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A Review of the Major Source and Effect of Pollution in Inland Water Bodies of Nigeria

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***Abstract* :- The source of water pollution caused by industrial effluents and other sources in Nigeria with a view to provide useful information to the authorities on the management, control and investigation of pollution cases, water quality surveillance and forecasting water quality in the country. Literature on the subject matter sources and effect was accessed through published and unpublished materials on the subject as well as browsing of related issues on the internet. The result shows that sources of pollution account for several point sources of water pollution, while developed nations adopt stringent water quality requirements to control river pollution from point and non-point sources, the situation is different in most developing countries like Nigeria. Waste water treatment in Nigeria is not given the necessary priority it deserves and therefore, industrial waste discharged into receiving water bodies without treatment and the effect of these include, among others, river pollution, loss of aquatic life, uptake of polluted water by plants, disease burden and shorter life expectancy. It is recommended that the federal, state and local governments in Nigeria should ensure that industrial wastes, agricultural, pesticides, petroleum, particularly effluents are pre-treated before discharging them into the environment.**

Keywords: Sources, Effect, Pollution, Inland Water Bodies of Nigeria.

INTRODUCTION

Nigeria has abundant water resources covering an enormity and diverse Land, though they are unevenly distributed in the country (WHO /UNEP, 1997). The space occupies by inland water bodies in Nigeria is estimated at 900km2 (Ekiya & Zejiao 2010) representing 0.1% of the mass while coastal estuaries and mangrove especially the Niger Delta. The water bodies in the country are used purpose fishing, transportation, mining, irrigation, recreation, industrial and domestic purposes as well as electric generation can. The contamination of ground water, rivers, lakes wetland, estuaries, and oceans can threaten the health of human and aquatic life. Sources of water pollution has been very damaging to aquatic ecosystem pollution the generally divided into two categories the first point sources pollution, and even humans and may consist of agricultural, Urban, and town in which contaminants are discharged from of discrete location. Sewage outfalls.

POLLUTION

- Industrial waste, many pollutant entering aquatic ecosystem and oil spills are example of point sources pollution. The second category is non-point sources of diffuse pollution, referring to all of the other discharges that dither contaminants to water bodies. Acid rain and unconfined run-off from agricultural or urban areas are examples of non-point sources pollution

1.0 Water Resources:

Nigeria lies an extensive mangroves system of which a great proportion lies within the Niger Delta and are also found mostly in Rivers, Delta, Cross River, Akwa Ibom, Lagos and Ondo states. They lie between latitudes 3o 60 north and are estimated to coven between 500,000 and 885 ha. The approximate expend of the, major inland water system is given I tables 1 and 2. The major Rivers, estimated at about 10,812,400 ha make up about 11.5% of the total surface area of Nigeria which is estimated to be approximately94, 185,000 ha

Thirteen lakes and reservoir with a surface area of between 4000 ha and 550,000 ha have a total surface area, 600ha and represent about 1% o of the total area of Nigeria.

The water bodies in Table 2 are divided into saline deltas and estuaries, and fresh waters Deltas and estuaries, with their saline wetlands have a total surface area of 858,000ha, white freshwater coven about 3,221,500ha. Other water bodies , including small reservoirs, fresh ponds and miscellaneous wetlands suitable for rice cultivation cover about 4,108,000 ha Thus the total surface area of water body in Nigeria, excluding deltas, estuaries and miscellaneous wetland suitable for rice cultivation is estimated to be a bond 14,1991, 900ha or 149,919 km2 and constitutes a bond 15.9% the total area of Nigeria.

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Table 1 Major Inland Water Resources of Nigeria

Types of Water bodies	Approximate Surface Area (ha	Reference
A MAJOR RIVERS		
i) Anambra River	1,401,000	Ita and Sado et al 1985
ii) Benue River	129,000	
iii) Cross River	3,900,000	
iv) Imo River	910,000	
v) Kw Iboe River	500,200	
vi) Niger River (Less Kaiji and Jebba)	169,800	
vii) Ogun River	2,237,000	
viii) Oshun River	1,565,000	
Sub-Total	**10,812,400**	
B. MAJOR LAKES AND RESERVOIR		
i) Lake Chad	550,000	Ita and Sado et al 1985
ii) Kainji Lake	127,000	
iii) Jebba Lake	35,000	
iv) Shiroro Lake	31,200	
v) Goronyo Lake	20,000	
vi) Tiga Lake	17,800	
vii) Chalawa Gorge	10,100	
viii) Dadin Kowa	29,000	
ix) Kiri	11,500	
x) Bakalori	8,000	
xi) Lower Anambra	5,000	
xii) Zobe	5,000	
xiii) Oyan	4,000	
Sub-Total	**853,600**	
TOTAL	**11,666,000**	

