



Disclosure and rating of some environmental performance of selected potable water firms in Port Harcourt Garden City area of Rivers State Nigeria

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Abstract

Water and noise pollution were among the top three environmental concern. The disclosure and rating of these parameters are important because of their linkage to health and other purposes. A total of thirty bottled water were examined for their disclosure of mineral content, faecal coliform and then rated. Only six bottles or twenty percent of them have some form of disclosure, while twenty four bottles or eighty percent do not. The media could help in disseminating such information to ensure effectiveness. The present method of registering sachet water and bottle water companies in Port Harcourt area has been abused and should be change. There is need for routine water analysis to ensure that the standards set are not compromise at any time. We need development in housing and infrastructure but not at expense of allocating some forest land to act as buffer to reduce the continuous increase in urban noise and its intrinsic environmental pollution.

Keywords: Environmental Performance; Water; Noise; Disclosure; Rating; Infrastructure; Port Harcourt

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1. Introduction

According to Tietenberg 1998, public disclosure of environmental performance has been characterized as third wave of environmental regulation after command-and-control and market-based. This has been gaining popularity worldwide due to its success in North America, Europe and Southeast Asia. All the Environmental and Food Protection Agencies in Port Harcourt Rivers State, the Garden City of Nigeria, should show interest in public disclosure because it is low-cost regulatory option that do not require formal enforcement procedures, with the present all time high increase in urban population, decommissioning of firms and its effect on the environment. The Indonesia and Phillipines government through their environmental agencies, in 1995 started pilot programmes (World Bank, 1999, 2009). A good template adapted from Indonesia's Program for Pollution Control, Evaluation and Rating PROPER, the Green Watch Programme rates firms environmental performance from best to worst in five – colours 1) green, 2) blue, 3) yellow, 4) red and 5) black. Also, Chinese regulators has begun the third wave regulation, having seen the success rate of disclosure in these two Asian countries. The ratings are disseminated to the public through media Hua et al. (2002). This paper is an attempt to evaluate disclosure and rating of some environmental performance in the areas of portable water and noise in the garden city of Nigeria.

In the Trans Amadi Industrial Layout, Slaughter house for animals and Onne Oil and Gas Free Zone contaminated land may arise largely as the result of past industrial processes leaving behind substances like oils and tars, heavy metals, organic compounds and soluble salts. The mining of sand, precious metals and industrial minerals in many rural communities also affect the land and water environment. The contaminative uses to which land may be put are very much industrial processes of today as shown on table 1, while some sources of contaminated land and water environment are shown in figure 1.

Table 1. Uses of land which may give rise to contamination

Agriculture	Burial of diseased livestock
Extractive Industry	Extracting, handling and storage of carbonaceous materials such as coal, lignite, petroleum, natural gas, or bituminous shale.
Energy Industry	Producing gas from coal, lignite, oil, or other carbonaceous material (other than from sewage or other waste) or from mixtures of those materials.
Production of Metals	Production, refining, recovery of metals by physical, chemical, thermal or electrolytic or other extraction processes
Production of Non-Metals and their Products	Production or refining of non-metals by treatment of the ore.
Glass making and Ceramics	Manufacture of glass and products based on glass. Manufacture of ceramics and products based on ceramics, including glazes and vitreous enamel.
Production and Use of Chemicals	Production, refining, recovery or storage of petroleum or petrochemicals or their by-products, including tar and bitumen processes and manufacture of asphalt.
Engineering and Manufacturing Processes	Manufacture of metal goods, including mechanical engineering, industrial plant or steelwork, motor vehicles, ships, railways or tramway vehicles, aircraft, aerospace equipment or similar equipment. Storage, manufacture or testing of explosives, propellants, ordnance, small arms or ammunition. Manufacture and repair of electrical and electronic components and equipment.
Food Processing Industry	Manufacture of pet foods or animal feedstuffs. Processing of animal by-

