International Journal of Environmental Protection and Policy
2022; 10(2): 31-38
http://www.sciencepublishinggroup.com/j/ijepp
doi: 10.11648/j.ijepp.20221002.13
ISSN: 2330-7528 (Print); ISSN: 2330-7536 (Online)

Status of Public Water Supply Facilities in Port Harcourt Metropolis

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To cite this article:
Geraldine Okwy Ojukwu, Hycienth Ogunka Nwankwoala. Status of Public Water Supply Facilities in Port Harcourt Metropolis. *International Journal of Environmental Protection and Policy*. Vol. 10, No. 2, 2022, pp. 31-38. doi: 10.11648/j.ijepp.20221002.13

Received: March 14, 2022; **Accepted**: April 6, 2022; **Published**: April 29, 2022

Abstract: Providing drinking water in the wetland area of the Niger Delta has been a lingering problem for a number of reasons, chief among which is providing the infrastructure for water supply and maintainability of such facilities, given the general culture of negligence and penchant for vandalization of public facilities. This study aimed to assess the facilities at the Port Harcourt Water Corporation (PHWC) to ascertain the fitness to deliver water of satisfactory quality to the city. This survey focused on taking an inventory of PHWC facilities at Rumuola main Water station, Eagle Island Water Station, Borokiri Sandfill Water Station, Diobu Water Station, Earnest Ikoli Water Station, GRA Omerelu Street Water Station, Moscow Road Water Station, Elelenwo Water Station, Rumuokwurushi Water Station and Trans Amadi Water Station. On the state of facilities used by PHWC, it was observed that preponderance of the facilities were poorly maintained, overgrown with weeds, underutilized and were at various degrees of dilapidation and working below capacities except for Moscow Road Water Station which is fairly maintained and currently supplies water to some areas. As a recommendation, the planned Port Harcourt Water Supply and Sanitation Project (PHWSSP) should be pursued to completion and improvement to the facilities made urgently.

Keywords: Port Harcourt Water Corporation, Facilities, Water Supply

1. Introduction

Water is indispensable for hydration and, therefore, for life. For man, it serves for food preparation and cooking, sanitation and hygiene and a wide range of other uses. Drinking-water supply has a primary objective of protecting human health, including ensuring access to adequate quantities of quality water [1-3].

The main sources of drinking water are surface and ground water (accessed via borehole) [4]. In the Niger Delta, though surrounded by water, the main source of public water supply in the urban and semi-urban settlements is ground water [5-8].

In Nigeria major cities, water corporations (water board) are statutorily charged with providing water supply but they have failed to meet up to this expectation owing to a number of reasons. As is the case, so many households now have privately sunk boreholes to meet their need for water. In a study of the water supply management policy in Nigeria: challenges in the wetland area of the Niger Delta, Chukwu [9] reviewed literature on water supply management policies and other works and revealed that the challenges facing sustainable water supply in the Niger Delta include among others, lack of effective compliance to policies, poor state of infrastructure, low rate of costs recovery.

In the city of Port Harcourt, the Port Harcourt Water Corporation (PHWC) is the agency charged with the provision of quality drinking, whose operation is mainly concentrated within Port-Harcourt City and its environs which include Diobu, Borokiri, Moscow Road and Obio Akpor, with treatment plants at Rumuola, Eagle Island and Moscow Road. There are also sub-project sites which service various population/customers within Port-Harcourt namely: Diobu water station; Earnest water Ikoli; Omerelu Street, GRA Phase 2 overhead tank; Moscow Road water station; Elelenwo water station; Rumuokwurushi water station; and Trans Amadi water station. The nature of projects executed by the PHWC includes rehabilitation of mechanical and

electrical equipment, treatment plant rehabilitation, office/generator/pump house rehabilitation and replacement of decayed or dilapidated pipelines fittings and equipment.

This study aims to assess the current status of the public water agency in Port Harcourt, to indicate any major problems facing the PHWC in following up with environmental and social concerns and to enable users make informed decision to treat or not to treat their water before use.

