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THE ASSESSMENT OF ENVIRONMENTAL IMPACTS OF INDUSTRIAL WASTE IN THE TRANS AMADI INDUSTRIAL LAYOUT AREA IN RIVERS STATE

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ABSTRACT

The relationship of man with the environment is necessarily symbiotic; the equilibrium between the two must be maintained at all cost. This study has been conducted to elaborate on the environmental and socioeconomic impacts that result from industrial hazardous waste due to indiscriminate dumping of waste. Trans Amadi industrial area was chosen as the study area

Introduction

Environment is a physical and biotic habitat, which surrounds us, which we can see, hear, touch, smell and taste.

and follows its waste from the resource generator up to the dumping of waste. The research followed many ways of collecting data and information to assess the impacts of industrial waste on the environment, which results in a series of harmful problems. The negative impact of environmental pollution accumulates and appears as a serious problem after many years if not properly managed, causing natural resources degradation such as surface and groundwater pollution, soil degradation due to accumulation of chemicals such (as zinc and manganese) and waste on surface and loss of vegetation cover. This also leads to air pollution, which increases respiratory disease in the area. Consequently, it results in human health deterioration and a decrease in income.

KEYWORDS: Waste, Industrial Waste, Hazardous Waste Industry, Pollution, Chemical Waste, Land Use, Waste Disposal, Industry Companies, Layout, Environment.

The relationship of man with the environment is necessarily symbiotic; the equilibrium between the two must be maintained at all cost. Unfortunately, on account of the various activities of man, the composition and complex nature of environment gets changed. Such activities include industrialization, construction, transportation, etc.

These activities, although desirable for human development and welfare, lead to generation and object able materials into the environment thus turning it foul, and make our life miserable.
Urbanization and industrial growth; complicate the problem because:

1. Natural resources were considered as free goods but population growth put a strain on this Resources
2. Environment is a sink where all the waste produced by man is assimilated. And it is impossible to dispose of waste materials outside the World

These two facts reflect the importance of efficient utilization of resources and the maximization of both quantity and toxic waste as important first

stage interventions in environmental planning. Sound environmental planning and management of the remaining waste will help to protect the local and global environment for future planning. (EPA 2004)

The waste from the area varied between solid, liquid, and gas according to different kinds of industries. Disposal of these wastes is a big problem affecting the area and its surroundings for long time. Dumping of these wastes was done randomly in neighboring areas, which damaged natural resources. Tay, Joo-Hwa (2003)

There are many signs for environmental degradation, soil pollution, health problems, which indicate a dangerous situation. Waste extends to the near farms resulting in disappearance of soil surface and consequently of the depletion of removal vegetation cover.

Most of the owners of manufacturing factories in the area tend to maximize their profits through decreasing production costs. They don't pay for waste treatments and manage it as it is in the environment that is creating a problem for the soil exposing it to erosion, water contamination and health hazards. (Babkir, 1998).

Port Harcourt the capital city of Rivers State also called Nigerian Garden City, lies along the Bonny River and is situated in the Niger Delta Region. Port Harcourt was established on the very edge of the West African swamp in 1912 by the British Colonial organization of Nigeria next to the farmlands called Obomotu, close to the bluffs of Igwuocha of the Diobu Ikwerre town. Port Harcourt was some time ago called Igwuocha and was renamed by Frederick Lugard, the Governor General of Nigeria after Lewis Vernon Harcourt the Secretary of State for the Colonies on eighteenth August 1913 (Mmom & Nwagwu, 2013).

