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## The Environmental Problems of Bottling Company: An Example of 7 up Bottling Co. Plc. at the 9th Mile Area of Enugu State, Nigeria

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### **Abstract:**

*This study aimed at the identification of the environmental problems caused by the 7 Up Bottling Co. Plc. at the 9<sup>th</sup> Mile area of Enugu state, Nigeria in order to determine the problems from the plant, types of wastes and waste disposal or management methods adopted by the industrial plant in the area. Purposive sampling technique was used and samples were drawn from managers and staff members of the plant, traders, households, and staff members of Enugu State Waste Management Authority (ESWAMA) at the 9<sup>th</sup> Mile area in the ratio of 3, 10, 4, 220, and 5 respondents respectively. Thus, 278 respondents formed the study population. The variation in the size of samples selected from each group is in line with the differences in their populations, and those who accepted and willingly attend to the researchers. The data were collected through the combined methods of questionnaire, interview, and field observation, while the collected data were analysed using descriptive statistic, percentage, and bar graph. The results of the analyses show that noise pollution (32.73%), water pollution (31.65%), traffic congestion (15.47%), land degradation (11.16%), and indiscriminate waste disposal (8.99%) are the environmental problems from 7 Up Bottling Co. Plc. at the 9<sup>th</sup> Mile area. A comparative result of all the waste materials reveals that broken bottle is the most frequent and commonest with 18.7%, while metal material formed the least of all the wastes with 1.9%. Also, found is the waste disposal/management strategies adopted by the plant which include deposition of wastes especially waste water into Ajali River (23.7%), burning (22.7%), land filling (19.1%), recycling (17.9%), and deposition on open land space (16.6%). From these results, it is recommended for the carriers of industrial policy on environmental issues to strictly monitor the activities of the industrial plant, and impose heavy fine on the plant whenever waste materials are found in any form on the available land spaces or underneath, and along the waterways in the area.*

**Keywords:** Bottling plant, environmental problem, waste, waste management

### **1. Introduction**

All over the world, there is growing decline in environmental quality and efforts are made to stop the widespread abuse of environment and improve its quality. Human beings live in the kingdom of nature and interact with it constantly in the form of the intake of air, water, food and the flow of energy and information. Any change in the environment can not only result in the devastating effects, but can pose a threat to the human race (Ewetan, 2011). The value of environment has been taken for granted over the years, and this has caused a lot of environmental disorder. In this regard, man through his activities to survive as in agriculture, mining, forestry, and other aspects of industrial activities introduced some devastating changes in the environment, in which he is found to be at the receiving end. Some of these activities result to environmental degradation in the form of pollution, erosion, emission of greenhouse gases as well as land degradation in the form of deforestation, mass wasting, and drought. Therefore, most industrial and other human activities have extremely damaged the environment and its elements such as water, air, and land. Environmental degradation and pollution occur in our everyday life. The effects of which are the numerous and disastrous environmental problems that are facing mankind as they differ and occur spatially over the face of the earth.

Like many places including sub-urban areas, Enugu state particularly the 9<sup>th</sup> Mile area has over the years witnessed tremendous growth in the number and varieties of industries. The wastes generated and discharged by the industries and other human activities in the area are the major sources of environmental pollution. The growth and development of the brewing and bottling companies, and other industries especially manufacturing activities have contributed greatly to the excess waste materials found in the area. The 7 Up Bottling Company which started operations at Ameke Ngwo, the 9<sup>th</sup> Mile area in Udi L.G.A of Enugu State in 2003 is not left out in this scenario of damaging our environment. The untreated wastes-liquid, solid, and gaseous materials do not only drain into the streams and rivers, but

also litter on the available land spaces and contribute in causing health problems to the people within their vicinity and environs.

The pollutants are usually chemical, physical and biological substances that affect the natural condition of water, air and land as well as the general ecosystem. This incidence is responsible for the wide spread water contamination and soil pollution. According to Onwioduokit (2010), most environmental problems are due to the production or consumption of goods whose waste products translate easily into pollutants. Industrial wastes contain some amounts of toxic materials and chemicals such that when deposited in landfills or open land spaces, and water bodies, they accumulate in the top soil thereby depreciating the fertility and biological activities of the soil due to soil poisoning (Ayeeni, 2011). They also pollute underground and the aquatic life that depend on it for their survival.

