Assessment of anthropogenic activities in three landing sites along the coast of Oyan Lake, Nigeria

ABSTRACT

There has been an increased report of anthropogenic activities around Oyan Lake, Nigeria because its supplies water round the year. Therefore, this study evaluated the anthropological activities of three different landing sites (Abule Titun, Ibaro and Apojola) along the coast of Oyan Lake Nigeria. Anthropogenic activity was evaluated using structured questionnaire administered to households around the three landing sites. Results showed that the major source of income of the respondents from the three study locations was artisanal fishing and farming. Hook and line, dragnet, gura trap, cast net, setting gill net and wired trap were the identified fishing gears used. Also, most of the respondents belong to the age range of 36 to 55 years old. The respondents described the population of less than 3,500 people in Abule Titun, within 3,500 to 7,000 people in Ibaro and within 7,000 to 25,000 people in Apojola. The main mode of transportation include canoe with outboard engine in Apojola and paddled canoe in Abule Titun and Ibaro. Types of toilets used include latrine and bush. Unfortunately, all the respondents from Apojola explained that they dispose their toilet, bathroom, kitchen and everyday wastes in the Lake. Similarly, all the respondents affirmed that automobile washing, urination, clothe washing, cassava washing, bathing and usage of fertilizers and herbicides in farming also contributed to the pollution of the lake. On the other hand, most of the respondents disagreed that fertilizer affects water quality in the lake.

Keywords: Pollution, human activities, water pollution, waste disposal, freshwater body

INTRODUCTION

Water is an indispensable natural resource that all life, both fish and human depend on (Adeosun *et al*., 2016). Freshwater has been a finite resource essential for agriculture, industry and everyday human use and also essential for the development and maintenance of the dynamics of every facet of the society (UNCSD, 2012). However, water bodies are constantly becoming polluted due to various human activities such as littering, chemical use, agricultural and industrial discharges (Fafioye *et al.,* 2005; Awoyemi *et al.,* 2014). Urban, industrial and agricultural activities, increasing exploitation of water resources and natural

processes such as precipitation inputs, erosion and weathering of crustal materials are examples of anthropogenic influences causing water pollution and damaging their use for drinking, recreational and other purposes (Irfan and Shakil, 2012).

The major uses of water in lakes has been described in the production of portable water supply, in agriculture productions, recreation activities and supporting aquatic life. However, there has been rapid population growth over the years which has led to an increase in waste generation, most of which ends up as pollutants in lakes (Wandiga et al., 2023). One of such lake in Nigeria is the Oyan Lake which has been major source of water use for several communities (Olopade and Rufai, 2014). In their report, while evaluating the composition, abundance and diversity of the Family Cichlidae in Oyan Dam, Ogun State, Nigeria, Olopade and Okulalu (2018) suggested that the lake is being polluted by activities around the it. One of the major pollution sources in Oyan Lake is heavy metals pollution. For example, Ayodele et al. (2019) recorded some levels of heavy metals in the water, sediment and fish species of Oyan Lake, Nigeria.

In order to control the levels of pollution in this lake, there is the need to ascertain the sources of such pollution, activities of people, as well as the pollution awareness of residents around the course of the lake. This study therefore evaluated the anthropogenic activities in three landing sites (Ibaro, Abule Titun, Apojola) along the coast of Oyan Lake, Nigeria.

MATERIALS AND METHODS

Study location

Oyan Lake is situated in Abeokuta North Local Government Area of Ogun State, southwest Nigeria. The lake crosses the Oyan River, a tributary of the Ogun River and is located on latitude 7°15'N and longitude 3°16'E at an elevation of 43.3 m above the sea level on the confluence of Oyan and Ofiki rivers, both tributaries of Ogun River close to Badagry-Sokoto Highway (Ofoezie *et al*., 1991). The dam has a crest length of 1,044m, a height of 30.4 m and a maximum storage capacity of 270 million m^3 (Ofoezie and Asaolu, 1997). Oyan Lake is bounded by few villages and landing sites such as Ibaro, Abule Titun, Apojola, etc. as shown on Figure 1.

