**TERM PAPER ON WASTE RECYCLING IN DELTA STATE; MATTERS ARISING AND WAY FORWARD**

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# **ABSTRACT**

According to the World Health Organisation WHO/United Nations Children Fund UNICEF, Joint Monitoring Programme for Water Supply and Sanitation (JMP) 32 per cent of the World’s Population – 24 billion people – lacked improved sanitation facilities, in-adequate access to safe water and sanitation services, coupled with poor hygiene practices kills and sickens thousands of children every day, and leads to impoverishment and diminished opportunities for thousands more”. In addition to this, “80 per cent of diseases in developing countries (including Nigeria) are caused by unsafe water and poor sanitation. Every 20 seconds a child dies of poor sanitation”.

What, then is waste management? One of the fundamental challenges bedevilling contemporary society in this part of the world. Delta State inclusive is as a result of its fragile eco-system, as well as lack of a proper Waste Management Culture and System, to tackle increasing urbanization, population growth and industrialization. Waste management is a serious problem in [Nigeria](https://www.bioenergyconsult.com/solid-waste-nigeria/), and Delta State is no exception. It is a problem that starts at a cultural level: many of the populace believe that once they remove waste from their homes it is no longer their concern. It is a problem that starts at a cultural level: many of the populace believe that once they remove waste from their homes it is no longer their concern, and you often see people disposing of their [household waste](https://salmanzafar.me/household-waste-into-fuel/) in the streets at night. Once the waste gets out into the streets, it’s perceived as the duty of the government to handle it.

# **CHAPTER ONE**

## **1.1 Introduction**

Recycling is the process of converting waste materials into new materials and objects. It is an alternative to "conventional" waste disposal that can save material and help lower greenhouse gas emissions. Recycling can prevent the waste of potentially useful materials and reduce the consumption of fresh raw materials, thereby reducing: energy usage, air pollution (from incineration), and water pollution (from landfilling).

Recycling is a key component of modern waste reduction and is the third component of the "Reduce, Reuse, and Recycle" waste hierarchy. Thus, recycling aims at environmental sustainability by substituting raw material inputs into and redirecting waste outputs out of the economic system.

There are some ISO standards related to recycling such as ISO 15270:2008 for plastics waste and ISO 14001:2015 for environmental management control of recycling practice.

Recyclable materials include many kinds of glass, paper, cardboard, metal, plastic, tires, textiles, batteries, and electronics. The composting or other reuse of biodegradable waste—such as food or garden waste—is also a form of recycling. Materials to be recycled are either delivered to a household recycling center or picked up from curbside bins, then sorted, cleaned, and reprocessed into new materials destined for manufacturing new products.

In the strictest sense, recycling of a material would produce a fresh supply of the same material—for example, used office paper would be converted into new office paper or used polystyrene foam into new polystyrene. This is accomplished when recycling certain types of materials, such as metal cans, which can become a can again and again, indefinitely, without losing purity in the product. However, this is often difficult or too expensive (compared with producing the same product from raw materials or other sources), so "recycling" of many products or materials involves their reuse in producing different materials (for example, paperboard) instead. Another form of recycling is the salvage of certain materials from complex products, either due to their intrinsic value (such as lead from car batteries, or gold from printed circuit boards), or due to their hazardous nature (e.g., removal and reuse of mercury from thermometers and thermostats).

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**Figure 1: Waste**

# **CHAPTER TWO**

## **2.1 Literature Review**

Waste management involves the steps taken to ensure the sanitary collection, transportation and safe disposal of all forms of waste arising from the economic and productive activities as wall as the consumption pattern of the people. The ultimate aim is to eliminate their negative impact on the environment and the survival of man. It also include steps taken to minimize and reduce waste generation, recovery and reuse of items that are still of value and the treatment and recycling of waste to produce other items that meet man’s un-ending needs. As a resident man’s development activities, waste is generated by the second, and its proper management is paramount in order to avoid inevitable negative impacts like the outbreak of deadly diseases such as dysentery, lassa fever, malaria, diarrhea, tuberculosis and other equally deadly afflictions whose root causes have been identified to be a filthy environment.In Nigeria, waste management had always been the responsibility of local government councils. However, with the near-collapse of the local government councils due to a myriad of factors including, but not limited to poor funding, a bloated work force, high cost of governance et, most states in Nigeria have found it expedient to set up their own waste management bodies to rescue the situation.

