Urban Water Supply as a Catalyse for Socio-Economic Transformation of Port Harcourt City, Nigeria

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Abstract

Greater awareness of the growing problems of water supply in various parts of the world cause concern in our contemporary societies. This complex and uneven global patterns of distribution to water continue unabated as population pressure reduces the per capital volumes available. This paper critically examine urban water supply as a catalyse for socio-economic transformation of Port Harcourt city. The city was divided into ten (10) different zones which include Abuloma, Rumuokwuta, Mule I and II, Diobu Port Harcourt, Town, G.R.A. phase II, Rainbow, Ogbu nabali, Elekiah and Rumuogba. Three hundred (300) questionnaires were administered to mostly head of household at the designed localities (30 per location). The Pearson's product moment correlation statistical technique was employed in testing the stated hypothesis and the result shows that income influences the quantity of water used by individual in different sections of Port Harcourt. Therefore, it is pertinent to state that efforts should be made at improving urban water supply in the area.

Key Words: Domestic water, domestic consumption, household and private water connection.

Introduction

Considering the tremendous role water plays in human life the 32nd Hague International Model Limited Nations (THIMUN) held in the Netherlands on 28th January 2000, focused attention on water crises plaguing different nations and the approach to handle the score resources. According to the Stockholm environmental institution, one-third of the world's population already live in areas that suffer moderate to severe water shortages. While (1976) observed that in the cities of the developing countries, their state of water provision and expansion of water project does not match the scale and rate of urban growth. The World Health Organization (WHO), noted that majority of people in new urban centres of developing countries do not have access to portable water, which is considered in developed countries to be a basic necessity.

It want further to state that the provision of adequate water will go a long way in preventing water-related diseases such as cholera and drancuncolisis (guinea worm) prevalent in this part of the world. In Africa, water supply problems emanate from large wave of rural-urban migration. In Nigeria the increasing rate of urbanization could be attributed to the general increasing rate of population growth, put at 3% and the rate of urbanization has added more to the existing urban problems. Among these problems are those of occurrence of slom housing problems, water supply problems and environmental pollution. In Port Harcourt, the scene remain the same as water supply is a serious problems which result to people travelling long distance often on foot before water can be obtained for domestic use. This situation has often led children roam the street in search of water. Could one say that urban water supply is a tool for socio-economic development?

What role is water playing in ensuring the socio-economic livelihood of the residents in Port Harcourt. This paper seek to examine the socio-economic impact of urban water supply in Port Harcourt as regards the sources of water in the area, domestic water consumption, constraint to urban water supply and the monthly rainfall and evaporation in the area. However, in other to achieve the research finding two hypotheses were tested which state thus:

H_1: There is no significant association between income of individuals and the quantity of water used in the Port Harcourt city.

H_0: There is significant association between income of individuals and the quantity of water used in the Port Harcourt city.

Study Area

Port Harcourt is located within the eastern lower Niger Delta in south eastern part of River State of Nigeria. It is situated at the right bank of the Bonny River approximately 65km (40 miles) in land from the Bight of Bonny. Geographically, Port Harcourt is found in latitude 04^0 47′ 30″N and longitude 06^0 59′ 30″E. It is bounded on the east and West by meandering Creeks, on the south by first the blockyard creeks, then the Bonny River and finally mangrove swamps and on the north by Abia State. The southern part of the town stands largely on raised lavees with silts and clay foundation. These afford permanently dry and firm points within the zone of its fresh water swamps of the Niger Delta. It covers an area of 290sq.km.

Methodology

The research employed the following methods of data collection. The city of Port Harcourt was divided into ten different zones which include Abuloma, Rumuokwuta, Mile I and II Diobu Port Harcourt, Town, G. R. A. phase II, Raibow, Ogbu nabali, Elekiah and Rumuogbu. 300 questionnaires were administered to mostly head of households at the designated localities. However, other relevant information were obtained from water board stations, and the River State Niger Delta Development Authority Port Harcourt. While the stated hypotheses were tested using the Pearson's product moment correlation coefficient which is presented mathematically as:

