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Original Research Article

Major sources of domestic water in Uyo metropolis of Akwa Ibom State

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Abstract

This study looked at the major sources of domestic water demand, supply and assessed its adequacy and regularity of water supply in Uyo metropolis of Akwa Ibom State. A survey research design was adopted and twenty five settlements were systematically selected to make the study area. Questionaire schedule were administered to selected households and from their response, the six sources of domestic water were identified. These were, Water Board, Rain water, Wells, Boreholes, Streams and Vendor. It was discovered that borehole happens to be the major source of domestic water supply.

Keywords: Major, Sources, Domestic.

INTRODUCTION

Man is endowed with various kinds of natural resources, one of which is water; which is a liquid without colour, smell or taste that falls as rain, is in lakes, rivers and seas, and is used for drinking, washing etc. According to United Nations General Assembly (2015), drinking water and sanitation is a human right. Today, approximately half of the world's population is without access to freshwater (Clarke & King, 2012). Water is derived from various sources such as the ocean water consisting 97% of the earth's water, ice 2%, and 1% of fresh water obtained from rivers, lakes, underground water, the atmospheric and soil moisture (Odey, 2013).

Water is life. The human body by weight consists of about 70% water and several body functions depend on water. Access to safe water supply has great influence on the health, economic productivity, and quality of life of the people (Ishaku, Majid, Ajayi and Haruna, 2011). The increasing demands on water supplies are closely related to population size and more precisely the concentration of human habitation (Kandissounon, Kalra and Ahmed, 2018). Water supply plays a key role towards enhancement of life and development. Community water demand is of utmost importance for sustainable water supply planning.

Water is vital for the life and health of people and ecosystems and a basic requirement for the development of countries around the world. Even though it is one of the precious gifts to mankind, lack of access to safe drinking water and basic sanitation is one of the problems affecting billions of people around the world (Hesperian Foundations,2015).

It is among the most precious of natural resources

and one of the most widely distributed and used solvents covering over 70% of earth's crust. However, due to deteriorating quality and quantity of surface water through increased urbanization and industrialization and high cost of developing new dams, urban groundwater is viewed as a better option (Ocheri, Odoma and Umar, 2014). Water is more than just a commodity, it is fragile, precious, finite and vulnerable important resource which nature has endowed man with, and is very essential for the existence of all forms of life. Affordable, abundant and clean water is essential for human well- being. If adequately provided in the right place at the right time in the right form, it would help to achieve the aim of every nation which is to develop its population into an economically active one that would enhance development (Chima, Nkemdirim and Ireogbu, 2009).

In 2015, all the United Nations member states adopted the Sustainable Development Goals (also called Global Goals) as a universal call for action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The sixth out of seventeen life-changing Sustainable Development Goals (SDGs) is to ensure access to water and sanitation for all (UN General Assembly, 2015). This is targeted towards eliminating neglected tropical diseases by promoting good hygiene. Since potable water supply is critical, it is our mandate to provide this resource in sufficient quantity and good quality to users.

Statement Of the Research Problem

Water issues in developing countries include drinking water scarcity, water stress, poor infrastructure for water access, floods and droughts, and contamination of rivers, streams and large dams. Millions of women spend hours every day collecting water, 2.6 billion people lack access to sanitation, and 1.8million children die each year from diarrhea (Ogbuka,2012). In most developing countries of the world, water requirements are not investigated accurately, resulting to development of water schemes that are either over-designed or under-designed as a result of poorly estimated population and costing of water facilities. Often times, data for this work is not available and water projects are embarked upon without carrying out proper engineering economic analysis to ascertain the viability of the project. Water demand and the population it will serve should be provided in a manner to ensure provision of sustainable water system. In a study on sustainability and impact of community water supply and sanitation programmes in Nigeria by Ademiluyi &Odugbesan (2018), it was found that Governments' inability (largely due to lack of resources) to maintain water and sanitation infrastructure has been the major factor leading to the promotion of community participation in water development programmes.

