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The Environmental threat of sachet Water package (waste) on agricultural land

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ABSTRACT-The issue of both sanitation and water supply contamination is traceable to contamination of the environment and water with waste generation. It is a universal fact that population growth is intricately intertwine with such critical issues as water shortage, climate change, loss of biodiversity, pollution etc. Sachet water is all over the country these days; and after drinking the water, the containers (plastic materials) is simply dumped anywhere and today, *pure water sachet* is a menace. All over the place there are empty sachets of "pure water". Nigeria total landmass is 923,768 Km^2 and from the calculations, it is obvious that the country generates approximately about 990,344 Km^2 (area) of sachet water waste daily which is larger than the total landmass of the country. Comparing the figures it is about 1/3 of Democratic Republic of Congo, more than ½ of Angola and South African and almost twice of France and almost five times of United Kingdom. The effects includes Increase disease transmission, contamination of ground and surface water, generation of greenhouse gas emissions and other air pollutants, damage to ecosystems, injury to people and properties.

Keywords-land mass, pollution, population, pure water, sachet water, wastes.

I. INTRODUCTION

Sanitation and water for all is a global partnership aimed at achieving universal and sustainable access to sanitation and drinking-water by firmly placing the issue on the global agenda. Millions around the world still lack access to global agenda. Millions around the world still lack access to safe water and improved sanitation [1].

In Nigeria, water shortage as well as access to safe water is a daily issue that threatens the health and living standards of our teeming population of about 144 million. This is because the demand of the ever increasing population overwhelms the supply of water [2].

II. NIGERIA POPULATION

There are growing concern over water availability in the light of a changing global climate even as the Food and Agriculture Organization, FAO, and organ of the United Nations, UN, has disclosed that over 2.8 billion people are affected by water scarcity worldwide [3].

It is a universal fact that population growth is intricately intertwine with such critical issues as water shortage, climate change, loss of biodiversity, pollution etc. [2].

Asia accounts for over 60% of the world population with more than 4 billion people. China and India together have about 37 percent of the world's population. Africa follows with 1 billion people, 15% of the world's population. Europe's 733 million people make up 11% of the world's population. Latin America and the Caribbean region is home to 589 million (9%), Northern America is to 352 million (5%) and Oceania to 35 million (0.5 %) [4,5].

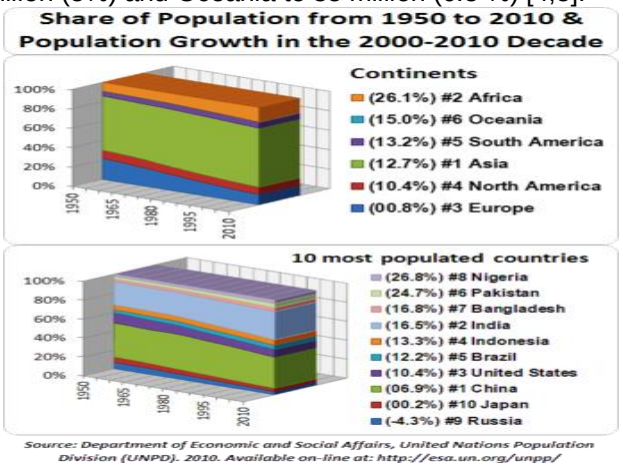

Fig 1 Population of continents and 10 countries

According to current data, one out of every four Africans is Nigerian [6]. Presently, Nigeria is the seventh most populous country in the world and even conservative estimates conclude that more than 20% of the world's black population lives in Nigeria. 2006 estimates claim 42.3% of the population is between 0–14 years of age, while 54.6% is between 15–65; the birth rate is significantly higher than the death rate, at 40.4 and 16.9 per 1000 people respectively [7].