2. Material and Methods

2.1. Study Area

Port Harcourt is the oil capital of Nigeria and the capital city of Rivers State lying at the South-South fringe. Port-Harcourt's urban area for 2021 population is now an estimated at 3,171,076 inhabitants, up from 302,023,2 as of 2020, having a 5.11% growth rate [10]. The locale that became Port Harcourt was before that time a cluster of fishing settlements, which later became the export route for imperialist trade.

Port Harcourt is featured by the Dockyard creek in the Southern part in a loop-like manner, while the Ntawogba River at the Western flank of the Amadi creek drains Rumuokwuta; GRA I-III; Ikwerre Road and Amadi flats. The hydrogeology of the state consists principally of freshwater continental friable sands and gravel with superlative aquifer features, recharged via precipitation (2000 – 2400mm) [11]. This area is abundant in biodiversity, with one familiar and distinctiveness being a distributary system with intertidal mud flat with assemblage animals (Clams, crustaceans, crabs, mollusc, burrowing worms, fish fry and juveniles, shrimp larvae etc.) present.

2.2. Study Population

The Port Harcourt Water Corporation (PHWC) has its operation mainly concentrated within Port Harcourt City and its environs which include Diobu, Borokiri, Moscow Road and Obio Akpor, with treatment plants at Rumuola, Eagle Island and Moscow Road. There are also sub-project sites which service various population/customers within Port Harcourt namely: Diobu water station; Earnest water Ikoli; Omerelu street, GRA Phase 2 overhead tank; Moscow Road water station; Elelenwo water station; Rumuokwurushi water station; and Trans Amadi water station, making a total of 10 of such facilities (Table 1).

Table 1. *Sampling locations and their coordinates.*

S/No.	Station	Coordinates
1	Rumuola main Water station	*N04°50'24.6"E007°00'19.4"*
2	Eagle Island Water Station	*N04°47'00.00"E006°58'46.9"*
3	Borikiri Water Station	*N04°44'38.1"E007°02'39.2"*
4	Diobu Water Station	*N04°47'12.2"E007°00'00.7"*
5	Earnest Ikoli Water Station	*N04°46'47.9"E007°01'04.0"*
6	GRA, Omerelu Street Overhead Tank	*N04°49'47.5"E007°00'04.2"*
7	Moscow Road Water Station	*N04°46'03.5"E007°01'06.3"*
8	Elelenwo Water Station	*N04°49'42.1"E007°04'28.3"*
9	Rumuokwurushi Water Station	*N04°51'53.8"E007°03'20.7"*
10	Trans Amadi Water Station	*N04°49'08.2"E007°01'51.7"*

2.3. PHWC Facilities Assessment

The methodology used for the facility assessment includes field and data collection followed by analysis of the collected information. General information, including technical data, was gathered through meeting key informants from the facilities and through observatory field visits. This environmental site investigation was based on the principles of objectivity and thoroughness. The study was based on working through the protocols, asking questions, and checking answers against site documentations.

3. Results

PHWC Facilities

Table 2 shows operational capacities of the PHWC water stations and their status as at the time of assessment. The facilities are generally underutilized and in poor working conditions. The status of the Rumuola Water Station facilities is presented in Table 3. It was observed the facilities were poorly maintained, working below capacity, armored cable vandalized by hoodlums at the transformer powering one of the 3 wells that are functional, collapsed fence at the back of the facility granting hoodlums access into the facility; and bushy fields covered most of the facility (Figure 1).

At Eagle Island water pumping station, not much activity was going on in this facility as equipment have been vandalized (Figure 2).

For Borokiri Water Station, at the time of visit the station was locked and access could not be gained to this facility. However, observations made showed that no activity has been going on in the facility for some time and the structures therein are under neglect (Figure 3).

