Vol. 5 No. 1, June, 2025

FUAM Journal of Pure and Applied Science

Available online at
www.fuamjpas.org.ng

An official Publication of
College of Science
Joseph Sarwuan Tarka University,
Makurdi.

FUAM Journal of Pure and Applied Science
© College of Science, Joseph Sarwuan Tarka University, Makurdi
https://fuamjpas.org.ng/
Vol.5 No. 1 June, 2025

Physicochemical Parameters of Uren River, Ikenne, Ogun State, Nigeria: A Preliminary Status Report with Multivariate Statistic

S.A[1]. Akinbola, O.D[2,3]. Umoren, D.A[1,3*]. Idowu, U.O[2,3]. Kayode & F.A[4]. Zoum

[1]Department of Chemistry, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria
[2] Department of Biological sciences, National Open University of Nigeria
[3]Department of Biological Sciences, National Open University of Nigeria, Abuja, Nigeria
[4]Department of Mining and Mineral Engineering, NAHPI, University of Bamenda, Cameroon
*Correspondence E-mail: idowudaniel284@gmail.com

Received: 30/10/2024 **Accepted**: 25/11/2024 **Published online**: 26/11/2024

Abstract
Major water bodies in Nigeria have consistently suffered from a high level of pollution attributed to human activities which are related to population increase, agricultural activities and industrialization. This study aimed to determine some physicochemical parameters in selected sections of the Uren River in Ikenne, Ogun State, Nigeria. Water samples were collected from five (5) stations. pH and Temperature were tested on site then further analysis were carried out by standard procedures. Multivariate statistics such as Pearson correlation (PC), and principal component analysis (PCA) were employed to determine the association between parameters. The results showed the highest mean pH, temperature, electrical conductivity, salinity, and total dissolved solids in station E (5.81, 26.83°C, 121.33 µS/cm, 60.33, 60.33 ppm) respectively. Total alkalinity and total acidity in station A and station C (4.27 and 4.20 mg/L) respectively. The temperature, TDS, EC, salinity and total alkalinity across the stations were within the WHO standards (25-29°C, <600 ppm, 1000 µS/cm, 100 ppm and 200 mg/L) while the pH across the station A-E (5.67, 5.75, 5.75, 5.77, 5.81) are not in compliance with the WHO standard (6.5-8.5). Multivariate analysis such as Pearson correlation and PCA revealed a strong association between EC, TDS and salinity in the river. The strong association between the parameters except for pH is an indication of a similar origin which is primarily from a natural source. In conclusion, the study revealed an unacceptable low pH level across the stations which could be linked to anthropogenic activities influencing the status of the river.
Keywords: Physicochemical, Uren, Ikenne, River, Anthropogenic Activities.

Introduction

In third-world countries, water pollution is one of the most important environmental problems [1]. It should be noted that the key to effective environmental quality management is the ability to continuously monitor the concentration of various pollutants of interest in the sample. The significance of various substances present in water is obvious and it is their level that gives a measure of the quality of the water. Most of the substances discharged into the water display an attraction towards the particulate matter as a result of industrialization. Consequently, the chemical constituents of sediment at the bottom reflect the influx of discharged materials into the marine ecosystem [2]. One of the most problematic issues facing the people is the availability of good quality freshwater for various domestic, agricultural and industrial purposes in most developing countries of the world, especially Nigeria [3, 4].

Most water bodies in Nigeria have consistently suffered from a high level of pollution occasioned by various anthropogenic activities related to increasing population, agricultural activities, industrialization, and urbanization [5, 6, 7]. Anthropogenic activities on surface water sources have resulted in a serious issue of concern among scholars globally due to their negative impact on humans, and the environment. Compared to the influence of natural occurrence, surface water is a major recipient of pollutants and materials resulting from human activities in the environment [8]. Specifically, urbanization and industrialization developments are implicated as major

stressors causing the degradation of riverine systems [9] that is occasioned by stormwater return flow, sewage disposition, agricultural runoffs, and effluent discharges resulting in the deterioration of the aquatic ecosystem [7, 10] by causing water quality impairment, biodiversity reduction, water management crises and policy enhancement [11]. In aquatic ecosystems, the physicochemical quality (depth, temperature flow velocity, dissolved oxygen, alkalinity, biochemical oxygen demand, nutrient concentration, and substrate type) of water, influence the diversity, composition, abundance and distribution of organisms [12, 13]. Studies have also shown that pollution contributed by human activities has

negatively affected the water's abiotic and biotic components [14, 15].

