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The Water Quality Conditions and Phytoplankton of Two Mangrove Creeks and an Adjoining Lagoon.

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ABSTRACT

The phytoplankton diversity of two mangrove creeks and the adjoining Lagos lagoon were investigated from October, 2010 to June, 2011. Four major algal groups were represented. These were the Bacillariophyceae, Chlorophyceae, Cyanophyceae, and Chrysophyceae. A total of 60 species from 36 genera were recorded. In terms of diversity, Diatoms were the most abundant group, recording 39 species (65%). The chlorophytes recorded 15 species (15%), while the cyanobacteria recorded 10 species (16.7%) and the chrysophytes with 2 species (3.3%). Comparatively, the Ikota creeks (Station C) (45 taxa) and Foreshore estate creek (Station B) (32 taxa) recorded higher species diversity than the Lagos lagoon (Station A) (27 taxa). The report of water quality conditions and phytoplankton species in this study is the first report for the two mangrove creeks.

Keywords: Lagoon, Mangrove, Checklist, Algae, Phytoplankton, Diatoms, Blue-green algae, Chrysophytes, Ikota creek, Foreshore estate creek.

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INTRODUCTION

Mangrove creeks and lagoons are common wetland features of south-western Nigeria and form part of the numerous ecological niches associated with the Nigerian coastal environment (Onyema, 2009 c). The Lagos lagoon is connected to a number of mangrove creeks that empty into it throughout the year and then flow out to the Atlantic Ocean via the Lagos harbor. These coastal ecosystems are rich in biodiversity, including phytoplankton and zooplankton species, fin and shell fish and even benthic invertebrates to mention a few. The survival of these species is tied to the continuous favourability of their environment. Among these biological forms, the phytoplankton are the 'most' important as they constitute the foundation of the aquatic food chain. Hence they serve as food for other higher aquatic organisms, including the zooplankton, fishes and even the benthos. Additionally, they can serve as bio-indicators of a lot of water quality conditions.

A checklist of phytoplankton species in Nigeria have been documented by different workers even from the last century. This includes Mills (1932), Fox (1957), Holden and Green (1960), Imebvore (1965), Egborge (1973), Nwadiaro and Ezefili (1986). Others within the country are Chindah and Pudo (1991)on a checklist of algae in the plankton from the Bonny River, while Kadiri (1999) presented a list of phytoplankton species in some coastal waters of Nigeria and Opute (1991) presented a similar list for the phytoplankton of Warri/Forcados estuary.

Over the last 60 years or so, there has been increasing interest in phytoplankton studies of the Lagos lagoon system (Nwankwo *et al*., 2003). Nwankwo (1988) compiled a list of 195 species of planktonic algae for the Lagos lagoon. Furthermore, Nwankwo *et al*., (2003) published an additional list of 126 taxa to for the Lagos lagoon (Nwankwo, 1988) after 15years of additional investigations in the Lagos lagoon. A first list of chrysophytes has also been documented by Wujeck *et al.* (2005) for the Epe lagoon. In a pioneering report of phytoplankton species in off shore waters of Nigeria, Nwankwo and Onyema (2004) published a list of 63 species from off shore Lagos. Onyema (2008) also inventoried 129 phytoplankton species from the Iyagbe lagoon.

Presently, there is no published work on the phytoplankton of the Forshore estate and Ikota creeks, especially in comparism to the adjoining Lagos lagoon. These autotrophic species form the primary producers of this environment hence their dire importance in inter-trophic relationships within this coastal wetland system. There is also the need to comparatively quantify the species diversity in these coastal ecosystems. The aim of this study was to investigate the water quality conditions and provided a comparative systematic list that will be useful in our knowledge of the phytoplankton of the region and a sure step to the preservation and conservation of the bio-diversity of wetland ecosystems in Nigeria.

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MATERIALS and METHODS

Study areas.

