

ENVIRONMENTAL IMPACT OF INDISCRIMINATE WASTE DISPOSAL ON RIVER CHANNEL IN PART OF AKOKO-REGION, ONDO STATE, NIGERIA

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ABSTRACT: The study investigates environmental impact of indiscriminate waste disposal on river channel in part of Akoko-Region, Ondo State, Nigeria. The study further identified; method of waste disposal within the study area, influence of waste disposal method on open space and streams, reaction of water to waste disposal method, environmental problems associated with waste deposited on river channel. Primary data for the study were generated through questionnaire administration and water sample analysis. Sixty questionnaires were systematically distributed in each of the selected sampled locations that included Ise, Akunu, Ikakumo, Ugbe and Ikare settlements based on interval of fourth house from another house. Twenty-two water samples were randomly collected from the selected sampled settlement in order to identify their physical properties using in-situ method. Simple percentages were employed for data analysis while tables and figures presented findings of study. It was observed that wastes are being flushed into streams and thereby affects the odor, taste and coloration of water quality. Flooding activities identified in this area is majorly caused by indiscriminate waste disposal that blocks water drainages. The study therefore recommends provision of waste management strategy that will ensure neatness of environment and avoid pollution of water with effective refuse collection and disposal system within the study area and the related environments.

KEYWORDS: Waste, Water, Management, Environment, River.

1 INTRODUCTION

One of the prominent components of man's environment is river that flows gently within its natural course. River serves as the source of water that man drinks. Other purposes such as agricultural and domestic purposes are also serving by water from river. River provides both defense and transportation means for human beings. Yet when the volume of water in a river smells due to disposal of indecent elements, such as wastes, it then starts to pose a threat to residents around its course.

Waste could be an unofficial measure of prosperity; it can also be a major problem on man especially where it is not well managed. Reference [1] observed that unregulated growth of urban areas and inadequate infrastructural facilities for collection, transporting, treating and disposal of waste have all contributed to increase in pollution. The heterogeneous mixture of plastics, cloths, metals and organic solution which are inevitable products of production and consumption are on increase as a result of urbanization that give room for indiscriminate discharge of solid and sewage waste into river channels thereby causing serious flooding which is a treat to life in general.

The present situation in Akoko North/East Local Government Area and in several parts of Nigeria portrays the above described situation. This study investigates the problem with a view to providing sustainable solution to the phenomenon in this fast growing part of Ondo State, Nigeria. Hence, the need for adequate and efficient waste disposal system in the study

area cannot be over emphasized. Adequate and efficient waste disposal system is required for good health and neat environment.

The effects of Waste Disposal and Management in Akoko North/East Local Government has attracted the attention of various researchers in References [2] and [3]; whose studies were limited to waste management and effects of waste on underground water, on health status and visual intrusion. Reference [4] has expressed concern on the volume and inadequate management of waste in the developing countries, the organization further reports that there is existing correlation between the quality of environment and health status of communities.

Waste disposed or flushed into the drainages and river courses in Akoko North East Local Government engender major environmental problem, particularly, in Ikare town, being the major commercial centre of the entire study area. The bulk of waste generated in Ikare are dumped into river courses which has led to a number of waste accumulation along the river courses and drainages resulting to water pollution, drainage blockage, infrastructural degradation, land pollution, flooding, erosion, as well as spread of diseases like cholera, diarrhea, typhoid fever which are water borne.

Attempts have been made by government to address the issue of waste collection and disposal within the study area. Such effort involves creation of Local Government Waste Management Board by State Government and recently Sanitation Department in the Local Government and Local Government Environmental Protection Agency [LGEPA], where Environmental Health Officer known as 'Wole-Wole' were directly involved in the past to supervise waste management of this area.

However, empirical observation reveals that at the initial commencement by the waste management board, their services were effective due to newness of its equipments especially with the assistance of the Niger Delta Development Commission [NNDC] in the supply of Dino trucks as well as the staff commitment to prompt maintenances of the waste equipments.