Thus, the setting up of the Delta State Waste Management Board via a law of the state House of Assembly in October 2004 during the Ibori administration was a clear recognition of the fact that local government councils lack the technical knowledge, manpower and funding that modern waste management require.

However, in spite of its best efforts since its establishment, there is a certain irony in the situation given the fact that the state waste management board itself seems to have become a victim of certain encumbrances that have continued to plague it and prevent it from achieving the objectives of its existence.

First and foremost is the lack of will be previous governments to strengthen the Board for effective performance of its statutory functions, as well as provide the enabling environment for the Board to thrive. No organ of government affects the lives of citizens more than the body responsible for keeping refuse out of our streets and ensuring that these developmental residues of our people are properly and safely managed in order not to create possible health epidemics in our cities and towns. Every citizen is affected if there is a break down in waste management services even for 24 hours. Hence the urgent need for government to take pro-active and decisive stamps.

In proffering solutions to this very important public health issue, therefore, serious concerns have been raised on certain factors like the negative attitude of members of the public. This public attitude is born of decades of apathy for the well being of the environment as well as the erroneous belief by many that the process of keeping the environment clean is the duty of government alone. Thus, without a re-orientation of this attitude, the best waste management efforts will come to nothing.

In addition to this is the crumbling social infrastructure, where agencies of government responsible for waste management lack the requisite technical manpower, facilities and basic equipment to carry out their functions. This problem is further compounded by unnecessary rivalry between the Chief Executive Officers of the different agencies of government, who compete against one another for territorial and personal gains, rather than working together as allies. This unhealthy rivalry quickly trickles down the line and fuels lack of commitment and co-operation by their subordinates.

However, this situation is not completely hopeless. Government can, and should take decisive steps to remedy the situation by taking concrete steps to re-structure and strengthen the waste management system in Delta State. The first crucial step would be to commission a reputable body to develop a comprehensive, sustainable waste management master plan for Delta State, the objectives of this would be to assess the current waste situation of waste management in the state, to support the design of a sustainable management master plan, as well as to provide technical assistance and capacity building for the State Waste Management Board to implement the master plan (including detailed engineering design for waste management facilities and financial systems upgrade to ensure long-term sustainability). In this era of economic down turn and dwindling government resources, amid several competing needs, a master plan would serve as a blue print for foreign Direct Investment in the Sector, which is an untapped investment goldmine, waiting for appropriate legislation and the provision of an enabling environment by government in the form of incentives to elicit private investors confidence.

Thus, a functional and well planned waste management system will create employment for thousands of Deltan in the different area – from waste collection and disposal, waste treatment and recycling to management of medical/toxic and hazardous waste, Organic fertilizers would also be produced for the agricultural; empowerment programmes of government.

An important part of this process too is to carry out a total restructuring of the state waste management board with regards to its administrative structure, core mandate, and a review of the law setting it up in order to meet up with current realities. A streamling of the functions of related agencies would also become crucial in order to avoid the current state of confusion and duplication of functions in the sector, as well as to avoid situations where these agencies work at cross purposes and waste scarce public funds in the process. For example, the state Ministry of Environment ought to restrict itself to giving policy directions where necessary, while the waste management board should be strengthened to perform its statutory role of managing waste across the state. Thus, a waste management master plan developed through the co-operation of relevant stakeholders in the sector would further enhance better performance as well as create a workable, standardized system of waste management that relies on international best practices as well as creating sustainable employment for Deltans across the state in the process.

Finally, while applauding the crucial intervention role recently played by the World Bank funded State Employment and Expenditure for Results (SEEFOR) project in the waste management component, it is quite unfortunate that the sustainability of the project has become suspect as a result of avoidable selfish bickering among stakeholders.

