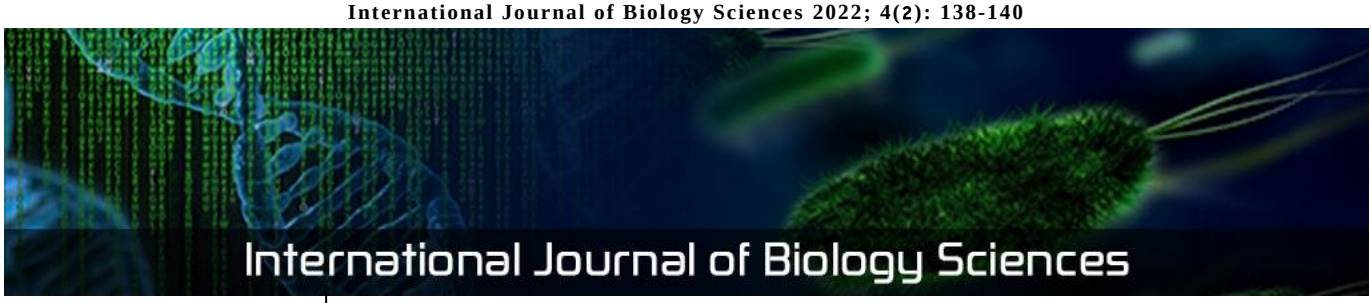

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Plankton diversity in Oriyanrin lower Ogun river water body

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Abstract
The plankton diversity of Oriyanrin lagoon, Ogun State, was sampled from February to September 2019. Plankton net was used to collect samples for plankton analysis. A plankton analysis per ml was carried out in the laboratory with the help of a binocular microscope. Results were presented using inferential and descriptive statistics, while diversity data was analyzed using diversity software. Forty taxa of plankton were encountered. Phytoplankton consisted of three families namely; Cyanobacteria, Bacillariophyceae and Rhodophyceae. Three groups of zooplankton encountered were Protozoa, Xanthophyceae and Desmidaceae. The plankton diversity of Oriyanrin lagoon, the system was high with a Simpson diversity index of 0.97, low dominance (0.03), and high evenness (0.94). The high value of plankton taxa and the number of individuals was an indication of a good aquatic environment. This ecological system should be maintained, which supports high plankton diversity, and its pollution should be discouraged to continue providing a healthy habitat for its aquatic inhabitants.

Keywords: Bacillariophyceae, hodophyceae, Rhodophyceae

Introduction
All over the world, freshwater resources have been subjected to an increasing pollution load from contaminated runoff water originating from anthropogenic activities like domestic and industrial (Banetti and Garrido, 2010) [5]. The adverse effects of human impacts on the aquatics include water-borne diseases, alteration of aquatic biota composition, eutrophication, and reduction or destruction of ecosystem integrity (Ekpo *et al*., 2013) [8].
Bio-monitoring programs that employ indices and metrics of community structure (Udoidiong and King, 2000) have been used to assess the potential impacts or non-impacts of these alternations on the aquatic ecosystem (Aiwerioghene and Adedolapo, 2016) [1]. The richness of macro invertebrate community composition in a water body can be used to provide an estimate of water body health (Argerich *et al*., 2004) [4]. The physical and chemical qualities of water and substratum occupied by macro invertebrates determine their occurrence and distribution (Danes and Hynes, 1980) [6]. Macro invertebrates play an important role in the aquatic community icluding mineralization, mixing of sediments and flux of oxygen into sediment, cycling of organic matter and assessing the quality of inland water (George *et al*., 2009) [9].
Human development pressures point to adverse consequences for water quality and general environmental degradation, which in the Lagos lagoon have manifested in declining fisheries, visible aesthetic nuisance, and loss of recreational amenities (Ajoa *et al*., 1996) [2].

Methodology
The study area
The Oriyanrin Lagoon, Abeokuta, Ogun State, is approximately 60 km long and 3 km wide and lies between longitudes 3°0′ and 3°45′ E and between latitudes 6°25′ and 6°30′ N. It is part of a continuous system of lagoons and creeks along the coast of Nigeria from the border with the River Ogun to the Niger Delta. Its water depth ranges from 1 m to 10m. The lagoon experiences two seasons: the dry season (December - May) and the wet season (June - November). (Williams, 1962). Most of the year, it is characterized by fresh and slightly brackish water. The lagoon is approximately equidistant from the entrances of Ogun and Cotonou harbors.

Therefore, it is influenced by tides and floods from the Ogun Lagoon and Cotonou harbour through Lake Nokue and Lake Porto-Novo (Anyanwu and Ezenwa, 1988) [3]. The river with its tributaries Italu and Itomo is the major river emptying into the lagoon. Creeks connected to the lagoon include Bawa and Doforo.