The movement of people to Uyo metropolis of Akwa Ibom State for employment, education, enjoyment of urban facilities/utilities etc has been on the increase in the past decades (Udoessien,2014). It is important to realize that, an unprecedented population growth and migration, increase urban population, and urbanization are inadvertent, thus all these eventually led to the initial human settlements into villages, towns, and then into cities (Onibokun and Faniran, 2018).

Fortunately, Akwa Ibom State has abundant rainfall with a mean annual of 342.56mm as well as surface and groundwater. In spite of this, it has been observed that the state is faced with domestic water problems especially in its urban areas (Udoessien, 2014). The movement of people to Uyo metropolis of Akwa Ibom State for employment, education, enjoyment of urban facilities/utilities etc has been on the increase in the past decades (Udoessien,2014). It is important to realize that, an unprecedented population growth and migration, increase urban population, and urbanization are inadvertent, thus all these eventually led to the initial human settlements into villages, towns, and then into cities (Onibokun and Faniran, 2018).

This has led to many households resorting to other supply sources like personal and private boreholes, hand dug wells, water vendors, rain water harvesting, surface water from stream or rivers. Some of these sources, apart from being unsafe, pose problem of ease of access as households have to trek long distances before getting to the source. The gap between water demand and the actual supply has widened in

Nigeria's urban centers including Uyo despite the continual efforts to develop the nation's vast resource.

There is a problem of broken pipes during road construction, as well as illegal connection or tapping. All these lead to shortage or inadequate domestic water supply and reduction in the quantity of water demanded and utilized by households. The most crucial problems in effective water supply and distribution are the pattern of unplanned sprawls in the metropolis, and the ageing water treatment and distribution system, stressing further that erosion has exposed many pipes to the risk of damage by men, vehicles and construction activities (Udoessien,2014).

The above scenario poses problems to domestic water demand, supply and management in Uyo metropolis and this study seeks to develop water demand model that will guide in determining water demand, provide policy thrust to improve supply sources and address the management technique so as to make the product available to the present and sustainable for the future generation. The aim of this study is to assess the major sources of domestic water demand, supply and management in Uyo metropolis. This aim will be achieved through this objective which is, to ascertain the major sources of domestic water supply in Uyo metropolis.

Study Area

Location: Uyo metropolis is located between latitude 4°58'N and 5°04'N and longitudes 7°51'E and 8°01'E of the Greenwich meridian and cuts across the following Local Government Areas (LGAs) – Uyo, Itu, Uruan, Ibiono Ibom, Nsit Ibom and Ibesikpo Asutan. The city has a total land area of 362km² and according to 2016 estimates, is the most populous city in Akwa Ibom State, which has an estimated population of 5,482,177 (Worldometer, 2020). Uyo functions effectively as a city centre and the state capital of Akwa Ibom State. It is central to other Local Government Areas and almost equidistant and easily accessible from all the other parts of the state. Also, the area is located on an elevation of about 60.96 meters (2090ft) above sea level (Worldometer, 2020). Below is a map (figure 1) of Akwa Ibom State indicating the study area (Uyo metropolis) and showing the 31 Local Government Areas.

Climate and Vegetation: Uyo is located in a partly rainforest and swampy mangrove region of Nigeria with a tropical climate. There is significant rainfall for most months of the year. Annually, rainfall is about 2509 mm, with only three months having considerably low rainfall, from December to February. The climate of the city allows for favourable cultivation and extraction of agricultural and forest products such as palm produce, rubber, cocoa, rice, cassava, yam, plantain, banana, maize, and timber. The average annual temperature is 26.4 °C and the yearly temperature range is approximately between 22 °C and 35 °C (Worldometer, 2020). The climate is classified as rainforest monsoon on the Köppen-Geiger climate classification system. Generally, the lowest minimum and maximum temperatures occur during the months from June to September, which is the peak period of the rainy season. The highest temperatures are usually recorded in the months of November to March, February/March being the hottest months (Udoessien, 2014). Continous removal of vegetation, one of the consequences of land cover change in the city, reduces the cooling effect that vegetation provides (Ibrahim, 2015).