One cannot also fall to point out that temporary intervention measures are nothing but” “knee-jerk” responses to a cancerous problem. Sustainability can only be achieved where there is a state wide waste management master plan, in addition to a well equipped, well structured and well managed waste management regulatory body that can play the role of enabler, facilitator and regulator of waste management activities in Delta State.

# **CHAPTER 3**

## **3.1 Methodology**

Delta State is a State in the Niger-Delta region of Nigeria. It lies roughly between longitude5o.00C and 6o. 45C East and latitude 5o. 00 and 6o.00 North. The state has a total land area of 16,842sq. km. The Capital City is Asaba while Warri is the biggest commercial city and most populated in the state. Other major towns are Agbor, Ughelli, Oleh, Ozoro, Oghara, Sapele, Koko, Burutu, Okpanam and Ogwashi-ukwu. It has a human geography typically comprising of the Ijaw, Urhobo, Igbo, Isoko, Itsekiri, Ika, Ukwuani, and other minor ethnic groups whose major occupation major mainly in farming, fishing, hunting and oil exploration. The State is been considered as a miniature version of Nigeria due to its multi-ethnicity. It is an oil producing state with a population of 4, 098, 291 comprising of 2,674, 306 Males and 2, 024, 085 Females (Federal Republic of Nigeria Official Gazette 2007).The State’s major towns and cities accounts for the bulk of waste materials generated in the State. The types of waste found in the these towns and the State in general are those typical of urban settlements devoid of proper waste disposal systems and majority of its dwellers living in areas designated as slums. These waste materials include papers, plant/ vegetable wastes, metal scraps, glass materials/bottles and plastics/rubber products. Of these waste materials, plastics, rubber and polythene products pose a great challenge to the State in terms of proper disposal as it is the most widely used packaging material and its long degradable lifespan. The method of waste disposal generally practiced in the State is the Landfill method which is visibly seen located in various parts of the State with some towns having up to five landfill sites. Incineration is also carried out not as a form of recycling (down-cycling) but as a way of reducing the volume of waste on the landfill sites. Recycling level in the State is very minimal. Currently, metal scraps, aluminium and glass materials/ bottles are the only waste materials collected for recycling in the State by the glass and steel company in the State as they are considered economically viable. Waste papers and paper products, clothing materials, drink cans, plastics and rubber products are left to their natural fate or been incinerated at the dumping sites. This can be attributed to the fact that the production of new ones from their basic raw materials which is readily available in the State is cheaper and more cost efficient. With respect to waste management, an appreciable effort has been made by the State Government with respect to proper collection and disposal with the provision of large waste collection bins/containers at strategic points within the above listed towns and villages, provision of waste collecting trucks whose duty is to transport the waste generated in the metropolis to the landfill sites, publicity in the various forms of media on the need for proper waste disposal, observation of the last Saturday in every month as sanitation day with the aim of keeping the environment clean and the setting up set up an 11-member committee on waste management charged with the responsibility of proffering solutions to proper refuse management in the state by the Delta State House of Assembly, but nothing major/concrete has been done concerning the recycling concept

### **3.1.1Legislation and Framework**

Nigeria does have a waste legislation framework in place. Its focus has been on the most toxic and hazardous waste: partly in response to some major pollution incidents in the 1980s, the government took powers in relation to Hazardous Waste in 1988. In the same year, the Federal Environmental Protection Agency was established – and was subsequently strengthened by the addition of an inspectorate and enforcement department arm in 1991, with divisions for standard regulation, chemical tracking and compliance monitoring. These laws have since given rise to regulations and guidelines pertaining to environmental and waste management issues.

Under our laws, waste management in each state is the duty of the local governments that fall within it, but few are taking an active approach to implementing and enforcing the sensible measures that the regulations require. A small number of states have taken over this task from local government, and Delta State’s decision to do this has led to significant new investment in waste management.

One of the fruits of that investment is the Delta State Integrated Waste Management Facility at Asaba for treating both household and clinical waste generated locally. It was developed when the Delta State government decided to put an end to the non-sustainable dumping of waste in Asaba, the state capital.