Port Harcourt is one of Nigeria's quickest developing urban areas. The normal yearly development rate of Port Harcourt between of 1963 and 2010 has been estimated to be 5.2%. The development of Port Harcourt is attached to the social and financial history of the nation. The city is the oil capital of Nigeria, since it has the greater part of the country's multi-national oil

Port Hart City Local Government Ares is one of the area councils that make up the Pon Harcourt Metropolis, and one of the twenty-three local Government areas in Rivers State. It is an momic beehive (centre) in the Niger Delta area of Nigeria. The Local Govemment area covers 100km and a population of 546,789 Persons (National Population Commission, NPC

2006), and has its headquarters at Old Fort Harcourt Township (Ajie & Dienye. 2014). The 1975 Port Harcourt City Master plan which covered both Port Harcourt City Area Council and Obio/Akpor shows that Port Harcourt Local Government Area Council has a total of 100km2 landmass out of which about 45% (17.3km) of it is wetland area (Visigah, 2017)

Port Harcourt City Local Government Area is bounded by Obio/Akpor to the North, Okrika to the South (S). It is located within latitudes 4°5'11" and 5°15'45" North and longitudes6°22'25" and 8°05'12" East (Ajie & Dienye, 2014).

Breweries Limited, Oginigba, Trans-amadi Industrial Layout; Hamilton Drills: First Aluminum Industries, Trans-amadi and Lubrick Construction Company all in the study area.

This study identified the following

Agricultural lands subjected to degradation through dumping of industrial waste. Land is nonrenewable resource, could be lost due to a dumping of no bio-degradable pollutant such as glass, plastic or inert.

Human and animal lives are threatened by emitted pollution of dumped waste.

Expected expansion over the affected area at present and in the future.

Pollution could lead to desertification. So one of the desertification definitions said: Desertification defined as a process leading to reduce biological productivity with consequent reduction in plant biomass, in the land's carrying capacity for livestock, in crop yields and human well-being leading to the intensification or extension of desert condition.

The study upon completion will

1. Support current studies on environmental impacts of industrial waste in Rivers State.
2. Reveal areas of environmental impacts that are peculiar to communities around the study area.
3. It will serve as a focal point for the need to have a robust study and the application of the findings and recommendation as a basis for improvements with similar challenges.

This study aim is to assess the environmental impact of industrial waste in Trans-Amadi industrial area, Port Harcourt and its objectives is to:
Identify the profile companies in the Trans-Amadi industrial area., Identify the different types of wastes generated from selected factories in the study Area, Evaluate the existing waste disposal practices, Determine the effects of waste generated on the environment

In the cause of this study, the following questions where considered

1. What are the companies operating in the study area?
2. What are the types of waste generated in the study area?
3. What are the existing waste disposal practices?
4. What are the effects of the types of waste generated on the environment?

The scope of the study hinges on the impacts of industrial waste operating in the study area, relevant data were gathered from about four categories of industries which include breweries, construction, steel and metal industries and plastic industries. The data were gathered through reconnaissance survey, interview granted by workers of the industries and tests carried out on the wastes samples obtained from the industries.
The environment can be defined as follows: In General, "the environment consists of the substances, circumstances, objects, or conditions in the surrounding that can have either a positive or a negative effect on human and animal life. Environment can also be defined as a complex of external factors that act on a system and determines its course and form of existence".
Socially: the environment is the culture that an individual life or education, and the people and institutions with whom he interacts. (UNCED) (1992).
Politically: "the environment is the natural world as perceived by humans, with particular reference to the damage done by human kind, or impact of this damage on) www.freedefinition.comhuman beings". (Biologically: the environment is defined as the complex of climatic, social, and Delphic factors that act upon organisms and determines their form and survival. Therefore, it includes everything that may directly affect the metabolism or behavior of a living organism including air, water, soil, and other living organisms. But the question is whether the definition of the environment can be related to man or not? There could be two answers: one is the

classical opinion which considers the environment as an ecosystem in equilibrium and that moves towards stability and nature can make itself in a balance. It is made to serve human needs. FEPA (1999)

We introduce four major factors that have direct effects on the environment. These are land, water, atmosphere and man. These factors interact with each other and result in deterioration or replenishment of the surrounding resource base. One of the off-shoots of these four factors interaction is represented by hazardous waste. Hazardous waste is among the recent reported factors that do harm to the environment.