Lagos coastal ecosystems

There are ten lagoons that make up the Lagos lagoon complex or system. They are the Yewa, Badagry, Ologe, Iyagbe, Lagos, Kuramo, Onijegi, Epe, Lekki and Mahin lagoons, from west to east (FAO, 1969; Afinowi, 1972; Yoloye, 1974, 1976; Nwankwo, 2004a; Onyema, 2009a, b). Like all parts of South-western these lagoons and their associated creeks are exposed to two distinct seasons namely the wet (May – October) and the dry (November – April) (Nwankwo, 2004b). In this region, creeks and creeklets flow into the proximate lagoon enroute to the sea. The Lagos lagoon is the lowest point in the region, so all other lagoons and creeks in the region to the east and west flows into it. The effect of tidal semi-diurnal seawater inflow impacts the Lagos and Iyagbe lagoons and their adjoining creeKs. On another hand, the Kuramo and Onijegi lagoons (Onyema, 2013) get salt ware inflow from beach overflows especially at high tide and during rough sea seasons (Onyema, 2009a, b : Onyema, 2013). The harmmattan, a short season of dry, dusty North-East Trade winds is experienced sometimes between November and January in the region reducing visibility and lowering temperatures. Dense rain forest zone vegetation preceded by littoral mangrove assemblages is the common macrofloral assemblages especially in areas with reduced anthropogenic influence. Mangrove conditions and communities (flora and fauna) are found to colonize the edges or intertidal spaces of the Lagos and Iyagbe lagoons among others. The Lagos lagoon has at least 12 creeks that empty into it continually. The Northern Foreshore estate creek and the Ikota creek are two of them. The entire area of study (three stations is located within the in Eti-Osa Local Government Area of Lagos state.

The Lagos lagoon (Station 1)

The Lagos lagoon (Fig. 1) is located in Lagos state. It has a surface area of 208km^2 (FAO, 1969), and an average depth of about 1.5m is open all through the year. Creeks and rivers inflow as well as seawater incursion determine the lagoon environment such that rainfall dilutes the lagoon water, breaks down any environmental gradient and enriches the environment through floodwater inflow (Nwankwo *et al*., 2003). Sampling of the Lagos lagoon (Station 1) was at co-ordinates - Longitude 6.28’ 6”N and Latitude 3.31’ 18”E co-ordinates.

The Foreshore Estate Creek (Station 2)

The foreshore estate creek (Fig. 1) is one of the numerous creeks that flow into the Lagos lagoon. The creek sampling station for this study is located at co-ordinates 6^o 27’ 20”N and 3^o 32’ 11”E. The creek is linked to the Lagos lagoon. The creek is about 5m deep averagely at the center. The area is tidal and sheltered. It is fed by water from the adjoining Lagos lagoon at high tide and at low tide the water ebbs into from it the lagoon. The creeks length, depth and shape are largely artificially and has been determined as a result of the need for sand and building needs of the Northern Foreshore estate developers. The creek edge is surrounded, by partly mangrove swamp and plants, which is inundated at high tide and partially exposed at low tide. Notable riparian flora of the creek includes: *Rhizophora*

racemosa, Avicennia nitida, Acrotiscum aureum, Paspalum orbiquilare, Tyha and water hyacinth (especially in the wet season). Notable fauna includes white and black herons that feed on exposed invertebrates at low tide. There was presence of fishing activity by local fishermen and sand mining activity in the area.

Ikota creek (Station 3)

Ikota creek (Fig. 1) is a brackish water creek linked to the Lagos lagoon. The site of this study is located at about Longitude 60 27'36''N and Latitude30 31'59''E Lagos, Nigeria. The creek is shallow, tidal and sheltered. It has a very large expanse of mangrove wetland and mud flats. The Ikota creek meanders through the mangrove swamp which is inundated at high tide and partially exposed at low tide. Ikota creek is over 4.5km long. It is connected and drains the wetlands areas within the popular National Conservation Foundation (NCF) located in Lekki, Lagos state. The sediment type in the study area is muddy sand. The reek salinity fluctuates between fresh conditions (in the wet season) to low and mid brackish water conditions in the dry season.

The shore of the creek is characterized by mangrove plants including *Rhizophora racemosa* (Red Mangrove) and *Avicenna* sp. (White Mangrove) and clusters of water hyacinths on the surface of the water (especially in the wet season) and along the edges, with *Rhizophora racemosa* being the dominant riparian vegetation.

There are also have some notable species such as *Paspalum orbiquilare, Acrotiscum aureum, Phoenix reclinata,* and shorebirds that browse the area especially at low tide. Human actives in the area include fishing, sand dredging and fish farming in the form of "Acadjas".

Collection of phytoplankton samples.