Table 4 shows the status of facilities at Diobu water station. As observed, booster pumps no. 3 and 6 are functioning, but their faults are mainly mechanical; booster panel no: 3 and 6 are functioning; with a capacity of 864 cubic meters each; generator sets (2No), 725KVA and 875KVA, 725KVA functioning with minor issues (battery); poor drainage system, experiences floods during rainfall inside the powerhouse; overhead tanks (2) cylindrical and funnel, the cylindrical tank has a faulty valve; and the surroundings were bushy (Figures 4 and 5).

At Ernest Ikoli Water Station, generally, this facility looks abandoned as no activity was observed going there (Figure 6).

At Omerelu Street, GRA Phase 2 water station, the compound is presently used as a mechanic yard and waste litter the environment (Figures 7 and 8).

Table 5 shows the status of facilities at Moscow Road water pumping station. Moscow road water pumping station is fairly well maintained and currently and supplies water to Bennard Carr Street, Aggrey Road, Pott Johnson,

Reclamation (Macoba) Road, NPA axis etc. The water tank is normally washed once in a year. Figure 9 shows properly maintained water tanks and pumping station at Moscow Road water station. water leakages were observed along Aggrey road at the following locations and coordinates First Bank, Aggrey Road and 9, Aggrey Road, by Young Model Supermarket (Figure 10).

For Elelenwo Water Station, observations within this facility include: a borehole which is also not well maintained; abandoned generator set, two overhead tanks (one, in a bad state presently); and an open burning of waste close to fence wall (Figures 11 and 12).

At Rumuokwurushi Water Station, observations showed that the station is not functioning as most of the equipment have broken down and require major repairs (Figure 13).

At Trans Amadi Water Station, the facilities observed include four Boreholes (1 abandoned but converted into use by a Gas Company operating within the premises); one cylindrical overhead tank; and one contact tank. Open waste dumps also litter the surroundings of this station and some waste dumps have been burnt closed to the fence (Figures 14 and 15).

Table 2. *PHWC Water Stations and their Capacities.*

Station	Production capacity	Remarks
Rumuola main Water station	3,300m^3/hr	Functioning at 50% capacity
Eagle Island Water Station	150M^3/hr	Facility lacks resources for operation
Eagle Island Wastewater Treatment Plant	500,000l/day	Facility not functioning (under maintenance)
Borikiri Water Station	75m^3/hr	Under capacity utilization
Diobu Water Station	980m^3hr	Under capacity utilization
Earnest Ikoli Water Station	75M^3/hr	Abandoned facility
GRA, Omerelu Street Overhead Tank	1000m^3	Overhead tank not Functioning since construction
Moscow Road Water Station	300m^3/hr	Under capacity utilization
Elelenwo Water Station	50m^3/hr	Dilapidated/abandoned facility
Rumuokwurushi Water Station	75m^3/hr	Facility not working
Trans Amadi Water Station	300m^3/hr	Under capacity utilization

Table 3. *Status of Rumuola station facilities.*

S/N	Assets	Quantity	Status
1.	Boreholes	17	11 to be rehabilitated, 3 functioning and 3 abandoned
2.	Aerator		Functioning
3.	Generator Sets	2,1100kva generator sets; 350KVA at middle field and 500KVA at lower field.	Working status not ascertained
4.	Diesel Tank	Several	33,000l at upper field; 10,000 litres at middle field; 10,000l at lower field.
5.	Transformers	3No.500KVA	Not ascertained due to vandalization

Table 4. *Status of Diobu station facilities.*

S/N	Asset	Quantity	Status
1.	Booster Pumps	6	Only 2 functioning
2.	Booster Panels	6	Only 2 functioning
3.	Generator Sets	2 (725KVA & 875KVA)	Only 1 (725KVA) functioning
4.	Starter Panel	1	Functioning 30 Horsepower
5.	Contact tank	4	Functioning
6.	Overhead Tanks	2	Functioning (1 has a faulty valve)
7.	Sump	1	Over 500 cubic meters
8.	Ground Valve Chambers	1	Functioning (2 Valves)
9.	Diesel Tank	1	33,000 Liters.