Some industrial activities are known for their generation of chemical substances, while others are involved in the generation of solid materials like domestic garbage, iron and plastic materials. Thus, these problems vary spatially in kinds and nature of waste materials depending on the types of industrial activities and technology applied. Therefore, different industrial activities in many cases cause different environmental problems which in varying degrees distort environmental composition and sustainability. In this regard, it is not clear the type, nature, and impact of waste materials generated by the different industrial activities in the area. It is in the light of these that this study became necessary in order to determine the problems caused by the activities of 7 Up Bottling Co. Plc. and identify their environmental effects at the 9<sup>th</sup> Mile area and environs.

## 2. The Study Area

The 9<sup>th</sup> Mile area is located in Udi Local Government Area of Enugu State and between latitudes 6° 25' North and 6° 30' North, and longitudes 7° 17' East and 7° 22' East (Fig. 1). It is bounded in the East by Enugu Urban, in the west by Ezeagu LGA, in the North by Igbo-Etiti and Uzo-Uwani LGAs, in the South by Awgu and Oji-Rive LGAs. The study area comprises Ngwo (Ngwo-Uno and Ameke) and Nsude communities. These two communities have population of 36223 persons (Ngwo, 28836 persons, and Nsude, 7387 persons) (Census 1991). This was projected (based on the National Population Commission (NPC) (2006) recommendation of 2.83% annual increase in population for Nigeria) to 101805 persons for 2019 because of the non-release of community by community, the 2006 census result by NPC.

The 9<sup>th</sup> Mile area is dominated by an Eastern highland, a dissected cuesta, traditionally called the "Udi hills" (Onouha, 2011). It is situated mainly on the top of escarpment which is about 366 meters above sea level. The 9<sup>th</sup> Mile area is crossed by a gully with two tributaries, which are expanding at an alarming rate, posing a serious threat to public utilities in the communities. The first tributary was formed due to uncontrolled discharge from a twin tank reservoir supplying pipe-borne water to Enugu city. The second tributary was formed due to unchecked local drainage systems. The 9<sup>th</sup> Mile area is within humid tropical climate (i.e. semi-hot equatorial) (Onwe, 2004). The vegetation of the 9<sup>th</sup> Mile is of the semi-tropical rainforest type. It is characteristically green and complemented by typical grassy vegetation. Many different types of industrial activities are available in the area including primary, secondary, and tertiary productions. Examples include; Rancco Water, Sharon Paints and Chemicals, Aqua Rapha Nig. Ltd, Nigeria Breweries, Nigeria Bottling Co. Plc, 7 Up Bottling Co. Plc, etc. These various industrial activities generate many kinds of waste materials (solid, liquid, and gaseous materials) that contribute greatly in the environmental problems in the study area.

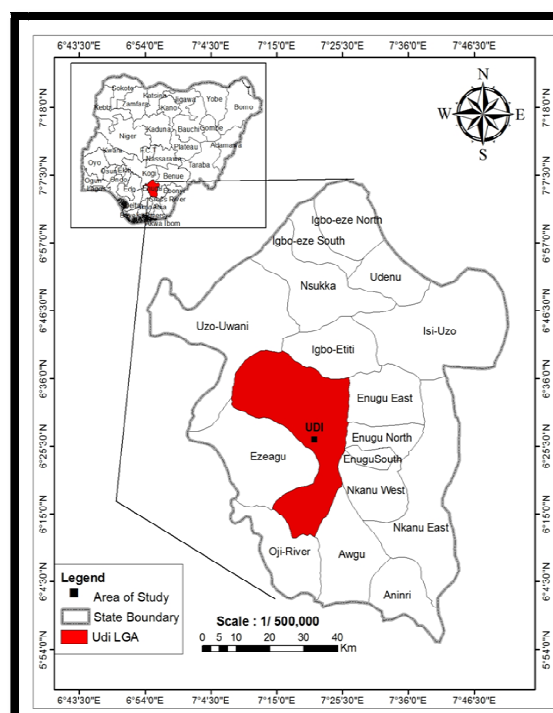


Figure 1 : Enugu State Showing Udi LGA  
Source : Geospatial Data of Nigeria, 2018