Phytoplankton sample was collected monthly, per station with a 55µm mesh size standard plankton net towed from a motorized boat for 5mins at low speed (5m/s). Plankton collections were from October 2010 – June, 2011. After collection the plankton net was hauled in and the filtrate sample transferred into a 250 ml well labeled plastic container with screw cap. Each sample was preserved with 4% unbuffered formalin and stored in the laboratory. After 48hours, samples were concentrated to 10 ml (Onyema, 2012).

Biological analysis

In the laboratory one drop of the concentrated sample, five different times for each sample was investigated at different magnifications (X100 and X400) using an Olympus binocular microscope with a calibrated eye piece. The drop count method was employed (Onyema, 2007). Appropriate texts were used to aid identification (Smith 1950; Hendey, 1958, 1964; Desikachary, 1959; Wimpenny, 1966; Patrick and Reimer, 1966, 1975; Whitford and Schmacher, 1973; Vanlandingham, 1982; Nwankwo, 1984, 1990, 2004a; Bettrons and Castrejon, 1999; Siver, 2003; Rosowski, 2003).

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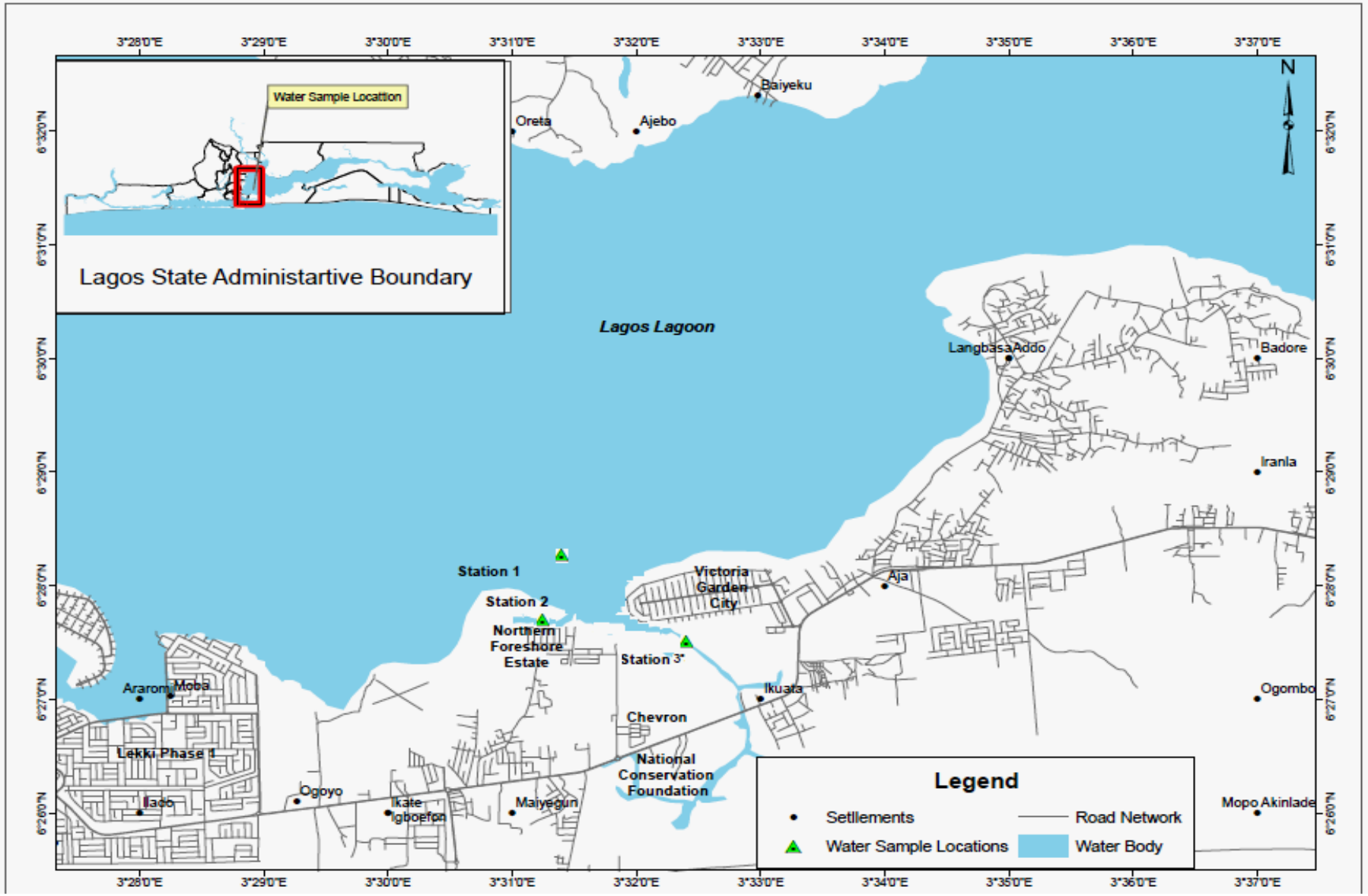

