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Situation analysis and initiatives for protection of rivers for sustainable development, Ondo State, Nigeria

Omosulu S. B., Akinrinmade O. and Sogbon O.*

Department of Urban and Regional Planning, Faculty of Environmental Studies, Rufus Giwa Polytechnic, Owo, Ondo State, Nigeria.

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Rivers are considered to be most important freshwater source to humanity. It is also a fundamental resource not only for human life but also for fauna and flora and crucial to the equilibrium of the environment and biodiversity. However, the unmindful exploitation of the great natural endowment and its wetlands have metamorphosed into serious menace. It is in the light of this that the paper looked into situation analysis and initiatives for protection of rivers for sustainable development. The paper adopted multi-stage approach. Meanwhile, the study area was delineated along political senatorial districts. One major river from each of the senatorial districts was selected. The sampling frame for the study was 268,085 out of which 0.15% was taken as the sample size, translating to 402 and 398 questionnaires were retrieved. The study revealed a strong relationship between rivers and economic activities; poor utilization of rivers and their wetlands. The mismanagement of rivers and their wetlands portend great danger to the survival of both aquatic and terrestrial lives. The dumping of wastes in the rivers and their wetlands also serve as severe pathogenic pollution that affects rivers. The paper recommends public awareness; enforcement of the legal and regulatory framework and constant monitoring of the integrity of freshwater with a view to prevent fresh water and its wetlands from further degradation.

Key words: Adaptability, Equilibrium, freshwater, Livability and Mis-management.

INTRODUCTION

Rivers are among the most ubiquitous resources of the earth, found unevenly in almost every geographical location and constitute many wetlands. Water is also a finite resource that is very essential for human existence, agriculture, industry and navigation. Without any doubt, inadequate quantity and quality of water have serious impact on sustainable development. It is a valuable natural resource that is inevitable for socio-economic development. Rivers are used for agricultural production, transportation, recreation, industrial process, fishing and domestic uses. Rivers also influence the typology and morphology of settlements. No wonder that great cities grew up along river courses. For instance, London, New York, Cairo, Lokoja and to mention a few are great cities whose growth and development are influenced by their uniqueness of locations along river courses.

*Corresponding author. E-mail: sogbonwole@yahoo.com. Tel: 08068237071.

Rivers are foundations of life and livelihoods, and are key to sustainable development. Successful water management will serve as a foundation for the achievement of many of the 17 Sustainable Development Goals (SDGs), as well as for Sustainable Development Goals 6, which is to ensure availability and sustainable management of water and sanitation for all (Guppy and Anderson, 2017) Freshwater plays a fundamental role in support of the environment, society and the economy. Ecosystems such as wetlands, rivers, aquifers and lakes are indispensable for life on our planet and are vital for directly ensuring a range of benefits and services such as drinking water, water for food and industry including energy, habitats for aquatic life, and natural solutions for water purification and buffering floods and bridging drought periods, among many others. Managed well to address competing demands and ensure their resilience in the face of climate change, disasters and conflict, freshwater ecosystems contribute to mitigating risks, and promoting stability and trust-building measures (UNEP, 2017) Water security is fundamental to poverty alleviation, and water resource management impacts almost all aspects of economic activity, including food production and security, industry, energy production, and transport (World Bank, 2009). In the same way, freshwater ecosystems themselves provide more than $75 billion in goods and ecosystem services for people annually; they also sustain a disproportionately large number of species, including a quarter of all known vertebrates (Vié et al., 2009)

Rivers serve as the chief source of renewable freshwater for humans and contain some of the highest levels of biodiversity on Earth. Threats to rivers have become severe in many regions of the world for both securing human water supply needs and maintaining aquatic biodiversity (Vorosmarty et al. 2010). Globally, water is becoming a pressing societal and geopolitical issue in some regions; it is already of critical national concern. Jacob, Jennifer and Aaron, (2017) noted that as water availability decreases, competition for access to this limited resource will increase and that 60% of all surface fresh water comes from internationally shared river basins. In view of this, Rieu-Clarke et al. (2017), stressed that continuing cooperation and coordination between nations is crucial to ensuring that water is available for human, economic and environmental needs.

Floodplains, which is the lowlands next to rivers and streams are usually subject to inundation during flood activities, are among the most productive wildlife habitats and of course the most fertile farmland, which constantly attract human settlements. Unfortunately, uncurtailed development activities in and around the floodplains across the globe have accounted for significant losses of wetlands, increased pollution and gross distortion and destruction in World rivers, streams and ocean respectively. Wetlands are being increasingly threatened by a host of problems since 1900 and 64% of the world's wetlands have disappeared (Ramsar Wetland Convention, 2016). The degradation has been valued at US$20 trillion in lost ecosystem services annually (Costanza et al, 2014). According to some estimates, the populations of freshwater species declined by 76% between 1970 and 2010 (McRae et al., 2016). Meanwhile, nearly one-third of the world's amphibians are at risk of extinction and in some regions, more than 50% of native freshwater fish species are at risk of extinction (Vié et al., 2009).