Table 5. *Status of Moscow Road Water Station facilities.*

S/N	Asset	Qty	Status
1.	Boreholes	5	4 functioning but presently only 1 is in use.
2.	Booster pumps (Surface)	3	All functioning.
3.	Booster panels	3	All functioning.
4.	Pumps for opening of filter valves	2	All functioning.
5.	Scavenger pumps	2	All functioning for washing.
6.	Generator sets	2	500KVA each. Only 1 is functioning
7.	Transformers	1	500KVA.
8.	Diesel Tank	1	10,000 liters Functioning.
9.	Water filters (Tanks)	6	Filter medium for replacement
10.	Dossier points	2	Functioning, no treatment chemicals.
11.	Compressors	2	All functioning.
12.	Pump for the only functional borehole	1	Functioning, 30 Horsepower
13	Water monitoring Borehole	1	Functioning (used for groundwater monitoring)

Figure 1. *Dilapidated generator house showing vandalized armored cable at Rumuola water station.*

Figure 2. *Non-functional treatment tank at Eagle Island Treatment Plant.*

Figure 3. *An overhead tank at Borokiri Station.*

Figure 4. *Fairly maintained engine room and an overhead tank at Diobu Water Station.*

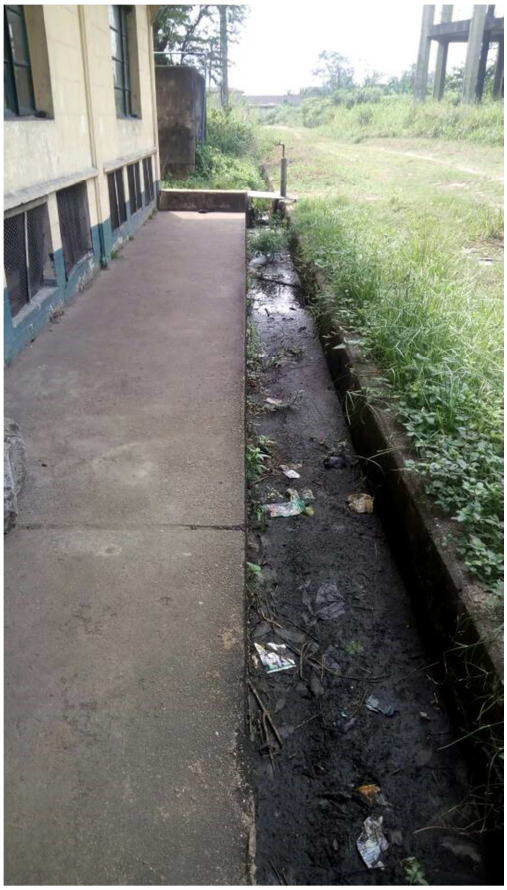

Figure 5. *Poorly maintained drainage and surroundings at Diobu Water Statio.*

Figure 6. *Abandoned structures at the Ernest Ikoli water station.*

Figure 7. *Overhead tank at Omerelu Street, GRA Phase 2.*

Figure 8. *Waste dump surrounding Omerelu Street overhead tank, GRA Phase 2.*

Figure 9. *Properly maintained water tanks and pumping station at Moscow Road.*

Figure 10. *Lines from Moscow station showing leakages and refuse.*

Figure 11. *Dilapidated overhead tanks and abandoned borehole at Elelenwo Water Station.*

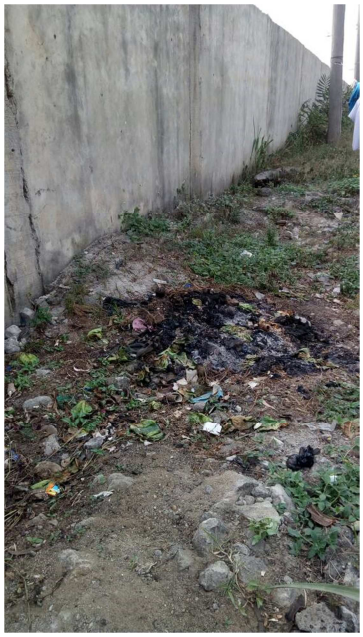

Figure 12. *Waste litter the surroundings of Elelenwo Water Station and burning of waste close to the fence.*