Fig. 1. Part of the Lagos lagoon (Station 1) showing the Northern Foreshore estate (Station 2) and Ikota (Station 3) creeks in Lagos.

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Table 1: Minimum, Maximum, Average and Standard Deviation of Water quality conditions at the Lagos lagoon and two mangrove creeks (Oct., 2011 – June, 2012)

	STATION 1				STATION 2				STATION 3			
PARAMETERS	**Min.**	**Max.**	**Average**	**Std. Dev.**	**Min.**	**Max.**	**Average**	**Std. Dev.**	**Min.**	**Max.**	**Average**	**Std.**
Air Temperature (^{o}C)	26	30	28	1.67	27.5	32	29.42	1.63	28	30	29.25	0.88
Water Temperature (^{o}C)	26	30	28.5	1.41	28	30	28.78	0.92	28	30	29.12	0.94
Transparency (cm)	32.5	120.5	91.42	33.12	30.5	100.5	56.50	30.67	25.5	72.5	43.33	20.97
pH @ 25°C	7.28	8.28	7.72	0.36	7.27	8.36	7.76	0.36	7.18	8.28	7.69	0.37
Conductivity, úS/cm	278.9	25700	12790.61	10464.66	398.5	25199	11695.33	10077.37	418	23200	11745.50	9749.57
Total Suspended Solids (mg/L)	5	37	14.63	12.13	4	44	18.75	16.71	5	35	14.25	10.58
Total Dissolved Solids (mg/L)	142	16962	8191.30	6829.10	203.9	16630	8053.88	6738.92	210	15310	7586.75	6445.20
Salinity (‰)	0.11	14.21	7.09	5.84	0.2	13.8	6.94	5.76	0.21	12.8	6.44	5.41
Acidity (mg/L)	3.1	8.1	4.21	1.82	2.9	7.8	4.34	1.66	2.4	7.5	4.30	1.64
Alkalinity (mg/L)	14	188.6	56.81	58.80	14.6	269.1	67.38	85.27	11.1	220.4	62.75	69.86
Total Hardness, (mg/L)	48.1	3010	1572.24	1323.99	51.4	3150.2	1459.95	1238.96	50.4	2700	1227.68	1060.03
Dissolved Oxygen (mg/L)	4.6	5.3	4.99	0.23	4	5.4	4.78	0.46	4.1	5.5	4.96	0.46
Biological Oxygen Demand(mg/L)	1	5	2.13	1.36	1	7	2.38	2.00	1	5	2.38	1.19
Chemical Oxygen Demand, (mg/L)	7	30	14.00	9.40	8	39	16.63	12.97	6	31	15.00	7.93
Chloride (mg/L)	55	7870	3901.88	3229.14	102.3	7644.7	3839.42	3204.67	97.01	7090	3568.15	2987.20
Nitrate (mg/L)	0.95	22.41	9.30	6.67	1.09	23.66	10.60	9.52	1.6	29.14	10.69	9.16
Sulphate (mg/L)	26	519	328.38	220.90	31	510	322.75	219.14	28.1	509	316.94	215.89
Phosphate, (mg/L)	0.43	16.2	4.93	5.66	0.51	4.16	2.12	1.21	0.88	5.94	2.77	1.79
Silica (mg/L)	1.3	11.6	3.52	3.36	1.3	10.2	3.55	2.79	1.5	4.6	3.22	0.97
Calcium (mg/L)	9.2	211	99.88	80.50	8.3	209.5	99.15	79.14	10.2	220	99.10	80.96
Magnesium (mg/L)	1.91	588.7	295.55	248.25	1.2	642.86	288.45	251.41	0.98	535.71	233.39	206.52
Zinc (mg/L)	0.005	0.016	0.01	0.00	0.007	0.014	0.01	0.00	0.007	0.025	0.01	0.01
Iron (mg/L)	0.004	0.58	0.20	0.20	0.004	0.99	0.30	0.39	0.004	1.09	0.39	0.45
Copper (mg/L)	0.003	0.034	0.01	0.01	0.003	0.049	0.01	0.02	0.002	0.04	0.01	0.01
Cadmium (mg/L)	0.0006	0.0011	0.00	0.00	0.0005	0.0019	0.00	0.00	0.0006	0.0014	0.00	0.00
Lead (mg/L)	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00
Chromium (mg/L)	0.03	0.051	0.04	0.01	0.02	0.055	0.04	0.02	0.041	0.08	0.07	0.02
Manganese (mg/L)	0.004	0.018	0.01	0.00	0.005	0.022	0.01	0.01	0.005	0.024	0.01	0.01
Nickel (mg/L)	0	0	0.00	0.00	0	0	0.00	0.00	0	0	0.00	0.00
Chlorophyll *a* (µg/l)	9.1	17.1	11.99	3.10	8.6	16.6	11.75	3.17	8.2	14.6	10.49	2.45

