THE PROSPECTS OF WATER RESOURCES DEVELOPMENT IN LAGOS STATE, NIGERIA

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Abstract - It is common knowledge that the quantity or quality of fresh water resources imposes limits on present use of the resource and on economic and social development of most Countries. Most face the common problem that existing policies and strategies, and the institutions to implement them, are inadequate to meet water use needs and sustainable development. In particular, the peculiarity of Lagos within the fabric of the corporate entity called Nigeria with the highest rate of urbanization in the country and migration from all parts of the Nigeria and even beyond presents the daunting challenge of ensuring that the State is able to provide adequate access to water supply and wastewater management services while preserving the integrity of the water resources of the State.

Key words - Prospects, water resources, supply, quality, waste, and Lagos state

I. INTRODUCTION

With a geographical size of 3,577 square kilometers, Lagos State is one of the smallest states in Nigeria, representing 0.4% of the entire geographical area Nigeria. Lagos State is located on the South-Western part of Nigeria on the narrow Coastal flood plain of the Bight of Benin. Lagos State has an area of 356,861hectares, out of which 75,755 hectares are wetlands with the dominant vegetation of tropical swamp forest, comprising fresh waters and mangrove swamp forests (See Figure 1). It shares a double rainfall pattern, with two climatic seasons – Dry (November-March) and wet (April-October). The drainage system of the State is characterized by a maze of Lagoons and waterways which constitute about 22% or 787 sq. km of the State total landmass. The state has the highest population in the country, with over five percent 5% of the national estimate. The 1991 National Census figures put the population of the State at 5,725,116, out of a national estimate of 88,992,220. The UN Habitat Study and the UNDP assisted state Regional Master Plan estimated Lagos State population in year 2000 at 13.4million and over 15 million inhabitants in 2004.

The recent UN study (1999) expected the City of Lagos to hit the 20million population flux in Year 2010, thus progressively reaching 24.5million population in year 2015, at which time Lagos will be the third most populous city in the world.



Figure 1. Lagos State Map

Water, a unique resource on the planet earth, is essential for sustaining all forms of life, food production, economic development, and for general well being of the life on the planet.

II. STATE OF WATER RESOURCES IN LAGOS STATE

2.1 Surface water

Surface water in Lagos State is composed of the following four parts: natural runoff, water resources entering Lagos, water leaving the city and entering the sea, and water transferred from other watersheds.

2.2 Lagos Water Corporation

The major water bodies in the state are the Lagos and Lekki Lagoons, Yewa and Ogun Rivers. The raw water supply is obtained by the Lagos Water Corporation (LWC) mainly from two rivers, the Iju and the Owo (170,000 and 265,000 m3 per day respectively).The location of the state within the coastline implies that it is vulnerable to climate change, while its high urban population implies that provision of potable drinking water by the state's water utility- the Lagos Water Corporation will be a major challenge. The Lagos Water Corporation is in charge of supplying drinking water services to all parts of urban and semi urban areas of the state. However, the size and growth rate of Lagos means that needs are growing very rapidly. The Lagos Water Corporation currently has an installed water supply capacity of 160 million gallons per day (MGD) (712.9 million litres per day (MLD)), but ageing supply lines, water works and poor public electricity hamper the services of the corporation, hence it is operating at only 48% capacity, or only 36% of water demand. It supplies water to about 60% of the population. Only about 4million of the state's 15million population have access to piped water. The general shortage of water supply that is a result of this low capacity utilization is then met by privately

operated tankers, porters and privately owned boreholes and wells. This in turn has its own issues with regards to water purity standards, higher delivery costs and the ultimate impact on the state's water levels from the improper tapping of ground water reserves and wastage in its collection and delivery.

Generally, integrated demand-side as well as supply-side strategies should be adopted to ensure water supply during average and drought conditions.