Things however started changing and take a new turn sooner than later as investigations reveals that this state of inefficiency as a result of insufficient Dino bin, poor maintenance of equipment, inadequate funding, greed, indiscipline, illiteracy and unconcern attitudes, from member of the public and official bodies that lead to inefficiency of effective waste management. This study therefore designed to holistically investigate effects of waste disposal along river channels in Akoko North/East with a view to provide sustainable solution to the defaced aesthetic configuration of the environment and drainage blockage in the study area. Generally, the study identifies the types of waste deposited along river courses, examines the effect of indiscriminate solid waste deposited on the river courses and underground water, and determines the impact on aesthetic value and human health and sustainable solution to the problem of improper disposal of wastes.

2 STUDY AREA

The study area is situated in the North senatorial district of Ondo State, Nigeria. This area is located on latitude $5^{\circ} 30'E$ and $6^{\circ} 05'E$ while on Longitude $7^{\circ} 17'N$ and $7^{\circ} 45'N$ (see figure 1). The study area shares common boundary with Akoko North/West in the Northern part, Akoko South/East in the Eastern part, Akoko South/West in the Southern part and with Ekiti State in the West.

This area observes dry season between October and March while the wet season between April and September. The terrain is an undulating valley surrounded by ridge hills and mountains especially in the south/Western parts while the terrain is fairly flat with scatter rock in the North/Eastern part of the local government covering the following towns Iboropa, Ise, Auga, Akunu and Ikakumo area.

As observed by References [5] and [6], Ikare metropolis is underlined by Precambrian basement complex rock of South/Western Nigeria. The lithological rock types include Grey gneiss, Granite gneiss, Charnockite, Granite, Quartzite and Migmatite gneiss. These rocks form residual isolated hills and continuous ridges around Ikare area.

The vegetation fall within two major type, the Sub-Tropical forest zone and the Guinea savanna zone. The forest zone is found within the South Western part of the study area, particularly in Ikare; this is characterized with tall tree and thick forest. The vegetation species include parasite, cumber and reepens with tall tree like walnut, iroko, obese, maogany and oil palm among others.

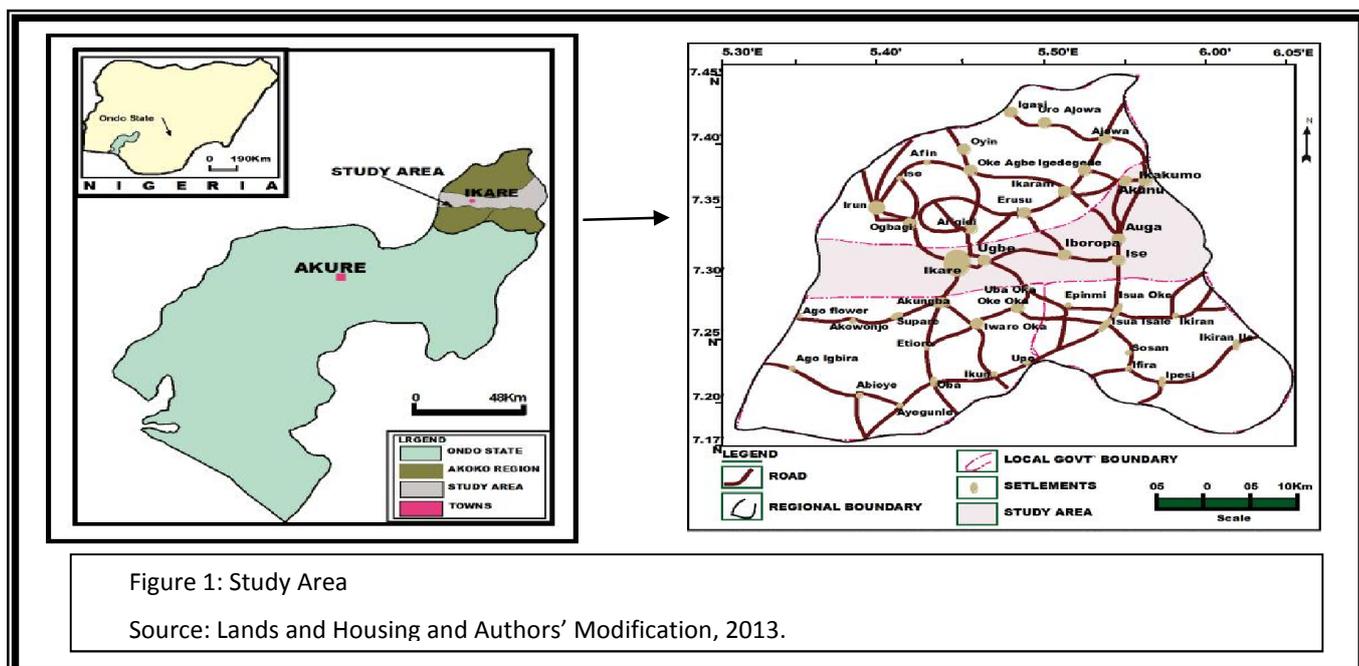
The Guinea savanna zone lies in the North Eastern part of the study area around Iboropa, Ise, Auga, Akunu and Ikakumo settlements. The vegetation is characterized with elephant grass, capet grass, cumber, parasites with mixture of tall trees scattered in the region and there are Iroko, Obeche, Maogany, Buter tree, Oil palm, Date palm among others, besides there are very many xerophitic plants.