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RESULT

The comparative results on water quality indices from the Lagos lagoon (Station 1), Foreshore estate (Station 2) and Ikota (Station 3) creeks are presented in Table I. The surface water temperature ranged between 27 and 31 ^{0}C. The air temperature values ranged between 30 and 32 ^{0}C and transparency levels were higher in the dry than wet season (13.5 – 78 cm) at the 3 Stations.

The Total suspended solid was between 20 and 180 mg/L, Total dissolved solids ranged between 70 and 10,212 mg/L. The highest volume of Rainfall (133.6 mm) was recorded in October while the lowest (11.3 mm) was recorded in December for the area. pH values ranged between 6.9 and 7.10 while Conductivity values were between 166 and 16,500 µS/cm. Salinity at the 3 stations were between 0.23 and11.55 ‰. Chloride was between 55 and 7870 mg/L and Acidity was between 5.0 and 25.5 mg/L. The surface water alkalinity also increased as the dry season progressed (October through to March). The Total hardness values showed a steady increase and ranged between 86.8 and 5820.1 mg/L with the highest value (5820.1 mg/L) recorded in March and the lowest value (86.8 mg/L) in October.

The Dissolved Oxygen ranged between 4 and 5.5 mg/L while the Biological Oxygen Demand values showed a steady increase and ranged between 1 and 7 mg/L. The Chemical Oxygen Demand ranged between 6 and 39 mg/L. The Chloride ranged between 55 and 7870 mg/L. The Nitrate ranged between 0.95 and 29.14 mg/L. The Sulphate ranged between 26 and 519 mg/L. The Phosphate ranged between 0.43 and 16.2 mg/L. The highest Silica level was 11.6 mg/L, while the lowest was 1.3 mg/L. The highest Calcium level was 220 mg/L and the lowest value was 8.3 mg/L. The Magnesium values showed a steady increase and ranged between 0.98 and 642.86 mg/L. The heavy metals - Zinc, Iron, Copper, Cadmium, Chromium and Manganese ranged between 0 and 0.025, 0.004 and 1.09, 0.002 and 0.034, 0.0006 and 0.0019, 0.01 and 0.055, 0 and 0.024 respectively. Lead and Nickel recorded zero value throughout the study. The highest Chlorophyll *a* value was (17.1 µg/L) while the lowest (8.2 µg/L). Chlorophyll *a* showed clear monthly variation for the 3 stations studied.

The phytoplankton flora of the Iyagbe lagoon.

Table 1 presents a checklist of Lagos lagoon, Foreshore and Ikota creeks phytoplankton species and their classification from October 2011 to June 2012. Four major algal groups were represented in the micro-flora of sampled areas the Lagos lagoon, Foreshore and Ikota creeks. These were the Bacillariophyceae, Chlorophyceae, Cyanophyceae, and Chrysophyceae. A total of 60 species from 36 genera were recorded. Whereas Station 3 recorded 45 species, Station 2 listed 32 species while Station 1 reported 27 species.