Literature Review

Concept of Domestic Water

Basically, domestic water refers to water consumed by the household and it uses varies with the climate and the stage of sophistication of the urban community Pereira (1973). It includes water for cooking, personal cleaning, drinking, flushing of lavatory, water of lawns and flowers, car washing and general house cleaning. Ayoade (1988), in his work posits that the human body is 60% water and an average daily water intake of 2.25 liters is required by every person. Generally, there had been lack of information on the components of domestic water particularly in the tropics. But however, personal washing and flushing of closets account for almost 30% of water used by the households. Isaac (1965) stipulates that an average man is entitled to 115 liters of water per day in the temperate region while Ayoade and Oyebande (1978) in their study of water situation in Nigeria states that an average individual requires 46 liters of water per day. Department of water affairs and forestry Merla (1994) in a recent report on water supply policy defines basic water supply as 25 liters per person per day at a good quality provided at a distance of 200m on a regular and assured basis. Experience shows that people tend to use more water when they have access to running water. For instance U.S. average personal water use is about 600 liters per day compared with about 50 liters per capita per day in India. European Schoolbook (1994).

Keith (1993), Gleick (1993) and UN (1997) in their various study confirmed that domestic water is about 8% of the total water used worldwide. There is an upsurge in the quantity of water required for domestic purposes due to population increase and sophistication in the standard of living. The use of modern household appliances such as dish washing machine by the affluent ones in the society need enormous amount of water. European Schoolbook (1994). White (1972) in their study of domestic water uses in East Africa, observed that the humidity of the courtyard may be enhanced through fountain or pools while large volume of water may go to irrigation of lawns and flowers for cooling effect or for esthetic enjoyment. A study conducted by Farror (1977) on domestic water use among low income communities in Nchixian Mexico reveals that the volume of water used by people of may developing countries is chiefly a function of income and material wellbeing, hence the affluent ones have access to sufficient quantity of water. McDonald and David (1988) supports the above point when he declared "in many urban centers, if one can afford the capital cost, clean piped water could be cheap enough for the rich to file their swimming pools, while the poor may have to pay two or three times as much, per unit quantity of water, to buy by the bucket from a tanker". The above preposition shows the disparity between the rich and the poor in the urban area.

Water as a Socio-Economic Potential

Who would not choose to follow the sound of a running water? Its attraction for a normal man is of a natural sympathetic sort. For man is water's child, nine-tenth of our body consist of it, and a certain stage the foestus possesses grills. For my part I freely admit that the sight of water in whatever form or shape is my most lively and immediate form of natural enjoyment: yes, I would even say that only in contemplation of it do I achieve true self-forgetfulness and feel my own limited individuality merge into the universe (Olson, 1993). Water is essential for every living things next to air, it is most necessary for sustaining man's, life. In the sap of plants, the bloodstream of animals water represents the great circulation of our planet and has covered the earth with evolving life and make the earth unique among the planets Pickford (1977). All efforts to promote growth and employment, to increase agriculture prosperity, to protect the environment and to revive our cities will be meaningless, unless we can meet society's need for water. Without water, the wheels of industry would grind to halt. Udoh (1978) realizes the importance of groundwater for many purposes.

He advises that long term solution to drought problems and fluctuation in water supply for agriculture and domestic purposes have among other through tapping underground water resources by digging bore-holes in many parts of Africa. Warner (1998) recognizes the vital role groundwater play in public water supply noting that its major problem is salt incursion especially when is excessively pumped. He reiterated that ground water movement is very slow and replenishment through precipitation takes a considerate time. Inspite of its inaccessibility, ground water supplies represents the largest store fresh water on earth Perira (1973) and Dijion (1985) testify that groundwater is commonly the only permanent and safe source of water which could utilized many purposes, hence the need to develop it. Describing a water supply scheme at Bara Banki (India) Cvyetanovic (1986) observes that the initial effects of water supply and sanitation in this town, besides being beneficial to health, also triggered economic developmental, prosperity and well being. Furthermore, Udoh (1984) and Ekpo (1980) in thir respective study of Calabar and Onna county show that influence of good water quantity on health in their area of study. Osi (1995) reinforced this idea by saying that the ravages of guinea worm in Nigeria are due to lack of potable drinking water.