Major weeds occurring in the lagoon yearly in December and January include the common water hyacinth (*Eichiorniacrassipes*) and *ceratophyllum* and *pistia sp.* The lagoon is surrounded by large areas of swamps covered with vegetation, among which the raphia palm (*Raphia sudanica*), the African oil palm (*Elaeis guineensis*), and the coconut palm (*Cocos nucifera*) are dominant (FAO, 1969).

Plankton

Plankton net (mouth area = 40 cm, mesh size =500 um) with a 10ml bottle attached to the apex was used to collect plankton samples. Ten vertical and horizontal hauls were made, and the net was dragged over a distance of 5 m to make a semi-lunar area.

Concentrated samples were poured into a labelled 150 ml bottle, and 4% formalin was added to preserve the phytoplankton, and 70% ethanol was used to preserve zooplankton.

The bottle was covered and properly labeled at each location. Plankton species were identified with illustration by Jeje and Fernando (1986), and the number of plankton was estimated using the Sedgwick Rafter counting chamber as described by Boyd (1979).

Results

Plankton composition of Oriyanrin Lagoon, Ogun State

Forty taxa of plankton were encountered. Phytoplankton consisted of three families, namely; cyanobacteria, bacillariophyceae, rhodophyceae. Three groups of zooplankton encountered were protozoa, xanthophyceae and desmidaceae. Simpson diversity (0.97) was very high during the study period, as shown in table 2. Species dominance (0.03) was very low with high evenness (0.94). Monthly taxa were highest in July (33) and least in May (24). The highest number of individual (4377) was observed in February, while the lowest (1916) was recorded in September. Simpson diversity index was generally high throughout the study period ranging from 0.94 to 0.96. Low dominance (0.04) was recorded in February, March, April and June. The high value of plankton taxa and the number of individuals was an indication of a good aquatic environment.

Table 1: Plankton diversity (Per ml) of Oriyanrin Lagoon, Abeokuta, OGUN State

S/N	Plankton	Feb	Mar	Apr	May	June	July	Aug	Sept	Total	Relative (%)
1	*Stylonychia*	145	28	0	56	98	109	213	84	733	2.95
2	*Meridion*	0	138	84	0	140	55	31	62	510	2.05
3	*Cosmarium*	0	109	0	113	56	106	139	140	663	2.67
4	*Closterium*	0	83	0	0	56	27	78	140	384	1.54
5	*Navicula*	201	0	134	112	51	53	115	25	691	2.78
6	*Prorodon*	140	84	168	0	196	64	31	85	768	3.09
7	*Spirotaenia*	0	136	101	56	171	109	84	79	736	2.96
8	*Penium*	78	136	168	28	139	280	56	0	885	3.56
9	*Aphanocapsa*	0	137	0	171	0	49	84	28	469	1.89
10	*Paramecium*	224	57	56	0	245	196	196	56	1030	4.14
11	*Euglena*	0	79	0	0	224	84	0	0	387	1.56
12	*Anabaena*	113	0	56	0	54	61	0	0	284	1.14
13	*Merismopedia*	168	0	0	56	0	111	87	28	450	1.81
14	*Spirogyra*	117	139	171	56	196	268	28	0	975	3.92
15	*Protococcus*	87	196	0	84	224	168	84	0	843	3.39
16	*Zygnema*	308	55	84	0	111	134	140	53	885	3.56
17	*Cosmarium*	112	0	84	224	113	112	0	28	673	2.71
18	*Oscillatoria*	140	28	55	109	107	0	29	57	525	2.11
19	*Coelosphaerium*	0	197	252	0	51	0	20	85	605	2.43
20	*Chrococcus*	81	56	112	0	0	84	84	56	473	1.90
21	*Gloeosphaerium*	140	112	107	25	107	257	111	0	859	3.46
22	*Synechococcus*	49	77	56	0	81	112	0	0	375	1.51
23	*Crucigenia*	224	59	112	0	0	0	0	0	395	1.59
24	*Rotifer*	53	27	252	56	199	56	0	44	687	2.76
25	*Cupelopagis*	196	84	56	0	0	0	0	0	336	1.35
26	*Diaptomus*	112	56	28	32	0	0	0	57	285	1.15
27	*Diffugia*	171	168	79	28	224	173	81	0	924	3.72
28	*Eudorine*	140	224	0	0	113	252	56	0	785	3.16
29	*Actinosphaerium*	56	56	196	0	107	56	84	0	555	2.23
30	*Entosiphon*	163	50	80	21	51	0	115	106	586	2.36
31	*Trinema*	100	106	28	27	0	28	23	0	312	1.25
32	*Volvox*	112	81	29	0	50	70	84	81	507	2.04
33	*Urocentrium*	55	0	23	29	25	84	84	79	379	1.52
34	*Lecane*	196	56	84	87	141	202	0	0	766	3.08
35	*Mytilina*	59	57	58	55	43	57	50	55	434	1.75
36	*Vaucheria*	309	130	55	0	50	56	28	56	684	2.75
37	*Lemanea*	166	49	81	112	84	103	333	112	1040	4.18
38	*Cyclotella*	0	81	56	238	0	112	51	135	673	2.71
39	*Rhizoclonium*	55	168	87	111	0	0	28	109	558	2.24