In all, diatoms were the most abundant group, recording 39 species (65%). The chlorophytes recorded 15 species (15%), while the cyanobacteria recorded 10 species (16.7%) and the chrysophytes with 2 species (3.3%).

Bacillariophyceae

The occurrence of diatoms were more in the Station 3 (28 taxa) than in the Station 1 (23 taxa) and in the Station 2 (19 taxa). The bacillariophyceae were the predominant group for the duration of the study in terms of phytoplankton species diversity. Species encountered were *Amphiprora alata, Actinoptycus splendens, Aulacoseira granulata, Aulacoseira granulata* var. *angustissma, Camplylodiscus* sp., *Aulacoseira granulata* var. *angstissima* f. *spiralis, Aulacoseira islandica, Chaetoceros decipens,* C*oscinodiscus centralis, Coscinodiscus eccentricus, Coscinodiscus radiatus , Cyclotella menighiniana, Melosira nummuloides, Melosira moniliformis, Odontella aurita, Odontella laevis, Odontella regia, Odontella sinensis, Skeletonema coastasum* and *Terpsinoe musica* were centric diatoms. The pennate diatoms were *Amphora ovalis, Cymbella affinis, Gyrosigma balticum, Gyrosigma spenceri, Gyrosigma scalproides, Gyrosigma wansbeckii, Navicula mutica , Nitzschia closterium, Nitzschia palea, Nitzschia sigma, Nitzschia sigmoidea, Pleurosigma angulatum, Pleurosigma elongatum, Pinnularia gibba, Surirella ovate, Surirella splendida, Surirella striatula, Synedra crystallina* and *Synedra ulna.*

Chlorophyceae

The occurrence of chlorophytes were more in the Station 3 (8 taxa) than in the Station 2 (5 taxa) and Station 1 recorded no green algal species. Species of green algae encountered were *Closterium ehenrenbergii, Closterium* sp., *Gonatozygon* sp., *Cladophora glomerat, Volvox* sp, *Spirogyra africana*, *Akistrodesmus* sp., *Scenedesmus obliquus* and *Scenedesmus quadriquada* were species recorded.

Cyanophyceae

The occurrence of blue-green algae were more in Station 3 (7 taxa) and Station 2 (7 taxa) with Station 3 recording only 4 taxa. Species encountered were *Chroococcus turgidus, Microcystis aureginosa, Microcystis flos-aquae, Merismopedia gluca, Anabaena constricta, Anabaena spiroides, Lynbgya martensiana, Oscillatoria Formosa, Oscillatoria tenius and Spirulina platensis* for this study.

Chrysophyceae

The chrysophytes recorded two species only at Station 2 (1 taxon) and Station 3 (2 taxa, namely *Chrysoteppanoshaera globulifera* and *Synura uvella.*

Table 1: A checklist of phytoplankton in the Lagos lagoon, Foreshore and Ikota creeks.

PHYTOPLANKTON TAXA	STATION 1	STATION 2	STATION 3
DIVISION: BACILLARIOPHYTA			
CLASS: BACILLARIOPHYCEAE			
ORDER 1: CENTRALES			
Amphiprora alata Ehrenberg	*		
Actinoptycus splendens Ehrenberg	*		*
Aulacoseira granulata Ehrenberg (Ralfs)	*	*	*
Aulacoseira granulata var. *angustissma* Muller	*	*	*