Sample Collection

The tool used was a structured interview using a questionnaire. The structured questionnaire was administered to one hundred and fifty (150) household heads. This comprised of fifty (50) questionnaire each from the three (3) study locations (Abule Titun, Ibaro and Apojola). Local language was used to explain the content of the questionnaire where the respondents does not understand English language. Information obtained include:

1. Demography of respondents
2. Respondents' mode of transportation on water
3. Fishing gear used by the respondents
4. Nature of toilet and wastes generated by the respondents
5. Perception on of the respondents on the sources of pollution and standard regulations on pollutant sources

Statistical analysis

Data obtained were subjected to descriptive statistics using the Statistical Package for Social Sciences (SPSS) version 20.0 (IBM Corp, 2011). Results were presented in tables as frequency and percentage frequency. Results were also represented in graph using Microsoft excel version 2016.

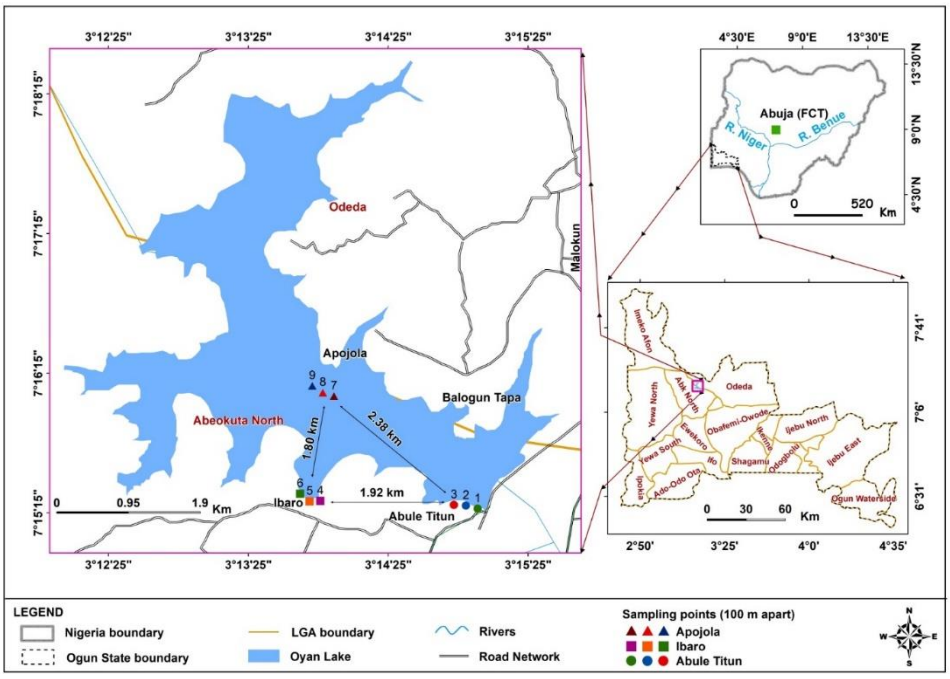

Figure 1: Map of Oyan Lake showing the surveyed landing sites

RESULTS

Demography of Respondents

The demography characteristics of the respondents are shown in Figure 2. Household size of the respondents from the three study sites (Abule Titun, Ibaro and Apojola) ranged from 2 to 8 persons. However, households with 2 to 3 persons were highest among the respondents from Abule Titun. On the other hand, households with 4 to 5 persons and 5 to 6 persons were highest in the respondents from Ibaro and Apojola respectively. The major source of income of the respondents from the three study locations was artisanal fishing and farming. However, few respondents (20%) from Ibaro had formal employment. Also, few respondents from Apojola practice artisanal fishing (20%), charcoal production and fish processing (20%).