	products (including rendering and maggot farming, but excluding slaughterhouses, butchering).
Paper, Pulp and Printing Industry	Making of paper pulp, paper or board products, including printing and de-inking.
Timber and Timber Products	Chemical treatment and coating of timber and timber products.
Textile Industry	Tanning, dressing, fellmongering or other processes for preparing, treating or working leather. Fulling, bleaching, dyeing or other textile floor coverings (including linoleum works)
Rubber Industry	Processing of natural or synthetic rubber (including tyre manufacture or retreading)
Infrastructure	Marshalling, dismantling, repair or maintenance of railway rolling stock. Dismantling, repair or maintenance of marine vessels, including hovercraft. Dismantling, repair or maintenance of road transport or road haulage vehicles. Dismantling, repair or maintenance of air or space transport systems.
Waste Disposal	Treating of sewage or other effluent. Storage, treatment or disposal of sludge including sludge from water treatment works. Treating, keeping, depositing or disposing of waste, including scrap (to include in-filled canal basins, docks or river courses). Storage or disposal of radioactive material.
Miscellaneous	Premises housing dry cleaning operations. Laboratories for educational or research purposes. Demolition of buildings, plant or equipment used for any of the activities in the schedule.

Source: Registers of Land which may be Contaminated: A Consultation Paper DoE, May 1991.

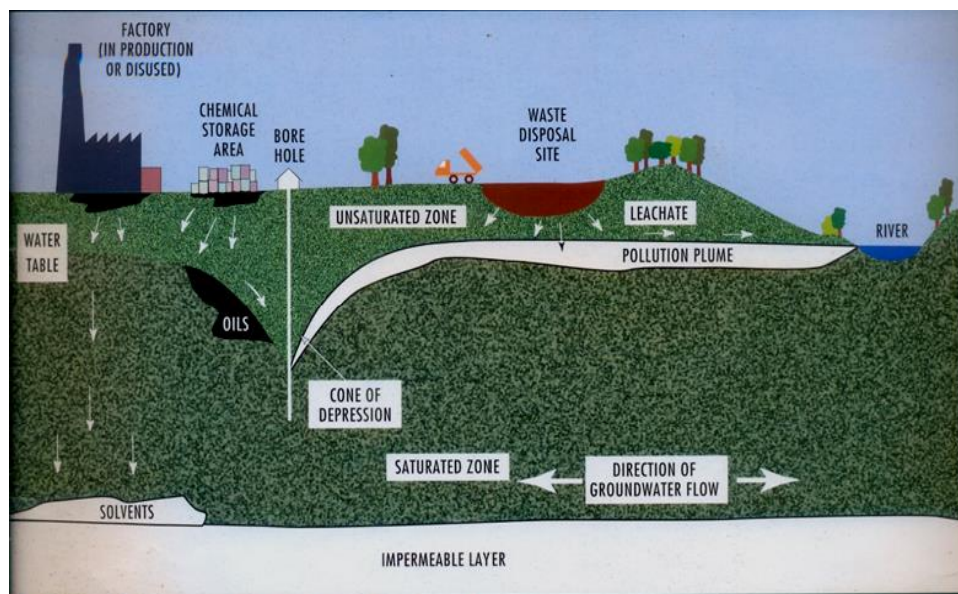


Figure 1. An illustration of some sources of Contaminated land and water environment. NRA, 1994

Some rural dwellers are of the view that what you drink from water does not kill anybody. Many people believe that holy water has healing properties but new research suggests that it may actually do more harm than good. Unless water pass through quality test like physical, chemical and bacteriological composition and meet the recommended standards set by World Health Organization (WHO), it cannot be classified as potable

water. Some researchers in Austria have found the prevalence of bacteria in most spring water regarded as holy springs by some church worshipers and it increases with rate of activities. The study also revealed that holy springs contain not only faecal contamination with E coli bacteria and enterococci, but also campylobacter, which can cause inflammatory diseases Adkins (2013). In our local environment, some churches believe if you add olive oil to rain water, spring water, stream water or river water in white container that makes the water holy.

2. Methodology

A total of thirty different types of bottled water were obtained from water vendors along major roads in the city, motor parks, super markets and shops which includes Chanrai, Everyday and Welldone. The bottled water include CWAY, Eva, Ragolis Spring, Nestle, Aquafina, Real Basin, Aquasence, Sons, Ashton wells, Rizia, Elioha, Sparwasser, Voltic, Mowa, Zina, Olivia, Notre Dame, Junac, Xyno, Uniport, Brooks, Nason, Shamac, Jolak, Bliss, Adima Premium, Lucozade-Hydropure, La Voltic, Fressi and Anizor figure 2. They were examined for the disclosure of mineral content composition and coliform content on their labels necessary for classification as potable water or not and then rated in the colour chart similar to Indonesia PROSPER. A few of the companies producing bottled water do advertise them on television but many do not, but adding it on the label is most appropriate as many rural dwellers where there is high population may not have access to these information on the television sets due to irregular or unavailable power supply.