Since the industrial revolution, industrial and mining operations have been accompanied by a problem: industrial waste which may be toxic, ignitable, corrosive or reactive. If improperly managed, this waste can pose dangerous health and environmental consequences. It is generated at every stage in the production process, use and disposal of manufactured products. Thus, the introduction of many new products for the home and office - computers, drugs, textiles, paints and dyes, plastics - also introduced hazardous waste, including toxic chemicals, into the environment. These, too, must be managed with extreme care to avoid adverse environmental or human health impacts (Maclaren, 2003).

Hazardous and non-hazardous wastes have been 'disposed' into landfill (i.e. put in the same hole in the ground). This mixing of waste could cause long term damage to the environment and also has the potential for different types of waste to react with each other.

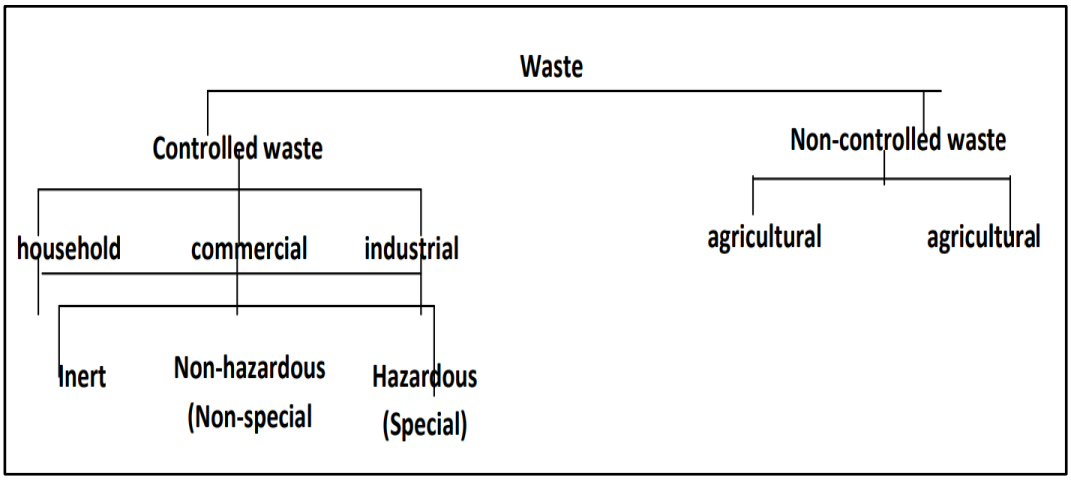
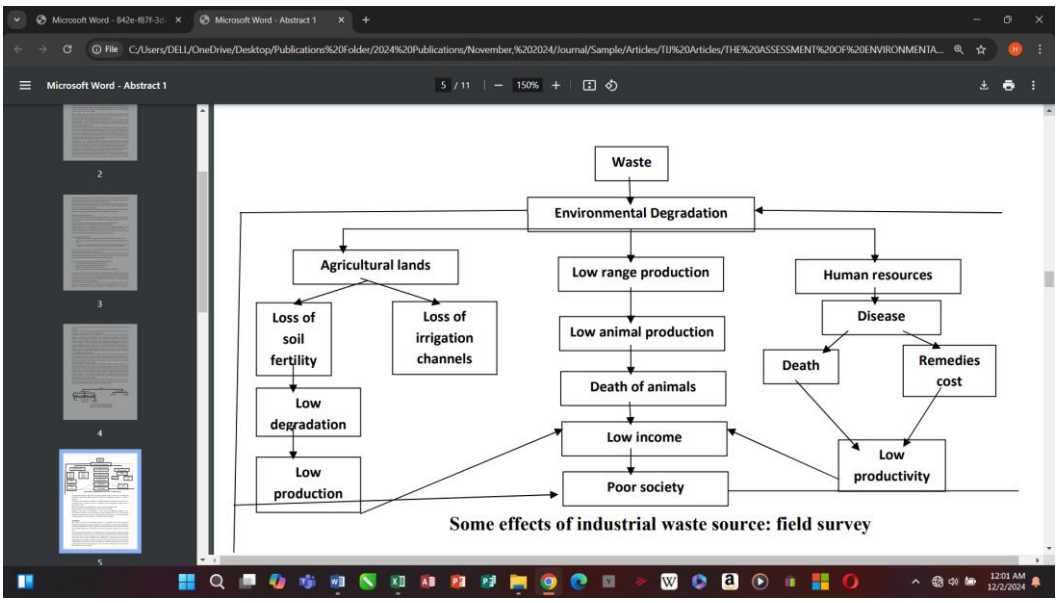