Table 2 Distribution and Extent of nig. Brackish & Freshwater

Types of Wetland and Distribution	Approximate Size (ha)	Reference
1. DELTA AND ESTUARIES		
i) Niger Delta	617,000	Scott (1966)
ii) Gross River Estuary	95,000	
iii) Imo and QuaIboe Estanary	36,000	Ekpan (1974)
iv) Others		
Sub-Total	110,000	
	858,000	
2. FRESH WATER		
i) Niger Delta	362,000	Scott (1966)
ii) Apex of Delta to Lokoja	635,000	Mutter (1973)
iii) Niger/Sokoto Basin	470,000	Hughes and Hughes (1991)
iv) Niger Kaduna Basin		
v) Lower Niger Jebba to Lokoja	150,000	Hughes and Hughes (1991)
vi) Benue River Floodplain	385,000	Hughes and Hughes (1991)
vii) Hadeja Komaduge Yobe	312,000	Hughes and Hughes (1991)
viii) Ogun/Oshun Flood plains	624,000	Hughes and Hughes (1991)
ix) Cross River Flood Plains	Not estimated	
x) Imo River Flood Plains	250,000	Moses (1981)
xi) Kwa Iboe	26,000	Enplan (1974)
Sub-Total		
TOTAL	7,000	Moses (1981)

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		3,221,500	
3. OTHER FRESH WATER			
i)	Minor Reservoir	98,900	
ii)	Fish Ponds	5,500	
iii)	Miscellaneous	4,212,500	
	Wetlands		
	Sub-Total	**14,212,500**	

RESULT AND DISCUSSION

Available literature on environmental monitoring of surface water indicated that streams and rivers in the country are also increasing trend of water pollution due to increase population, industrialization and urbanization. Wastes generations by the industrial and house hold have continued to increase this waste are indiscriminately disposed off into the water bodies. These lead to pollution of inland water bodies and subsequently increased water quality parameters such as heavy metals, urgent attention is therefore necessary to meet water pollution problems in Nigeria through monitoring as well as enforcement of standard by industries (Ekiye & Zejio, 2010). According to national Bureau of statistics (2009)at least 27%Nigerians depended absolutely on streams, ponds and rainwater for the drinking water some Research as shown high prevalence of water borne diseases such as cholera, dysentery, hepatitis etc. among Nigeria's (Ogontoke *et al*, 2009; Raji & Ibrahim 2009).

INDUSTRIAL AFFLUENT

Studies in most cities in Nigeria had shown that industrial affluent is one of the main sources of water pollution in Nigeria (Ekaye & Zejiao, 2010). Industrial affluent when discharged directly into the rivers without treatment have capacity of increasing quality parameters. Dada (1997) indicates less than 10% of industrial in Nigeria treat affluent before being discharged into the river.

The characteristics of selected effluents from industrial in Ikeja, Lagos Nigeria, were analyzed and it was reported that the concentration of effluent discharged is on the high side exceeding the maximum recommended unit (Sangadoyin, 1995). Also high blood levels were reported among Nigerians due to exposure to the environmental pollutant which can get into the human body through various sources (Orisikwe, (2009).

Furthermore, the characteristics, as well as the pollution implications of effluents from give tannery industries in Kano metropolis, Kano State Nigeria were analyzed and it was discovered that effluent quality discharged by the tanneries differed significantly. Chromium concentration varied between 1.02+0.13 to 1.56 +0.6 mg L^{-1} which is above the limits set by (Nigerian Industrial Standard (2007) and World Health Organization (Nigeria Industrial Standard (2007) of 0.05 mgl^{-1} as shown in table 1.

Table 1 Upper permissible limit of some physic chemical parameters and heavy metals in Nigeria Drink Water

Parameters	**Unit**	**Max Permissible Value**
PH	-	6.5-8-5
Conductivity	us/im	1000
Turbidity	NTU	5-0
Colour	TCU	15
Total/Dissolve Solid	Mg/L	500
Mercury	Mg/L	0.001
Arsenic	Mg/L	0.01
Cadmium	Mg/L	0.003
Lead	Mg/L	0.01
Iron	Mg/L	0.01
Cyanide	Mg/L	0.01
Copper	Mg/L	1.0
Chromium	Mg/L	0.05

Source: Nigeria Industrial Standard, NIS 5542007.

PETROLEUM ACTIVITIES

According to (Christopher *et al*., 2004) the total number of reported spills between 1976 and 1996 in the oil industry is put at 4,835, resulting in a cumulative spill volume of 2,382,373.7 barrels of crude oil of this amount only 15.91% was recovered, on the average, implying that about 84.09% of the cumulative spills was lost to the environment. Oil spills occurs majority as a result of drilling (bringing oil to the surface for refining and distribution) oil wells are found at both Onshore and offshore. Oil and gas transportation is another main source. There are many ways of transporting oil and gas to the refining station; these include offshore and onshore pipelines, marine terminals with offshore loading platforms, and Tank vessels (Onuoha, 1980). Oil gets spilled to the environment through these methods, especially leaked pipes, causing pollution.