From the foregoing, it is obvious that Lagos state is likely to be adversely affected from climate change. The challenge remains the capacity of appropriate agencies to effectively explore the possible extent of the impact, discuss what can be done to reduce the adverse effects, and make policy reviews and development to address the impacts. However, current water management practices of the Lagos Water Corporation, may not be robust enough to cope with the impacts of climate change on water supply reliability, flood risk, health, agriculture, energy and aquatic ecosystems. Therefore to address these challenges the Lagos State Water Corporation needs to set up a Desk on Climate change to study the likely effects of climate change on water supply in Lagos state and come up with mitigation and adaptation strategies.

III. DRINKING WATER SUPPLY IN LAGOS STATE

Safe Water is a renewable resource required to keep and maintain a state of Positive health and well being. Much of the ill health which affects humanity, particularly in the developing countries can be traced to lack of safe and wholesome water supply. Therefore water is not only a vital environmental factor to all forms of life, but it has also a great role to play in socioeconomic development of human population. To ensure that water consumed by human population is safe and wholesome, adequate monitoring, evaluation and Quality Assurance of Water become necessary

3.1 Drinking Water – (NSDWQ NIS 554:2007)

All water either in its original State or after treatment, intended for drinking, cooking, food preparation or other domestic purposes, regardless of its origin and whether it is supplied from a drinking water system, or a tanker or taken from a private well.

(i) All water used in any food production undertaking for the manufacture, processing, preservation or marketing of products or substances intended for human consumption.

3.2 Categories of Drinking Water

i. Water produced by Lagos Water Corporation
ii. Water supplied by community managed drinking water system
iii. Water supplied by water vendors and water tankers
iv. Water used in public or privately owned establishments
v. Water used in food processing by manufacturers
vi. Water from privately owned drinking water system and used solely for the family residence e.g. boreholes and well
vii. Packaged Water- Bottled water and sachet water

3.3 Drinking Water Quality Surveillance

This involves water tests, sanitary inspections and spot checks conducted by LSDQCL to ensure that Lagos Water Corporation meets the standard. Sampling – this is the collection of water samples from the sampling points or compliance points inorder to measure compliance with maximum allowable limits.

There are 55 sampling points sited at different locations within the state. Each of the sampling points is visited for sampling of water six (6) times in a year.

Table of sampling points and locations List/Distribution of Sample Collection Location in the 27 Zones

GROUP	NAMES OF THE ZONES	SAMPLING POINTS	MONTH
A	IKEJA I IKEJA II IPAJA/SHASHA IDIMU	3 4 1 1	JAN4thWeekGroups I & II
B	ISOLO MUSHIN OSHODI ILUPEJU	2 2 1 1	JAN 5th Week Groups III&IV
C	IWAYA YABA LAGOS ISLAND	1 2 3	FEB1st Week Groups I & II
D	OGUDU ISHERI OKE IFAKO IJAYE AGEGE	3 2 2 2	FEB2nd Week Groups III& IV

E	ITIRE SURULERE	3 3	FEB 3Rd Week Groups I & II
F	APAPA AJEGUNLE OWODE TRUNK MAINS BADAGRY V/ISLAND ANNEX VICTORIA ISLAND	3 2 1 1 1 2 3	FEB 4th Week Groups III &IV
G	IKORODU EPE LEKKI	1 1 2	MARCH 2ndWeek Groups III& IV
TOTAL	27	55	

3.4 Standards for Drinking Water Quality

A standard for drinking water quality sets parameters and maximum allowable limit in drinking water.

It ensures the safety of drinking water supplies and theprotection of Public Health.Nigerian Standard for Drinking Water Quality (NIS 554:2007) developed by Standard Organisation of Nigeria(SON)

i. National Guidelines and Standards for Water Quality in Nigeria
ii. Nigerian Industrial Standards for Mineral Water (NIS 345:2003) and Portable Water (NIS 306:2004).
iii. The World Health Organisation (WHO) guidelines for drinking water quality
iv. International Organisation for Standardization (ISO)
v. National Guidelines and Standards for Water Quality in Nigeria

The Nigerian Standard for Drinking Water Quality sets parameters and maximum allowable limits in drinking water in Nigeria.