### **3.1.2 Integrated Waste Management Facility at Asaba**

It is described as an integrated waste management facility because it includes a composting department, a recycling department and a (non-WTE) incineration department. Trucks carrying waste are weighed in as they come into the facility. From the weigh bridge, they move to the relevant reception bay – there are separate ones for household and clinical wastes – to tip their load, and are then weighed again on the way out.

Medical waste is taken directly for incineration, but household wastes are sent along conveyors for sorting. Recyclables and compostable materials are, so far as possible, separated both from other waste and from one another. Each recyclable stream ends up in a chamber where it can be prepared for sale. The compostable materials are moved to the composting section, which uses aerated static pile composting.

The remaining waste is conveyed into the three incinerators – moving grate, rotary kiln and fixed end– for combustion. The resulting ash is recycled by mixing it with cement and sharp sand and moulding it into interlocking tiles. The stacks of the three incinerators are fitted with smoke cleaning systems to reduce emissions. The process produces wastewater, which is channelled to a pit where it is treated and reused. Overall, 30% of the waste is composted, 15% recycled and 55% incinerated.

There are many examples of sophisticated waste infrastructure being built in developing countries, but failing because the necessary collection systems were not in place to support them. To ensure that this problem is avoided at Asaba, the Delta State government is working with a group known as the Private Sector Participants (PSP).

Each member of this group has trucks assigned to them and has been directed to collect household waste from different parts of the city, for delivery to the facility for treatment. The arrangements made by each PSP are different: some collect from outside individual properties, and some from communal sites; most collect waste that is found in the streets; and while each is subsidised by the state, households also have to pay towards the cost.

Before the Asaba facility was developed, most of the wastes generated in Asaba were disposed of at a dumpsite just adjacent to the Delta State Airport. This created a pungent odour, as well as visual disamenity for people nearby. A great deal of remediation work is now taking place at the dumpsite, which is vastly improving the local environmental quality.

### **3.1.3 War on Waste**

Of course, although this is an improvement there remains more to do. First on the list is education. People do not know how sustainable waste management can impact positively in their lives, reducing their exposure to toxins as well as improving their surroundings. Nor do they understand that recycling a beverage can or a plastic bottle will cost less than producing one from virgin materials and will have a lesser environmental impact. There remains a good deal of cultural change and environmental education that is needed before people will stop throwing waste and litter on the streets – but there are few countries where, to some extent, the same would not be true.

Next is the lack of infrastructure. Nigeria has 36 states and a federal capital, yet the facility in Asaba is the first publicly commissioned one of its kind in the country; there are also some privately owned incinerators that a few companies in Port Harcourt use to treat wastes from vessels (ships), hospitals and industries. Lagos state and Abuja are relatively advanced, simply by virtue of having put in place a few managed landfills, but they are still far from having the level of facility that Asaba can now boast.

The backbone of Asaba’s progress is the state government’s commitment to put a proper waste management solution in place. We’ve seen the impact in the form of infrastructure, collections and remediation, and law enforcement work is starting to change people’s perception about waste management in Delta State. At the moment, plans are being concluded to setup another facility in Warri, Delta State’s industrial hub, which will be twice the size of the Asaba facility.?

My hope is that the progress made by Delta State will be a beacon for other states’ governments. The example we are providing of cleaner, hygienic, more environmentally responsible waste management, and the positive changes that is bringing about, should inspire new development elsewhere in the country, which could equal or even exceed Delta State’s results. So whilst Nigeria’s track record on waste may leave a lot to be desired, the path ahead could be a great deal more promising.

# **CHAPTER FOUR**

## **4.1 RESULTS**

Using WARRI DELTA STATE as case study.

The results for the analysis of the water samples from Ekpan River are presented in table l , figures I and 2. In the River water analysis, the pH values reported ranged from 6.48 — 6.59 pH units. The highly coloured samples were turbid and there was high concentration of total suspended solids (TSS). Values obtained for turbidity (Fig I ) and TSS väried from 30 to 42 NTU and 25 to 50 mg/L respectively (Table l). Significant concentrations were recorded for ammonia (2.04 — 3.32 mg/L) and phosphate (3.24—4.97 mg/L) (Table I ).