Geology and Soil: The subsurface stratigraphic profile of Uyo consists from top to bottom of silty clays (0-3m), sandy clays (3-15m) and sand (10-20m) respectively. Engineering geological properties of the soils reveal that the low to intermediate plasticity clays are firm and expected to yield relatively high shear strengths (Udoessien, 2014).

Relief and Drainage: The area consists of level-to-gently undulating sandy plains where rivers are few and far between. Shallow depressions contain seasonal lakes that serve as sources of rural water supply in many areas. Agriculture and the road network are also adversely affected. Soil erosion has intensified considerably especially where gullying takes place. The drainage network in the upland part of Uyo is not dense, as rivers are few and distant apart with wide interfluves. Only one major river, the Qua lboe River, traverses the entire State from north to south. A major tributary of the Cross River, the Enyong Creek, drains the highly dissected terrain in Ikono, Ibiono and ltu

(Udoessien, 2014).

According to Ibrahim (2015) studies have shown that removal of vegetation, one of the consequences of land cover change in the city, reduces the cooling effect that vegetation provides.

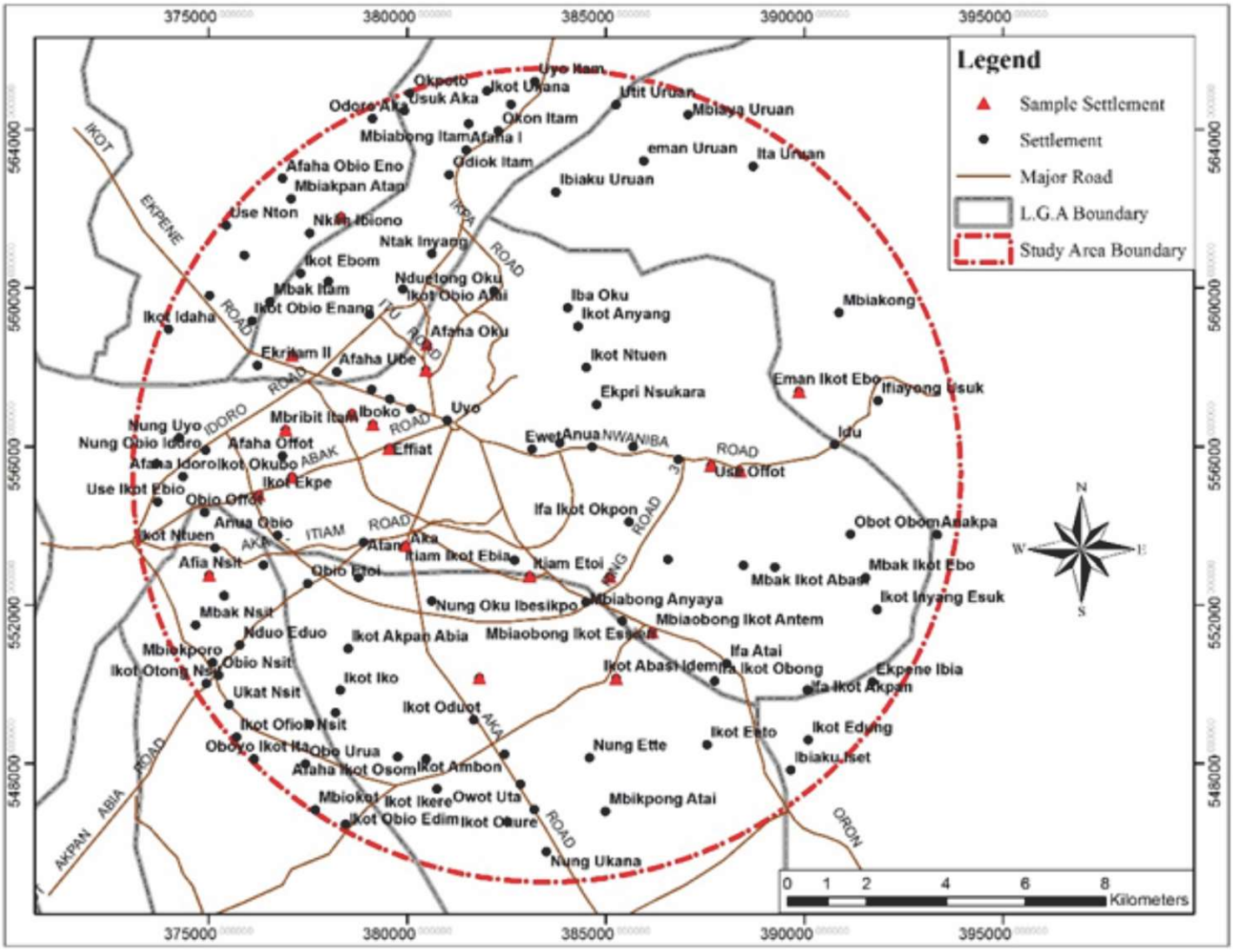

Fig. 1 : Map showing the different settlements in Uyo metropolis of Akwa Ibom State.
Source : GIS/Cartographic Studio, University of Uyo

Methodology