Camplylodiscus sp.	*		*
Aulacoseira granulata var. *angstissima* f. *spiralis* Muller		*	*
Aulacoseira islandica (O.F. Muller) Simonson			*
Chaetoceros decipens Cleve	*		
Coscinodiscus centralis Ehrenberg	*		*
Coscinodiscus eccentricus Ehrenberg	*		*
Coscinodiscus radiatus Ehrenberg	*	*	*
Cyclotella menighiniana Kutzing		*	*
Melosira nummuloides C.A. gardh	*		*
Melosira moniliformis Agardh	*		*
Odontella aurita (Lyngbe) Brebisson	*		
Odontella laevis Ehrenberg		*	*
Odontella regia (Schultze) Ostenfeld		*	*
Odontella sinensis Greville	*		
Skeletonema coastasum Cleve	*		
Terpsinoe musica (Ehr.) Hustedt		*	*
ORDER 11: PENNALES			
Amphora ovalis Kutzing			*
Cymbella affinis Kutzing			*
Gyrosigma balticum (Ehr.) Rabenhorst	*	*	*
Gyrosigma spenceri W. Smith	*		
Gyrosigma scalproides (Rabh) Cleve	*	*	
Gyrosigma wansbeckii (Grunow) Cleve		*	
Navicula mutica Kutzing			*
Nitzschia closterium Wm. Smith	*	*	
Nitzschia palea (Kutzing) Wm smith		*	*
Nitzschia sigma Grunow		*	*
Nitzschia sigmoidea (Witesch) W. Smith	*		
Pleurosigma angulatum (Quekett) Wm Smith	*		*
Pleurosigma elongatum Wm Smith	*	*	
Pinnularia gibba Ehrenberg		*	*
Surirella ovata Kutzing			*
Surirella splendida Wm. Smith		*	*
Surirella striatula Turpin			*
Synedra crystallina Kutzing	*	*	*
Synedra ulna (Nitzsch) Ehrenberg	*	*	*
DIVISION: CHLOROPHYTA			
CLASS: CHLOROPHYCEAE			
ORDER I: DESMIDIALES			
Closterium ehenrenbergii (Bory) Ehrenberg		*	*
Closterium sp.			*
Gonatozygon sp.			*
ORDER 11: CLADOPHARALES			
Cladophora glomerata Linnaeus Kutzing		*	

ORDER 111: VOLVOCALES			
Volvox sp.			*
ORDER IV: ZYGNEMATALES			
Spirogyra africana (Fritsch) Czurda		*	*
ORDER V: CHLOROCOCCALES			
Akistrodesmus sp.			
Scenedesmus obliquus (Turp.) Kutzing		*	*
Scenedesmus quadriquada (Turp.) de Brebisson		*	*
			*
DIVISION: CYANOPHYTA			
CLASS: CYANOPHYCEAE			
ORDER I: CHROOCOCALES			
Chroococcus turgidus (Kutz.) Lemm		*	*
Microcystis aureginosa Kutzing	*	*	*
Microcystis flos-aquae Kirchner		*	*
Merismopedia gluca (Ehr.) Nageli	*		
ORDER II: HOMOGONALES			
Anabaena constricta Geitler		*	*
Anabaena spiroides Klebahn	*		
Lynbgya martensiana Meneghini		*	*
Oscillatoria formosa Bory			*
Oscillatoria tenius Agardh	*	*	
Spirulina platensis Geitler		*	*
DIVISION – CHRYSOPHYTA			
ORDER – CHRYSOPHYCEAE			
Chrysotepphanosphaera globulifera Scherffel			*
Synura uvella Ehrenberg		*	*

DISCUSSION

The hydrodynamic of lagoons and mangrove creek ecosystems are important in governing the distribution and occurrence of phytoplankton forms within wetland ecosystems. Species recorded in this study have been previously recorded in the Nigerian coastal environment and are therefore known endemic species. The mangrove creeks however recorded higher phytoplankton diversity than the Lagos lagoon. The diatoms were the more prevalent group, taxonomically. Comparatively, more pennate diatoms were recorded in the mangrove creeks than the lagoon. Additionally the Ikota creek recorded noticeably higher numbers than the Foreshore estate creek. The occurrence of pennate forms are likely from the effect of tidal flow/mixing that probably scours up the phytobenthic forms into the water column within the Lagos lagoon and more within the shallow creeks.

The flushing of planktonic algal forms towards the sea especially during the rains by flood waters and as the tide ebbs could also account for the reduced phytoplankton diversity within the lagoon, comparatively and at these times.
In terms of the bio-indicative qualities of the encountered species, the Lagos lagoon phytoplankton spectrum clearly reflected higher salinities in contrast to the mangrove creeks per time. On the other hand, the chrysophytes encountered were reflective of acidic and higher nutrient conditions at some time within the mangrove creek as against the Lagos lagoon. These kinds of conditions have been recorded in the Elete creek adjoining the Porto-Novo creek during the peak raining season.

It is possible the effect of habitat mordification in the form of sand minning and dredging which is common in the area, could be implicated in the lower species diversity recorded, especially from the Foreshore estate creek.

There is need for more in-depth ecological studies into our wetland areas to provide more information per time, and help guide better eco-friendly understandings and policy formation for the region. It is imperative to save our wetlands as their values are economically and ecologically invaluable.

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