Increasing global exploitation of water resources has led to significant degradation of freshwater biodiversity and the services that rivers provide. In many places, rivers have completely stopped flowing. The socio-economic consequences of disruption to and collapse in freshwater systems are often profound: people are much more dependent on natural riverine services than is immediately apparent, and this only becomes obvious when the river is seriously degraded (Jay and Tom, 2009). It is becoming increasingly evident that, on regional and global scales, freshwater biodiversity is more severely endangered than that of terrestrial or marine systems. Like others natural resources, rivers are very useful if they are used sensibly, and useless or dangerous if they are abused. Rivers with little or no flow, and lots of waste water, are likely to become centres of diseases like malaria, cholera, schistosomiasis and dysentery (Jay and Tom, 2009)

It is obvious from the background that rivers influence political, economic and cultural relationship among the nations or regions of the world, as well as those of national and local entities. It is, therefore, a matter of grave concern that if proper steps are not taken to conserve rivers in time, many communities in the world will face serious consequences. However, human activities often degrade water resources, 2 million tons of human waste are disposed of in water courses every day. It was also noted that approximately 15–18 billion m^3 of freshwater resources are contaminated by fossil fuel production every year (World Water Assessment Programme, 2017)

The role of rivers in the current reality of Nigeria cannot be over-emphasized. History indicates that major political boundaries in the country were primarily dictated by rivers. Also a lot of industrial, agricultural and transportation potentials are based on the nation's rivers.

Meanwhile, rivers are one of the resources of the earth that have suffered in the hand of man. In Ondo State, it has been discerned that pollution, unethical waste disposal, unwholesome agricultural and industrial practices and unwarranted encroachment and reclamation for development purposes are major factors that are currently threatening sustainable existence of rivers.

On the basis of the foregoing, this research is aimed at unraveling current depth of utilization of river resources in Ondo State in order to determining its implications for sustainable development. The imperativeness of this is the fact there is a dearth of information and knowledge on

this all-important subject matter.

Study area

Ondo State was carved out of the former Western State in 1976. The state lies between latitudes 5° 45' and 7° 52''N and longitudes 4° 20' and 6° 3'E. It is bounded on the east by Edo and Delta states, on the west by Ogun and Osun states, on the north by Ekiti and Kogi states, and to the south by the Bight of Benin and the Atlantic Ocean. The state occupies a land area of about 15,000 km^2, with a population of 3,441,924 people (NPC, 2006). The state has eighteen (18) Local Government Areas, with Akure as the capital city as well as the largest settlement. Other prominent towns of metropolitan function in the state are Ondo, Owo, Ore, Okitipupa, Ikare, Idanre, Igbokoda and Ile-Oluji. The people of the state are mostly Yorubas, although other Nigerians and foreign nationals equally live in the state. Agriculture is the mainstay of the people of Ondo State (Figures 1 and 2).

LITERATURE REVIEW

Water is our most valuable natural asset and it is central to sustainable development (UNEP, 2015). The socio-economic demands on water resources are greatly influenced by a number of local and global factors around the world, which include population explosion, economic development, dietary demands and physical interventions among others. These indices have the capacity of influencing the uncertainty regarding the use of available water resources. The world Economic Forum Survey of Global Risks (2012) ranked water supply crises as the second highest in terms of impacts, after major systemic financial failure, and ahead of other top five ranked risks: food shortage crises, chronic fiscal imbalances and extreme volatility in energy and agricultural prices. Water supply crises rank in the top five in terms of livelihood along with severe income disparity, fiscal imbalances, green-house gas emission and cyber-attacks.

In theory, there is enough water to meet the entire global demand, albeit, it is currently managed inefficiently and there is a global imbalance in the distribution of water. The water footprints of human activities are becoming increasingly unsustainable. Water usage has been growing at more than twice the rate of increase in population in the last century, although there is no global water scarcity as such but there is an increasing number of regions that are chronically short of water. Sustainable water management is a key global concern and a matter of life and death for a huge number of humans.

Water covers about three-quarters of the earth's surface and is a necessary element for life. Freshwater resources are under increased pressure to satisfy the needs of water users throughout the world. Since 1800 the world's population has increased from 1 to 6 billion, but freshwater is finite. The amount of freshwater on Earth does not change, yet water use went up nine-fold in the 20th century. For many river basin and aquifers, however, because of pollution and overexploitation, availability and access to clean, safe water is declining (IWRM, 2018).

With industrialization, expanding irrigated agriculture combine with climate change, water security is under threat. By 2025, 1.800 million people will be living in countries or regions with absolute water scarcity, and two-thirds of the world population could be under stress conditions. Water resources are under major stress around the world as events are unfolding on daily basis towards water demands for various uses. Today, however, expansion of agriculture, damming, diversion, over-use, and pollution threaten these irreplaceable resources in many part of the globe (RBA Centre, 1999).