Surface water is a natural water source which collects from water running across the surface of the ground [1]. Microorganisms, organic material, and minerals are collected as water flows over the land. Sand, soil, and gravel are types of sediments that accumulate at the bottom of the water [1]. Surface water has numerous uses, including drinking, providing fish, irrigation, and recreational activities, but it is often contaminated. Surface waters are most exposed to pollution due to their accessibility for disposal of wastewater [16]. Physicochemical monitoring of water samples provides quantitative information about the presence of pollutants [7], and their changes/alteration can affect water quality which is necessary for numerous activities [7, 17].

The Uren River is a vital water source in Ikenne. At present, there is a lack of data regarding the water quality. The river primarily provides drinking water for the town and supports other municipal functions, but fishing is excluded. Renaissance visits indicated that local culture forbids fishing in this specific river due to certain cultural beliefs. The study aims to determine some physicochemical parameters in the to provide a basic status report.

Materials and Methods

Description of Study Area

The study was carried out in Uren River (coordination: 6°52"N 3°43"E), in Ikenne, Ogun State, South-West Nigeria in the month of January 2024. In the Remo Region of the Ikenne Local Government Area, it is the town with the highest population. The entire LGA is 144 km² in size, and the 2006 census found 118,735 people living there. Ikenne Local Government is comprised of five major towns namely Iperu, Ogere, Ironu, and Illishan. The population at large are mainly Remo stock with trading and farming as their predominant occupation. The climate and geographical location of the Ikenne area are supportive of the wide range of economic activities such as agriculture, industrial and commercial activities.

Sampling Procedure

Water samples were collected using a 1L plastic bottle pre-treated with 5% nitric acid (HNO_3) overnight each from five (5) stations, 100 meters apart in the river water. During sampling, all necessary precautions were taken into consideration to avoid contamination. The temperature and pH of the samples were determined in situ, labelled appropriately and transported in an ice pack to the Chemical Sciences Unit of Pure Sciences, Abeokuta, Ogun State, Nigeria for further analysis.

Quality Control

All chemicals used in experimentation were of Analytical grade purity and reagent blanks were made following the specifications to evaluate the reagents' purity. To ensure the highest level of instrument accuracy, the water quality meter and laboratory equipment were checked and calibrated according to the manufacturer's specifications and instructions [3, 18].

Physicochemical Quality

The physicochemical quality of the water samples collected was carried out using standard methods [3, 19]. Temperature and pH were measured in situ using a handheld digital water quality meter (Model: EZ-9909SP). After standardizing the apparatus with standard buffer solutions of varying pH, the sample pH was immediately taken. Total dissolved solids, salinity and electrical conductivity were determined using a handheld digital water quality meter (Model: EZ-9909SP). Total acidity and total alkalinity were determined using Titrimetric Methods [4].

Total Acidity: This was carried out as follows, the titrant (0.025 M NaOH) was titrated against 100 cm³ of sample in a conical flask using two drops of phenolphthalein as indicator, then a pink coloration was obtained to indicate the endpoint.

$$Total\ Acidity = \frac{Titre\ value \times 0.025 \times 1000}{100}$$

Total alkalinity: This was carried out as follows, the titrant (0.025 M HCl) was titrated against 100 cm³ of sample in a conical flask using two drops of methyl orange as an indicator, then a peach colouration was obtained to indicate the endpoint

$$Total\ Alkalinity = \frac{Titre\ value \times 0.025 \times 1000}{100}$$

Statistical Analysis

Data was subjected to the Statistical Package for Social Sciences (SPSS version 21) for descriptive statistics. Tukey Post hoc test was employed to determine the significance between the stations ($p<0.05$) while Pearson correlation and principal component analysis were employed to determine the association between parameters.