The transportation and distribution of oil involves a very complex network, spread oil over the Niger Delta Region, which is very rich in fish and shrimps. Imevbore, (1979) reported widespread pollution in the delta the creeks and estuaries of the various rivers, causing the death of a great number of specimens of callinectus gladiator and c. latimanus, two species of edible crabs, but no contitative data were available. Two years later Imvbore , (1979) and (Adeyemi, (2004) presented a map of the Niger

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Delta showing the isopleths of oil concentration as measured by infrared spectrography thus improve the information available a great deal, although not fully satisfaction.

AGRICULTURAL ACTIVITIES

The important pollutants from agricultural drainage include the prisons pesticide residues and mineral fertilizers. Unlike industrial effluents, it is very difficult to contain the transport of the nutrients chemicals and pesticides though agricultural drainage, which is an on point source of pollution. The fertilizer dead in agricultural are major contributor of residual phosphates and nitrate in surface waters. Pesticides and Herbicide are used in the control of different pest, weeds that affect plants and animals. The entire chemical ends up in the environment where they enter the nutrient cycle. In Nigeria there is an increase in the use of herbicide as reported (Asogwa & Dongo, 2009), but total quantities applied are not known. Apparently, DDI and end sulfur are still in use for these purpose in a quantity of 50,000kgIa. (Koeman *et al*., 1971). Also (Koeman *et al*, (1978); Mittendorfi, (1978), studied the effects of insecticide application on the Dauna of marshes in Nigeria and analyzed the levels of pesticides in the brain, liver and put of different aquatic birds fish and snakes. Levels of 0.1 mgIkg of die/drin were found in the fish while DDT was much lower, not exceeding 0.05mgIkg

It has also been observed that pathogenic contamination of Nigeria water bodies also comes from aquaculture practices involves fertilization of ponds with cow and poultry manures and direct dumping of fecal into rivers (Abasohan *et al* .,2010). And of microbial pollutants in drinking water pose risks to public health of water borne diseases such cholera, diarrhea, dysentery, poliomyelistis, typhoid etc. Nearly 40,000 cases of Cholera were reported in 11 states in Nigeria from January – October, 2010, out of which many were reported dead (Adewora & Visser, 2011). Diarrhea is the second cause of children's mortalities in Nigeria according to water initiative (2010). Nigerian children of age less than 5 years make of the total annual death of 1.8 million recorded globally due to poor sanitation initiative, 2010).

HUMAN ACTIVITIES

Humans have contributed significantly to the nitrogen cycle by artificial nitrogen fertilization (primarily through the haber process, using energy from fossil finals to convert N^2 to ammonia gas (NH_3) and planting of nitrogen fixing crops (Vitonsek *et al*., 1997). In addition, to human have significantly contributed to the transfer of nitrogen trace gases from earth to the atmosphere N20 has risen in the atmosphere as a result of agricultural fertilization, biomass burning, cattle and feed lots and other industrial sources (Chapen et al, 2002)

Ammonium lows readily blinds to soils, especially to human substances and clays. Nitrate irons, done to their negative electric charge, blind less readily since there are less positively charged ion exchange sites. After rain or irrigation, leaching (the removal of soluble ions, such as nitrate and nitrate into ground water can occur elevated nitrate in ground water is a concern for drinking water use because nitrate with blood oxygen levels in infants and cause mathemoglobinemia or blue baby drone (Vitonouse *et al.*, 1994). Where ground water recharges stream flow, can contribute eutrophication a process leading to high algal, especially blue green algal population and the death of aquatic life due to excessive demand for oxygen. While not directly toxic to fish life like ammonia, nitrate can have indirect effects on fish if it contributes to this eutrophication in some water bodies. Discharge level of ammonia from waste water treatment plants must often be closely monitored.

CONCLUSION AND RECOMMENDATION

The release of untreated effluent affects the natural water bodies' flora and fauna of the ecosystem and increases the effect to human health and environment (Pushendra & Upadhay, 2015)**.** In Nigeria, most of the portable water used for domestic, agricultural and industrial purpose is channeled from rivers and ground water. The quality of these water bodies cannot be guaranteed due to constant disposal of industrial effluents, agricultural pesticides, petroleum activities and human activities.

Presently, very little if anything has been done at integrated level concerning industrial pollution abatement in Nigerian waters. Moreover, there is very little or no institutional memory in Nigeria on the influence of industrial waste on human health, thus, a detailed campaign should be put in place, elucidating the mechanism of water pollution especially with regard to these toxic source of pollution.

The provide a holistic approach toward water pollution abatement, prevention at the source is the best alternative. Having identified these major water pollution sources in this paper, government should as a matter of urgency, adopt legal, administrative and technical measures to eliminate or lessen the undesirable effects of industrial effluents in Nigerian water bodies. Imposition of direct charged on industrial effluents by the regulating agency, as well as continuous monitoring and surveillance is imperative in order to ensure the protection of Nigerian water resources from further degradation as a result of pollution.

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