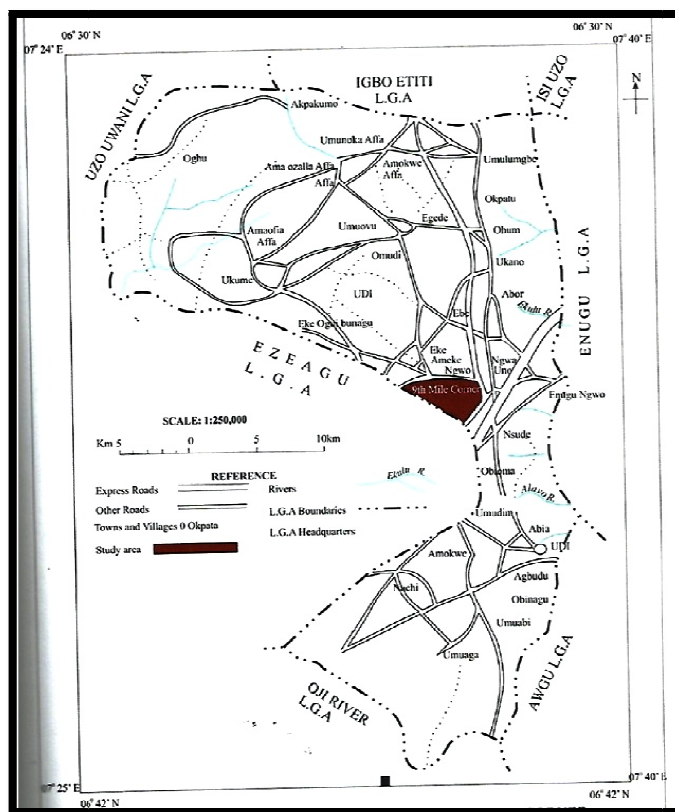


Figure 2: Udi LGA Showing the 9<sup>th</sup> Mile area  
Source: Geospatial Data of Nigeria, 2018

### 3. Literature Review

Industrialization is unintentionally accompanied by seeds of environmental damage, abetted by both needs and greed of man (Gupta, Rajaram, and Ashutost, 2009). Activities such as manufacturing, processing, transportation and construction do not only deplete the stock of natural resources, but add stress to the environmental system by accumulating stock of wastes (Adesiyin, Alayande, and Adekeye, 1983). Many countries, including Nigeria, embark on various industrialization plans, strategies and policies in order to provide employment opportunities, raise the general standard of living, boost income, pay off both national and international debts, and promote export and technical skills (Okereke, 2007). In an example, Shakede and Onyuanyi, (2017) noted that the idea of development was considered by the government with the aim of putting a rise in the standard of living of every Nigerian by growing output of goods and services.

Ogedengbe, Shakede and Onyuanyi (2017) stated that the major alarming activity is production, which encompasses diverse industrial activities from petroleum refining to chemical processing, textile, food, and biosynthetic production of these activities which are useful to man, emit by-products that constitute major pollution to the environment. Industrial activities release major pollutants into the environment thereby causing air, water and land pollution as well as noise (Shakede and Onyuanyi, 2017). Industrial pollution is therefore a threat to both human animal, and plant life; and it affects the aesthetic quality of the environment. Noise, which could cause stress related illness and diseases such as cancer, kidney failure, nervous and mental disorder, leukemia, hearing failure or total deafness is impact of industrial problems. There is also a quest for civilization and modern life style without having a regard on the impact of these activities on the environment.