The soil of this area is lateritic. They are grayish/reddish in color, generally sticky, impervious to water and of mediocre fertility. These soil are of little use for Agriculture thus responsible for the low in Agriculture product of the area which is limited to a root crop and cash crop e.g. Cassava, Yam, Colanut and Cocoyam.

The population of the study area according to Reference [7] is 179,092, being the 9th most populated Local Government in Ondo State. The substantial portion of the land is used for agriculture activities; places like Iborapa, Auga, Ise, Akunu and Ikakumo has about 98% of their population engaged in farming which is the sources of their living, cash and food crop are there major farm product except Ikare where there major activities is trading which eventually increase the waste deposit in the area.

Other activities involve in buying and selling and this comprises wholesale, retail sales, financial institutions, hotels and restaurants. Most of these commercial activities are been performed in the market places like Oja-Oba, Obada, Osele, Owode, Jubile, Okore, Oja-Oba Iboropa, Oja-Oba Auga, Ugbe market where solid waste predominantly generated and disposed indiscriminately into drainages.

Though every settlement has servicing road network but they are usually of low grade without adequate drainage channels. The existing channels are not maintained, being filled-up with assorted refuse that rendered it useless; especially, most bridges that link Ugbe-Iborapa, Ugbe-Epinmin, Iyame road (road from Idimango to Ese) and those at river Dada, Jubilee-Ugbe and Ikare, Ese-Jubilee, Osele Market - Olukare palace. All these observed bridges have been affected by the indiscriminate deposit of waste into the drainages.



definitions and conceptions of environment is closely linked to the facts that the study of environment is multi-disciplinary, thus each discipline tended to develop and adopt definitions in line with its interest.

Reference [9] stated that the multiplicity of the usage and concept of the term environment have resulted in a variety of adjectival forms environment which include social, moral, physical home, psychological, behavioral, geological, and geographical environment. Reference [10], for instance, defined environment as all the external and non personal conditions and influence that affect the welfare a people in a giving area. Reference [11] on the other hand defined environment as the sum total of all conditions that surround man at any point on the earth's surface. While the federal Environmental Protection Agency (Reference [12]) stated that the environment include water, air, land plant, animal human being, living there in, and the interrelationship that exists among them.

From the above definitions, environments can be view according to Reference [13] as a determinant of the characteristic futures of growth, development and sustainability of both the components element of the environment and

the environments itself. Though, evidences suggested that the prevailing global environmental degradation poses serious threat to sustenance of carrying capacity of the ecosystem. Hence, Reference [14] opined that environmental sustainability have taken priority position in housing, infrastructure provision, planning, land use and urban development among others.

Generally, Refence [15] observed that environmental problems are mostly due to developmental process and are of local, regional and global effect. These effects are viewed as consequences of human activities are most often harmful on humans being, livelihoods, animal and plant lives presently or transferred to posterity.

Man's quest for survival deteriorates the environment as we commit ourselves to a particular set of problem; more rapid depletion of domestic and greater pressure are exerted on the environment which can lead to irreversible change in life sustainability. Thus unethical waste disposal on river channels according to Owotorose (2007) must be discouraged to ensure good human health and safety in our entire environment.