In a related development, report of the secretary General of UN (1997) rightly points out that providing clean supplies of water and ensuring proper sanitary facilities would save millions of lives by reducing the prevalence of water diseases such as typhoid, malaria, hepatitis, bilharzi and diarrhea etc, thus finding solutions to these problems should become a high priority for developing countries and assistance agencies. Many studies link improvements in sanitation and provision of potable water with dramatic reduction in water-related morbidity and mortality. In 1991, over 100 studies were conducted of the effects clean water and sanitation on human health and result shows a median reduction in death from water related disease as 60% among people with access to portable water and proper sanitation as observed by Postel (1996). One major reason that greatly enhance the uses of water is sanitation. Increased awareness of people through education as regards the sanitary condition of their environment has equally resulted in the use of ample quantity of water in many parts of the developing word.

Progressive to improve the lots of those without water and sanitation has been advocated by WHO (1997) in her declaration, which state thus: "it remains a grave moral shortcoming that 1.2 billion people cannot drink water without risking disease or death. The reason is not so much a scarcity of water or inadequate technologies as a lack of social and political commitment to meeting the basic needs of the poor. It would take an estimated $36 billion more per year, equal to roughly four percent of the world's military expenditure to bring to all of humanity what most of us take for granted-clean drinking water and a sanitary means of wastes disposal". The above quotation shows the importance of water in bringing sanitation to all and sun dry in both developed and developing nations. Inspite of all efforts to bring sanitation to the doorstep of those in the third world countries, it remains a pipe dream to realize this noble objective as 2.6 – 2.9 billion people are without adequate sanitation between 1990 and 1997 Awake Magazine (June, 2001). Serageldin (1994) suggest that the first environmental priority of an average person is to secure an adequate water facilities thus only when the first service provision has been substantially met do house hold and the societies to which they belong start paying attention to higher order.

Findings

Quantity of domestic water use

The daily water need of most households in Port Harcourt city is governed by factors such as the volumes of domestic works, number of people in the households and water availability. There are many sources of domestic water supply in Port Harcourt city. These include pipe borne water, spring, water tanker, well, rain water and stream. The water board in Port Harcourt city has eight pumping stations spread all over the area. Some of these water works has a capacity 700,000 gallons (3150000 liters) and 500,000 gallons (2250000 liters) per day. The main source of water for these stations is ground water.

There are devated storage tanks with capacities of 400,000 gallons (1800000 liters) and 350000 gallons (1575000 liters) respectively for storing water. However, Table I revealed that residents in Port Harcourt City most depend on public tap as a source of domestic water supply in the area.

Table 1:Source of Domestic Water Supply in Port Harcourt City

Source	No. of Households	% of Sample
Public tap	160	53.3
Well	10	3.33
Private tap	120	40
Rain water	2	0.67
Water tanker	7	2.3
Stream	1	0.3
Total	300	100

Source: Field Work, 2008

The information gathered during the study revealed that the average daily distance of 940 and 930.05 metres are traveled by residents. While average daily quantity of 220 and 204 liters of water are used respectively. Whereas in G.R.A phase II and Town, average quantity of 435 and 418 liters of water with a corresponding average distance of 175.79 and 201.15 meters are traveled respectively. The implication of this result shows that people tend to use relatively smaller quantities of water if they have to travel longer distance to source of supply as seen in areas such as Rumuogba, Elekiah and Rainbow, whereas reverse is the case for those in Town and G.R.A. phase II area as presented in Table 2.

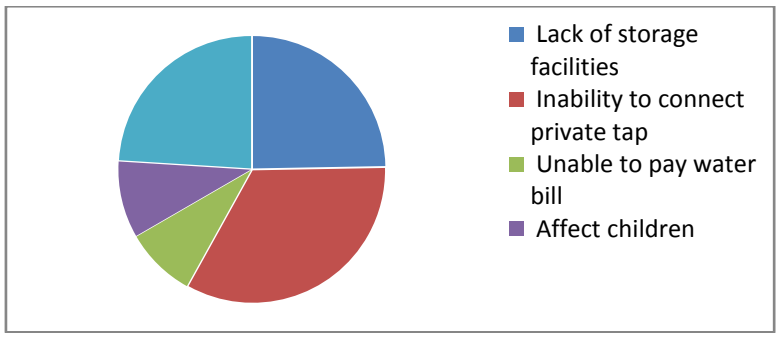
Table 2: Mean Household Domestic Water Use in Different Parts of Port Harcourt