Results and Discussion

Water parameters

The physicochemical qualities are presented in Table 1 across the river. The study showed that the highest pH was recorded in station E (5.81) while the lowest was recorded in station A (5.67). The pH from all the stations (A-E) is not in compliance with the WHO [20] standard (6.5- 8.5). The highest temperature was recorded in station E (26.83◦C) while the lowest was recorded in station A (26.73 ◦C). The temperature from the stations (A-E) complies with the WHO [20] standard (25- 29◦C). The highest salinity was recorded in station E (60.33 ppm) while the lowest was recorded in samples equally recorded in stations C and E (59.67 ppm). The salinity from all stations (A-E) is by the WHO [20] standard (100 ppm). The highest TDS was recorded in station E (60.33 ppm) while the lowest was equally recorded in stations A and B (58.33 ppm). TDS from all stations (A-E) comply with the WHO [20] standard (<600 ppm). The highest EC was recorded in station E (121.33 µS/cm) while the lowest was recorded in station B (116.67 µS/cm). EC from all stations recorded complies with the WHO [20] standard (1000 µS/cm). The highest total alkalinity was recorded in station A (4.27 mg/L) while the lowest was recorded in station E (3.53 mg/L). The total alkalinity from all the stations complies with the WHO [20] standard (200 mg/L). The highest total acidity was recorded in station C (4.20 mg/L) while the lowest was recorded in station B (3.17 mg/L).

Table 1: Descriptive Statistic of the water parameters

Parameters	Stations	Mean	Std. Dev	Std. Er	Minimum	Maximum
Temperature (°C)	St A	26.73	0.15	0.09	26.60	26.90
	St B	26.80	0.00	0.00	26.80	26.80
	St C	26.77	0.12	0.07	26.70	26.90
	St D	26.77	0.06	0.03	26.70	26.80
	St E	26.83	0.06	0.03	26.80	26.90
	WHO	**25-29**				
pH	St A	5.67	0.03	0.01	5.65	5.70
	St B	5.75	0.01	0.00	5.75	5.76
	St C	5.75	0.17	0.10	5.57	5.90
	St D	5.77	0.04	0.03	5.74	5.82
	St E	5.81	0.02	0.01	5.79	5.82
	WHO	**6.5-8.5**				
TDS (ppm)	St A	58.33	0.58	0.33	58.00	59.00
	St B	58.33	0.58	0.33	58.00	59.00
	St C	59.67	2.08	1.20	58.00	62.00
	St D	59.67	3.79	2.19	57.00	64.00
	St E	60.33	2.08	1.20	58.00	62.00
	WHO	**<600**				
Electrical Conductivity (µS/cm)	St A	117.00	1.00	0.58	116.00	118.00
	St B	116.67	0.58	0.33	116.00	117.00
	St C	120.33	4.16	2.40	117.00	125.00
	St D	119.67	7.37	4.26	114.00	128.00
	St E	121.33	4.04	2.33	117.00	125.00
	WHO	**1000**				
Salinity (ppm)	St A	58.00	1.00	0.58	57.00	59.00
	St B	58.00	0.00	0.00	58.00	58.00
	St C	59.67	2.08	1.20	58.00	62.00
	St D	59.67	3.79	2.19	57.00	64.00
	St E	60.33	2.08	1.20	58.00	62.00
	WHO	**100**				
Total Alkalinity (mg/L)	St A	85.33	4.62	2.67	80.00	88.00
	St B	74.67	9.45	5.46	64.00	82.00
	St C	76.67	1.15	0.67	76.00	78.00
	St D	71.33	21.94	12.67	54.00	96.00
	St E	70.67	4.62	2.67	68.00	76.00
	WHO	**200**				
Total Acidity (mg/L)	St A	72.67	7.02	4.06	66.00	80.00
	St B	63.33	6.11	3.53	58.00	70.00
	St C	84.00	3.46	2.00	80.00	86.00
	St D	79.33	22.30	12.88	54.00	96.00
	St E	78.67	2.31	1.33	76.00	80.00
	WHO	**-**				

The mean values for each parameter along the column are not significantly different at $p<0.05$

Correlation Matrix

Pearson's correlation coefficient conducted between parameters is presented in Table 2, this showed a significantly moderate correlation between temperature and TDS (0.526), EC (0.532) and salinity (0.568), $p<0.05$. A significantly strong correlation between TDS and EC (0.987) and salinity (0.986), $p<0.01$. and a significantly strong correlation between EC and salinity (0.990), $p<0.01$.