Figure 13. *The facilities at Rumuokwurushi Water Station under disrepair.*

Figure 14. *Borehole converted and put into use by a Gas Company operating within the premises.*

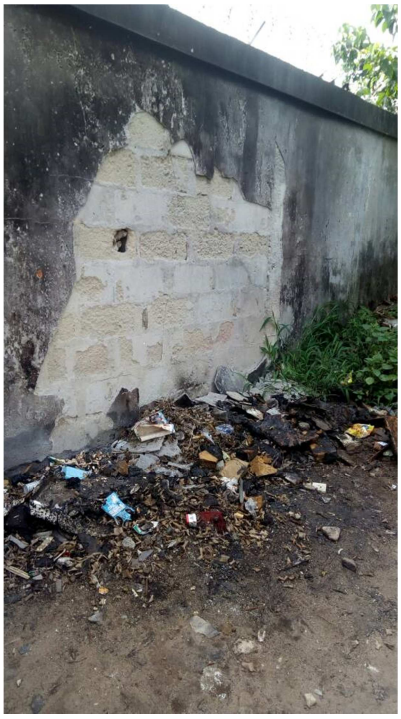

Figure 15. *Open burning of waste close to fence wall at Trans Amadi water station.*

4. Discussion

The need for potable water in our everyday life cannot be overemphasized because water is life. Drinking water that is free from pollutants and fit for drinking according to regulatory standards is what we all aim for, so the presence of pollutants in groundwater resources

constitutes a hazard in the utilization of water, particularly for household use.

On the status of the PHWC facilities, it was observed that most of facilities are underutilized and needing urgent rehabilitation and maintenance works. It was observed that the operation of the PHWC is not in compliance with the stated Nigerian regulations on the environment. Particularly, of note is the waste management practice in most of the facilities studied as the premises of operation were filthy or used for unsanitary purposes and some of the supply lines were leaking. This suggests the possibility for contamination of water supplied by the corporation. The general observation in most of the facilities can be summarized as follows: Some dilapidated and vandalized structures at the Rumuola facility; poor refuse disposal observed at Rumuola well field, Omerelu Street, GRA Phase 2, Elelenwo and Trans Amadi facilities respectively; drainages are not properly maintained in Eagle Island and Diobu water stations; flooding issues mainly noticed at Eagle Island and Diobu water station; generally, most of the facilities are poorly maintained; the facilities are also working below their respective capacities, with high rate of vandalization and stealing of assets recorded at Rumuola Water Station and Eagle Island Treatment Plant; broken down equipment observed in all the facilities visited; collapsed fence are also rampant as seen in some of the facilities; and almost all the facilities visited have bushy fields and untidy environments. However, it appears that only Moscow Road water station is fairly maintained and currently; supplies water to some areas including, Bennard Carr Street, Aggrey Road, Pott Johnson, Reclamation (Macoba) Road, NPA axis etc.

Groundwater has long been valued amongst the purest forms of water available in nature to meet the general demand for rural and semi-rural people [5, 12, 13]. Groundwater is a choice source of potable water for its widespread occurrence, availability, and constituent good quality across varied locale. This has been so for a better half of the last century, as it is in addition, highly dependable during dry seasons and substantially cost-effective during development [4, 14, 15].

For water corporations to be able to supply water of ample quality their facilities must be functioning optimally, to ensure that treatment to remove pollutants can be achieved and that treated water is shielded for recontamination during transport and storage.

5. Conclusion

This study has shown that preponderance facilities used by PHWC was poorly maintained, overgrown with weeds, underutilized and were at various degrees of dilapidation and working below capacities except for Moscow Road Water Station which is fairly maintained and currently supplies water to some areas. The study recommends that the infrastructures be properly secured against vandals. The abandoned borehole facilities at different locations should be rehabilitated and put to use and operations be made to conform to the statutory environmental standards applicable in Nigeria.