3 MATERIALS AND METHODS

Data used for this study were sourced through questionnaire administration and water sampling. This involved the distribution of 60 questionnaires in each of the selected sample locations. The sample locations involved rural (Ise, Akunu and Ikakumo) and urban (Ugbe and Ikare) areas where human population concentrates. Systematic sampling technique was employed to select houses based on interval of fourth house in each location. Direct observation of water samples collected with in-situ test of water parameter in order to identify water physical properties. In all, 120 questionnaires were administered in the course of the study. Water samples were collected from 6 boreholes, 6 wells and 10 streams (surface water) using one (1) liter Teflon bottle container. This makes it a total of 22 water samples that represents random selection of water sources within the studied settlements. Also, depth of water level on each wells were taken with the aid of meter tape with a bulb attached to its end to allow easy immersion.

4 DISCUSSION OF RESULTS

4.1 METHODS OF WASTE DISPOSAL IN AKOKO NORTH/EAST

The method of waste disposal employed by the people in the study area is indicated in table 1. The study identified open dump with 31.7 percent forming the highest way by which people in this area dispose their wastes. Whereas, wastes subject to burning as the second common way of waste disposal is of 25 percent. Wastes dump at stream or river channels is of 20 percent. This finding presents total of 76.7 percent refuse in the study area is responsible for overland and stream water pollution; although, the effect of the pollution is based on mode of waste evacuation, as this explains that delay in waste evacuation mostly result into terrible pollution effect in this area.

Table 1. Method of Waste Disposal

Disposal Method	Frequency	Percentage
Open dump	19	31.7
By burning	15	25
Dino bin	5	8.3
Dug pit	9	15
Stream/River channels	12	20
Total	60	100

Source: Field Survey, 2013

As observed in table 2, waste evacuation is not regularly done because it takes more than a period of one month to evacuate waste deposited in Dino bin by waste management board. This automatically leads to overflow of waste in Dino-bin that results into spreading of waste along major roads in most cases. This study confirms that refuse were not regularly collected and resulted into environmental pollution especially in urban area.

Table 2. Waste Evacuation

Period of Evacuation	Frequency	Percentage
Promptly	5	8.3
Weekly	16	26.7
Monthly	18	30
Above a month	21	35
Total	60	100

Source: Field Survey, 2013

4.2 INFLUENCE OF WASTE DISPOSAL METHOD ON THE STUDY AREA

Table 3 revealed rate of waste deposition within the selected study areas. The study identified majority of people in rural area with open dump method while those in urban area prefer dumping their refuse on drainage channel as soon as it rained. This arbitrary refuse dumping usually lead to drainage blockage and worst still polluting water in rivers.

Table 3. Waste disposal methods in urban and rural area

S/N	Method of Disposal	Rural		Urban	
		Frequency	%	Frequency	%
1	Open dump	21	35	19	31.7
2	Burning	15	25	14	23.3
3	Dino bin	6	10	2	3.3
4	Dug pit	4	6.7	2	3.3
5	Stream/river	14	23.3	23	38.3
Total		60	100	60	100

Source: Authors' Field Survey 2013

For instance, the waste dumped on river Atikua, Odo, Dada and Aringa has contributed to ground water contamination that serves bore-hole and well water in the area which resulted into water coloration, especially, in urban areas. Rural area has appreciable water condition with limited or no pollution. This result shows that waste deposited on drainages should be cautioned in order to preserve adequate water condition in the study area.

4.3 WASTE DISPOSAL METHOD AND WATER QUALITY IN AKOKO

Table 4 present the locations where water samples were collected and the results of the water test carried out on Wells, Boreholes and Streams within the study area. The study confirmed more water in rural area to be tasteless and colorless due to reduced activities of refuse disposal at drainage locations. Although, the result derived from borehole water shows that more of this water source are effected with odour.

It is also established that water pollution is one of the major problems commonly attributed to most of the study locations within the urban areas. This is so based on the observed effect of color, taste and odor that characterized water sources in this area. It shows that waters in rural areas such as Iboroba and Akunu have a more quality characteristics based on its physical description when considered the reduced effect of odor and color in the area. The exception of well-water salinity in Akunu is attributed to the location of the water and other external influences such as low impact of environmental degradation due to low population effect.