Globally, water is already a scarce resource in many regions of the world, which represents a major challenge to biodiversity conservation and to some of the most pressing human development needs. For instance, it is estimated that over 1.4billion people are currently living in river basin with high environmental water stress, covering over 15% of the world's land surface (International Water Management Institute, 2008). In developing countries, approximately 45 million cubic meters per day are lost through water infrastructure leakage, which is enough to serve nearly 200 million people (Kingdom et al., 2006). A growing number of countries are experiencing rising and often permanent water stress, and climate change consequences will increase the numbers of countries experiencing high variability in water resources availability, including higher flood and drought frequencies or intensities and competition over water can heighten tensions and even lead to open conflict among nations that share the resources (Dimple et al., 2011). This problem will only get worse if water infrastructure is not maintained properly, even for high income countries; for example, the capital investment needed to maintain aging water infrastructure in the USA will reach an estimated US$195 billion in 2040, but if current funding trends continue, needs will be underfunded by US$144 billion (American Society of Civil Engineers, 2011). Therefore, the sound allocation and management of water are among the most urgent and critical global issues for the conservation and sustainable use of biodiversity. Not only is the rate of loss of inland water biodiversity the fastest of all the major biomes, but the unsustainable use of water is a major driver of freshwater biodiversity loss (Sabine et al., 2008).

According to Burton (1984) providing safe drinking water for the more than one billion people who currently lack it is one of the greatest public health challenges facing the world today. In many developing countries, safe water, free of pathogens and other contaminants, is

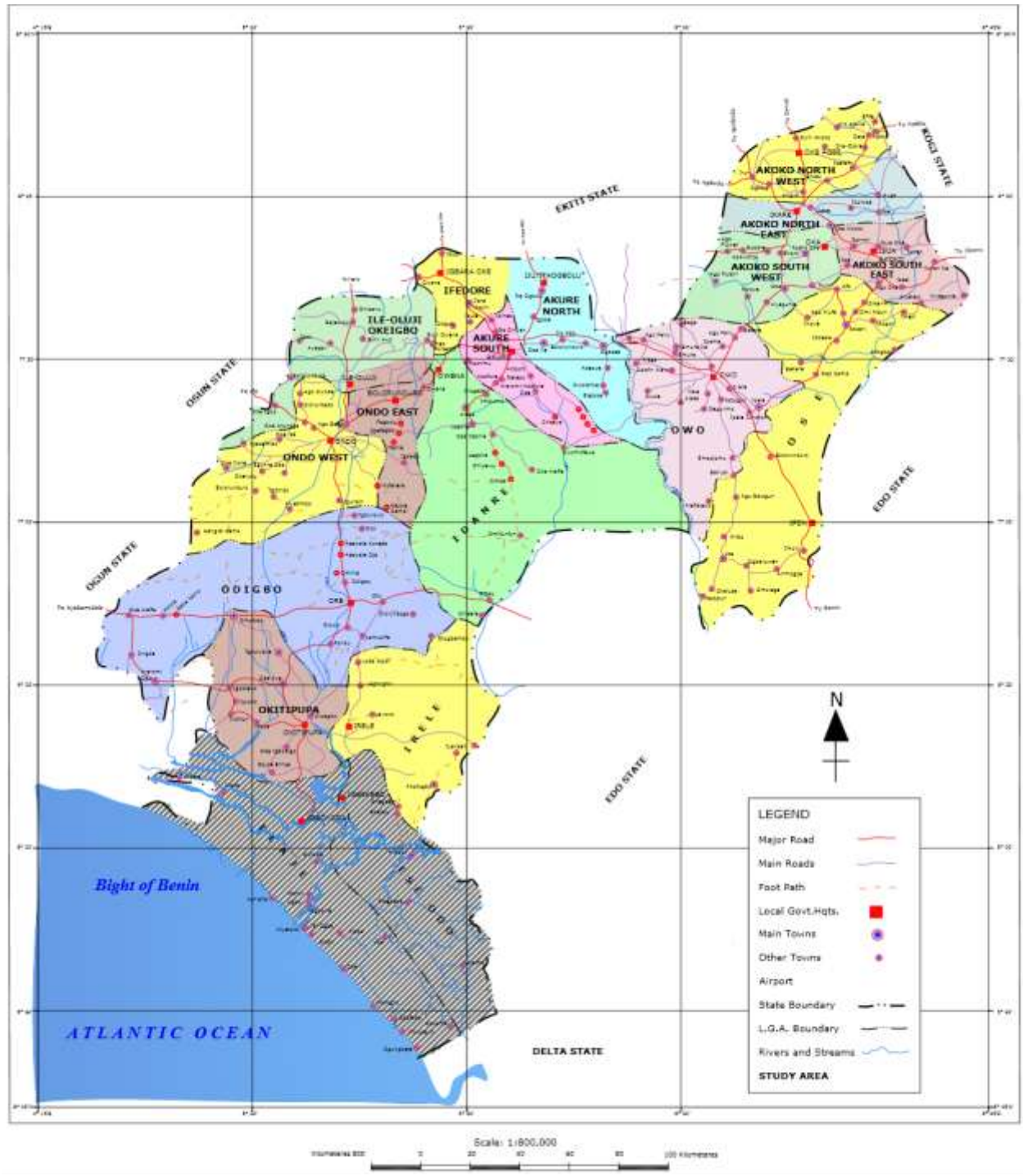

Figure 1. Map of Ondo State in its Local Government Settings.
Source: Ondo State Ministry of Physical Planning and Urban Development (2017).