References

[1] Environmental Protection Agency (EPA) (2018). Drinking Water. EPA. Retrieved 23-01-2022 from: https://www.epa.gov/report-environment/drinking-water

[2] World Health Organization (WHO) (2005). Water For Life. Retrieved 23-01-2022 from: https://www.who.int/water_sanitation_health/waterforlife.pdf

[3] Ranjana, A. (2010). Physico-Chemical Analyisis of some Groundwater Samples of Kotputli town, Jaipur, Rajasthan. International Journal of Chemical Environmental and Pharmaceutical Research, 1 (2), 111-113.

[4] United Nations Educational, Scientific and Cultural Organization (UNESCO) (2019). Groundwater. Retrieved 23-01-2022 from: https://en.unesco.org/themes/water-security/hydrology/groundwater

[5] Tyagi, P., Buddhi, D., Choudhary, R., & Sawhney, R. L. (2000). Physico-Chemical Quality of Ground Water in Industrial Areas of India - A Review. EM International, 19 (3), 443-445.

[6] Udom, G. J., Nwankwoala, H. O., & Daniel, T. E. (2016). Determination of Water Quality Index of Shallow Quaternary Aquifer Systems in Ogbia, Bayelsa State. British Journal of Earth Sciences Research, 4 (1), 23-37.

[7] Udom, G. J., Ushie, F. A., Esu, E. O., & Oofojekwu, P. C. (2002). A Geochemical Survey of Groundwater in Khana and Gokana Local Government Areas of Rivers State, Nigeria. Journal of Applied Sciences and Environmental Management, 6 (1), 53-59.

[8] Tariwari, C. N., Angaye, Ohimain, E. I., & Mieyepa, C. E. (2015). The Potability of Groundwater in Bayelsa State, Central Niger Delta Nigeria: A Review. Journal of Environmental Treatment Techniques, 3 (2), 134-135.

[9] Chukwu, K. E. (2015). Water Supply Management Policy in Nigeria: Challenges in the Wetland Area of Niger Delta. European Scientific Journal ESJ, 11 (26).

[10] World Population Review. (2021). Port Harcourt Population 2021. Retrieved 23-01-2022 from: https://worldpopulationreview.com/world-cities/port-harcourt-population

[11] Olobaniyi, S. B., & Owoyemi, F. B. (2006). Characterization by Factor Analysis of the Chemical Facies Of Groundwater In The Deltaic Plain Sands Aquifer Of Warri, Western Niger Delta, Nigeria. African Journal of Science and Technology (AJST) Science and Engineering Series, 7 (1) 73-81.

[12] Agbalagba, O. E., Agbalagba, O. H., Ononugbo, C. P., & Alao, A. A. (2011). Investigation into the physico-chemical Properties and Hydrochemical Processes of Groundwater from Commercial Boreholes in Yenegoa, bayelsa State, Nigeria. *African Journal of Environmental Science and Technology*, 5 (7), 473-481.

[13] Ocheri, M. I., & Ode, O. O. (2012). Water quality from hand dug wells in Oju town, Benue State, Nigeria. *Nigerian Journal of Hydrological Sciences*, 1, 57-66.

[14] Adetoyinbo, A. A., Adelegan, F. T., & Bello, A. K. (2015). Environmental impact assessment of the potability of water from bore-hole, hand dug well and stream at Itagunmodi gold deposits Southwestern, Nigeria using FORTRAN algorithm for monitoring leachates and interpreting physicochemical data of contaminants in groundwater. *academicjournals*, 7 (1), 1-6.

[15] Oborie, E., & Nwankwoala, H. O. (2012). Relationships Between Geoelectrical and Groundwater Parameters in Parts Of Ogbia, Bayelsa Sate, Central Niger Delta. *Continental J. Earth Sciences*, 7 (1), 29-39.