Table 2: Correlations Matrix of water parameters

	Temp	pH	TDS	EC	Salinity	Alkalinity	Acidity
Temp	1	0.218	0.526*	0.532*	0.568*	-0.098	-0.064
pH		1	0.258	0.267	0.283	-0.105	0.105
TDS			1	**0.987****	**0.986****	0.435	0.286
EC				1	**0.990****	0.419	0.280
Salinity					1	0.359	0.318
T. Alkalinity						1	0.010
T. Acidity							1

******Correlation is significant at the 0.05 & 0.01 level (2-tailed) respectively.***

Principal component analysis (PCA)

The principal component analysis of water parameters is shown in Table 3; the factor was plotted in 3-dimensional rotated space to show their associations (Figure 1). Three components make up 84% of the overall variance. The first component accounted for 52.4 % of the total variance and a strong loading (salinity, EC and TDS), The second component accounted for 17.7 % and a moderate loading (temperature and pH), and low loading (Total alkalinity, pH and total acidity) respectively while the third component accounted for 14.8 % and a strong loading with total acidit

Table 3: Component Matrix

Parameters	**Component**		
	PC1	**PC2**	**PC3**
Salinity	0.987		
EC	0.984		
TDS	0.983		
Temp	0.605	0.521	-0.393
T. Alkalinity	0.413	-0.772	-0.188
pH	0.344	0.587	0.262
T. Acidity	0.327	-0.112	0.881
Eigenvalue	**3.670**	**1.237**	**1.037**
% Variance	**52.4**	**17.7**	**14.8**

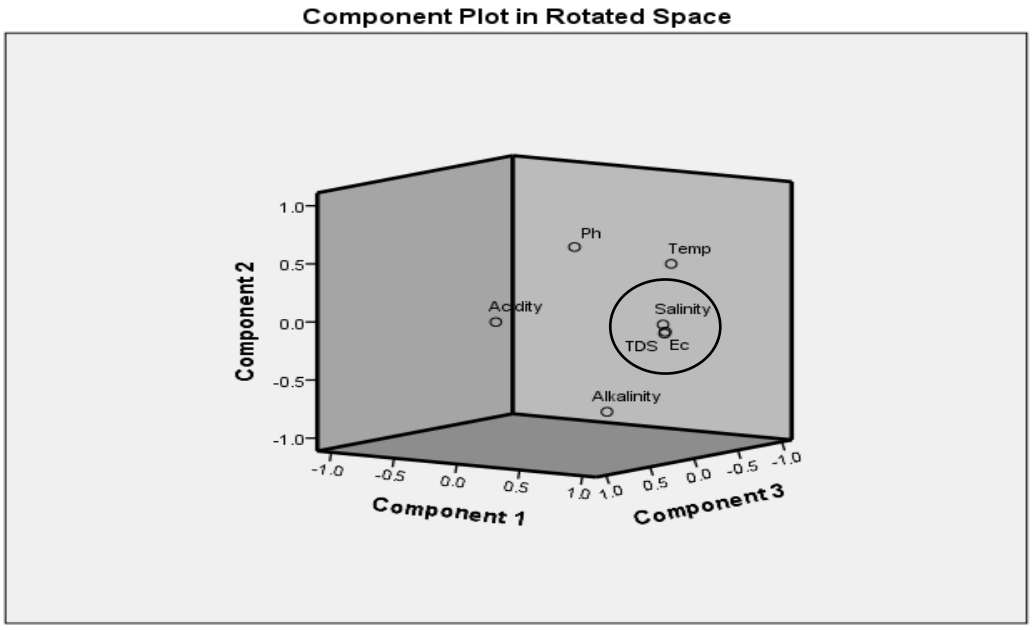

Figure 1: Principal Component Analysis (PCA) of water parameters

Discussion

pH of a river water is the measure of the acidity and alkalinity, although pH has no significant hazardous implication on the health of humans its impact on physiology cannot be neglected [3]. The pH range of the river water was lower than the reports from surface water in Ogbomosho, Nigeria (5.7–6.7) [21], and also lower than the range recommended by WHO, but it aligns with the assumption of APHA [22] that natural water has pH values in the range of 4 to 9 and most are slightly basic due to the presence of bicarbonate and carbonates of alkali and

