Implications of Borehole Water as A Substitute for Urban Water Supply: The Case of Egbeada Federal Housing Estate Owerri, Imo State

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Abstract

Water is a necessity for human existence. It is needed for man's daily activities. Federal Housing estate, Egbeada was being supplied water from the ministry of public utilities in the 1980s and 1990s. With the expansion of Owerri urban and the consequent population growth of the same, the ministry could no longer meet the water need of the estate. This inability of the Government to meet this need has led to the proliferation of boreholes in the area. Out of 335 housing units in the estate, 199 have boreholes. About 20 houses were randomly selected for oral interview. Water analyses were also carried out from 5sampled boreholes. Result showed that the water in the area is slightly acidic. Recommendations were also made based on the result of the findings.

Keywords: Implications, boreholes, substitute, proliferation, population growth.

1. Introduction

Water is required for the sustenance of man and the entire ecosystem. It is available in nature but it is hardly free for man's use. Whether available in good quantity, quality or not, It has no substitute. As important as water is to man, about one million people lack access to safe water in 2002, as a result 2.4million lacked adequate sanitary facilities [1]. He equally estimated that in the first half of this century, water availability per person will drop by 74% as population increases and adequate water quality decreases, meanwhile, water use is expected to increase by 40% over this same period.

The benefits of meeting basic water requirement far outweigh the cost of providing it is Cunningham [2] quoting Peter Gleik of pacific Institute said that 'The cost of providing new infrastructure needs for all major urban water sectors has been estimated at about $25 to $50 billion per year and observed that these cost are far below the costs of failing to meet these needs''.

Water is no doubt the most critical issue facing human development. The rural areas are known for inadequate water supply but today, even the urban areas in Nigeria are being hit by this same problem. It has also been observed that only 14 percent of rural households have access to safe water. This has been attributed to lack of investment by both federal and State Government into this areas [4]. The Scarcity of potable water in urban areas in Nigeria is heightened by the rate of urbanization which is also exacerbated by the rapid population increase in the cities. Most of the cities in eastern Nigeria for example Onitsha, Owerri, Aba, Enugu etc. are said to have exceeded their carrying capacity and as a result the infrastructural facilities (water inclusive) are inadequate and can no longer serve the areas they were meant to serve.

1.1. STUDY AREA/METHODOLOGY

Federal housing Estate Egbeada is in Mbaitoli Owerri North Local Government Area of Imo State Nigeria. It is located between latitudes 5^{o} 31' N, and 5^{o} 31' N and between longitudes 70 00' E and 7^{0} 01' E. Situated in the humid tropics Egbeada has an annual rainfall of about 200 mm and annual temperature of 30^{0}c.The Housing estate has a total of 335 housing units - 170 in the old sites and 165 in the new site. The number of boreholes in the Estate totalled 199. Both the old and the extension areas are faced with the problem of water supply. The estate extension does not have any government/public water facility unlike the old site which had pipe borne water.

During the field survey, the researcher counted both the number of houses and boreholes. Oral interview was used to obtain information from the residents.20 houses were randomly selected for oral interview. In each house selected, the head of the family was interviewed.10 persons were selected from the old estate and 10 from the new site. Water analysis was carried out on water samples from five (5) sampled boreholes. The result indicates that the major problem from the water samples is acidity of water. About 98% of the people interviewed are not aware of the adverse effects of indiscriminate drilling of boreholes on the environment.

2. History of water supply in the estate

The [5] colonial administration developed domestic water supply as part of overall programme to improve the level of hygiene and environmental sanitation and thereby the health of the people. Unfortunately, this priority given to domestic water had not been sustained by post-independent governments in Nigeria.

The old Egbeada housing Estate area was supplied water by Imo State water board under ministry of public utilities Owerri. The source of the water to the capital city Owerri through the water board is Otamiri River. The water is processed by the water board before distributing to the public as pipe borne water. This supply was very effective from the 1980sand 1990s when population of Owerri was about 281,000 people [3]. With the influx of people into Owerri and the consequent expansion of the city due to immigration, the government has not been able to meet with the water demand of the people. Consequently, house owners started drilling boreholes to meet their water requirements. This not only limited to federal housing estate Egbeada. It[1] observed that borehole is the fastest growing source of potable water now and is likely to outweigh other sources even in the rural areas. According to www.allafrica.com/storiesboreholes, in the decades above ponds will replace water boards nationwide. This is already the situation in Lagos state of Nigeria where households use water from pond /well for other domestic activities while drinking water is bought from the popular 'merua'(meaning water vendor) while those that take bottled water buy from shopping centres/shops

3. Consequences of proliferation of water boreholes to the environment

3.1. Reduction of flow:

When borehole is randomly drilled and water is collected from so many points at any time, it leads to reduction in the net flow of underground water which consequently can have significant effect on the water cycle

3.2. Risk of saline intrusion:

The area runs a risk of saline intrusion when ground water is over extracted especially if the area in question is located close to the coast of the sea or ocean. It also means that something has to go in there to take its place otherwise in the future the area may run the risk of having landslides etc. which may consequently reach the

surface and affect structures and infrastructures around the site. These holes may in the future develop into cracks which may lead to faults in the earth

3.3. Reduction in the level of ground water/draw down effect

Pumping out ground water from much water borehole point will lead to a reduction in the level of ground water. This means that people have to drill farther down to get enough water to sustain pumping. Those that have shallow wells will no longer get water unless they go deep into the aquifer. It will therefore cost more in future to drill to a realistic sustainable depth in the aquifer if one desires to have a borehole in other words recharge will be low.