40	*Rotaria*	107	73	146	216	113	21	0	76	752	3.02
	Total									100	

Key:
Feb – February
Mar – March
Apr – April
May - May
Jun – June
Aug – August
Sep – September
% - percentage

Table 2: Monthly variation of plankton diversity in Oriyanrin Lagoon, Abeokuta, Ogun State. (Feb – September 2019)

Diversity index	Feb	Mar	Apr	May	June	July	Aug	Sept	Overall
Taxa_S	32	35	32	24	31	33	30	26	40
Individuals	4377	3372	3138	2102	3620	3709	2627	1916	24861
Dominance_D	0.04	0.04	0.04	0.06	0.04	0.04	0.05	0.05	0.03
Shannon_H	3.35	3.42	3.30	2.93	3.29	3.31	3.17	3.16	3.63
Simpson_1-D	0.96	0.96	0.96	0.94	0.96	0.96	0.95	0.95	0.97
Evenness_e^H/S	0.89	0.87	0.85	0.78	0.86	0.83	0.79	0.90	0.94

Discussion

Sources of dissolved oxygen in the aquatic environment include the atmosphere and photosynthesis. This depends on its solubility, while a loss of oxygen includes respiration, decay by aerobic bacteria, and decomposition of dead decaying sediments (Gupta and Gupta, 2006) [10].

Accumulation of free carbon dioxide due to little photosynthetic activities of phytoplankton will lower the pH value of the water, while intense photosynthetic activities of the phytoplankton will reduce the free carbon dioxide content resulting in increased pH values (Egborge, 1981; Gupta and Gupta, 2006) [7, 10].

Conclusion

Although considerable interest has been directed towards research and development of fisheries in Nigerian waters, surprisingly little effort has been directed at the association of non-fisheries resources (Aquatic microflora and fauna). Apart from their ecological role, plankton contributes greatly to the economic and scientific importance of Nigerian water bodies. The present tendency to annihilate these resources through anthropogenic activities, importance, water physical and chemical tolerance level, will spell doom to aquatic organisms which depend on them. The ecological system should be maintained, which supports high plankton diversity, and its pollution should be discouraged to continue providing healthy habitat for its aquatic inhabitants.

Recommendation

There is a need to study the primary production of the water, know their population dynamics and diversity as most aquatic organisms are dependent on plankton.

The uncontrolled use of the water body should be checked through the enforcement of variation regulation by the implementing agencies involved, as there will be a serious biodiversity loss if this situation should continue.

Any management programme put in place should be such that it will address the issues of environment protection, integrated management, and sustainable development, as well as the conservation of the living resources of the system.

So far, no work has been published on the diversity of plankton in Oriyanrin lagoon. Therefore, this study provides baseline data for Oriyanrin lagoon.

References

1. Aiwerioghene ANO, Adedolapo AA. Evaluation of some physicochemical parameters and benthic macro invertebrates of Ikere Gorge Reservoir in Oyo State, Nigeria. Journal of Applied Sciences and Environmental Management. 2016;20(4):1097-1103.
2. Ajao EA, Oyewo EO, Unyimadu JP. A review of the pollution of coastal waters in Nigeria. Nigerian Institute for Oceanography and Marine Research, 1996.
3. Anyanwu AJ, Ezenwa BIO. Incidence of parasitic infection of pond raised Tilapia spp. and some cultivable fish species from three ecological areas of Lagos state. Nigeria Institute of Oceanography and Marine Research, Technical Paper No. 32, 1988, 102.
4. Argerich A, Puig García M, Pupilli E. Effect of floods of different magnitude on the macroinvertebrate communities of Matarranya stream (Ebro river basin, NE Spain). Limnetica. 2004;23(3-4):283-294.
5. Benetti CJ, Garrido J. The influence of water quality and stream habitat on water beetle assemblages in two rivers in northwest Spain. Vie et milieu. 2010;60(1):53-63.
6. Dance KW, Hynes HBN. Some effects of agricultural land use on stream insect communities. Environmental Pollution Series A, Ecological and Biological. 1980;22(1):19-28.
7. Egborge ABM. The composition, seasonal variation and description of zooplankton in Lake Asejire, Nigeria. 1981;127:389-401.
8. Ekpo I. Effect of physico-chemical parameters on zooplankton species and density of a tropical rainforest river in Niger Delta, Nigeria using canonical cluster analysis. International Journal of Engineering Science. 2013;2:13-21.
9. George ADI, Abowei JFN, Daka ER. Benthic macro invertebrate fauna and physico-chemical parameters in Okpoka Creek sediments, Niger Delta, Nigeria. International journal of animal and veterinary advances. 2009;1(2):59-65.
10. Gupta SK, Gupta RC. General and Applied Ichthyology (Fish and Fisheries). S. Chand and Company Ltd., Ram Nagar, New Delhi. 2006, 98-102.