alkaline earth metals. The temperature of River water is the degree of coldness and hotness of the river water, the report from the study was similar to the report of an abattoir impacted wells in Omu – Aran, Nigeria with 26.90 – 26.70 °C [23], but was lower to the report from palm oil mill effluents in Rivers State Nigeria (45–70 °C) [3, 24]. Total dissolved Solid (TDS) content in water serves as a measure of salinity, and its high concentration has significant effects on water density, organisms that inhabit freshwater, and the solubility of gases like oxygen [25]. Potential health effects of high TDS include damage to the central nervous system, dizziness, and paralysis of the tongue [26]. This low level of TDS observed shows good quality. Golterman [27] asserted that water with high TDS is generally of inferior palatability and may induce an unfavourable physiological reaction in the Electrical conductivity (EC) is a direct function of total dissolved salts in water constituents. This low EC value is very good as high conductivity may reduce the quality of the water by giving the miner a taste of the water in line with [28]. The salinity of the River water is a measure of dissolved salts in the River water [29]. Ademorati [30] reported that excess chlorides in water are usually taken as an index of pollution and that natural levels in rivers and other fresh waters are usually in the range of 15-35 ppm. However, the result was higher than 28.40 ppm obtained for salinity. Total alkalinity is the concentration of titratable bases in water [31]. The result is lower than the 200 mg/L set as standard by WHO. It is close to the result of bi-carbonate, which was 18.3 mg/L, and the closeness corresponds with the postulation of Verma *et al.* [32] which state that the change in alkalinity depends on carbonates and bicarbonates, which in turn depend upon release of CO_2 within the water environment. The TA recorded across the river waters was lower than the report across the sampling stations in the dry season in River Sokoto (11- 71 mg/L) [33]. Total Acidity is primarily caused by naturally occurring, unpolluted waters is dissolved CO_2. Weak acids like CH_3COOH can make a major contribution to the overall acidity of contaminated waters [34]. Additionally, adding to the acidity of some organic fluids are organic acids. The acidity recorded across the river waters was similar to the report across sampling stations in the dry season in River Sokoto (05- 20 mg/L) [33] and Asa River, but lower than Ilorin (26.3 - 50.23 mg/L) [34].

Conclusion

The human-induced effects on the physicochemical quality of water in the Uren River, Ikenne local government, Ogun State, Nigeria was determined and represented in the study. The experiment results from the study revealed that only pH has an unacceptable value which is far lower than the given WHO standard and it is therefore recommended that anthropogenic activities should be regulated in and around the river water.

References

[1] Barry, H.O. 2019. ***Towards a clean water for third world cities***. *Journal of Environment.* 1(3): 113-127

[2] Chukwura, E.I. 2021. **Sources and indicators of surface and ground water pollution. Aquatic Microbiology**. Otoba Press Ltd., Nkpor-Onitsha. 4-6. (Accessed Nov. 2024)

[3] Famuyiwa, A.O. Umoren, O.D. Ande, S. Eze, R.I. Sowemimo, K.S. and Rafiu, R.B. 2023. **Physicochemical quality, potentially toxic elements characterization and toxicological risk assessment of industrial effluents in Iju River, Ogun State, Nigeria.** *Journal of Research in Forestry, Wildlife & Environment.* 15(3): 126 – 135

[4] Umoren, O.D. Adetula, E.E. Benjamin, N.F. Akinbola, S.A. Ibrahim, S.S. and Orefuwa, T.R. 2024. **Impact of Anthropogenic Activities On the Physicochemical Quality of Oke Bola Stream, Oyo State, Nigeria.** *ChemSearch Journal.* 15(1): 64-71.

[5] Mohammed, Y.M. Arimoro, F.O. Ayanwale, A.V. Adamu, K.M. Keke, U.N. Abubakar, M.D. and Achebe, A.C. 2021. **The current state of water quality and benthic invertebrate fauna in Chikke Stream (North-Central Nigeria).** *Ukrainian Journal of Ecology.* 11(3): 26-34. DOI: 10.15421/2021_136

[6] Omovoh, B.O. Arimoro, F.O. Anyanwale, A.V. Egwim, E.C. Omovoh, G.O. Akamagwuna, F.C. Zakari, H. and Edegbene, A.O. 2022. Macroinvertebrates of Wupa River, Abuja, Nigeria: **Do environmental variables pattern their assemblages?.** *Biology Insights***.** 1, 612 https://doi.org/10.55085/bi.2022.612.