Fig. 2. Waste classification system

Source: researcher's fieldwork 2024



Some effects of industrial waste source: field survey

Environmental problem comes in line with Rio conference which concern is in environmental degradation, particularly pollution effect that called for precautionary measures as stated in principle.

Agricultural lands subjected to degradation through dumping of industrial waste. Land is nonrenewable resource, could be lost due to a dumping of non bio-degradable pollutant such as glass, plastic or inert.

Human and animal lives are threatened by emitted pollution of dumped waste.

Expected expansion over the affected area at present and in the future.

Pollution could lead to desertification. So one of the desertification definitions said: Desertification defined as a process leading to reduce biological productivity with consequent reduction in plant biomass, in the land's carrying capacity for livestock, in crop yields and human well-being leading to the intensification or extension of desert condition.

METHODS

The sample was drawn from permanent secretary of responsible Rivers State government Ministries, Departments and Agencies (MDA's), such as Ministry of environment, RIWAMA. and International Breweries Limited, Oginigba, Trans-amadi Industrial Layout; Hamilton Drills, First Aluminum

Industries, Trans-amadi and Lubrick Construction Company all in the study area.

After these prospective participants were identified, the researcher approached and invited them to participate in the study. They were presented with the information sheet and further informed about their right to refuse participation and that participation was voluntary. They were also made aware of their right to withdraw from partaking in the interview. They were further informed that the information that they will provide in the interviews will also be treated with confidentiality; they were not required to disclose their identities. Finally, they were presented with informed forms for their participation and for the audio recording of the interview which they signed and gave their consent.

Results were analyzed using the thematic content analysis method. Ezzy (2000)

Table 1.1. Physic-chemical properties of industrial effluents from selected industries and the recommended standards

No	Parameter	Chemical industry	Brewery industry	Construction industry	Plastic industry	Recommended level
1	pH	5.2	4.8	5.8	6.8	6.0-9.0
2	Suspended solid (mg/litre)	486	2.287	220	375	30
3	Dissolved solid (mg/litre)	217	581	320	480	2,000
4	B.O.D (mg/litre)	89	1,340	148	92	50
5	C.O.D (mg/litre)	260	760	150	180	80

Source: Researcher's field work, 2024

Table 1.1 shows physico-chemical properties of industrial effluents from selected industries and the recommended standards. The characteristics of industrial effluents vary with the type of industry. This can be seen when the wastes are discharged into the environment. Examples are white water from paper mills and coloured wastes from textiles industries.

Two of the parameters used to evaluate the level of pollution in the industrial effluents are BOD and COD. They are used to express the oxygen demand of microorganisms, which stabilize the waste and thus give an estimate of the concentration of organic waste. Other important parameters are the pH and the suspended solids.

Table 2.1. existing waste disposal methods in the study area

	Disposal methods	Number	%
1.	Open dumping	3	5
2.	Incineration	7	12
3.	Bin/storage	10	17
4.	Dumping into drains, streams and river	35	59
5.	Collected by government agencies	4	7
	Total	59	100

Source: researcher's field work, 2024

Table 2.1 shows that 7% said waste are collected hourly and disposed off 31% said on a daily basis, while 37 said their waste are disposed weekly.