unavailable to much of the population, and water contamination remains a concern even for developed countries with good water supplies and advanced treatment systems. He reiterated that over-development, especially in coastal region and areas with strained water supplies, is leading many regions to seek water from more and more distant sources. IWRM (2018) also affirmed that fresh water ecosystems play a vital role in the lives of humans, providing critical provisioning services, the basis for economic activities, and a wide range of regulating and cultural services. In the face of development, human population growth, and increasing

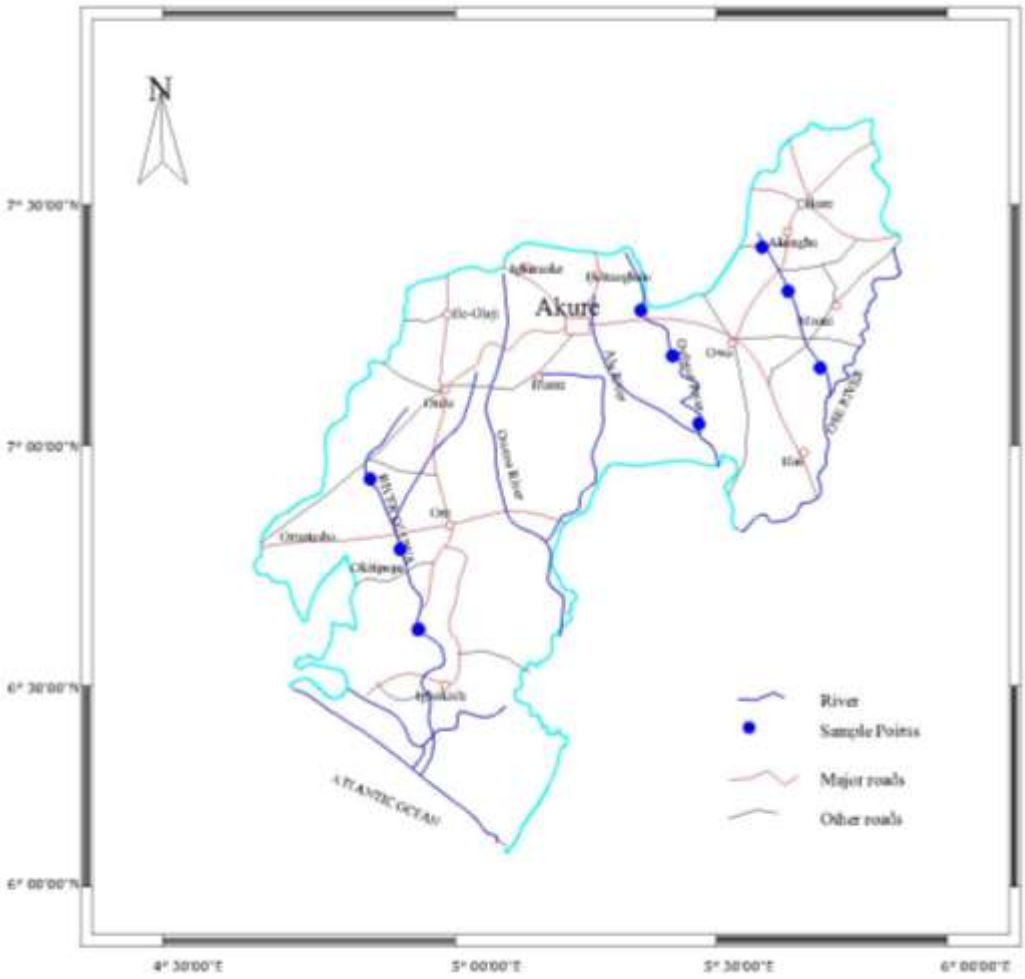

Figure 2. Map of Ondo State showing the selected rivers for sampling.
Source: Authors' Field Survey (2017).

competition between freshwater uses and users, development must be carefully planned such that the services that freshwater ecosystems provide are maintained and that irreplaceable ecosystems and species are not lost. There is a need to identify those areas that must remain intact and actively protected as "No-Go" areas. In order to guide river basin management and also dams and other water infrastructure development towards a sustainable and balanced outcome, stakeholders including planners, decision makers, regulators, developers, financiers, and affected communities must be aware of the implications and impacts of infrastructure development on freshwater ecosystems (Jian-hua et al., 2011).

RESEARCH METHODOLOGY

Research assistants were trained on specific tasks to be carried out at the various study locations. The study adopted observatory approach, oral interview and questionnaire administration in collecting data from relevant stake holders in the study area. Ondo State was delineated into zones using the existing three senatorial districts. In view of this, three major rivers were considered for the study. These include: Rivers Oluwa, Ogbese and Ose in the three senatorial districts, respectively. The choice of these rivers was based on equal representation, as one major river in each of the three senatorial zones was purposefully selected. The sampling frame for the three zones which form the study locations is 268,085 out which 0.15% was taken as sample size, translating to 402. The distribution of the sample sizes among the 3 senatorial zones is as shown Table 1.