Nigeria has a total land mass of 923,768 Km^2. The following table presents a list of Nigeria's 36 states ranked in order of their total population based on preliminary 2006 Census figures [8]

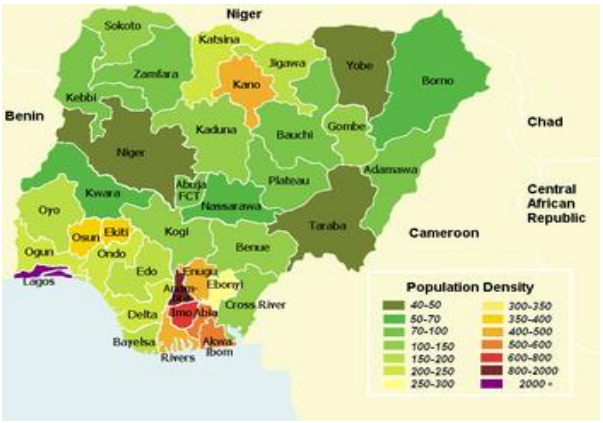

Fig 1 Showing map of Nigeria

Table 1: Lists of Nigerian State by Landmass and Population Density

Nigerian States	Population 2006	Land mass Km^2	Population Density (Km^2)
Kano	9,383,682	20,680.00	454
Lagos	9,013,534	3,345.00	2,695
Kaduna	6,066,562	43,460.00	140
Katsina	5,792,578	26,785.00	216
Oyo	5,591,589	27,460.00	204
Rivers	5,185,400	11,077.00	468
Bauchi	4,676,465	64,605.00	72
Jigawa	4,348,649	22,605.00	192
Benue	4,219,244	34,059.00	124
Anambra	4,182,032	4,844.00	863
Borno	4,151,193	71,130.00	58
Delta	4,098,391	18,050.00	227
Imo	3,934,899	5,430.00	725
Niger	3,950,249	13,930.00	284
Akwa Ibom	3,920,208	6,187.00	634
Ogun	3,728,098	16,762.00	222
Sokoto	3,696,999	25,973.00	142
Ondo	3,441,024	14,606.00	236
Osun	3,423,535	10,245.00	334
Kogi	3,278,487	32,440.00	284
Zamfara	3,259,846	39,762.00	82
Enugu	3,257,298	12,440.00	262
Kebbi	3,238,628	41,855.00	77
Edo	3,218,332	17,450.00	184
Plateau	3,178,712	58,030.00	55
Adamawa	3,168,101	36,917.00	86
Cross River	2,888,966	21,050.00	137
Abia	2,833,999	5,420.00	441
Ekiti	2,384,212	6,353.00	375
Kwara	2,371,089	37,700.00	63

Gombe	2,353,879	18,768.00	125
Yobe \	2,321,591	45,270.00	51
Taraba	2,300,736	55,920.00	54
Ebonyi \	2,173,501	5,530.00	393
Nasarawa	1,863,275	27,117.00	69
Bayelsa	1,703,358	10,773.00	158
Abuja Federal Capital Territory (FTC)	1,405,201	7,315.00	192

Source: National Population Commission [9], Landmass complied from NPC Report, [10] and Field Reports.

III. SACHET WATER PACKAGES (WASTE)

The contiguity between man and his environment can never, ever be separated except by the activities of man and these activities of man produces pollution (solid waste), which contaminate the environment [11],[12].

Over the years plastics have replaced leaves, glass and metal as a cheaper and more efficient means of packaging. But on the down-side the plastics are non-biodegradable and that means if they are randomly discarded, then, they collect around the city, choking drains, threatening small animals, damaging the soil and polluting beaches [13],[14].

Fig 2 Samples of sachet water

Fig 3 Bags of sachet water

Drinking water especially in Nigeria and Ghana comes in plastic bags not bottles called sachet water. Sachet water, known as *pure water*, in Nigeria is one of the booming business, and it goes for either 5 naira or 10 naira depending on the area [15],[16].

Fig 4 Sachet water package (WASTES) dumped in drain (moat)

Fig 5 Dumpsite on Asu street, Benin City

Sachet water is all over the country these days; and after drinking the water, the containers (plastic materials) is simply dumped anywhere.

Today, *pure water* is a menace. All over the place there are empty sachets of "pure water". People drink and drop... its "normal" to find people throwing out "pure water" sachets through their car windows. Some drop them as they walk...and nobody cares [17].

Sachet water pack is made from thermoplastics. Thermoplastics, which accounts for 87 percent of plastics sold, are the most recyclable form of plastics because they can be remelted and reprocessed, usually with only minor changes in their properties.

From the figures above (2-5) about 30-50% of the waste generated find their way to the nearest surface water body were all the drains are connected to, thereby polluting these water source(s).

IV. RESULTS AND ANALYSIS

According to Fox [18], the daily average need of water for man is between 2-3 litres for drinking alone. The average consumption is 2.5litres per day i.e. approximately *4.5* packs (60cl) consumed per day, which translates to generating 4.5 empty sachets of waste per person per day.