Section	Mean Distance (in meters)	Average Quantity (in liters)
G. R. A. phase II	175.79	435
Town	201.15	418
Ogbunabali	255.28	375
Mile I	655.84	350
Rumuokwuta	590	345
Mile III	750.26	330
Rumuogba	810.18	230
Rainbow	930.05	204
Elekiah	835.05	201
Abuloma	940	220

Source: Field Work, 2008

However, to establish whether there was any relationship between the income of individuals and the quantity of water use in Port Harcourt metropolis, the hypothesis that there is a statistical significant relationship between income of individual and the quantity of the water use in Port Harcourt city was tested. The result shows that the calculated value 5.15 while the tabulated 2.306. The values shows that the null hypothesis was rejected at 0.05 significant level and 8 degree of freedom. Therefore income influences the quantity of water used by individuals in different sections of Port Harcourt. Domestic water supply in Port Harcourt city suffered a series of setbacks as presented in Figure 2. It was also discovered that the major constraints to domestic water supply in Port Harcourt was the problem of inability to connect private tap and lack of storage facilities as both had values of 33.33% and 24.7% respectively

Fig.1: Constraints to Domestic Water Supply in Port Harcourt



Source: Author's Field Work, 2008

Figure 1, revealed that 33.33% of the residents are private tap in their premises. It was also observed that the number of premises connected with private water have been declining steadily from 1998 to 2008 in contrast with expected number of premises in the respective years as present in Table 3.

Table 3: Number of Premises connected to Public Water Supply in Port Harcourt from 1998 to 2008

YEAR	NO. OF PREMISES	NO EXPECTED
1998	429	480
1999	395	500
2000	346	400
2001	302	510
2002	300	411
2003	285	504
2004	273	390
2005	266	400
2006	255	355
2007	237	328

Source: Rivers State Water Board (P.H), 2007

Table 4 illustrates the evaporation and rainfall situation in Port Harcourt for nine years (1997 - 2007). The table shows that evaporation increases during the dry months (December to April) in most of the years. However, there is great variation in rainfall during those years under review. These variation coupled with high evaporation affects the amount of water available during this periods. However, Table 4 indicate that August 2006 had the highest rainfall and evaporation rate compared to other years.

Table 4: Total Monthly Rainfall and Evaporation for Port Harcourt from 1997 – 2007