## **4.2 Discussion**

It has been reported that high concentrations of hea\.y metals could adversely affect aquatic organisms resulting in retarded growth, reduced reproduction and abnormal response to the opposite sex (Ezemonye and Enuneku, 2006). Waste generated if not properly lilanaged could contaminate our water ways to the extent of leaching toxic substances into the water. The result of which could lead to damage of organisms in such environment. There could also be gradual seepage into underground water bodies with a transfer of these harmful substances (Gupta et al., 2009).

Similarly, high TSS can cause an increase in surface water temperature, because the suspended particles absorb heat from sunlight. The decrease in water clarity caused by TSS can affect the ability offish and other aquatic organisms to see and catch food. Suspended sediment can also clog fish gills, reduce growth rates, decrease resistance to disease, and prevent egg and larval development. High TSS in a water body can often

mean higher concentrations of bacteria, nutrients, pesticides, and metals in the water (Degen and Nussberger, 1956; World Bank & (jovemment ofthe Netherlands, 1999).

In addition, daily exposure of aquatic organisms can lead to bioaccumulation of toxicants, and besides the detrimental effects it could cause these delicate species, man may also be affected since they are the end consumers ofthese viable species.

The aesthetic value of the rivers would also be compromised, especially if these shores are to be used for recreational purposes. Currently, Ekpan River is used for fishing activities, and organisms from such catch would enter the market and be consumed by man without knowledge of the environment the organisms were obtained.

Waste management is very' poor in Warri, Delta State and there is a serious need to address the prevailing issues surrounding proper waste disposal so as to safeguard our delicate aquatic environment, the organisms that thrive in it and finally man.

4.1 The way forward

The following could be undertaken to improve the waste management situation in Warri, Delta State.  Waste disposal along dual carriage line in major cities in the state should be discouraged.

Dumping ofwaste on the shores and into rivers especially Ekpan River should be prohibited.

In light of the above, waste bins should be placed at every 500 m distance in all public places and streets.

The approved government open dump site should be converted to an engineered landfill which is practiced in most countries ofthe world.

Incinerating (burning) items to destroy the item as well as any microorganisms. (This is the best method for disposal of contaminated waste. Burning also reduces the bulk volume of waste and ensures that the items are not scavenged and reused).

Local government regulators should ensure that waste generated should be collected daily at the disposal sites for fm-ther segregation, treatment or disposal.

The public should be enlightened on the appropriate waste disposal, health impact and  environmental damage.

Refuse collectors (private and government) should ensure that the waste gets to the final disposal point.

 Interlocking tiles should be used in all compounds to reduce the alnount of waste getting into the gutters.

 Users of sachet water papers and other wrapped edible materials should ensure proper disposal into waste bins instead ofthrowing them along streets and roads.

 Training and awareness should be conducted for local Government regulators to ensure that Waste Management objectives are implemented.

Waste management awareness should be made known to the public through short presentations, jingles and the usp ofposters at strategic locations.

Open piles ofwaste should be avoided.

 Use ofplastic or galvanized metal containers with tight-fitting covers for contaminated wastes.

 Place waste containers close to where the waste is generated and where it is convenient for users (cårrying waste from place to place increases the risk ofinfection for handlers).

 Wash all waste containers with a disinfectant cleaning solution (0.5% chlorine solution plus soap) and rinse with water regularly.

When possible, use separate containers for combustible and noncombustible wastes prior to disposal.

 Use personal protective equipment (PPE) when handling wastes (e.g., heavy-duty utility gloves and closed protective shoes).

 Wash hands or use a waterless, alcohol-based antiseptic hand rub after removing gloves used in handling wastes.

As a further step, investigation to assess the effect of the waste effluent on onions (Allium cepa) would be researched.

# **CHAPTER 5**

**5.1 Conclusion** 

Whilst techniques and legislation are constantly evolving to improve our waste management performance, the volumes of waste we produce also keep increasing. Waste management has become part of our survival strategy. If we have to live, we will produce waste. If we do not treat waste, it will choke us. Waste is a problem, waste management is the solution.

# **REFRENCES**

Waste management Progress in nigerias delta state https://www.bioenergyconsult.com/waste-management-nigeria/