Majority of the respondents from the three study locations were males. Similarly, the age of the respondents ranged from 18 to 65 years. However, most of the respondents belong to the age range of 36 to 55 years old. Results also showed that the respondents from Abule Titun either have no formal education, primary education or Arabic education. On the other hand, most respondents from Ibaro had primary education, while most of the respondents from Apojola had Arabic education. The respondents also identified that the average population of people in Abule Titun was less than 3,500 people. Similarly, that of Ibaro was within 3,500 to 7,000 people and those from Apojola were within 7,000 to 25,000 people. Respondents from Ibaro use mainly the central borehole and stream as their main water source. However, those from Abule Titun use well and central borehole as their main water source. On the other hand, respondents from Apojola mainly depend on the lake as their water source.

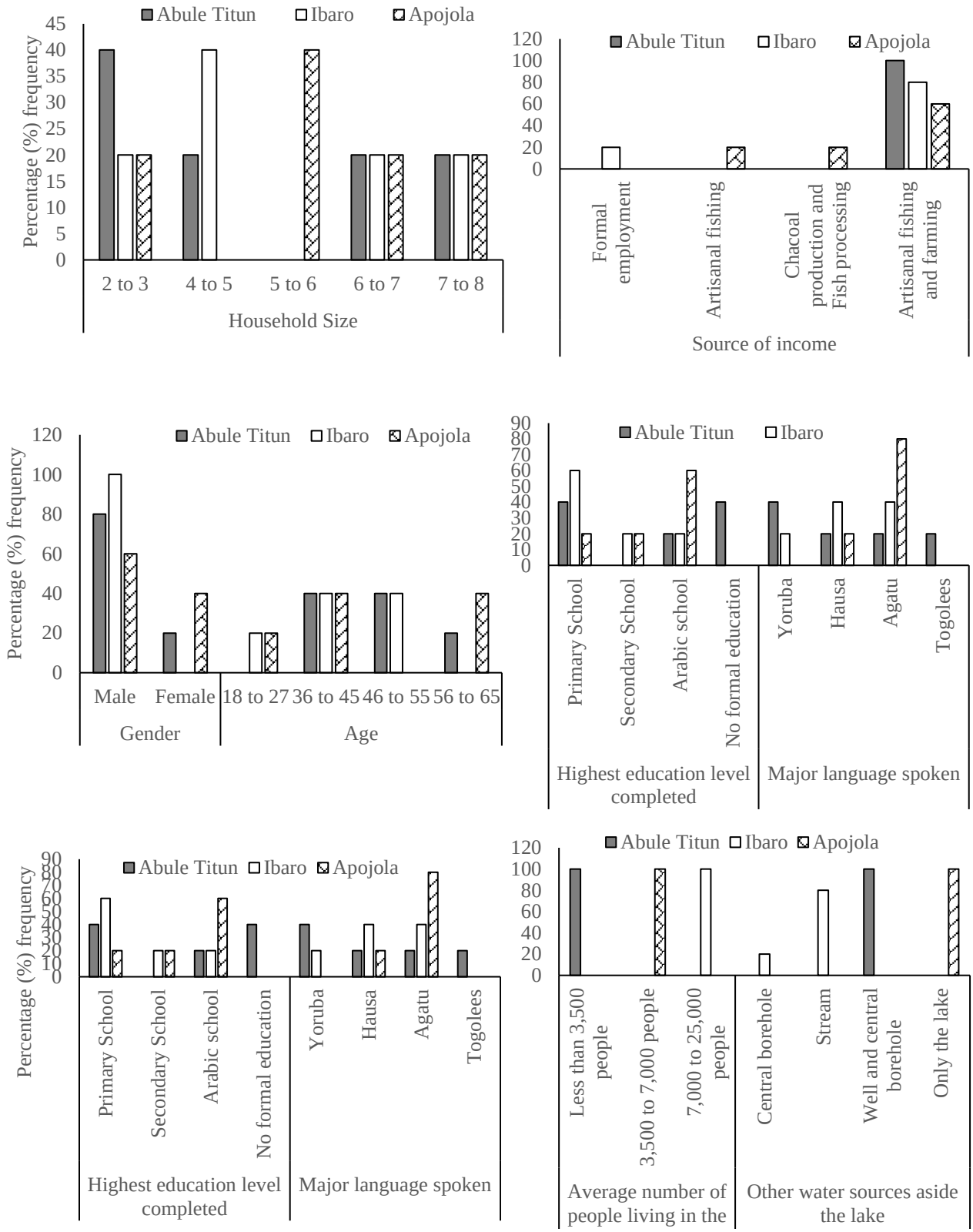

Figure 2: Some demographic characteristics of the respondents

Mode of Transportation

Figure 3 represents the mode of transportation used by the respondents from the three study locations. Results showed that canoe with outboard engine was the main mode of transportation used by the respondents in Apojola. However, paddled canoe was the main means of transportation used by the respondents in Abule Titun and Ibaro.

Fishing Gear Used by the Respondents

Wired trap and setting gillnet were the most used fishing gears among the respondents from Abule Titun and Ibaro (Table 1). Also, all the respondents from Abule Titun and Ibaro made use of at least a fishing gear. On the other hand, 10% of the respondents from Apojola do not make use of any fishing gear. On the overall, fishing gears used in the three study sites as identified by the respondents include hook and line, dragnet, gura trap, cast net, setting gill net and wired trap.

Nature of toilet and wastes generated by the respondents