DATA ANALYSIS AND DISCUSSION

Only 398 questionnaires were retrieved out of 402 that were administered to respondents. Meanwhile, the study's discoveries are as follows.

Gender of respondents

Water utilization is known to know no bound. It is useful to the wellbeing of both the human race and his biological environment That is the reason why it is stated that all humans' maculate gender

Table 1. Zones and sample classification.

S/N	Name of Location/Zone	Sampling Frame	Percentage	Sampling Size
1	Okitipupa (Southern Senatorial)	250,675	0.15	376
2	Ogbese (Central Senatorial)	12,850	0.15	19
3	Ose (Northern Senatorial)	4,560	0.15	7
	Total	268,085	0.15	402

Source: Authors' Field Work (2017).

Plate 1. Wetlands being used for the growth of sugar cane and annual crops at Ogbese.
Source: Authors' Field Survey (2017).

should guide against its misuse.

The study showed that 168 of the respondents were of the opinion that men make use of river or depend on river for their sustenance. On the contrary 230 of the respondents affirmed that women depend on river for their daily sustenance more than men. This number accounts for 58% of the total respondents. The implication of this is that women's involvement in the utilization of these natural drainages is higher than men's. Not only that, direct observation also revealed that more women were found using the rivers than men particularly for washing of clothes and other household activities. The aforementioned situation was also confirmed by the oral interviews conducted in the 3 localities with some of the respondents and residents of these communities reaffirming that women utilize river for diverse purposes compared to men. Plate 1 shows the involvement of women in the utilization of natural drainages in Ondo State.

Educational status of respondents

It was revealed through the study that 26.13% of the total respondents have formal education, while 73.87% of the respondents have no formal education. This implied that the majority of the people who also happen to be female members of the study locations always carry out their daily activities without any informed consequences of their actions since they are not literate. This might also be responsible for not being informed about government policies and regulations on river conservation in Ondo State. There is always a link between educational attainment and sustainable utilization of any resource. In fact, literacy is a principal factor towards sustainable maintenance and management of these endowments. The human knowledge to act diligently and desirably in the proper direction as planned becomes indispensable if resources sustainability is to be achieved. Since the majority of the respondents are illiterate the tendency for abusing the use of this tangible natural resource is unavoidable unless pragmatic local inclusion and initiatives are adopted toward the realization of the set goals.

Knowledge about regulation on rivers conservation in Ondo State

Respondents (102) which account for 25.63% of the total respondents confirmed being fully informed about government regulations and policies on river conservation and management. Meanwhile, a frequency 78 (19.60%) respondents said that they were partially informed about regulations and policies of government in respect to river conservation in Ondo State. On the contrary, a frequency of 218 (54.77%) respondents affirmed that they were not informed or aware of government regulations and policies with respect to river conservation in Ondo State. This set of people accounted for 54.77% of the total respondents across the study locations in the state. The lack of information and education on government policy on rivers management might perhaps be responsible for the abuse of these natural resources across the state. Since the people are not properly informed about the consequences of their actions, the tendency of misusing these resources becomes eminent. No wonder that people at these locations were using the rivers for many undesirable activities, which have the tendency of polluting and contaminating these

natural resources. Some of these activities include but are not limited to washing of vehicles with different detergents which are capable of contaminating the water bodies thereby distorting the water quality, disposal of poisonous wastes including human and animal feces, bathing and washing of clothes, rearing of cattle and other animal across the rivers channels. All these are sufficient to alter the quality of these natural water resources endowments in the state. The aforementioned scenario was replicated in all the three selected and sampled rivers in the state.

River and agriculture practices enhancement

Out of the total respondents, 50 (12.56%) were of the opinion that rivers do not enhance agricultural practices in the study location. In another vein, 348 (87.44%) respondents were of the view that rivers enhance their various agricultural practices over the years. Oral interview conducted in the study locations equally attested to the fact that rivers promote and enhance food security through effective agricultural practices along the river courses. Large expanses of reach and fertile alluvial wetlands, which serve as veritable and cultivable lands for qualitative agricultural engagements across the study locations, are available. Wetlands are being utilized for annual crops like vegetable, okro, pepper, maize and sugar cane. At some other locations of relatively high lands, the wetlands are also being utilized for the cultivation of early yam popularly known as 'Akuro' or Fadama before the peak of rainy season. At some locations along the wet plain, the rivers are being used as source of irrigation to enhance agricultural activities during the dry season. Plate 1 is one of the agricultural activities being carried out along the river courses on the wetlands of River Ogbese.