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec
1997 Rainfall	23.0	00	96.4	174.5	380.1	353.1	360.0	305.6	207.4	133.2	247.7	29.9
Evaporation	108.5	133.0	115.1	84.0	60.2	65.4	59.4	68.3	52.1	59.7	60.4	88.3
1998 Rainfall	22.6	36.9	87.6	188.0	279.1	414.6	369.8	247.3	489.1	49.0	136.7	32.0
Evaporation	115.5	96.8	93.2	91.2	73.6	66.7	42.5	62.0	49.5	385.7	63.0	127.8
1999 Rainfall	12.0	125.0	77.9	149.5	314.0	285.5	351.3	148.0	270.5	385.7	222.6	100.8
Evaporation	96.2	116.5	108.4	72.6	73.9	67.3	52.4	48.3	58.0	62.2	60.6	63.4
2000 Rainfall	000	000	47.9	16.2	54.7	128.5	291.0	165.0	410.0	23.0	161.0	63.4
Evaporation	129.7	98.6	94.5	102.4	78.2	57.8	62.6	40.9	53.9	55.3	61.5	78.8
2001 Rainfall	00	29.5	157.5	387.0	282.3	95.0	180.0	109.0	325.0	180.0	122.7	20.3
Evaporation	101.5	117.5	94.1	64.2	67.1	55.2	47.0	38.1	46.8	49.4	65.8	78.8
2002 Rainfall	10.5	11.5	38.4	165.2	431.3	425.2	430.3	411.7	313.9	209.1	229.2	65.9
Evaporation	112.1	96.5	171.3	94.0	73.2	62.5	52.8	59.7	43.5	48.9	50.3	78.2
2003 Rainfall	20.3	00	45.7	172.4	471.1	455.3	502.3	497.0	473.1	218.5	111.9	70.1
Evaporation	121.5	144.0	71.2	84.3	75.3	65.1	60.9	62.5	62.7	57.1	46.8	53.8
2004 Rainfall	000	36.7	50.3	153.5	373.2	351.4	401.4	531.7	511.1	345.6	204.5	100.0
Evaporation	119.1	148.2	81.5	71.4	63.4	60.5	68.8	71.0	59.3	63.4	41.9	39.3
2005 Rainfall	11.3	14.6	85.3	131.7	187.0	285.1	411.7	350.7	411.1	211.7	128.7	95.4
Evaporation	126.1	141.3	51.3	58.9	65.2	69.4	85.8	51.9	71.0	40.0	37.9	25.8
2006 Rainfall	10.0	000	000	30.9	209.5	301.7	411.8	590.0	301.0	200.0	103.7	59.9
Evaporation	110.4	100.1	121	105	41.8	61.7	87.9	95.1	45.0	35.1	40.1	25.7
2007 Rainfall	12.1	13.5	51.7	41.9	211.8	385.1	400.0	511.0	411.0	195.4	110.7	65.8
Evaporation	115.6	121.0	100.1	61.8	71.0	74.2	61.8	70.1	69.1	54.0	49.1	31.5

Source: Rivers State Niger Delta Development Authority Port Harcourt (2008)

Recommendations

Domestic water is of utmost importance to the inhabitants of any locality. Infact, water make human life possible and it is difficult to imagine any programme for human development that does not require a steadily available supply of water. It is very unfortunate that Port Harcourt the capital of the state whose name is synonymous with water has serious problem of domestic water supply. However, base on the result presented in the study, several recommendations were put forward to help solve the problems of domestic water supply in Port Harcourt city.

1. The state government as a matter of policy need to take some remedial measures to redress the ugly situation for efficient and effective operations of the water Board. It is imperative that enough fund should be allocated to the Board so as to enhance the operations, since most of the water Board's problems are traceable to insufficient finance.
2. Government should employ both skilled and unskilled staff to man the operations of the water Board and to undertake the necessary staff training schemes where the staff can be expose to certain related aspects of their work in water engineering management.
3. The renovation and improvement of water distribution network in different location of Port Harcourt is imperative some of the rusty pipes which cause such problems of poor colour and impurities should be replaced with plastic and asbestors pipe.
4. More borehole needed to be constructed by government to allow for constant supply of water.

There is also need for more over head tanks to enhance the availability of water throughout the year especially places such as Rainbow, Abuloma, Mile III Diobu and Rumuogba where people suffer chronic water shortage.

5. Government in collaboration with the water corporation should set up a monitoring team to check the activities of water vendors to ensure that water supplied to the public is palatable and pathogenic free. This will go a long way in reducing water related diseases.
6. High priority should be accorded research programs that provide knowledge necessary for sound management of water resources. If these plans are strictly adhere to with prudent financial management, the multiplicity of domestic water problems in Port Harcourt will be a thing of the Past.

Conclusion

The quality of water in Port Harcourt is generally poor because of the chemical content which is either too high or too low in contrast to WHO recommended standard, a situation that necessitate water treatment before use, climate, physical and socio-economic factors have been identified as the major constraint to water availability. The inefficient operation of the Water Corporation has discouraged many from connecting private water and this is of great concern to the Board and the Government. However, it is self evident that the quantity supplied varies widely and, moreso, the per capita consumption of 44.24 liters is low compare to 46 liters and 115 liters for developing and developed countries as asserted by Isaac (1965). Distance, seasonality of rainfall, income and social status influence availability of water residents of Port Harcourt. Nevertheless, it is pertinent to state that efforts at improving urban water supply should incorporate aims to curtail distance to source of supply, enhance even distribution, replace damage pipes and ensure constant supply so as to give the people a sense of belonging.

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