Industrialization was seen initially as a sign of development but with many complicated problems. It has negatively impacted the environment through the destruction of the ecosystem and pollution of the soil with industrial waste discharges. According to Nielsen and Rank, (2000), the major activities during production process involve the use of chemical whose by-products constitute industrial waste that are sometimes discharged carelessly into the environment through pipes, drains, air, and land, which eventually find their way into water used for drinking, fishing and other purposes. Nielsen and Rank (2000) concluded that in Nigeria, over 80% of the industries release solid wastes, liquid effluents, and gaseous emissions directly into the environment. Onipede and Bolaji (2004) showed that industrial wastes in Nigeria include solids, liquids and gases, which occur in the form of plastic materials (e.g. Polypropylene, polyethylene, polyvinyl-chloride), cloth and fibre residue, paper and fibre residues, spent grams, broken bottle, metal, glass, and wood materials. In Aba, Abia state industrial wastes are plastics, papers, glass, aluminum scraps, metal scraps, compostable (e.g. food and wood), water sachets, and cellophane package waste materials (Ajero and Chigbo, 2012).

Many industrialized cities in Nigeria still have inadequate waste management; poorly controlled open dumps and illegal roadside dumping remain a problem (Obi, 2019). Also, discovered by Ogunmakinde, Sher, and Maund (2019) is that open dumping, recycling, land filling, incineration, reuse as backfill, onsite dig and bury, and burning are available methods of waste management in Nigeria. Such dumping destroys scenic resources, pollutes soil and water resources and

habitation. This situation is probably a social problem as much as a physical one. Many, in fact, may not see dumping their garbage as an environmental problem (Obi, 2019). In opinion of Bakare (2020) most of the wastes is generated by households and in some cases, by local industries, artisans and traders which litters the immediate surroundings. Improper collection and disposal of municipal wastes is leading to an environmental catastrophe as the country, Nigeria currently lack adequate budgetary provisions for the implementation of integrated waste management programmes across the States (Bakare, 2020). It is on these premise that this study is anchored in order to determine the waste materials that emanate from the activities of 7 Up Bottling Co. Plc., types of such wastes, and the methods adopted in their management in the study area.

#### 4. Materials and Methods

Survey research design was adopted in this study. The data for this study were obtained using questionnaire, personal interview, and field observation. These methods captured information on the socio-demographic characteristics of respondents in which 30 years and above were involved because they are found to be better experienced and exposed to explain the problems from the industry, the environmental problems from the 7 Up Bottling Co. Plc. in the study area, and mitigation measures to the environmental problems. Production, plant, and marketing managers at one in each case as well as 6 other staff members of the firm were involved in this study. These managers are better exposed to production activities of the firm than other staff members, while the use of other staff members was to confirm and obtain more information on the subject matter. Also, traders within the vicinity of the plant, and households in the area were involved in this study. Therefore, managers (3), other staff members (10 at 2 from each of production, security, marketing, store, and personnel), traders (45), and households (220 at 55 from each of the 4 clans of Ameke, Ifueke, Ngwo-Uno, and Nsude in the area) formed the study population. On the whole, 278 respondents were selected using purposive sampling technique. The uniform size from each of the different study populations is due to similarities in their different populations. Similar questionnaire was administered on each group of the respondents, and as such data from the different groups of the respondents were merged. Descriptive statistics, percentages, and bar graph were the techniques employed to analyze the data collected from the field for this study.

#### 5. Results and Discussions

The major variables identified in this study are problems from the activities of 7 Up Bottling Co. Plc. issues on the types of waste materials generated by the industry, examples of materials found in each type of wastes as a result of 7 Up Bottling Co. Plc. activities in the area, and the available methods of waste disposal/management adopted by the industrial plant in the area.