This research adopted survey research design procedure since the researcher is interested in studying what happens in the sample location with regards to assessing domestic water demand, supply and its management in the study area. This was achievable through, first undertaking a reconnaissance survey in order to be conversant with the study area, then administration of questionnaire schedule.

This study employed systematic sampling technique in choosing the settlements to be sampled. This was done by listing all the settlements within the study area and selected at a regular interval after choosing the origin. For proper and wider coverage, 25% of the overall settlements shall be selected and their population projected to 2023. A systematic sampling technique was used in selecting households to be administered with questionnaire in the selected localities/settlements in the study. Primary sources data collection was used such questionnaire to obtain data and was analyzed using simple percentage to assess the major

sources of domestic water demand and supply in the study area.

Results and Discussion

What are the dominant sources of domestic water supply in Uyo metropolis?

From the responds of the household after the administration of questionnaire, six sources of domestic water were used by the respondents. These were Water Board, Rain water, Wells, Boreholes, Streams and Vendors. The table shows that 1282 respondents representing 57.28% depend on borehole as their major source of water because it is more accessible and available to consumers. This is followed by Water Board with 640 respondents, representing 28.59%. Rain 180, Wells 14, Vendors 61 and Stream 48, respondents, representing 8.04%, 1.16%, 2.72% and 2.14% respectively.