Table 3.1: the status of diseases among families of laboureres' and residents respondents in and neighbouring industrial area

Age	Existing sick respondents families	Kind of diseases among sick people in the family			Date of diseases as stated by the sick people in the family		
35	25	17	3	5	3	15	7
36-50	17	11	3	3	2	9	6
50	10	9	0	1	1	3	6
Total	52	37	6	9	6	27	19

Source: researcher's field work, 2024

Table 3.1 shows that about 90% asserted that dumped waste have polluted their air and surroundings and had negative impacts on their health

Table 4.1: impact of waste pollution upon crop and poultry farmers and grazing in the waste dumping places in percentages

	Effect	No respond
Effects on animal	68	32
Effects on agriculture	55	45
Effects in land reduction	48	52
	Effects on input	
Seeds	33	67
Irrigation	58	42
Cleaning	28	72
Harvesting	13	67

Source: researcher's field work, 2024

RESULT

The socio-economic status of the area was highly poor and the most of the population were labourers in the factories had low incomes that cannot enable them to satisfy their basic needs. These respondents had low to moderate level of education, and therefore may not have adequate awareness about the study area.

Information gathered from the state ministry of environment and Rivers State waste management agency reveals that there are 162 factories and companies operating within the trans-amadi industrial area .Samples of solid waste were also collected from a tipping site located at Trans- amadi Industrial Layout. This site is chosen because it is meant only for the disposal of industrial wastes. Tipping sites are area set aside for the disposal of solid wastes. Sometimes, such sites are located in an area suffering from some physical deficiencies such as being slightly swampy. The sampled solid wastes were separated into six groups (paper, plastics, metal, glass, wood and others) and the results of their percentage composition by weight.

Different mode of waste disposal is adopted by various companies that 5% said waste are disposed through open dumping, 12% claims that waste are been incinerated, 17% disposed through bins, 7% was been collected by government agencies, while 59% were dumped into drains, streams and river bodies.

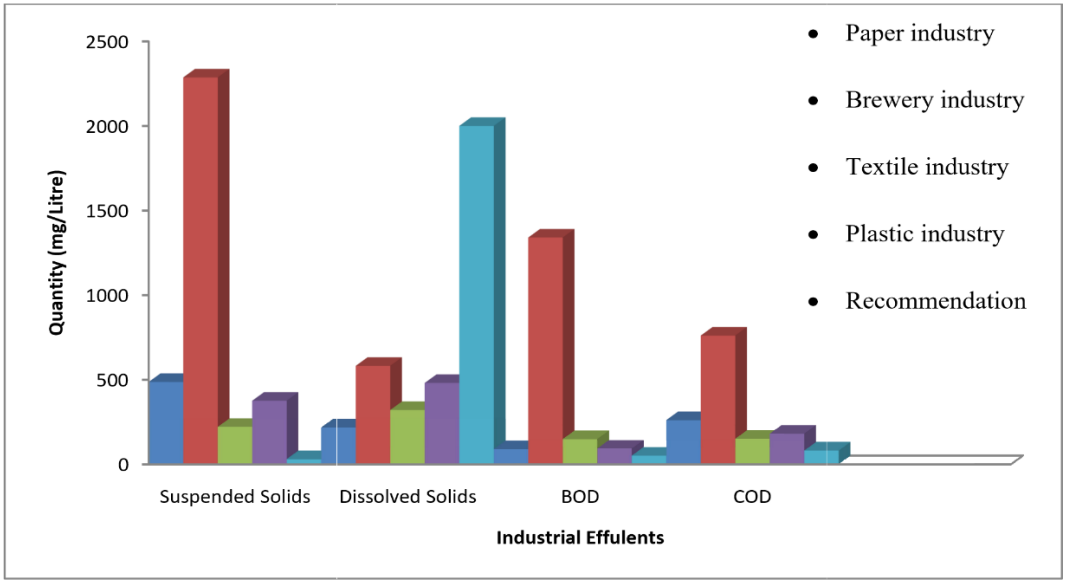
However, 7% said waste are collected hourly and disposed off, 31% said on a daily basis, while 37 said their waste are disposed weekly.