All the respondents from Abule Titun uses the latrine and bush as their main type of toilet (Table 2). Also, all respondents from Apojola made use of the latrine. However, the toilet type used by the respondents from Ibaro include the latrine, bush and the water system. Similarly, the respondents either take their bath in the bathroom, and or in the lake. Kitchen wastes and farm wastes are the major type of waste generated by the respondents. Unfortunately, all the respondents from Apojola explained that they dispose their toilet, bathroom, kitchen and everyday wastes in the Lake.

Perception on the Sources of Pollution and Standard Regulations on Pollutant Sources

All the respondents from the three study locations disagreed that the industries using the lake use chemical substances and that there is any chemical use around the lake (Table 3). However, all the respondents from the three study locations described the quality of water in the lake around them as fair. The respondents (100%) however identified erosion/runoff from roads, construction sites or homes as the most likely pollution source into the lake. On the other hand, all the respondents (100%) from the three study sites were of the opinion that activities such as automobile washing, urination, clothe washing, cassava washing, bathing and usage of chemicals (fertilizers and herbicides) in farming also contributed to the pollution of the lake. According to the respondents from Abule Titun (100%), the main cause of

pollutant affecting the Lake around them are pathogens causing blood in urine. Majority of the respondents from Ibaro and Apojola believed that several forms of wastes serve as pollutants affecting the lake water quality in their different areas. Similarly, all the respondents believed that pathogens (bacteria, viruses, germs) affecting water quality in the lake are problems on the Lake. On the other hand, most of the respondents (83.3%) disagreed that fertilizer affects water quality in the lake. However, all the respondents from the three study locations agreed that there are regulations on the use of fishing gear, waste disposal and chemical use. Majority of them (86.9%) however believed that these regulations were not enforced.