##### 5.1. Environmental problems from 7 Up Bottling Co. Plc. at the 9<sup>th</sup> Mile area

In responses to the problems from 7 Up Bottling Co. Plc. activities in the study area, 67.27% of the respondents responded in affirmation, while 16.19% disagreed. Also, 16.55% of 278 respondents are not aware if there are environmental problems in the area as a result of the activities of 7 Up Bottling Co. Plc. Thus, only 67.27% or 187 respondents perceive the problems caused by the industry in the area. These problems as identified by the respondents and found on Table 1 are water pollution, traffic congestion, noise pollution, and indiscriminate disposal of waste materials. With 91 responses and percentage score of 32.73%, noise pollution is the worsted problem from the industry in the area, while indiscriminate disposal of waste materials is the least with 25 responses and 8.99%. Table 1 shows the proportions of other problems.

S/N	Environmental Problem	Frequency	Percentage (%)	Rank
1	Water pollution	88	31.65	2 <sup>nd</sup>
2	Traffic congestion	43	15.47	3 <sup>rd</sup>
3	Noise pollution	91	32.73	1 <sup>st</sup>
4	Indiscriminate waste disposal	25	8.99	5 <sup>th</sup>
5	Land degradation	31	11.16	4 <sup>th</sup>
	Total	278	100%	

Table 1: Environmental Problems from 7 Up Bottling Co. Plc. at the 9<sup>th</sup> Mile area  
Source: Fieldwork, 2020

Fig. 3 further illustrates this result, and clearly shows that noise and water pollutions stand out conspicuously among the environmental problems from 7 Up Bottling Co. Plc. In contrary, indiscriminate disposal of waste materials picked the rear and 5<sup>th</sup> position.

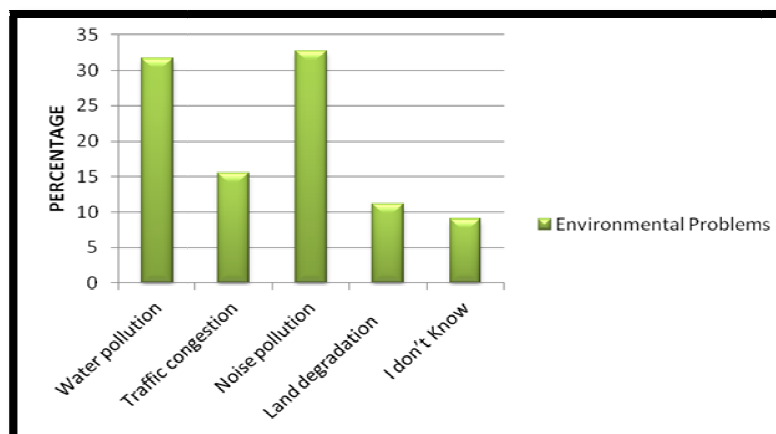


Figure 3: Proportion of Environmental Problems from 7 up Bottling Co. Plc.

Source: Table 1

### 5.2. Types of Waste Materials from 7 up Bottling Co. Plc. at the 9<sup>th</sup> Mile Area

The wastes from the industrial plant are classified into solid, liquid, and gaseous materials with frequency and percentage scores of 138, 111, and 29; and 49.64%, 39.93%, and 10.43% respectively. The indication of this result is the dominance in occurrence of solid waste materials in the area. Five (5) different types of solid waste materials are identified in the area (Table 2). Among the 5 solid waste materials, broken bottles obtained the highest frequency and percentage scores of 156 and 56.12% respectively to be in the 1<sup>st</sup> position, while metal materials with frequency score of 15 responses or 5.4% obtained the least and 5<sup>th</sup> position.

Liquid wastes (waste water) come from 4 sources of processing, sanitary, run-off, and recycling, in which processing waste water is found in the 1<sup>st</sup> position with both frequency and percentage scores of 117 and 42.09%. It is the recycling waste water that is in the last position with 41 responses or 14.75%. 40.65% of gaseous waste materials (Table 2) are carbon dioxide with 113 responses. In the 2<sup>nd</sup> position is hydrogen that obtained 70 responses that is equivalent to 25.18%, and the rear position of 4<sup>th</sup>, is occupied by oxygen that obtained 39 responses or 14.03%. The wastes generated by the industrial plants were classified into solids such as broken bottle, wood material, waste paint, glass, and metal; liquid especially waste water from processing, sanitary, run-off, and recycling; and gaseous waste materials of carbon dioxide, hydrogen, nitrogen, and oxygen.

