Feb. 2014. Vol. 1, No.4 ISSN 2311-2484
International Journal of Research In Earth & Environmental Sciences

http://www.ijsk.org/ijrees.html

WATER SUPPLY SITUATIONS IN KANO METROPOLITANT PROSPECTS AND CHALLENGES

Nura Isyaku Bello 1 And Ibrahim Kabir Abdullahi 2

Fatih University, Department Of Geography, 34500, Buyukcekmece / Istanbul
1 Ma Student, Isyakunura@Gmail.Com, 2ma Student, İkabdullahika@Gmail.Com

ABSTRACT

The research of water supply situation in Kano metropolitant is very significant. This is because of the fact that the population of Kano especially metropolitant area is growing rapidly due to migration and their is also rapid growth of industrialization. Secondary method was used for this research work because the reserach was solely depends on data from institutions responsible for water supply in the state. The collected data were analysed using statistical techniques such as tables and other illustratives methods. The reserach was able to identify main sources of water in the study area, total water supply and corresponding demand in the study area and also identify some obstacles that hindered smooth running of water supply and finally the research suggests solutions to curtail the identify water supply problems in the Kano metropolitant.

Key words: Water demand, water supply, Kano metropolitan

1.INTRODUCTION

The system of water supply in Kano is traditionally oriented, local and outdated equipments are still in used for water supply. As such, private individuals also engaged in water supply by using distribution tankers and water vendors. Similarly, the existing infrastructural facilities used for water supply are not maintain regularly and errati power supply to run the machinery for better supply, even the places with pipe borne water supply, the supply is irregular (Olokesusi, 2004).

The increasing pressure on world water available resources shows that unless its management was effectively improved, a serious water shortage that can sustain future population growth will prevail (Biswan, 1978). This is because the world water supply will become insufficient through mismanagement, pollution, poor conservation.

Recently the drought and flood in Nigeria and several different parts of the world's draw the attention of stakeholders for effective planning of water resources in Nigeria. Water resources are found to be non-renewable resources. Therefore, it's better to stop the current rate of mismanaging and destroying the water sources in order to avoid its persistent shortages. It can be transformed from one form to another depending upon the environmental and technological act upon it (Kavanagh, 1967).

More than one billion people do not have access to adequate water especially in the urban areas of the developing world, about 70% of the population had access to pipe water supply and more than 150 million people in the low income do not have the supply at all (Farouk B. B, 1987).

The demand and supply of water in relation to per capita income is the great concern of developing nations, where demand exceed corresponding supply capacity of the populace. Domestically, water is used for drinking, cooking, among others. It is equally essential in agricultural and industrial (Howard, 2003).

According to David (1969) pointed out that in near future there will be much more demand of water due to rapid increases in population and industrialization. The research further stated that the consumption by industries sometimes affect domestic supply, to minimize this problems, research suggested that there are need for industries to reduced wastage to

minimum and to return what is left to river in a fit state for use by the consumers.

The rapid growth rate of the population presently has significant impact on the water supply in Kano State. Drought and rainfall seasonality are the main features associated with Sudano-Sahelian area (Sawa, 2002), these decreases in rainfall intensities and increasing dry season (Ojonigu, 1990). The combined effects of drought and high evaporation in the area, increases the water the deficit, which signifies scarcity (Salama and Okafor, 2003). The per-capita domestic water consumption when compared with the increasing population of the area has rise significantly this has already define an increasing domestic water demand in an established low water supply.

However, Tiga dam operate below utilization capacity design. The Kano city water supply expansion is in progress and the main irrigation projects along Kano River still not completed. There is clear evidence of climate change in Kano, due to decrease in rainfall received annually, from 1961 to date (Dupreez, 1965).