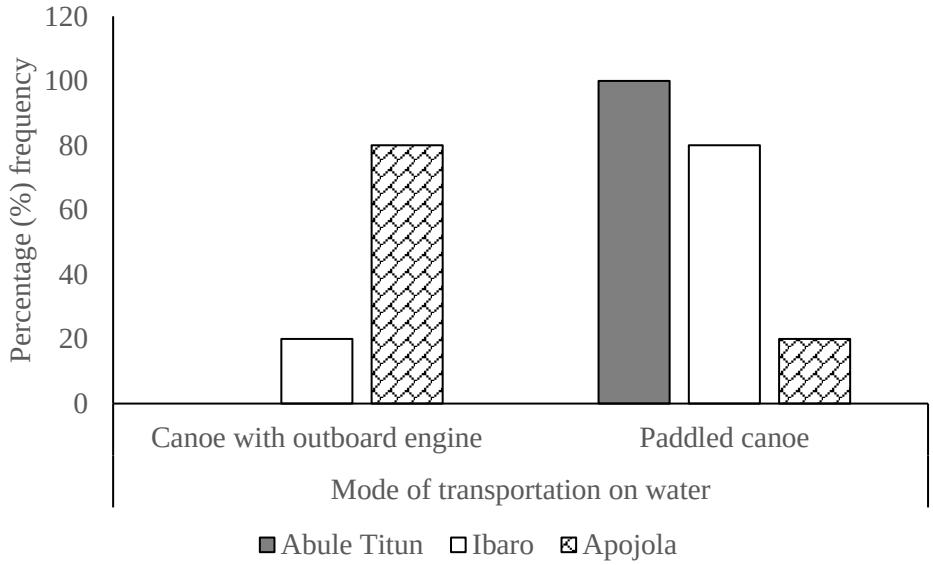

Figure 3: Mode of transportation used by the respondents

Table 1: Fishing gear used by the respondents

	Abule Titun	**Ibaro**	**Apojola**
Hook and line only	0(0.0)	10(20.0)	0(0.0)
Hook and line and dragnet	10(20.0)	0(0.0)	0(0.0)
Hook and line and Gura trap	0(0.0)	10(20.0)	0(0.0)
Hook and line and cast net	0(0.0)	0(0.0)	10(20.0)
Setting gill net only	10(20.0)	10(20.0)	10(20.0)
Wired trap and setting gillnet	30(60.0)	20(40.0)	10(20.0)
Cast net and setting gill net	0(0.0)	0(0.0)	10(20.0)
None	0(0.0)	0(0.0)	10(20.0)

N(%)

Table 2: Nature of toilet and wastes generated by the respondents

Questions	Response	Abule Titun (%)	Ibaro (%)	Apojola (%)
What kind of toilet do you have?	Latrine	0(0)	30(60)	50(100)
	Bush	0(0)	10(20)	0(0)
	Water system	0(0)	10(20)	0(0)
	Latrine and bush	50(100)	0(0)	0(0)
How do you bath?	Bathroom	0(0)	30(60)	20(40)
	Bathroom and in the lake	50(100)	20(40)	0(0)
	In the Lake	0(0)	0(0)	30(60)
What kind of waste do you generate?	Kitchen waste	0(0)	0(0)	10(20)
	Farm waste	0(0)	0(0)	10(20)
	Kitchen and farm waste	50(100)	50(100)	30(60)
Where do you empty your toilet, bathroom, kitchen and everyday waste?	Ground	50(100)	10(20)	0(0)
	Lake	0(0)	0(0)	50(100)
	Sewage system	0(0)	40(80)	0(0)

N(%)

Table 3: Respondents' perception of the sources of pollution and standard regulations on pollutants sources

		Abule Titun	**Ibaro**	**Apojola**
Do the industries using the lake use chemical substances	No	50(100)	50(100)	50(100)
In your opinion, what is the quality of water in the lake where you live	Fair	50(100)	50(100)	50(100)
In your opinion, which of the following are most likely pollution sources in the lake	Erosion/runoff from roads, construction sites or homes	50(100)	50(100)	50(100)
Pollutants affecting lake water quality in your area	Pathogens/parasites causing haematuria	50(100)	0(0)	20(40)
	Wastes	0(0)	50(100)	30(60)
Is there chemical use around the lake	No	50(100)	50(100)	50(100)
Do you know of or suspect that pathogens (bacteria, viruses, germs) affect water quality in the lake	Know it IS a Problem	50(100)	50(100)	50(100)
Do you know of or suspect that Fertilizer affects water quality in the lake	Know it is NOT a Problem	30(60)	0(0)	0(0)
	Suspect it is NOT a	20(40)	50(100)	50(100)