The majority of the population was suffering from respiratory diseases especially after their residence in the area, or due to their working in

factories that released substances such as dust and gases irrespective of any precautions taken (e.g. textile, chemical, and wheat factories). Also there were skin irritations due to direct contact with chemicals or using the empty containers from factories waste or sometimes transmitted by insects that breed due to poor sanitary system in the area.

Ingestion diseases are prevailing especially among children, because their soil is contaminated with different types of wastes. Children play and sometimes eat polluted soil particles, which might subject them to ingestion diseases. In addition to this, there were trace cases of cancer and mental or psychological diseases.

Poultry farms found in the area were highly affected because birds are very sensitive to the surrounding polluted environment. It needs clean area and moderate temperature, which is impossible among smells, dust from land fill and heat from the burning in the dumping site. From the study it is shown that quantities of most pollutants in wastewater from the selected industries are far above the recommended levels. Except the quantities of dissolved solids, which were found to be within the recommended level in all the selected industries? Also, it is clearly shown that wastewater from breweries contain the highest quantity of all categories of pollutants. Ideally, before discharging industrial effluents into the environment, they should be treated and detoxified with the installation of pollution abatement equipment based on the best practical technology (BPT) or best available technology (BAT).



The quality of pollutants in the effluents from selected industries

Sources: Researcher's Field Work, 2024

CONCLUSIONS

Wastes generally, are an inherent part of the manufacturing processes. Other causes of waste are manufacturing defects. It is necessary to avoid generating waste, which can be achieved if all the raw materials entering the process are thoroughly tested to ensure firstly, that they meet the required quality standard and secondly, are free of contaminants.

The four groups of industries discussed have been selected to give a cross-section of the industrial life of the area with the existing manner in which wastes are managed and disposed. Observation shows that these industries place little emphasis on proper waste management, preferring the cheapest methods to the most appropriate methods. In some cases they contract out the solid waste disposal and subsequently feel innocent, pretending that no further problems exist. The analysis of quantity of pollutants in wastewater discharged from selected industries shows that larger proportion of the pollutants are total solid, suspended solid, dissolved solid, which can be easily treated and separated. It also shows that wastewater from breweries contained the highest quantities of all categories of pollutants. Most industries discharge their effluents in to the environment untreated. This act is environmentally unacceptable and it poses serious threats to public health. The percentage composition by weight of solid wastes from industries shows that, paper is by far the most abundant of these solid wastes, followed by plastic, metal, glass and wood in that order. If appropriate waste management is employed, these discarded solid wastes can be recycled and turned into valuable resources.

The following are the recommendations for the improvement of the industrial waste management and disposal in the area and at large the State:

The government initiative of waste-to wealth should be re-introduced were for effective management of in the study area.

Waste management should be allowed to management by government registered waste handling.

(i) Companies operating in the study area should stop patronizing community as waste contractors, who evacuate and dump waste indiscriminately.

(ii) There should be effective monitoring, inspections of companies activities by government in the study area.

(iii) Companies whose wastes are found dumped indiscriminately should be sanctioned, fined or license to operate revoked.

(iv) In the design and establishment of future industrial estates, attention should be given to possible collective handling of industrial wastes so as to minimize costs and to ensure effective handling of industrial wastes so as to minimize costs and to ensure effective handling.

(v) Process conditions may often be adjusted either to recycle products or reduce the quantity of effluent produced or by suitable treatment on site to convert the waste products to a form suitable for subsequent treatment and disposal

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