3.4. Pollution and Contamination

Proliferation of boreholes leads to the spread of pollution and contamination. Due to lack of planning and adoption of profession procedures, Government allows indiscriminate springing up of mechanic villages workshops and waste collection and disposal sites all over the town especially in elevated topography. Some of their wastes have heavy metals and other harmful substances. These substances dissolve with rain and seeps through the layers of the soil to shallow aquifers like in Owerri, Aba, Port Harcourt, and Warri etc. The rains will definitely wash these pollutants that are injurious to health into water bodies and also to various low land areas of the territory (city) inhabited by many people who ignorantly drill water boreholes that have likelihood of being polluted. There are industries whose wastes are dumped indiscriminately and yet boreholes are all around such areas. Boreholes stand the chance of being polluted by seepage from septic tanks around the borehole. Other domestic wastes are also sources of pollution of boreholes.

3.5. Effect on vegetation

When water is constantly drawn from many boreholes, groundwater recedes, and this will bring about a shift in the level of saturation of moisture. As a result of this recession, it is most likely that water at the upper soil layer will remain only at the capillary level which may not be very available to the plants and other soil organisms. This Draw Down effect will affect soil moisture availability adversely and consequently vegetation will be affected adversely.

3.6. Lack of Standards in drilling boreholes

Most of the water samples from the boreholes are not analyzed. The health implications have not yet been known, for instance analysis [6] shows that for over sixty water samples from boreholes within Owerri Zone, Imo State shows that the PH of water samples is between 6.0 to 6.5 on the average. It means the water around the area is slightly acidic which is not good for drinking. It is unfortunate that despite the above listed consequences of having many boreholes concentrated in a place the government whose job it is to provide potable water for the citizens is not taking immediate measures to address the problem and discourage this trend. It is also surprising that the totality of the people interviewed, (100%) of them are not aware of the implications of having many boreholes in an area.

Table 1. Physico-chemical tests of selected Borehole Water Samples in the area

	Water Samples					
Parameter	1	2	3	4	5	WHO Std
Sulphate	0.00	0.00	0.00	0.00	0.00	200
T. hardness	0.00	0.00	0.00	0.10	0.50	200
Nitrate	0.0066	0.02	3.40	6.20	5.72	10
Appearance	clear	clear	clear	clear	clear	clear
PH	6.00	6.2	6.3	6.0	6.2	7.00-8.5
Colour	0.00	0.00	0.00	2.00	0.00	0.00
Chloride	0.001	0.01	0.5	0.00	0.00	0.3
Iron	0.05	0.08	0.02	0.05	0.01	0 - 3
Turbidity	0.00	0.00	0.00	0.00	0.00	5
Odour	none	none	none	none	none	none
Temp	25	25	25	25	25	-
Calcium	0.10	0.001	0.00	0.00	0.00	50

Source Author fieldwork 2011, WHO Std

The essence of analysis is to see if there are parameters that deviate from WHO standards for potable water. If there are efforts should be made to create a device to correct the deviation. In essence the reason for the analysis is for purification. Observation from the analysis shows that the parameters are within World Health Organization standards except the pH which is slightly higher. The implication is that the water in federal housing Egbeada and probably its environs is a bit acidic. This should be corrected by introducing a liming device to bring the ph to between 7.00 - 8.5 which is the WHO acceptable limit

4. Conclusion

The inability of the government to provide constant water supply to Egbeada federal housing estate and other residential areas in Owerri has led to proliferation of boreholes. The water facility in the area was provided in the 1980s.With the increase in the number of population due to high rate of urbanization, the water facilities can no longer sustain the growing population in the area and as a result people have resorted to drilling boreholes to meet their water requirements. Though these boreholes are solving these problems of water scarcity, it has some environmental consequences which in the long run may outweigh the gains. The government should rise to its moral responsibility so as to have the justification to redress this situation

5. Recommendations

- Water facility should be expanded and upgraded to accommodate increasing demand because it is the right of citizens to have access to good and constant water supply. If this is done the government will have the justification to stop proliferation of boreholes.
- Mechanic workshops should be moved to designated places far away from residential areas to avoid pollution that emanates from their workshops littered all over the city, defaulters should be penalised
- These wastes from various sectors must be properly disposed to reduce the risk of pollution and contamination. Boreholes must be sited wisely to avoid drinking polluted

water.
- Boreholes should be removed far away from septic tanks and sources of pollution
- The boreholes must be drilled according to professional standards.
- A monitoring body should be constituted to ensure that the above is implemented.
- Defaulters to the regulation concerning these stated above must be penalized for it to be effective.
- For those that already have boreholes, they should observe and maintain WHO standards for safe drinking potable water at the desirable and permissible limit for human consumption.
- Water from the boreholes should be limed before consumption because of the acidic nature of the water samples.

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