Rivers and economic development

There is a strong relationship that exists between river and economic growth and development of residents of the study locations and their environs. 36 out total of 398 respondents, which account for 9.05% were of the opinion that rivers in their areas contribute nothing to the economic growth and development. This number is so insignificant to the extent that it only accounts for less than 10% of the total respondents. On the contrary, 362 respondents out of 398 were of the opinion that rivers contribute significantly to their improved standard of living through enhanced economic development. This enhanced economic development was attributed to the presence of rivers in those locations and are manifested in subsidiary activities that have direct links with the presence of rivers in the localities. Enhanced means of livelihood through fishing and other related activities stepped up the standard of living of the people in the study locations. Aside, people who also engage in dredging of sand from these rivers explore it as a means of economic sustenance over the years. However, the study revealed that with the huge economic advantages being benefited by residents of these locations, sustainability in any regard were not demonstrated in their cultural practices. These were also credited to poor awareness and enlightenment creation by concerned organs of government in the state. Nevertheless, there is a clear indication that the availability of rivers in the study areas have direct impact on the economic growth and development of the study locations (Plate 2).

Rivers and cultural practices and development

Table 2 shows the relationship that exists between rivers and cultural development in the study locations. A frequency of 294, which translates to 73.9% of the total respondents were of the opinion that rivers enhance cultural heritage across the study area. In another dimension, 26.1% of the respondents differed from the aforementioned assertion, that rivers do not enhance cultural heritage. Judging from these two divergent points of view, it is evident that the divergence in opinion portrays the orientation of individual communities on the cultural significance of rivers to their livelihood or sustenance. Oral interviews with some respondents also attested to the fact that availability of rivers serve as a propellant of cultural development, norm and belief. For instance, some worship the god of rivers where sacrifices are being made in some locations along rivers courses as a symbol of paying homage to their ancestral background. These practices are common along river courses having some dedicated points being devoted alone to the worshiping of idols and their subjects. The traditional leaders also accord special respect and importance to rivers in their domain with strong belief that it saves them from all evil that may likely come their ways and their community members. All these engagements constitute filthiness to river bodies and consequently contaminate them. In some cases, some of these materials are being discarded inside the rivers. Traditionalists were confirmed to have given strong priority and recognition to rivers in their belief and activities. Moreover, society derives a huge variety of cultural services ranging from recreational opportunities to aesthetic and spiritual values of rivers and their landscapes being icons of cultural and religious heritage.

Rivers and industrial activities

As revealed in Table 3, 6.0% of the total respondents said that rivers do not promote industrial development in the study locations. In contrast to this, 374 respondents which translate to 94% of the total respondents were of the view that rivers promote industrial development. The implication of this result is that availability of rivers in the study locations serve as an impetus to industrial growth and development in the study area, which consequently provide employment for the unemployed in the area. These were also evident the number of medium and small-scale industries available along the river courses. These industries are palm oil processing industries, garri processing and palm kennel processing industries. However, the expected sustainable uses of these natural resources by prospective entrepreneurs' operators were deficient. Liquid wastes were discharged directly into the water bodies while solid wastes were also discharged along the riverbanks in huge heaps which spill into the river course. This experience is a common phenomenon along River Oluwa in Okitipupa, Southern Senatorial districts. These consequently pollute the water bodies and distort the water quality. Plates 3 and 4 show the expression described.

RESULTS AND DISCUSSION

Figure 3 shows the physicochemical quality of selected surface water used for domestic and recreational activities in Ondo State.

The temperature of the water samples ranged between 28.20 and 28.80°C. This is found to be within the permissible limit of the WHO of 40°C. Water temperature is one of the most important physical characteristics of the aquatic systems (Beans and Lown, 2000). It has direct and indirect effects nearly on all aspects of stream ecology. As water temperature rises, the rate of photosynthesis increases thereby providing adequate amounts of nutrients (Bolton, 2012). This result is similar to Fafioye et al. (2005) who reported a range of 26.5 to 31.5°C in Omi water body, Ago Iwoye, Ogun State,

Plate 2. Fishing activities at River Oluwa.
Source: Authors' field survey, 2017

Table 2. Analysis of rivers and cultural practices and development.

Option	Frequency	Percentage
It enhances	294	73.9
It does not	104	26.1
Total	398	100.00

Source: Authors' Field Work (2017).

Table 3. Analysis of levels of metal ion in selected rivers in Ondo State.

Parameter	Oluwa	Ose	Ogbese	WHO
CD (ppm)	ND	0.001	0.001	0.003
Zn (PPM)	0.098	0.105	0.133	3.0
CO (ppm)	0.006	0.042	0.118	-
AS	ND	ND	ND	-
Cr	0.103	0.112	0.0.97	-
Pb	0.034	0.025	0.060	-
Ni	0.003	0.001	0.001	-
Fe	0.186	0.058	0.013	-

Source: Authors' Field Work (2017).

Nigeria. The (3) three water samples were not clear in appearance in terms of colour and usually did not meet the WHO standard for appearance of water which should be colourless. The non-colourless characteristics of the water examined did not make them to be potable. This showed that the water samples contain a lot of particles which could be as a result of human activities around the river such as locust bean processing, farming, refuse disposal, washing, batching and run offs from land erosion while the increase could be as a result of more water influx which is a characteristics of the wet season when the samples were collected.