The comparison among all the waste materials from the industrial plants found on Table 3 indicates that broken bottle is the most frequent waste materials with response score of 52 (18.7%). In the 2<sup>nd</sup> position is waste water from the processing activities of the plants that obtained percentage score of 14.0% that represents 39 responses. It is carbon dioxide that is found in the 3<sup>rd</sup> position with responses of 38 (13.5%). However, metal waste material is in the last and 13<sup>th</sup> position with response score of 5 and percentage equivalent of 1.9% (Table 3). The response and percentage proportion of other waste materials are as shown on Table 3.

S/N	Class of Waste	Waste Type	Frequency	Percentage (%)	Rank
1	Solid waste	Glasses	20	7.19	4 <sup>th</sup>
		broken Bottles	156	56.12	1 <sup>st</sup>
		Iron/Metal materials	15	5.40	5 <sup>th</sup>
		Wood palate materials	62	22.30	2 <sup>nd</sup>
		Paints	25	8.99	3 <sup>rd</sup>
		Total	278	100	
2	Liquid waste	Process wastewater	117	42.09	1 <sup>st</sup>
		Sanitary wastewater	62	22.30	2 <sup>nd</sup>
		Rain water	58	20.86	3 <sup>rd</sup>
		Recycling waste water	41	14.75	4 <sup>th</sup>
		Total	278	100	
3	Gaseous waste	Nitrogen	56	20.14	3 <sup>nd</sup>
		Hydrogen	70	25.18	2 <sup>nd</sup>
		Oxygen	39	14.03	4 <sup>th</sup>
		Carbon dioxide	113	40.65	1 <sup>st</sup>
		Total	278	100	

Table 2: Types of Wastes from 7 up Bottling Co. Plc. at the 9<sup>th</sup> Mile Area

Source: Fieldwork, 2020

S/N	Class of Waste	Waste Type	Frequency	Percentage (%)	Rank
1a	Solid waste	Glasses	7	2.5	12 <sup>th</sup>
B		broken Bottles	52	18.7	1 <sup>st</sup>
C		Iron/Metal materials	5	1.9	13 <sup>th</sup>
D		Wood palate materials	21	7.4	5 <sup>th</sup>
E		Paints	8	3.0	11 <sup>th</sup>
2a	Liquid waste	Processwaste water	39	14.0	2 <sup>nd</sup>
B		Sanitary waste water	21	7.4	5 <sup>th</sup>
c		Run-off from rain water	19	6.9	7 <sup>th</sup>
D		Recycling waste water	14	4.9	9 <sup>th</sup>
3a	Gaseous waste	Nitrogen	18	6.7	8 <sup>th</sup>
B		Hydrogen	23	8.4	4 <sup>th</sup>
C		Oxygen	13	4.7	10 <sup>th</sup>
D		Carbon dioxide	38	13.5	3 <sup>rd</sup>
		Total	278	100	

Table 3: Comparison among Types of Wastes from 7 up Bottling Co. Plc. at the 9<sup>th</sup> Mile Area

Source: Table 2

### 5.3. Methods of Waste Management in 7 up Bottling Co. Plc.

Table 4 shows the available methods of waste management in the industrial plants and reveals that burning (only solid waste is involved), open land deposition, land filling, deposition into Ajali River, and recycling are the methods adopted in the disposal or management of both solid and liquid waste materials by the industry. Among these methods, deposition of especially waste water into Ajali River is mostly adopted by the plants because it obtained the highest frequency of 66 responses that represent 23.7%. This is followed by burning particularly solid waste materials like paper and condemned wood with response score of 63, an equivalent of 22.7%. The next method is land filling. It obtained 53 responses or 19.1% and found in the 3<sup>rd</sup> position. Recycling which involves glasses and broken bottles though in another industrial plant at Port Harcourt (PH) in Rivers State is in the 4<sup>th</sup> position with response and percentage scores of 50 and 17.9% respectively. However, waste water is recycled in the plant whenever there is shortage of water supply or damage in the water supply system. But the problem is that the quantity recycled is dependent on the quantity of water required at a particular time, and once such quantity is met, the rest of waste water is flown into the available open space and Ajali River.