The average area of a sachet water pack is approximately **0.0211m^2.**

Table 2: Sachet waste generated per state per day and area covered

Rank	Nigeria States	Sachet water waste generated (population x sachet consumed per day)	Area covered by waste Km^2 (sachet area x waste generated)
1	Kano	37,534,728	791.983
2	Lagos	36,054,136	760.742
3	Kaduna	24,266,248	488.894
4	Katsina	23,170,312	488.894
5	Oyo	22,366,356	471.930
6	Rivers	20,741,600	437.648
7	Bauchi	18,705,860	394.694
8	Jigawa	17,394,596	37.026
9	Benue	16,876,976	356.104
10	Anambra	16,728,128	352.964
11	Borno	16,604,772	350.361
12	Delta	16,393,564	345.904
13	Niger	15,800,972	333.401
14	Imo	15,739,596	332.105
15	Akwa Ibom	15,680,832	330.866
16	Ogun	14,912,392	314.651
17	Sokoto	14,787,996	312.027
18	Ondo	13,764,096	290.422
19	Osun	13,694,140	288,946
20	Kogi	13,113,948	276.704
21	Zamfara	13,039,384	275.131
22	Enugu	13,029,,192	274.916
23	Kebbi	12,954,512	273.340
24	Edo	12,873,328	270.627
25	Plateau	12,714,848	268,283
26	Adamawa	12,672,404	267.388
27	Cross River	11,555,864	243.829
28	Abia	11,335,996	239,190
29	Ekiti	9,536,848	201.227
30	Kwara	9,484,356	200.120
31	Gombe	9,415,516	198.667
32	Yobe	9,286,364	195.942
33	Taraba	9,202,944	194.182
34	Ebonyi	8,694,004	183,443
35	Nasarawa	7,453,100	157.260
36	Bayelsa	6,813,432	143.763
	FCT	5,620,804	118.599
	TOTAL	**560,014,144**	**990,344**

Table 3: Some countries in Africa and Europe and their land mass

S/N	Country	Land mass (Km^2)
1	DRC	2,344,858
2	Angola	1,246,700

3	South Africa	1,221,037
4	Bostwana	582,000
5	Kenya	580,367
6	France	551,500
7	Spain	505,370
8	United Kingdom	242,900

Source: en.wikipedia.org [8]

Nigeria total landmass is 923,768 Km^2 and from the calculations in Table 2 above, it is obvious that the country generates approximately about **990,344 Km^2** (area) of sachet water waste daily which is larger than the total landmass of the country.

Comparing the figure with table 3 above it is about 1/3 of DRC, more than ½ of Angola and South African and almost twice of Botswana, Kenya, France and Spain and almost five times of the United Kingdom.

V. SOME EEFECTS ASSOCIATED WITH SACHET WASTE DUMPING

II. **Increase disease transmission:** Due to the fact that these plastics are non biodegradable they tend to store water and the stored water act as breeding place for insects e.g. mosquitoes which transmit malaria.

III. **Contaminate ground and surface water:** The sachet waste dumped into rivers or water bodies can affect aquatic lives by limiting the penetration of sunlight and diffusion of oxygen.

When dumped on the ground surface they do not allow plants to grow there by reducing the area of land for agriculture.

IV. **Create greenhouse gas emissions and other air pollutants.** Burning creates thick smoke that contains carbon monoxide, soot and nitrogen oxide, all of which is hazardous to human health and degrades urban air quality. Combustion of polyvinyl chlorides (PVCs) generates highly carcinogenic dioxins.

V. **Damage ecosystems.** When solid waste is dumped into rivers or streams it can alter aquatic habitats and harm native plants and animals and affects biodiversity.

VI. **Injure people and property**. The accumulation of waste along streets may present physical hazards, clog drains and cause localized flooding.

VI. CONCLUSION

Almost about 30-50% of these wastes get to the water bodies, thereby creating water scarcity by polluting it.

The issue of both sanitation and water supply contamination is traceable to contamination of the environment and water with waste generation, contaminate surface water (the sachet waste dumped into rivers or water bodies affect aquatic lives by limiting the penetration of sunlight and diffusion of oxygen). When dumped on the ground surface they do not allow plants to grow thereby reducing the area of land for agriculture and indiscriminate dumping of sachets block drains and pipes.

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