Potable water supply in Kano state is facing serious challenges because of rapid population growth, urbanization, budgetary constraints, corruption, and imperatives of development and social equity. Despite huge amount of money invested in water supply projects, but still the supply is facing serious problems of growing population and development of new sources of water is increasingly become capital intensive. Rapid population increase in the study area is as a result of natural increase i.e. birth rate and migration from rural areas into Kano metropolitan and other urban centers in the state from different rural areas within and outside the state which lead to high concentration of people in the Kano metropolitan, which in turn affect water the supply tremendously. Similarly, increase in income level raised living standard, which also lead to high water consumption. Definitely, increase in population will exert high pressure on available water resources and infrastructural facilities use for water supply, for different types of uses intended. Hence, there are needs to critically study water demand of the populace and the current supply, so as to know whether supply satisfy the demand or not, and what are the main constraints/ problems of potable water supply. The purpose of this research work is to evaluate the water demand and supply, because the knowledge of water demand and supply will yield economic benefits through increasing efficiency, greater equity, reduce environmental damage and greater public participation.

Kano state was created by military Government in the year 1967. Before the creation of the state the central government aware of huge number of water bodies such as rivers, streams and abundance subsurface water which exist in several part of northern region which when harnesses and utilized it can be used for several developmental purposes. The government sponsored several studies to explore and identify areas with water resources potentiality. These studies find a huge amount of water resources in the area. The first administration gives water resources development high priority, after creation of Kano state. The first water resources development plan cover between the years of 1968 to 1980 was put in place. This plan resulted in the construction of 22 dams. The water in these reservoirs becomes the main sources of water supply to various water treatment plants and irrigation (Parkman Ltd, 2000).

The provision of potable water in Kano state is part of a coordinated development programme for rural development is seen as an essential service imperative to the entire state development (Macdonald's and Partners, 1986). Three governmental organizations were responsible for provision of water for the entire state; namely, Water Resources Engineering and Construction Agency (WRECA), Kano State Water Board, Ministry of Water Resources. Similarly, local government's authorities are promoting their own groundwater supply programmes. Groundwater exploitation by these agencies is carried out by sinking of hand-dug, concrete limed wells and drilling of abstraction boreholes all located in geologies.

The public water Supply in Kano state was started by Kano Native Authority (NA) during colonial administration before creation of the state in 1967. The water supply is control by water division of ministry of work and survey after Kano state creation. In 1975, water resources development agency was created by Kano state named it as water resources and engineering construction agency popularly known as WRECA, which carry out research on water resources development and supply water to the State. WRECA was able to realize over 90% of water supply facilities and infrastructure in the state. Three water bodies were resulted after

WRECA was splitted in 1990; namely, Kano State Ministry of Water Resources, Kano State Water Board and the newly established WRECA. The new WRECA take care of developing and maintaining water resources facilities in the state. The Water Board is control process of water supply in urban and semi-urban centers while the water board activities over see by ministry of water resources.

There are serious problems in Urban Water Sector (UWS) in Kano as it is in several urban centers; this means high demands because of high populations and high water usage. Almost all cities exhaust, contaminate and vandalized most of their water sources such as rivers, lakes and in most case groundwater are inclusive. The precipitation is usually considered as unfortunate instead of blessing as it leads to flooding due to the blockage of drainage systems. Water resources having misused, mismanaged and local sources was contaminated after incessant neglect the local water potential, all urban centers are continuously looking for another new alternative water sources to meet its populace demands (KASEPPA,1990).

Kano State Water Board was officially enacted by Kano State Edict No. 3 of 1993. Its responsibility includes treatment, distribution and public enlightenment on water preservation. The board supply public stand taps free to the less privilege of the society but nowadays to vendors those sell water to hawkers. The activities of water board are support by law. It opportunities includes skilled personnel. The board shortcomings are shortage of money, and mismanagement, bribery as well as incessant power shortage. Presently, it has more 18 Water Works with capacity of producing more than 350 million litres daily to the state and its environs. In terms of Performance, The KNSWB lack enough infrastructural facilities to satisfy the water demand, only less than 60 % of the demand the board was able to meet.