The turbidity of the water samples ranged between 2.8 and 4.2 (NTU). This is found to be within the WHO standard of 5.0. Turbidity is the cloudiness or haziness of water sample. It is usually caused by suspended solid

Plate 3. Medium and small-scale industrial activities along the Oluwa River bank.
Source: Authors' Field Survey (2017).

Plate 4. Heap of kernel shell refuse beside Oluwa River in Idepe Okitipupa.
Source: Authors' Field Survey (2017).

particles which can be as a result of the presence of phytoplankton in open water or in drinking water (Chinedu et al., 2011). The more fubid water is the greater the chances of water borne diseases (USEPA, 1986).

The pH of the studied water samples ranged between 6.60 and 8.80. The results were not within the acceptable range (6.5 - 8.5). Only Oluwa River water was within the limit while Ose and Ogbese River were above the limit.

The pH level of studied water samples compares adequately with the study of Adefemi et al. (2007) in water samples from Ureje, Egbe, Ero and Itapayi dams in Ekiti State. Asade et al. (1997) also obtained similar results from water samples from the Coastal region of

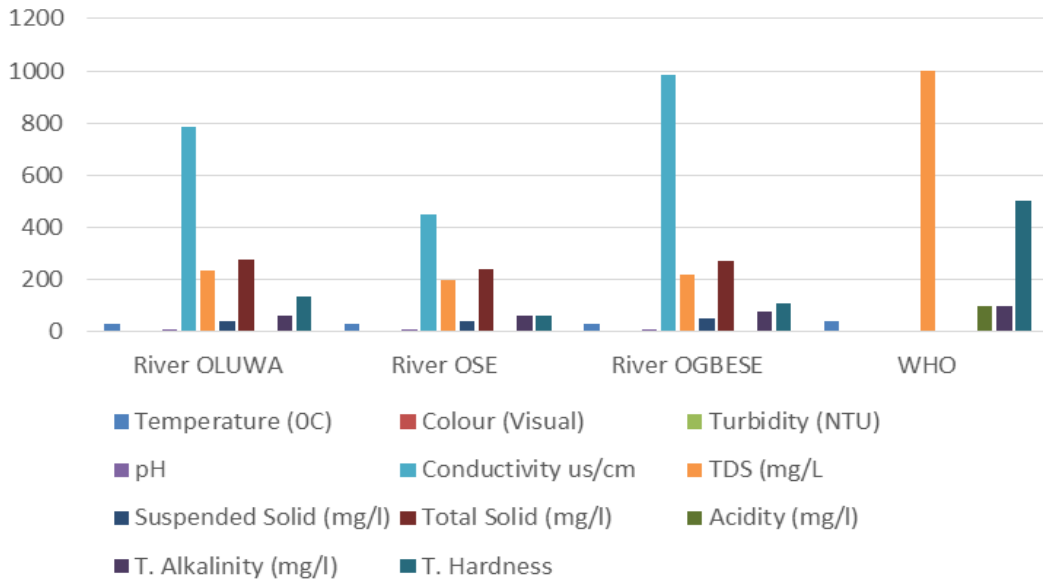

Figure 3. The physicochemical quality of selected surface water used for domestic and recreational activities in Ondo State.
Source: Authors' Field Survey (2017).

Ondo State.

The results of the conductivity of the water samples ranged between 6.49 and 9.82 (NS/cm). This fell within the permissible limit of WHO and ECL of 1000. Conductivity is the ability to conduct electricity, heat or sound. Pure water is a bad conductor of electricity. It increases as the concentration of lows in water samples increases (Chinedu et al., 2011). This result serves as an indication of the total dissolved solid content of the water samples in some cases (Ibrahim and Oluyeye, 2015).

Total dissolved solid (TDS) is a measurement of inorganic salts, organic matter and other dissolved materials in water (USEPA, 1986). This is used to evaluate the quality of fresh water systems (Manora-Onlere, 2012). TDS of the studied water samples ranged between 199 and 234 mg/L. This is within the permissible limit of WHO (1000 mg/L). Total solid (TS) are the combined content of all the organic and inorganic substances contained in a liquid which are present in ionized molecular or micro-granular form (Beychok, 1967). Total suspended solids (TSS) are solids that cannot pass through a sieve of 2 micrometers and yet are indefinitely suspended in the solution. From Figure 3, both TS and TSS had high value but are within the accepted level of 500 mg/L which can affect the organism living in water bodies as these can influence the level of dissolved oxygen.