	Problem			
Are there regulations on				
Fishing gear use	Yes	50(100)	50(100)	50(100)
Waste disposal	Yes	50(100)	50(100)	50(100)
Chemical use	Yes	50(100)	50(100)	50(100)
Are the regulations enforced	Yes	0(0)	0(0)	20(40)
	No	50(100)	50(100)	30(60)

N(%)

DISCUSSIONS

This study has assessed the anthropogenic activities in three landing sites along the coast of Oyan Lake, Nigeria. Results showed that most of the respondents belong to the age range of 36 to 55 years old. This is an indication that the respondents of this study are old and mature enough to give valid information on this subject matter. Similarly, the major source of income of the respondents from the three study locations was artisanal fishing and crop farming. This is a confirmation that the lake is frequently used fishing as well as for irrigation of crop plants. Previous study of Olutegbe *et al*. (2021), also explained that many dwellers around freshwater dams in Nigeria engage more in agricultural activities where the people use its water for irrigation faming, livestock production and fishing activities all year round. Other study also submitted that the majority of people in rural areas of Nigeria mostly practice agriculture, directly or indirectly (Adesugba and Mavrotas, 2016). Thus, respondents of this study are frequently in contact with the water of Oyan Lake.

Despite the fact that most of the respondents utilized the lake in fishing, all the fishing gears used were not potential source of pollution. Such include hook and line, dragnet, gura trap, cast net, setting gill net and wired trap. Previous report of Ajagbe *et al*. (2020) also identified these types of fishing gears among fishermen in Ikere-gorge. Bawa *et al.* (2019) also recorded that these types of fishing gears are used in artisanal fisheries in inland waters of Kebbi State, Nigeria. This study therefore affirmed that the types of fishing gears used by the respondents in fishing does not pose significant pollution threat on the water body.

The main mode of transportation include canoe with outboard engine in Apojola and paddled canoe in Abule Titun and Ibaro. Similar result was obtained by Ajagbe *et al.* (2020) who reported that the fishing operation in Ikere-gorge were carried out by fishermen using dug-out canoe. Kigbu *et al.* (2014) also reported the use of canoe by all fishermen in Feferuwa Lake, Nasarawa State, Nigeria. However, it is noteworthy that canoes with outboard engine are

used in Apojola landing site of Oyan lake. This landing site (Apojola) contain the highest human population (7,000 to 25,000 people) than the other two studied sites. Unfortunately, these canoe with outboard engine have the potential to cause water pollution especially with faulty and old engines. According to Jackivicz and Kuzminski (1973), the effects of the outboard motor exhausts on water quality and aquatic biota include problems affiliated with water quality such as the formation of undesirable tastes and odours and the appearance of oily substances. The study also reported that outboard motor exhaust water can exhibit a toxic effect in sufficiently high concentrations on aquatic lives. Another pollution source by the respondents could be linked with sewage disposal and fertilizer usage. All the respondents from Apojola explained that they dispose their toilet, bathroom, kitchen and everyday wastes in the Lake. Similarly, all the respondents affirmed that automobile washing, urination, clothe washing, cassava washing, bathing and usage of fertilizers and herbicides in farming also contributed to the pollution of the lake. Unfortunately, most of the respondents disagreed that fertilizer affects water quality in the lake. According to Zhang *et al*. (2022), the use of pesticides, fertilizers and feed additives could increase the chances of heavy metal contamination in River Basins. Thus, the operation of canoe with outboard engine as well as disposal of sewage, kitchen and agrochemicals could be a major anthropogenic pollution source of Oyan lake Nigeria.

CONCLUSION

This study has shown that people residing in the three landing sites used in this study are frequently in contact with the water of Oyan Lake. Also, the types of fishing gears used by the respondents in fishing does not pose significant pollution threat on the water body. However, the disposal of sewage, kitchen and agrochemicals as well as improper management of canoe with outboard engine could be a major anthropogenic pollution source of Oyan lake Nigeria.

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