It contains mandatory limits concerning constituents and contaminants of water that are known to be hazardous to health and or give rise to complaints from consumers. It includes normative references/Laws guiding drinking water quality, definition of terminologies, institutional roles and responsibilities monitoring, data management and compliance criteria

Parameters and maximum allowable limits Physical/Chemical Test

S/N	DESCRIPTION	ACCEPTABLE LIMIT(POTABLE)
1	Appearance	Clear &Colourless
2	Odour	Odourless
3	pH @ 25^{o}C	6.5 – 8.5
4	Temperature (^{o}C)	Ambient Temp
5	Salinity (g/Kg)	-
6	Phenophthalein Alkalinity (mg/L)	100
7	Total Alkalinity (mg/L)	100
8	Total Hardness (mg/L)	150
9	Total Solid (mg/L)	500
10	Turbidity (FTU)	5
11	Chloride (mg/L)	250
12	Calcium (mg/L)	75
13	Sulphate (mg/L)	100
14	Conductivity (uS/cm)	1000
15	Lead (mg/L)	0.01
16	Magnesium (mg/L)	20
17	Iron (mg/L)	0.3
18	Free Chlorine (mg/L)	0.2-0.25

Microbiological Examination:

S/N	MICROBIAL GROUP	ACCEPTABLE LIMIT
1	Total Aerobic Mesophillic Count	100CFU/ml
2	Coliform Count	0 CFU/ml
3	Total Coliform Count	NIL
4	Escherichia coli	Absent
5	Vibrocholerae	Absent
6	Salmonella spp.	Absent
7	Enterococcus faecalis	Absent

IV. WASTEWATER MANAGEMENT IN LAGOS STATE

Mandate of Wastewater Management in Lagos State are Follows;

- Provision of Decentralized Wastewater Systems In Built-up Part of the State: General Provisions for Cluster Systems.
- Provision of Decentralized Wastewater Systems In Built-up Part Of The State -(Strategy for efficient Wastewater Management in Lagos State).
- Guidelines Developed and Embraced by All Stakeholders

4.1Residential Districts

When the proposed project is in a community with an existing wastewater collection system, the community's historic records provide the best estimate of wastewater production. Conversion of total wastewater flow to a per capita basis allows for the separation of population growth from the growth in unit production of wastewater.

4.2Commercial Districts and Institutional Facilities

Estimates for commercial wastewater flows range from 7.5 to 14 m 3 /ha · d (cubic meters per hectare per day)(Metcalf & Eddy, 2003).

4.3Industrial Wastewater Flows

If the water requirements of the industries are known, estimates of wastewater flow may be made by assuming about 85 to 95 percent of the water used becomes wastewater when internal recycle is not practiced.

A typical design value for estimating the flows from industrial districts that have few wet processes is in the range 7.5 to 14 m 3 /ha · d for light industrial development and 14 to 28 m 3 /ha · d for medium industrial development (Metcalf & Eddy, 2003).

4.4 Infiltration and Inflow

The extraneous flows in sewers are defined as follows (Federal Register, 1974):

- Infiltration. The water entering a sewer system, including sewer service connections and from the ground through foundation drains, defective pipes, pipe joints, connections, or manhole walls. Infiltration does not include inflow.
- Inflow. The water discharged into a sewer system, including service connections from such sources as roof downspouts (also called leaders); basement, yard, and area drains; cooling-water discharges; drains from springs and swampy areas; manhole covers; cross connections from storm sewers and combined sewers; catch basins; storm water; surface runoff; street wash water; or drainage. This category is further subdivided as:
- Steady inflow. • Direct inflow.

CONCLUSION

It is common knowledge that the quantity or quality of fresh water resources imposes limits on present use of the resource and on economic and social development of most Countries. Most face the common problem that existing policies and strategies, and the institutions to implement them, are inadequate to meet water use needs and sustainable development.

In particular, the peculiarity of Lagos within the fabric of the corporate entity called Nigeria with the highest rate of urbanization in the country and migration from all parts of the Nigeria and even beyond presents the daunting challenge of ensuring that the State is able to provide adequate access to water supply and wastewater management services while preserving the integrity of the water resources of the State.

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