Alkalinity is a measure of the acid neutralizing capacity of water. In most natural waters, it is due to the presence of carbonate (CO_3^-), bicarbonate (HCO_3^-) and hydroxyl (OH^-) anion. However, borates, phosphates, silicates and other bases also contribute to alkalinity if present (Wilson, 2010). The total alkalinity (mg/L) ranged between 59.50 and 75.35. This value falls within the permissible level of 120 mg/L by WHO. Excess alkalinity results to a distinct flat and unpleasant taste, scale formation (Orewole et al., 2007). Total hardness of the water samples ranged between 59 and 136 (mg/L). These values were within the standard limit (500 mg/L) for hardness of water for both domestic and recreational use. As hardness increases, more soap is needed to achieve the same level of cleaning due to the interactions of the hardness ions with the soap. In fresh water, the main hardness causing ions are calcium and magnesium (USEPA, 1976). The trend in the hardness values showed that the water samples were moderately soft (50 - 100) and slightly hard (100 -150).

The results showed that metals/toxic metals: cadmium (cd), Zn (Zinc) Colbat (Co), Cr (Cronium), Ni (Nicket), Fe (Iron), and Lead (Pb) were found in the water sample analyzed. The level of lead (Pb) is higher than the WHO allowable limits (0.001). This raises a lot of toxicity issues. The concentration of Pb in the water samples was higher than the allowable limit. It is used primarily in the manufacturing of lead acid battery and alloys. It gets into the environment though waste water or solid waste disposal. Implicitly, the level of waste pollutants in the water bodies is high. This confirms the unhygienic manner in which the resident populations dispose of waste in to the flowing rivers in the 3 (three) localities.

The level of Cd in the samples as shown in Table 3 is of a health concern. It was not detected in Oluwa River; but lower than the WHO limit of 0.003 mg/L. The possible source of Cd metal in the groundwater analyzed and

includes industrial effluent and solid waste dumped around the river. High concentration of Cd in food and drinks could lead to cancer of kidney, development of hypertension and some vascular diseases (Ibrahim and Oluyege, 2015). The level of Fe in the water samples ranged between 0.013 and 0.186 which were within the recommended limit of 0.3 mg/L by WHO. Iron is the most abundant element in the Earth Crust, it is an important element in human nutrition, it helps in the formation of haemoglobin, and it also helps during pregnancy and lactation (Jacobs and Worwood, 1981). However, toxicological study has established a link between accidental exposure and iron overload and idiopathic hemochromatosis as well as excess dietary iron (Majolagbe et al; 2011). The level of other metals analyzed (Zn, Co, As, Cr and Ni) were within the recommended limit of WHO. The result agrees with the previous works of Asaolu and Olaofe (2005) and Nwajei and Gagophien (2000). From the results, the water samples contain minimal number of contaminants and dissolved organic matter and were within the acceptable standard for consumption for majority of the parameters analyzed for.

CONCLUSION AND RECOMMENDATIONS

The study revealed an in-depth analysis of development problems in rivers utilization across the study areas. The study was sectionalized and analyzed in line with their existing situations. Unfortunately, the mode of utilization of this natural endowment is catastrophic in nature. The lives of the aquatic habitat are greatly threatened, while the purity of the natural resources itself is undergoing serious infiltration through different pollutants. The capacity of this river to sustain economic growth, create jobs and reduce poverty has been hindered by regular and incessant misuse. The wetland that is supposed to be a veritable arena for urban agriculture towards food security has also been altered and distorted, thereby giving rise to flooding. The river banks have now turned to wastes and refuse dumpsites. The river banks are dotted with a series of heaps of solid wastes of different categories being discharged by small and medium scale business operators along the river banks.

The paper recommends the following as a means of enhancing rivers and wetlands performance in the state for effective and optimal utilization:

(1) There should be a holistic and integrated natural drainage master plan or blue print in the state. This is required to determine the best possible options for rivers' development and utilization of its wetlands.
(2) Rearing of animals particularly by any tribe across rivers and streams should be prohibited by the State and the National governments with a view to conserving these valuable natural resources across the country.
(3) The use of rivers for other unhealthy and unfriendly activities like car wash, washing of clothes, and discharge of other effluent from industries should be sanctioned with a strict penalty.
(4) A public awareness and enlightenment campaign should be pursued with rigor. The public should be sensitized on the need to conserve and protect the various natural drainages we have in the state.
(5) Assessments of existing water situation should be conducted to identifying freshwater areas of conservation value at the appropriate scale including trans- boundary.
(6) Ensure enforcement of the legal and regulatory framework on priority freshwater conservation areas by the relevant organ of government in the State.
(7) Require Strategic Environmental Assessments for river basins and/or infrastructure development according to internationally recognized standards, the precautionary principle, and under full consideration of environmental services. This will assist in preserving the status of the river as a natural endowment in the State.
(8) Regularly monitor the integrity of freshwater areas of conservation value to update conservation status and adjust management, as required and stipulated in the law.
(9) Government should encourage the public to embark on fish farming on the rivers without tampering with the natural fishes in the rivers. Sleeve development should also be practiced to conserve excess water for reuse during dry season particularly in some of the seasonal rivers around the state. These sleeves could also be used for intensive irrigation practices.
(10) There should be total compliance with the mandatory provisions for freshwater areas of conservation value in planning procedures and approval processes in the state.
(11) Development plans at all stages must be transparent and inclusive in its contents and implementation with a view to prevent fresh water from further degradation.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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