The aim of this research work is to examine the water supply situation in Kano metropolitan. The main research questions of this study are:

1. What are the main sources of potable water in Kano metropolitan?

2. What is the potable water demand and supply in Kano metropolitan?

3. Is there any potable water deficit in Kano? If yes, what are the solutions to the problems?

2. METHODOLOGY

This research work solely depends on of secondary data. These data were derived from some institutions that are related to water supply in Kano metropolitan such as Kano State Water Board and Water Resources Engineering and Construction Agency as well as National Population Commission. The collected data were analyzed using descriptive statistics such as Tables and chart as well as other illustrative.

3. GEOGRAPHICAL DESCRIPTION OF STUDY AREA

Kano State is located in the northern part of Nigeria. The state has total land mass of 20,131 km2. It's bounded by Katsina on the west, by Kaduna State on the south-west and by Jigawa and Bauchi on east and southeast respectively. The state has 44 local government areas and divided into three different zones, named as Kano Central, Kano South and Kano North.

The state has the highest population in Nigeria, with population of 9,383,682 and population density of 470 per/sq km (NPC, 2006). The Kano metropolitan alone has the population of 2,163,225 (NPC, 2006). The currently rate of population growth in the state is 2.9% per annum.

Presently Kano state has the highest number of dams in Nigeria. Some of the dams located in the state are Challawa Gorge dam, Tiga dam, Thomas, Watari dam, and Kussalla dam (Mbagwu, 1994). The two larger rivers found in Kano contain water throughout the year and most of the streams are seasonal in nature. Tiga and Challawa dams are among the largest dams in Africa. These two dams were constructed by Kano state government in the 1970s. These rivers are dammed to stored huge amount of water in surface reservoirs for various purposes.

The state has about three distinct vegetation types. It begins from southern part of the state as guinea savanna, and then followed by Sudan savannah

which is scatted trees and more grasses and shrubs. Finally the third type emerge which dominate the extreme northern part is Sahelian vegetation forms.

The basement complex of Kano is mostly weathered rock. Water table in the state were found in dept less than 20 m depth and less than 8 m in some places and boreholes it goes to up to 60 m. Hydraulic conductivity of the aquifer ranges from 0.039 to 0.778 m/d and permeability differs from 3.756 to 36.600 m2/d(Mohammed, 1984).

4. RESULT AND DİSCUSSİON

4.1. Sources of Water in Kano metropolitan

The ultimate sources water resources in any given society are precipitation so also in Kano. The water was collected from surface and ground water deposit. Many water reservoirs were constructed for decades in the state in order to supply water to the state, so also boreholes and wells were constructed for water supply. Thus, this research was able to identify the main water sources in the study area as pipe water, borehole, hand pump and wells. Kano State Water Board charged with the responsibility of water distribution to Kano metropolitan. The Ministry of Water Resource is the supervisory agency in terms of water supply in state.

4.2. Greater Kano Supply

The urban area of Kano comprises of six local government areas. Namely; Tarauni, Dala, Fagge, Kano Munincipal, Gwale and Nassarawa, with population of 2, 163, 2225 (NPC, 2006), while the metropolitan comprises of eight local government area, the above six mentioned, with addition of Ungogo and Kumbotso with total population of 2,828,861 (NPC, 2006). The water treatment plants supply water to the Kano metropolitan local government areas and its surrounding are Challawa and Tamburawa as well as Watari water work.

A Challawa water works was constructed by the Water Resources and Engineering Construction Agency, Kano between the years of 1990 to 1992. It has 42m high and 7.8 km length, with storage capacity of 904,000,000 m3. It has direct catchment area of 3857 km2. The water is currently used only to supply Kano city.

The water work has three distinct phases, namely first, second and third Challawa water work. The first water work started in 1932 with capacity of supplying 20 million litres to the metropolitan of Kano. The second and third Challawa water work was established in the year 1974 and 1992 respectively with capacity of supplying 90 million liters to greater Kano each.

The Tamburawa water work are named as old and new Tamburawa, Old Tamburawa water works commenced in 1986 with capacity of 9.6 million liters of water and then it was upgraded to supply 20 Million litres, and New Tamburawa water treatment plants has the capacity to supply 150 million liters of water to the Kano city and its surrounding environs.

