

## POLLUTION ALONG THE LAGOS LAGOON

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### ABSTRACT

Pollution of the Lagos Lagoon was studied by examining and comparing the water quality at various locations along its course. Five high density communities in Lagos state, along which the Lagoon runs were randomly selected for sampling. The five parameters studied are appearance, pH, temperature, dissolved oxygen and iron. Results show that pollution was higher at Ajegunle and least at Lekki and Lagos Island. The latter are the high brow parts of the city and expectedly with a lower contribution to pollution. Only samples from both Lekki and Lagos Island had a clear appearance while others were dark and dirty brownish. Samples from Lekki also had the highest DO, while those from Ajegunle were least. Concentration of Iron was a highest value of 1mg/l for samples from Ajegunle and Oworonsoki, but not detectable in samples from Lekki, Lagos Island and Ebute-metta. Results points to the need for an environmental pollution awareness and a good water quality and sustainable development.

**KEYWORDS:** Pollution, Lagoon, Water, Ph, Dissolved Oxygen

### INTRODUCTION

The importance of water to life cannot be overemphasized. It is very useful in many ways among which are; domestic, industrial, agriculture, recreation, hydroelectric, transportation and waste disposal (for surface water bodies) to mention a few [1, 2]. Availability and proximity to water source influences the choice of man's allocation of land space for settlement. In this regard and related instances however, surface water pollution become obvious when the self-cleansing or the pollutant carrying capacities of the water is exceeded [3, 4]. Unless hygienic practices are encouraged and awareness campaign is continuous especially in the affected areas, surface water pollution may be more grave an environmental problem than imagined. Waterborne diseases are acute and rapid in their spread [5, 6]. Due to inadequate public water supply, residents have to seek other sources of freshwater from rainfall, wells and the lagoon [7]. Hence, this paper investigates the pollution along the Lagos lagoon, considering the influence of communities within the immediate environment.

The Lagos lagoon is the largest of the nine coastal lagoons of south-western Nigeria, and receives fresh water from Lekki lagoon via Epe lagoon in the North-east. It is over 50 kilometres long and varies between 3 to 13 kilometres in width. It traverses the city, stretching out to the east, up to Epe and discharges into the Atlantic Ocean at the Lagos Harbour [8, 9]. Figure 1.0 is a map of Lagos mainland showing the Lagos Lagoon.

On the basis of proximity to the Lagos lagoon and high population density, five communities were selected for sampling from among those that the lagoon traverses. The communities are: Ajegunle, Oworonsoki, Ebute-meta, Lagos Island and Lekki.



Source: [9]

Figure 1: Map of Lagos Mainland Showing the Lagos Lagoon

## MATERIALS AND METHODS

Samples were obtained from the Lagoon portion within each selected community according to the standard methods. Two samples were collected upstream and downstream at each community, the sampling location is as presented in Table 1:0. They were analysed in the laboratory for physical, chemical and bacteriological characteristics to determine the extent of pollution.

## RESULTS AND DISCUSSIONS

The characteristics of the lagoon under study are presented in Table 2.0. Samples were analysed and checked for potability, since it is a possible source of water for domestic use by residents when in a grim situation of public water supply. Possible domestic uses include; washing, cooking, drinking and toilet uses among others [10]. Samples from both Lekki and Lagos Island had a clear appearance each. While samples from Ebute-metta had a straw like appearance which could be attributed to an algal growth or other aquatic plants. Samples from Oworonshoki appeared brownish and those from Ajegunle dirty brownish. These could be associated with the presence of nutrients, sediments and pollutants [11]. Potable water is required to be unobjectionable and of a clear appearance[12, 13].

The pH for all samples ranged between 6.90-7.01 which is almost neutral and is similar to the findings of Inyang et.al. [14] on the pH at Ejirin, a part of Epe Lagoon. pH is a measure of the acidity or alkalinity of a solution, it ranges between 6-8 for Freshwater lakes, streams, and ponds depending on the surrounding. But variation in the pH of lagoon could be due to algal activity or industrial influent for wastewater lagoons. For most freshwater aquatic organisms, a pH range of 6.5-8.0 is preferred, although up to 8.5 is allowed for surface waters and between 6.5-8.5 is required of a potable water[15, 16].