Several visits to places where borehole water were made available to the public was made, at Amadi Flats Old Government Reserve Area, it was observed that Shell residential areas there do indicate that the water members of the public are fetching is either treated or not treated from source which is very good disclosure method. Thus, encouraging users to boil the water before using them. All the sachet water examined commercially known as pure water do not have mineral content composition disclosed. All do have National Agency for Food, Drug Administration and Control (NAFDAC) approved numbers but the findings show inconsistency. For instance, individuals or organizations that wants to register their water product for private or commercial purpose some well placed officials of this agency directs them to their private laboratories were few selective analysis of these parameters necessary to classify water as potable are made.

3. Results and Discussion

A comprehensive analysis of the physical, chemical and bacteriological composition of water should resemble the parameters shown in Table2a/b. This was a United Nations International Children Education Fund (UNICEF) water project in partnership with Cross River Rural Water and Sanitation (RUWATSAN) in Katchuan Irruan 2009 and 2014 Boki area, Cross River State. The necessary parameters are indicated for potable water. The borehole was located in high population density area and human activities may probably be responsible for the high content of calcium, phosphate, magnesium, total hardness and slightly acidic nature of the borehole water in 2014. The lithology of borehole indicate water was struck at 22m, 36m and the borehole was

terminated at 45.47m, due poor penetration rate on fresh migmatite gneiss. Figures 3 and 4 are the photographs of the samples that were rated 1 green while figure 5 is the pie chart showing 80% rated 4 red, while only 20% were rated I green.



Figure 2. A photograph of the thirty bottled water samples taken for their disclosure of mineral composition and coliform content

Table 2a. Laboratory report of physico-chemical/bacteriological examination of borehole

	PARAMETERS	UNIT	NDWQS/W.H.O. STANDARD	TEST RESULT	HEALTH IMPACT
1	Taste	Mg/l	Unobjectionable	Unobjectionable	
2	Odour		Unobjectionable	Unobjectionable	
3	pH		6.5-8.5	7.1	
4	Temperature °C	°C	Ambient	19.4	
5	Colour (Platinum-Cobalt) scale	Pt-Co	<5	0	
6	Turbidity (Formazin Turbidity Unit)	FTU	<5	0	
7	Conductivity mS/cm	mS/cm	1000	0.46	
8	Calcium mg/1Ca ²⁺	mg/l	200	39.2	
9	Magnesium mg/Na ⁺	mg/l	150	33.5	
10	Sodium mg/1Na	mg/l	200	BDL	
11	Potassium mg/1K ⁺	mg/l	10-12	0	
12	Sulphate mg/1SO ₄ ²⁻	mg/l	400	0	
13	Chloride mg/1CL ⁻	mg/l	250	3.0	
14	Magnesium hardness mg/l	mg/l	100	138	High
15	Total Alkalinity mg/l	mg/l	100	BDL	
16	Calcium Hardness mg/l	mg/l	50	98	High
17	Nitrite mg/1NO ₂ ⁻	mg/l	0.2	0.02	
18	Nitrate mg/1NO ₃ ⁻	mg/l	50	9.3	
19	Ammonia mg/1NH ₃	mg/l	0	0	
20	Ammonium mg/1NH ₄ ⁺	mg/l	0	0	
21	Phosphate mg/1PO ₄ ³⁻	mg/l	3.5	3.6	High
22	Fluoride mg/1F ⁻	mg/l	1.5	0.07	