Watari water work located in Bagwai Local Government, which is about 18km, Northwestern part of Kano between latitudes 1206’ 54.54’’N and 120 9’ 17.8’’N and longitudes 08011’ 50.62’’E and 080 16’ 28.05’’E and its play significant roles in water supply to Kano city. It has the capacity of producing 45 million liters of water.

S/N	Name of treatment plant	Capacity (ml)	Year of establishment
1	1st Challawa water work	20	1932
2	2nd Challawa water work	90	1974
3	3rd Challawa water work	90	1992
4	Old Tamburawa water work	20	1986
5	New Tamburawa water work	150	2008
6	Watari	45	2010

Month	watari (L) month	
	Raw water	Treated water
Jan	627,687,000.00	537,477,000.00
Feb	542,112,000.00	484,168,000.00
Mar	872,534,606.00	618,340,480.00
Apr	875,350,000.00	568,731,000.00
May	445,340,000.00	303,652,000.00
Jun	412,640,000.00	302,467,000.00
Jul	274,859,000.00	231,974,000.00
Aug	265,489,000.00	244,995,000.00
Sept	233,015,000.00	216,231,000.00
Oct	300,652,000.00	281,569,000.00
Nov	321,203,000.00	297,637,000.00
Dec	277,093,000.00	244,220,000.00
Total	5,447,974,606.00	4,331,461,480.00

TABLE 4.1. WATER TREATMENT PLANTS FOR

Month	Tamburawa (L) month	
	Raw water	Treated water
Jan	2,958,000,000.00	2,644,000,000.00
Feb	2,113,000,000.00	1,853,000,000.00
Mar	2,217,000,000.00	2,060,000,000.00
Apr	2,217,000,000.00	1993,000,000.00
May	2,145,000,000.00	1,987,000,000.00
Jun	1,971,000,000.00	1,773,000,000.00
Jul	2,298,000,000.00	2,134,000,000.00
Aug	2,272,000,000.00	2,088,000,000.00
Sept	2,367,000,000.00	2,134,000,000.00
Oct	2,262,000,000.00	2,031,000,000.00
Nov	2,061,000,000.00	1,824,000,000.00
Dec	2,231,000,000.00	2,059,000,000.00
Total	24,580,000,000.00	24,580,000,000.00

GREATER KANO SUPPLY

Source: Kano State Water Board, 2013.

It was stated clearly in table 4.1. that the water treatment plant of Challawa and Tamburawa and Watari combined have design capacity of supplying large quantity of water to Kano metropolitan about 415 million liters. These clearly show that Kano metropolitan alone needs huge amount of water for its populace.

TABLE 4.2. PRODUCTION DATA FOR GREATER KANO WATER SUPPLY

Sources: Planning Research and statistics, 2012 production data for greater Kano production (KSWB, 2013).

Its shows in table 2, that the three giant water treatment plant in Kano does not satisfy their installation capacity designed to achieve. For example Challawa water treatment plants has the design capacity of supplying 200 million liters but hardly the supply exceed an average of 115 million liters only about 57.5% so also Tamburawa which has the capacity of producing 170 liters end of in supply only an average of 70 million litres about 41.2%, and Watari with design capacity of producing 45 million litres but is able to supply only 15 million litres about 33% only.

Kano state is yet to provide adequate water supply to its population. The water supply does not satisfy the demand because the supply encountered with a lot of problems. The total water demand of Kano metropolitan presently is estimated to reach about 550 million liters per day but the whole water work is able to supply only 200 million litres per day, about 36%. It's very clear that the demand is far away from the supply. This shows that the government alone cannot satisfy the demand of the public. It's obvious from the above table that Kano metropolitan required huge quantity of water because of the following reasons (1) high concentration of industrial and commercial activities which consumes large quantity of water. For examples in greater Kano metropolitan there are over 300 large and small scale industries, these industries directly or

indirectly requires water for their normal operation. Most of these industries are tanneries industries, food and beverage industries and agro alliance industries these types of industries needs large amount of water. (2) commercial activities such as markets, banks and hotels needs much water, there are more than 360 commercial account in Kano metropolitan all these consumes more water for sanitation, public conveniences and so on. (3) The life styles of city resident differ with those living in semi-urban areas and villages, in city an individual may take shower 2-3 times a day while village one can pass a day without showering.