Similarly, for temperature, samples had temperatures less than 30°C. Although these could have been affected by weather conditions and specifically the hours of the day during which samples were collected. For instance, samples collected early morning at winter would be expected to have a lower temperature as the day is cooler at this period of time. Conversely, samples collected at mid-day in summer would be expected to have a higher temperature. Nevertheless, temperatures above 40°C is not suitable for surface waters as it adversely affects the aquatic organisms and 27-40°C is

required for pot ability[17].Surface water temperature is generally affected by sunlight.

Dissolved oxygen (DO) is a measure of the oxygen gas molecules present in water. It is available to support aquatic life, thus high DO is best for a healthy ecosystem. Factors affecting DO include; temperature; seasons; period of day; depth; altitude and rate of flow. DO is consumed in the processes such as oxidation and respiration, while it is replenished by photosynthesis and from the surrounding air[18]. The atmosphere and aquatic plants are the primary sources. Using the average of results presented, samples from Lekki had the highest DO, while those from Ajegunle were least.

Iron content was a highest value of 1mg/l for samples from Ajegunle and Oworonshoki, but not detectable in samples from Lekki, Lagos Island and Ebute-metta. Although iron is non-toxic but it affects the palatability of water and its appearance, as it adds colour to water. Concentrations above 1mg/L will impart taste to water[19, 20]. Samples A, B, C and D had 1mg/l of iron each, which is above the 0.3mg/l required for potability. Also, it can be objectionable in water for domestic uses as it gives a rusty color to clothes being laundered[21].

## CONCLUSIONS

The Lagoon has been polluted more at Ajegunle and least at Lekki and Lagos Island. It is considered that the activities of residents at each community could have contributed significantly to the pollution, to account for variation in characteristics along the same stretch of surface water. It is therefore recommended that a further study to determine the contribution of each community should be carried out.

**Table 1:0: Location for Sampling**

Sample ID	Community	Sample Source	Location
A	Ajegunle	Lagos Lagoon	Upstream
B	Ajegunle	Lagos Lagoon	Downstream
C	Oworonsoki	Lagos Lagoon	Upstream
D	Oworonsoki	Lagos Lagoon	Downstream
E	EbuteMetta	Lagos Lagoon	Upstream
F	EbuteMetta	Lagos Lagoon	Downstream
G	Lagos Island	Lagos Lagoon	Upstream
H	Lagos Island	Lagos Lagoon	Downstream
I	Lekki	Lagos Lagoon	Upstream
J	Lekki	Lagos Lagoon	Downstream

**Table 2:0: Results of Physical and Bacteriological Analysis of Samples**

Parameters	Physico-Chemical Properties									
	Ajegunle		Oworonsoki		Ebutemetta		Lagos Island		Lekki	
	A <sub>1</sub>	A <sub>2</sub>	B <sub>1</sub>	B <sub>2</sub>	C <sub>1</sub>	C <sub>2</sub>	D <sub>1</sub>	D <sub>2</sub>	E <sub>1</sub>	E <sub>2</sub>
Appearance	Dirty Brown	Dirty Brown	Brown-ish	brown-ish	Straw-like	straw-like	Clear	Clear	Clear	Clear
pH	6.99	7.01	6.98	6.99	6.98	6.97	6.97	6.99	6.90	6.92
Temperature (°C)	29.3°C	29.5°C	29.7°C	29.1°C	29.7°C	29.9°C	29.7°C	29.7°C	29.2°C	29.8°C
DO (mg/l)	1.83	2.03	2.85	2.91	1.91	2.1	2.84	2.82	3.10	3.43
Iron (mg/l)	1	1	1	1	-	-	-	-	-	-

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