S/N	Disposal Method	Frequency	Percentage (%)	Rank
1	Burning	63	22.7	2 <sup>nd</sup>
2	Open Land space	46	16.6	5 <sup>th</sup>
3	Recycled	50	17.9	4 <sup>th</sup>
4	Land fill	53	19.1	3 <sup>rd</sup>
5	Into Ajali River	66	23.7	1 <sup>st</sup>
	Total	278	100	

Table 4: Methods of Waste Disposal by 7 up Bottling Co. Plc. at the 9<sup>th</sup> Mile Area

Source: Fieldwork, 2020

Indiscriminate deposition of waste materials of both liquid and solid wastes on open land space with response and percentage score of 46 responses, and 16.6% obtained the 5<sup>th</sup> and rear position.

Another environmental problem as a result of the activities of 7 Up Bottling Co. Plc. at the 9<sup>th</sup> Mile area is noise pollution from the industrial machines during the bottling processes and trucks of the plant that are involved in the distribution of the products of the plant to the widely distributed customers. This affects especially the residents and traders/artisans who live close to the factory and along the transport routes of the plant. 151 responses or 54.32% of the respondents expressed dissatisfaction over the disturbing noise from the industrial plant and its vehicles.

## 6. Summary

The environmental problems caused by the activities of 7 Up Bottling Co. Plc. are not felt in every part of the 9<sup>th</sup> Mile area. It is only those who live/work (67.27%) within the area of its location and where customers are found that are affected by such problems which in order of severity are noise pollution, water pollution, traffic congestion, land degradation, and indiscriminate disposal of waste materials.

This activity generates waste materials in the area such as solid (49.64%), liquid (39.93%), and gaseous (10.43%) waste materials. The solid wastes are broken bottles and glasses, metal materials, wooden materials, and waste paint with broken bottles dominating others. The liquid waste is waste water from activities of recycling (14.75%), rain (20.86%), sanitary (22.3%), and processing (42.09%) which is the major source. The gaseous waste materials include carbon dioxide (40.65%), nitrogen (20.14%), hydrogen (25.18%), and oxygen (14.03%). Among these various waste materials, broken bottles are the most frequent, while metal waste materials are not often generated by the industrial firm in the area.

The waste disposal/management methods adopted by the firm in order of frequency of occurrence are disposal into Ajali river especially waste water, burning of wood and paint materials, land filling, recycling which involves mainly waste water, and disposal on open land spaces within the vicinity.

## 7. Conclusion

Activities such as manufacturing, processing, transportation and construction do not only deplete the stock of natural resources, but also add stress to the environmental system by accumulating stock of wastes. As 7 Up Bottling Co. Plc. at the 9<sup>th</sup> Mile area produce different kinds of soft drinks, it also generates different kinds of waste materials that are solid, liquid, and gaseous in nature. Examples include broken bottles and glasses, waste paint and damaged wood, waste water from processing, rain, recycling, and sanitary activities that reduce air qualities via air pollution. These various pollutions and land degradation are achieved through disposal into Ajali River especially waste water, burning of wood and paint materials, land filling, recycling of waste water, and disposal of waste materials on open land spaces in the area. These waste materials are inimical to the environment and its components including man. They pollute water elements, air, lead to a lot of noise, contribute in land degradation, and greatly affect movement in the area. In this regard, precautionary measures are important to reduce environmental pollution, and salvage environmental sustainability.

## 8. Recommendation

In the light of the results of this study, it is recommended that;

- Industrial policy on waste disposal/management is strictly implemented in the study area through monitoring in order to reduce environmental pollutions and achieve sustainability of the environment for mankind.
- Heavy fine should be imposed on the firm whenever waste materials are found in any form on the available land spaces or underneath, and along the waterways in the area. In addition, the firm should be meant to evacuate any such waste materials found in any part of the area.

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