The total water demand of Kano metropolitan presently is about 550 million liters but the whole water work is able to supply only 200 million litres, about 36%. It's very clear that the demand is far away from the supply. This shows that the government alone cannot satisfy the demand of the public as a result community, private individual like commercial water vendors and philanthropist come in to supplement government effort in water production in Kano city. Majority of these water vendors are collecting water from boreholes at sell it to public at an average rate of 20- 30 NGN (0.19 USD) per 25 liters depending on the proximity to the source of water supply. Similarly, community and philanthropist construct boreholes and dug well for public but most of these well get recharge during rainy season but when its dry season the water get exhausted as such people have to buy water or get it from community or philanthropist boreholes which is most cases one have to join a long queue before fetching water.

Month	Challawa (L)/ month	
	Raw water	Treated water
Jan	3,612,941,600.00	3,483,570,432.00
Feb	4,809,096,000.00	4,620,549,000.00
Mar	4,362,870,000.00	3,915,666,000.00
Apr	4,396,900,000.00	4,060,932,000.00
May	4,103,300,000.00	3,958,235,000.00
Jun	3,709,820,000.00	3,474,635,000.00
Jul	3,359,394,000.00	3,172,605,000.00
Aug	4,055,014,000.00	3,839,405,000.00
Sept	2,722,592,000.00	2,485,949,222.00
Oct	2,794,320,000.00	2,632,156,000.00
Nov	2,835,018,000.00	2,686,577,000.00
Dec	3,228,480,000.00	3,070,245,000.00
Total	43,989,745,600.00	41,400,524,654.00

5. CHALLENGES FACING WATER SUPPLY IN KANO METROPOLITAN

The distribution of water to the Kano metropolitan encountered with a lot of problems. These problems are can be financial or otherwise. These includes

5.1. Power Supply

The power is very necessary for efficient working of water treatment plants machinery. There is irregular electrical power supply from Nigerian power holding company which hampers the smooth operation of water supply system. The power supply is erratic and can hardly last for 10 hours, despite the fact that water board has some arrangement with power holding company. As a result of power failure to run the machinery, pumping installation mechanism are not functioning well, as a result of this the water board resort to use diesel as an alternative to supplement power but the cost of diesel is very high too, this drastically affect water supply.

5.2. Insufficient Fund

Lack of enough capital to efficiently run the water sector in Kano state is a serious problem. The government budgetary allocation to water sector is not enough and the tax and monthly due paid by consumers to the board is not enough to cater for high electricity bill, high cost of chemical and other miscellaneous expenses in the sector as such potable water supply at full capacity is not realize.

5.3. Lack of Autonomy

The Kano state water board, water resources engineering and construction agency and ministry of water resources do not have total freedom to exercise their power in the water sector and recruitment but rather there are some interruption from the higher authority as such they are not capable to meet their expectations. There are also problems with regards to government policies and political instability, when a particular government started a project another government will bring a new policy when steps in without completion the previous projects. This is seriously dragging the water resources agency in Kano state backward in achieving its goal.

5.4. Poor maintenance

The water supply facilities are poorly maintain in the state, exposes pipes can be seen in some places, and old age of the water tanks and other distribution facilities which mostly were in used for more than 50 years many tanks and distribution mains are leaking due to over aging as result of its leads to the losses of large quantity of water and also most of these pipes use in conveying water are undersize because they are laid several years when the water demand is not much as its now and uncontrolled population growth and migration into Kano city. Also many mains are over extended beyond their design capacity due to rapid population growth. Similarly the main pipes for water distribution were exposed to surface hence they can easily get damaged. Others are lack of proper maintenance, inadequate skill personnel to effectively manage the system.