23	Chlorine mg/lCl ₂	mg/l	0.5	0	
24	Iron mg/lFe	mg/l	0.3	0	
25	Manganese mg/lMn ²⁺	mg/l	0.1	0	
26	Copper mg/lCu ²⁺	mg/l	1	0	
27	Arsenic ug/lAS	ug/l	10	0	
28	Lead ug/lPb ²⁺	ug/l	10	0	
29	Aluminium mg/lAL ³⁺	mg/l	0.2	BDL	
30	Total Hardness mg/l	mg/l	150	236	V. hard
31	Salinity mg/l NaCl	mg/l	100	4.95	
32	Total Dissolved Solids g/l (TDS)	g/l	500	0.23	
33	Total Suspended Solids mg/l (TSS)	mg/l	0	0	
34	Feecal Coliforms/100ml of H ₂ O	CFU/100	0	0	Safe
35	Total Coliforms/100ml of H ₂ O	CFU/100	0	0	Safe

*BDL Below Detection Limit Source: RUWATSAN, 2009

Location: Katchuan Irruan

Local Government Area: Boki

Date of Analysis: 07/10/2009

Total Depth: 45.47m

Static Water Level: 6.57m



Figure 3. A photograph of one of the sample bottle water that met disclosure of mineral composition and coliform content through advertisement rated 1 green

Table 2b. Laboratory report of physico-chemical/bacteriological examination of borehole

	PARAMETERS	UNIT	NDWQS/W.H.O. STANDARD	TEST RESULT	HEALTH IMPACT
1	Taste	Mg/l	Unobjectionable	Satisfactory	
2	Odour		Unobjectionable	Satisfactory	
3	pH		6.5-8.5	6.14	Slightly acidic
4	Temperature °C	°C	Ambient	27.8	
5	Colour (Platinum-Cobalt) scale	Pt-Co	<5	0	
6	Turbidity (Formazin Turbidity Unit)	FTU	<5	0	
7	Conductivity mS/cm	mS/cm	1000	79.4	
8	Calcium mg/lCa ²⁺	mg/l	200	0.20	
9	Magnesium mg/Na ⁺	mg/l	150	0.32	
10	Sodium mg/Na	mg/l	200	-	
11	Potassium mg/lK ⁺	mg/l	10-12	0.0	
12	Sulphate mg/ISO ²⁻⁴	mg/l	400	0.0	
13	Chloride mg/lCl ⁻	mg/l	250	-	
14	Magnesium hardness mg/l	mg/l	100	0.31	
15	Total Alkalinity mg/l	mg/l	100	0	
16	Calcium Hardness mg/l	mg/l	50	0.53	
17	Nitrite mg/lNO ₂ ⁻	mg/l	0.2	0	
18	Nitrate mg/lNO ₃ ⁻	mg/l	50	0.00	
19	Ammonia mg/lNH ₃	mg/l	0	0.00	
20	Ammonium mg/lNH ₄ ⁺	mg/l	0	0.00	
21	Phosphate mg/lPO ₄ ³⁻	mg/l	3.5	0.54	
22	Fluoride mg/lF ⁻	mg/l	1.5	-	
23	Chlorine mg/lCl ₂	mg/l	0.5	0.32	
24	Iron mg/lFe	mg/l	0.3	0.00	
25	Manganese mg/lMn ²⁺	mg/l	0.1	0.00	
26	Copper mg/lCu ²⁺	mg/l	1	0.00	
27	Arsenic ug/lAS	ug/l	10	0.00	
28	Lead ug/lPb ²⁺	ug/l	10	0	
29	Aluminium mg/lAl ³⁺	mg/l	0.2	0.00	
30	Total Hardness mg/l	mg/l	150	0	
31	Salinity mg/l NaCl	mg/l	100	-	
32	Total Dissolved Solids g/l (TDS)	g/l	500	39.12	
33	Total Suspended Solids mg/l (TSS)	mg/l	0	0	
34	Faecal Coliforms/100ml of H ₂ O	CFU/100	0	0	Safe
35	Total Coliforms/100ml of H ₂ O	CFU/100	0	0	Safe

*BDL Below Detection Limit Source: RUWATSAN, 2014.