[7] Faiza, M. Adamu, K.M. and Mohammed, Y.M. 2022. **Anthropogenic impact on some water quality characteristics of Wupa River Federal Capital Territory, Abuja, Nigeria.** *Issues in Biological Sciences and Pharmaceutical Research.* 10(3): 30-38. https://doi.org/10.15739/ibspr.22.006

[8] Idah, S.E. 2017. **Review of Impact of Anthropogenic Activities in Surface Water Resources in the Niger Delta Region of Nigeria: A Case of Bayelsa State**. *International Journal of Ecotoxicology and Ecobiology.* 2(2): 61. https://doi.org/10.11648/j.ijee.20170202.1 2

[9] Keke, U.N. Arimoro, F.O. Auta, Y.I. and Ayanwale, A.V. 2017. **Temporal and spatial variability in macroinvertebrate community structure in relation to environmental variables in Gbako River, Niger State, Nigeria.** *Tropical Ecology.* 58 (2): 229–240.

[10] Adamu, K.M. Mohammed, Y.M. Ibrahim, U.F. Abdullahi, I.L. and Jimoh, Y.O. 2022. **Assessment of some physical, chemical and biological parameters of Lake Dangana, Niger State, Nigeria**. *The Zoologist:* 20: 133-140. http://dx.doi.org/10.4314/tzool.v20i1.17.

[11] Edegbene, A.O. Arimoro, F.O. and Odume, O.N. 2019. **Developing and applying a macroinvertebrate-based multimetric index for urban rivers in the Niger Delta, Nigeria**. *Ecology and Evolution.* 9(22): 12869-12885. DOI: 10.1002/ece3.5769.

[12] Bakure, B.Z. Fikadu, S. and Malu, A. 2020. **Analysis of physicochemical water quality parameters for streams under agricultural, urban and forest land-use types: in the case of gilgel Gibe catchment, Southwest Ethiopia**. *Applied Water Science.* 10 (11):234 https://doi.org/10.1007/s13201-020- 01318-9

[13] Arimoro, F.O. Odume, N.O. Uhunoma, S.I. and Edegbene, A.O. 2015. **Anthropogenic impact on water chemistry and benthic macroinvertebrate associated changes in a southern Nigeria stream**. *Environmental monitoring and assessment.* 187: 1- 14. DOI:10.1007/s10661-014-4251-2

[14] Zhang, C. Nie, S. Liang, J. Zeng, G. Wu, H. Hua, S. and Xiang, H. 2016. **Effects of heavy metals and soil physicochemical properties on wetland soil microbial biomass and bacterial community**

structure. *The Science of the Total Environment.* 557: 785-790

[15] Garba, F. Ogidiaka, E. Akamagwuna, F.C. Nwaka, K.H. and Edegebene A.O. 2022. **Deteriorating water quality state on the structural assemblage of aquatic insects in a North- Western Nigerian River.** *Water Science.* 36(1): 22–31. https://doi.org/10.1080/23570008.2022.2034396.

[16] Rashid, I. and Romshoo, S.A. 2013. **Impact of anthropogenic activities on water quality of Lidder River in Kashmir Himalayas**. *Environmental Monitoring and Assessment.* 185 (6): 4705–4719. https://doi.org/10.1007/s10661-012-2898-0

[17] Okon, I.E. Anweting, I.B. Udo, I.E. and Danzarami, D.A. 2023a. **Investigation into some physicochemical parameters and heavy metal status in bread from bakeries in Zaria**. *Journal of Materials and Environmental Science.* 14(6):711- 719.

[18] Ma, J. Wu, S. Shekhar, N.V. Biswas, S. and Sahu, A.K. 2020. **Determination of physicochemical parameters and levels of heavy metals in food wastewater with environmental effects**. *Bioinorganic Chemistry and Applications.* 1: 8886093. https://doi.org/10.1155/2020/8886093

[19] AOAC 2019**. *Official Methods of Analysis (21st ed.).*** Washington, DC, USA. Association Official Analysis Chemists (Assessed Dec. 2023).