6. RECOMMENDATION

To alleviate the above mentioned problems related with water supply situation in Kano metropolitan there are needs for stakeholders, community and individuals to work together in order to in achieving the following:

- Disbursing enough money to water resources sector so as to improve water supply.
- Improving electricity supply and providing alternative sources of power to supplement electricity in order to pump the water to the consumers.
- Regular maintenances of existing water supply facilities.
- individuals and organization must paid their monthly water due so that the water board will have enough fund to efficiently supply water to the state,
- Training of man power. The Kano state water board and state ministry of water resources should embark on the training of man power by organizing seminar, workshop to increase their skills in water resources engineering, water resources management, hydrology and other related fields,
- Public enlightment campaign should be embarked in the mass media against misuse and over consumption of water, destruction of public properties and maintaining of existence water supply facilities,
- Alternative sources of water supply should be provided through construction of more water treatment plants, boreholes, well and solar powered driven water supply system.

REFERENCES

1. Biswan, A.K. (1978), Resources and Needs, assessment of the world water situation in asit, water demand and management proceeding. The united nation water conference part I and II. Pergaman press oxford 1978.
2. David, L.S. (1969), International encyclopedia of social sciences. The Macmillan Company and free press, New York
3. Dupreez, J. W., Barber, W. (1965), Distribution and Chemical Quality of Groundwater in Northern Nigeria. Geological Survey Nigeria Bulletin, vol. 36, pp. 67
4. Farouk, B. B. (1987), Water quality and uses of some surface water bodies in Kano metropolitan. B.sc. Dissertation, geography department Bayero University Kano.
5. Howard, G. (2003), Arsenic, drinking water and health risk. Journal of Water and Human Health. Vol. 41, pp.15-23.
6. Kano State Government of Nigeria, (1990), Kano State Environmental Planning and Protection Agency (KASEPPA) Edict No. 15 of 1990.
7. Kavanagh, N.J. (1967), The demand for water. policy issues and empirical evidence. /. Instn Water. Engrs 21, no.
8. MacDonald's and Partners, (1986), Rural Water Supplies Final Report. Main Report, Sir MacDonald's Press Limited, Demeter, England. Vol. 1, pp. 123-153.
9. Mbagu, I.G. (1994), Effect of pollution on macro benthic invertebrates in Jakara reservoir in Kano state. Ph.D. Thesis Bayero University Kano. Pp. 14-19.
10. Mohammed, I. (1984), Hydraulic properties of the Basement Complex and Chad Formation aquifers of Kano State based on test-pumping of selected boreholes. M.Sc. Thesis, Department of Geology, Ahmadu Bello University, Nigeria.

11. National population commission. (2006), ‘‘Gender and sustainable development’2. Nigeria population census 1991, analysis.
12. Ojonigu, F. A. (1990), ‘‘Rainfall Characteristics in Drought - Prone Sudano Sahelian Zones of Nigeria’’. Department of Geography, Ahmadu Bello University, Zaria. (M.Sc. Dissertation, Unpublished).
13. Olokesusi, F. (2004), A Survey of Indigenous Water Management and Coping Mechanisms in Africa: Implications for knowledge and Technology Policy. Paper Presented at the ATPS/EIIPD Conference on Science, Technology’ Water and Environment in Africa. Held at ILRI Campus, Addis Ababa, Ethiopia.
14. Parkman Ltd. (2000), Greater Kano Water Supply Feasibility Study, Volume 1.
15. Salama, J. M., Okarfor, I. D. (2003), Surface water quality in an Iron Ore mining area, Itakpe, Kogi State Nigeria. Journal of Environmental Issues 7, vol. 1, pp.15-26.
16. Sawa, B. A. (2002), Persistent wet and dry spells in Northern Nigeria North of Latitude 100 N. Department of Geography, ABU, Zaria. M.Sc Dissertation, Unpublished.