Location: Katchuan Irruan

Local Government Area: Boki

Date of Analysis: 07/01/14

Total Depth: 45.47m

Static Water Level: 6.57m

The members of the public should show interest on the disclosure rate of these parameters like hardness, pH, anions, cations and coliforms content and the expiring date of the water on the identification labels before they drink because of its health implications. This is similar to checking the percentage of alcohol on the label of a drink before you buy. Results from the pie chart figure 5 indicate that only twenty percent or one fifth of the bottled water have mineral composition and coliform content disclosed. A large number about eighty

percent were not disclosed. There is need for water re-analysis from the appropriate agency after the initial approvals has been given at random. There should a well equipped laboratory well known to the members of the public like the Niger Delta River Basin Development Authority a parastatal of the Federal Ministry of Water Resources, where such analysis can be undertaken particularly, if the water is for commercial purposes.



Figure 4. A photograph of Ragolis Spring, Aquafina, Uniport, Notre Dame, Nestle and Eva that met disclosure of mineral composition and coliform content on label or advertisement rated 1 green

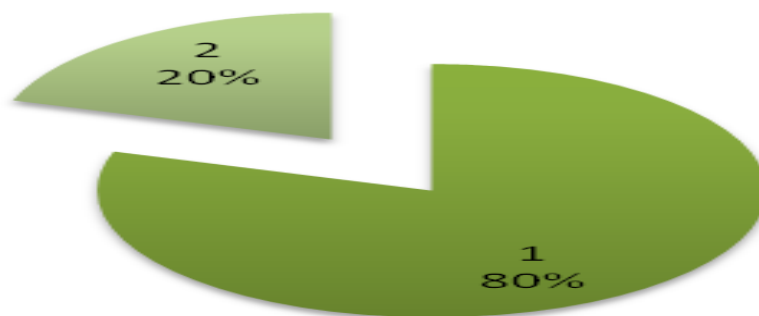


Figure 5. Pie chart showing 20 percent disclosed mineral content and rated green while 80 percent undisclosed rated red

Noise is sound undesired by the recipient. Noise in big cities like Port Harcourt is considered by the World Health Organization (WHO) to be the third most hazardous type of pollution, right after air and water pollution

(WHO, 2005). It was considered as a part of the normal jobs and this was due to the fact that the effects of noise pollution were not given attention (Gupta, 2010). There has been a number of researches on noise pollution in Port Harcourt area. Crowded cities and towns, mechanized means of transport, new devices of recreation and entertainment are polluting the atmosphere with their continuous noise (Nwaogazie and Owate 1995, Abumere et al., 1999, Onuu and Inyang 2000, Oyedepo, 2012). Modern life has given rise to a new form of pollution, noise (Smriti, 2009, Omubo-Pepple et al., 2010). In Rivers State the government of Police Commissioner Fidelis Oyahkilome made a good policy on the Environment particularly on noise, security and waste disposal. It was an offence for record shops to play music at certain time of day and the volume, tree planting along major roads encouraged, houses were painted regularly inside and outside, security lights on the houses are switched on between 6.30 pm to 6.30 am. The members of the public acknowledged that his government was a huge success in that regard. Unlike cities like Calabar and Jos Plateau great attention to reduce noise level has been adopted through tree planting. The rubber plantation forest acts like a filter of noise and forest trees along major roads of Calabar metropolis reduces the noise level to the barest minimum. In Jos Plateau about eight plots of land divided into four plots with two plots on each side of the road at different positions along the road have forest trees to help reduce the noise level. In some of these places precast concrete or iron sits are provided for people to relax and enjoy fresh air. In our local environment in the villages, it is not unusual to see forest even in occupied areas dedicated as evil forest were people do not go and collect even dry woods. So, they have been practicing environmental protection through such processes without knowing or being aware of its importance. In the city of Port Harcourt the old Government Reserve Area, Amadi Flat Area, the Shell Residential Area, River State University of Science and Technology, The University of Port Harcourt and University of Port Harcourt Teaching Hospital are well planned with forest trees. A close look at the University of Port Harcourt area indicates that the heavy traffic and other noise on the East West road are cut off by the forest. They believe that people safety should dominate any development concern and this is of great importance to environmentalist. The Greater Port Harcourt City Development Authority should as matter of policy take into consideration these in the expansion of the city.

4. Conclusion

The media should be involved in the disclosure and rating analysis of environmental parameters such as water and noise. The present situation were only twenty percent or even less of readily available bottled water indicate some form of mineral and coliform content is not appropriate and should be change. The Rivers State Government should be able to acquire some portions of land along major roads and streets that will be dedicated to environmental protection and not for construction any type of structure.

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