Table 1: Sources of Domestic Water for Head of Households

S/N	Localities	Borehole	Water Board	Rain Water	Well	Vendors	Stream	Total
1	AfahaAtai	62	26	15	5	0	13	121
	%	2.9%	1.6%	0.7%	0.2%	0.0%	0.6%	5.41%
2	Afaha Oku	120	53	20	0	0	8	201
	%	5.2%	2.3%	0.8%	0.0%	0.0%	0.3%	8.98%
3	Aka Offot	95	51	15	2	1	0	164
	%	4.1%	2.1%	0.5%	0.3%	0.3%	0.0%	7.32%
4	EffiatOffot	88	66	31	7	12	0	204
	%	3.9%	2.9%	1.3%	0.3%	0.5%	0.0%	9.11%
5	EmanIkotEbo	25	10	16	0	0	0	51
	%	1.1%	0.4%	0.7%	0.0%	0.0%	0.0%	2.28%
6	IbiakpanIkotEdim	20	0	10	3	0	5	38
	%	0.8%	0.0%	0.4%	0.1%	0.0%	0.2%	1.68%
7	Iboko	13	0	0	0	0	0	13
	%	0.6%	0.0%	0.0%	0.0%	0.0%	0.0%	0.58%
8	IfaIkotObong	19	3	0	0	0	0	22
	%	0.8%	0.1%	0.0%	0.0%	0.0%	0.0%	0.98%
9	IkotAbasi Idem	66	20	15	0	12	4	117
	%	2.9%	0.8%	0.7%	0.0%	0.5%	0.2%	5.23%
10	IkotAkpan Oku	25	15	9	0	0	0	49
	%	1.1%	0.7%	0.4%	0.0%	0.0%	0.0%	2.19%
11	IkotEbido Oku	18	0	0	0	0	0	18
	%	0.8%	0.0%	0.0%	0.0%	0.0%	0.0%	0.80%
12	IkotAkpe	25	17	5	0	0	0	47
	%	1.1%	0.8%	0.2%	0%	0.0%	0.0%	2.10%
13	IkotNtuen	28	20	5	0	5	0	58
	%	1.3%	0.8%	0.2%	0.0%	0.2%	0%	2.59%
14	IkotObioEnang	65	35	5	0	0	3	108
	%	2.9%	1.6%	0.2%	0.0%	0.0%	0.1%	4.83%
15	Ikot Okubo	87	55	8	0	5	3	158
	%	3.8%	2.5%	0.4%	0.0%	0.2%	0.1%	7.06%
16	ItiamEtoi	58	34	4	4	3	3	107
	%	2.6%	1.0%	0.2%	0.2%	0.1%	0.1%	4.78%
17	MbakIkotEbo	54	18	0	0	0	0	72
	%	2.4%	0.8%	0.0%	0.0%	0.0%	0.0%	3.22%
18	Mbiabong	40	20	0	0	0	0	60
	%	1.6%	0.8%	0%	0.0%	0%	0.0%	2.68%
19	MbiabongIkotAntem	30	15	0	0	0	4	49
		1.3%	0.7%	0.0%	0.0%	0.0%	0.2%	2.19%
20	MbribitItam	35	16	4	0	0	0	55
	%	1.6%	0.7%	0.2%	0%	0%	0%	2.46%
21	NsukaraOffot	75	45	0	0	5	0	125
	%	3.4%	1.0%	0%	0.0%	0.2%	0%	5.59%

24	UkatNsit	21	9	0	0	0	0	30
	%	0.9%	0.4%	0%	0%	0.0%	0%	1.34%
25	Use Offot	98	54	10	5	8	5	180
	%	4.4%	2.4%	0.4%	0.2%	0.4%	0.2%	8.04%
	Total	1,282	640	180	26	61	48	2238
	%	57.28%	28.59%	8.04%	1.16%	2.72%	2.14%	100%

Conclusion and Recommendations

Findings also reveals that respondents do not depend on one source only, but majority of them maintained one source of supply, while others use more than one source depending on the use to which water is put. For example, 32.34% used two sources, 10.41% used three sources and 3.75 used one. The use of more than one source cut down amount spent on water as well as reduce pressure on public source of supply, though some of the alternative sources may not be of required quality, and injurious to health.

A further categorization of supply into public and private supply indicates that the private sector predominates in domestic water supply, supplying 67.69% of the respondents as against public sector with 32.75%. This is contrary to the case in United States where the public sector provides 87% of the population, while the private sector accounts for just 13%. However, the result is similar to findings in other parts of Nigeria, where private sector dominates in domestic water supply, (Ezugwu 2015). Findings also show that majority of the people depended on private commercial borehole supply with 75.57% while 24.42% are self supplied with their individual boreholes as indicated in Table 4.17. Moreover, only 32.70% of those who are self supplied have water connected into homes, while a large proportion of 67.29% have water in standpipes. This has effect on the quantity of water use, thus nature of supply influences the quantity demanded and used.

Based on the findings of the study, the following recommendations are made:

I.) Since per capita daily demand is low and mostly influenced by income, the economic base of the state should be improved through diversification of the state's economy, provision of gainful employment to residence and adequate remuneration to workers. This will help reduce dependent ratio thereby reducing household size and the problem of insufficient money to demand for more water.

ii) Though price of water was adjudged affordable by many except the private commercial borehole users when generator is used yet majority of people were willing to demand for more water if the price is reduced. Effort to increase water tariff or rate should therefore be discouraged for the mean time, while improvement in the power supply sector should be boosted.

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