In addition, the study identified that depths of the sampled waters measured in meters have considerable influence on the quality of water in the study locations. For instance, within the four locations comprising of rural and urban areas, where the total of twenty-two results of physical water tests extracted shows that the deeper the water the lower the taste, color, and odor recorded; especially, the color and odor characteristics. Though, the taste perceived is not influenced in many cases even in a deeper water points. The reason for this may not be far-fetched since most of the stream waters usually serves on motion and "taste characteristics" are not easily detected. Although, contrary is for waters that are under the ground. The study shows that the influence of continuous waste deposit in this area has much influence on the water qualities in many of

the deep-bored water in the study area. This is so, because accumulations of waste deposit usually concentrate at lower grounds.

Table 4. Water Sample and Result of Water Test in the Study Area (In-Situ Test)

	Sample Location	Source of Water	No of Source	Sampled Water	Depth/ Meter	Taste	Color	Odor
URBAN AREA	Ikare	Well	1	1	16	Taste	Colorless	Odor
		Borehole	1	1	48	Taste	Colorless	Odor
		Borehole	2	1	52	Taste	Colorless	Odorless
		Stream	1	1	06	Taste	Greenish	Odor
		Stream	2	1	2.0	Taste	Brownish	Odor
		Stream	3	1	1.6	Taste	Darkish Brown	Odor
	Ugbe	Well	1	1	14	Tasteless	Colorless	Odor
		Well	2	1	9.4	Tasteless	Colorless	Odorless
		Borehole	1	1	100	Tasteless	Colorless	Odorless
		Borehole	2	1	3.5	Taste	Colorless	Odorless
Stream		1	1	1.02	Taste	Brownish	Odor	
	Stream	2	1	0.8	Taste	Brownish Dark	Odor	
RURAL AREA	Iboropa	Well	1	1	12	Taste	Colorless	Odorless
		Well	2	1	15	Taste	Colorless	Odorless
		Borehole	1	1	42	Taste	Colorless	Odorless
		Borehole	2	1	46.2	Taste	Colorless	Odorless
		Stream	1	1	1.92	Tasteless	Colorless	Odorless
	Akunu	Well	1	1	14.50	Salty	Colorless	Odorless
		Well	2	1	10	Tasteless	Colorless	Odorless
		Borehole	1	1	54	Tasteless	Colorless	Odorless
		Borehole	2	1	46	Tasteless	Colorless	Odorless
		Stream	1	1	2.7	Tasteless	Colorless	Odorless

Source: Field Survey 2013

4.4 WASTE DEPOSAL AND RIVER COURSE ALTERATION

Apart from the effect of waste deposition on physical characteristic of waters, the study agrees in table 5 that alteration on the course of streams does more damages and destruction to life and properties, especially in urban centers. The study gathered that "river course alteration" through indiscriminate waste deposition results into 43.3 percent and 33.3 percent of flooding activities in urban and rural areas respectively. This especially, is well pronounced in places where drainage has been badly blocked by wastes. The degenerating influence of flooding in most cases leads to overland pollution that drains into river bodies, which led to infrastructure degradation where 33.3 percent of urban and 38.3 percent rural infrastructures have been affected in the study areas (table 5).

Table 5. Effect of Waste on River Channels

S/N	Effect	URBAN AREA		RURAL AREA	
		Frequency	%	Frequency	%
1	Flooding	26	43.3	20	33.3
2	Erosion	9	15	10	16.7
3	Pollution	5	8.3	7	11.7
4	Infrastructure Degradation	20	33.3	23	38.3
	Total	60	100	60	100

Source: Author's Field Survey, 2013

5 CONCLUSIONS AND RECOMMENDATIONS

The study revealed that wastes disposed into river/stream channels indiscriminately resulted into drainage blockage, disastrous flooding, infrastructural degradation, stream/river pollution and underground water contamination. Thus, sustainable management of waste is needed to correct this environmental anomalies that impact lives and properties. On this ground, the study suggests that there should be waste management strategy to ensure neatness of environment and avoid pollution from wastes through the provision of less strenuous and effective refuse collection and disposal system within the study area and the related environment.

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