[20] World Health Organization 2011. ***Guidelines for Drinking–water Quality, 4th edition. World Health Organization (WHO).*** http://whqlibdoc.who.int/publications/2011/9789241548151_eng.pdf?ua=1 (Accessed Dec. 12, 2023).

[21] Adelowo, O.O. Akinlabi, I.A. and Fagade, O. E. 2012. **Environmental impact assessment of Attenda abattoir, Ogbomoso southwestern Nigeria on the surface and groundwater quality using geoelectrical imaging and microbiological analysis**. *Environmental monitoring and assessment.* 184 (7): 4565 – 457

[22] APHA, 2017. ***Standard Methods for examination of water and wastewater***. In American Public Health Association (APHA) (Assessed Feb. 2023).

[23] Elemile, O.O. Raphael, D.O. Omole, D.O. Oloruntoba, E.O. Ajayi, E.O. and Ohwavborua, N.A. 2019. **Assessment of the impact of abattoir effluent on the quality of groundwater in a residential area of Omu – Aran, Nigeria**. *Environmental Sciences Europe.* 31(1): 1 – 10.

[24] Kanu, I. and Achi, O.K. 2011. **Industrial effluents and their impact on water quality of receiving rivers in Nigeria**. *Journal of Applied Technology in Environmental Sanitations.* 1(1): 75 – 86.

[25] Ogundele, O. and Olarinde M.G. 2018. **Physicochemical Properties and Heavy Metals Concentration in Waste Water Discharged from Two Industries in Agbara, Lagos State, Nigeria.** *International Research Journal of Public and Environmental Health.* 5(3): 32-27.

[26] Gupta, N. Pandey, P. and Hussain, J. 2017. **Effect of physicochemical and biological parameters on the quality of river water of Narmada, Madhya Pradesh, India**. *Water Science.* 31(1): 11-23.

[27] Golterman, H.I. 2018**. *Methods for physical and chemical analysis of fresh waters***. (2nd Ed.) Billing and Sons Ltd. U.S.A. p.25. (Accessed Dec. 12, 2023).

[28] Kavcar, P. Sofuoglu, A. Sofuoglu, S.C. 2019. **A health risk assessment for exposure trace metals via drinking water ingestion pathway.** *International journal of hygiene and environmental health.* 212(2): 216–227.

[29] Tadesse, M. Tsegaye, D. and Girma, G. 2018. **Assessment of the level of some physico-chemical parameters and heavy metals of Rebu river in Oromia region, Ethiopia**. *MOJ Biology and Medicine.* 3(3): 99-118.

[30] Ademorati C.M.A. 2019. ***Environmental Chemistry and Toxicology***. Ibadan: Foludex Press Ltd., 171-215. (Assessed June. 2024).

[31] Boyd, C.E. Tucker, C.S. and Somridhivej, B. 2016. **Alkalinity and Hardness: Critical but Elusive Concepts in Aquaculture**. *Journal of the World Aquaculture Society.* 47: 6-41. https://doi.org/10.1111/jwas.12241

[32] Verma, P.U. Chandawat, D.K and Solanki, H.A. 2019. **Pollution status of Nikol Lake located in Eastern Ahmedabad.** *Environmental monitoring and assessment.* 210(8): 3603–3609.

[33] Raji, M.I.O. Ibrahim, Y.K.E. Tytler, B.A. and Ehinmidu, J.O. 2015. **Physicochemical Characteristics of Water Samples Collected from River Sokoto, Northwestern Nigeria.** *Atmospheric and Climate Sciences.* 5: 194-199. http://dx.doi.org/10.4236/acs.2015.53013

[34] Olawale, S.A. 2016. **Physicochemical analysis of water from Asa River, Ilorin, Nigeria.** *Imperial Journal of Interdisciplinary Research.* 2(3): 122- 129.

Cite this article

Akinbola S.O., Umoren O.D., Idowu D.A., Kayode U.O., & Zoum F.A. (2025). Physicochemical Parameters of Uren River, Ikenne, Ogun State, Nigeria: A Preliminary Status Report with Multivariate Statistic. FUAM Journal of Pure and Applied Science, 5(1):89-94