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ASSESSMENT OF WATER NEED TO SUPPLY DEFICIT FOR LIVELIHOOD ACTIVITIES IN MAKURDI URBAN AREA, BENUE STATE- NIGERIA

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ABSTRACT

The study assessed water need to supply deficit for livelihood activities in Makurdi Urban Area, Benue State, Nigeria. Variables considered base on water need to supply deficit and used for the study include livelihood activities such as engine grinding, block industries, rice milling, palp making among others, quantity of water needed per day in litres and quantity supply per day in litres. A sample size of 400 respondents were selected and administered questionnaire, but only 394 respondents returned their questionnaire. Three sampling techniques were employed for the study. Firstly, stratified sampling technique was used to stratify the study area into eleven residential areas. Secondly, systematic random sampling was used to select five streets from each residential area bringing the total to 55 streets. One street out of every five streets was selected and one house out of every ten houses on the street was selected for questionnaire administration. Purposive sampling technique was used in questionnaire administration due to variation in water need for livelihood activities in the study area. Descriptive statistics of frequency and percentage was used to analyse the data collected and one-way analysis of variance (ANOVA) was used to test the deficit between water need and supply for livelihood activities in the study area. The study discovered that rice milling industries have the highest deficit with 4000 litres, followed by sachet and bottle water factories with 1000 litres and block industries with 775 litres. The one-way analysis of variance conducted to test the deficit between water need and supply shows a

statistically significant deficit of water need to supply for livelihood activities at $p<0.05$ level, $F(1, 22, 23) = 0.775$, $p = 0.388$. The study concludes that the process of water need and supply for livelihood activities should be stepwise in accordance with the participatory and managerial capacity of the study area to enhance water related livelihood activities. The study recommends there is need to put in place a suitable water management system so as to avert the water need to supply deficit in the study area.

Keywords: Water need, Supply deficit, Livelihood activities, Makurdi urban area, Benue State.

1.0 INTRODUCTION

As the most important resource for life, water has been a central issue on the international agenda for several decades. Nowadays, many areas of the world are affected by water deficit (Alcamo, et al; 1997). The projected increase of the world population growth rate suggests that higher food demand is expected in the future, with a direct effect on livelihood water usage (UNDESAPD, 2013). In addition, as a result of the increased water deficit and drought due to climate change (Jimenez, et al; 2014). In order to cope with future estimates of water deficit, some measures aimed at streaming and optimizing the efficiency of water needed for livelihood activities are critical in view of the large volumes of water required for livelihood activities (Noemi, Richard, Gavriil and Donatella; 2015). Nowadays, “deficit” is one of the adjectives most related to the word “water”; thus, many studies and projects focusing on the assessment of global water need and its availability have been developed. In fact, water need has reached critical levels in many areas of the world, especially in countries with limited water availability (Noemi, Richard, Gavriil and Donatella, 2015). The misuse of water resources, the lack of infrastructures to supply water and also climate change are some of the reasons for water need deficit, despite the vast amount of water on the planet. The Intergovernmental Panel on Climate Change (IPCC) Fourth Assessment Report states that

the magnitude of stress on water resources is expected to increase as a consequence of climate change, future population growth and economic and land-use change, including urbanisation. The transportation of water from source to the point of consumption with minimum losses is known as water supply. An effective water supply system is one which maintains a continuous, coherent, safe and regular supply of water and the supplied water should maintain a prescribed quality and quantity (Gaayam, et al; 2011). Hence a good water supply system should be capable of the following such as: it should meet all the necessary needs such as, domestic, agriculture, commercial, industrial among others (Gaayam, et al; 2011). It should maintain an adequate pressure under continuous consumption, it should convey the treated water up to the consumers with a prescribed degree of purity, it should also be capable to supply the necessary amount of water needed for livelihood activities such as car wash among others, it should also be reliable and safe against any future pollution and the system should be efficient with minimum losses (Gaayam, et al; 2011). Water need is the quantity that the treatment plant produce in order to meet all water needs in the community (Obeta, 2012). Meanwhile, water need is mainly composed of domestic demand, ecological water demand, agricultural water demand, industrial water demand and commercial water demand (Yu, et al; 2002; Hung, et al; 2014). A livelihood may be defined as the sum of ways in which households obtain things necessary for life, both in good years and in bad. These necessities include food, water, shelter, clothing and health care (FAO, 2006). Adequate water need is an essential input in livelihood activities in urban areas, water scarcity is a feature of many urban livelihood realities and the lack of adequate water is linked to poverty and households facing water shortages are more likely to be poor or fall into poverty than households not facing such shortages (Omeje, 2012). Residents' water need can be analysed in terms of three main components: access, control, and management. Access describes the degree to which a household can obtain water from rainfall, surface water sources among

others, control describes how well a household can move water from a source to the location at which its used for livelihood activities, while management describes residents' level decisions and practices regarding the application of water for livelihood activities (Omeje, 2012). Makurdi urban area has extensive water infrastructure (i.e. Greater Makurdi Water Works) situated within the town, there should be no water deficit for residents' needs for livelihood activities in the study area, but the reverse seems to be the case as residents of the town are faced with acute water shortages, a situation where majority of the residential areas are not connected to public water supply with very little water resources seem available against actual needs. This situation seems to impact negatively and severely on the livelihood activities of residents thereby increasing the poverty rate in the study area as most of the residents' means of livelihoods are connected to water. Where the water supply scheme is functional, queues are inevitable problems as this water scheme supplies quite a few numbers of residents. Such long queues seem to divert valuable time and energy from productive livelihood activities like beans cake (akara) and palp (akamu) businesses that is folding up due to water shortages in the study area. Also, staying in long queues for a long time at water provision centre could be a source of tension and conflicts which seem to force residents to resort to unauthorized connections which could worsen the water need-supply deficits in the study area. Since there is a mismatch between residents' water need and supply, sustainability, efficiency and equity of their livelihood activities seem threatened leading to hunger and poverty in the study area.

2.0 STUDY AREA

Makurdi town is the capital of Benue State, North-Central Nigeria. It is a town occupying the South and the North banks of the Benue River. The North and South divides of the town are connected by two bridges: the railway bridge and the dual carriage bridge. The town is located at the North Eastern part of Benue State and lies between Lat. $7^{o}45'5^{o}$N and Long $8^{o}32'10'$E and is

located within the flood plain of the lower River Benue Valley. It has a spatial landmass of approximately eight hundred and thirty-six (836.km^2) square kilometres (National Bureau of Statistics, 2007). The town is bounded by Guma Local Government Area to the North, Nasarawa State to the North-West, Tarka Local Government Area and Gboko Local Government Area to the East. Gwer-East local Government Area in the South-East as well as Gwer-West Local Government Area to the South-West (Fig.1.1) it is situated in the Benue Valley on the Bank of River Benue. The inhabitants of Makurdi Urban Area are mostly Tiv speaking people who are the most dominant ethnic group in the state. There are also the Idomas, Igedes, Etulos and other ethnic groups such as the Hausas, Nupe, Jukun, Igala, Igbo who are long time settlers and constitute a very significant number of the general population. The type of settlement pattern in Makurdi Urban Area is nucleated urban settlement where lots of buildings are grouped in a low land area. The buildings are clustered into neighbourhoods' which may be influenced by history of geographical factors such as defence, water supply, flatness of the terrain and fertility of the soil for agricultural purposes. The commonest housing types are zinc with roofed houses with earth brick walls.

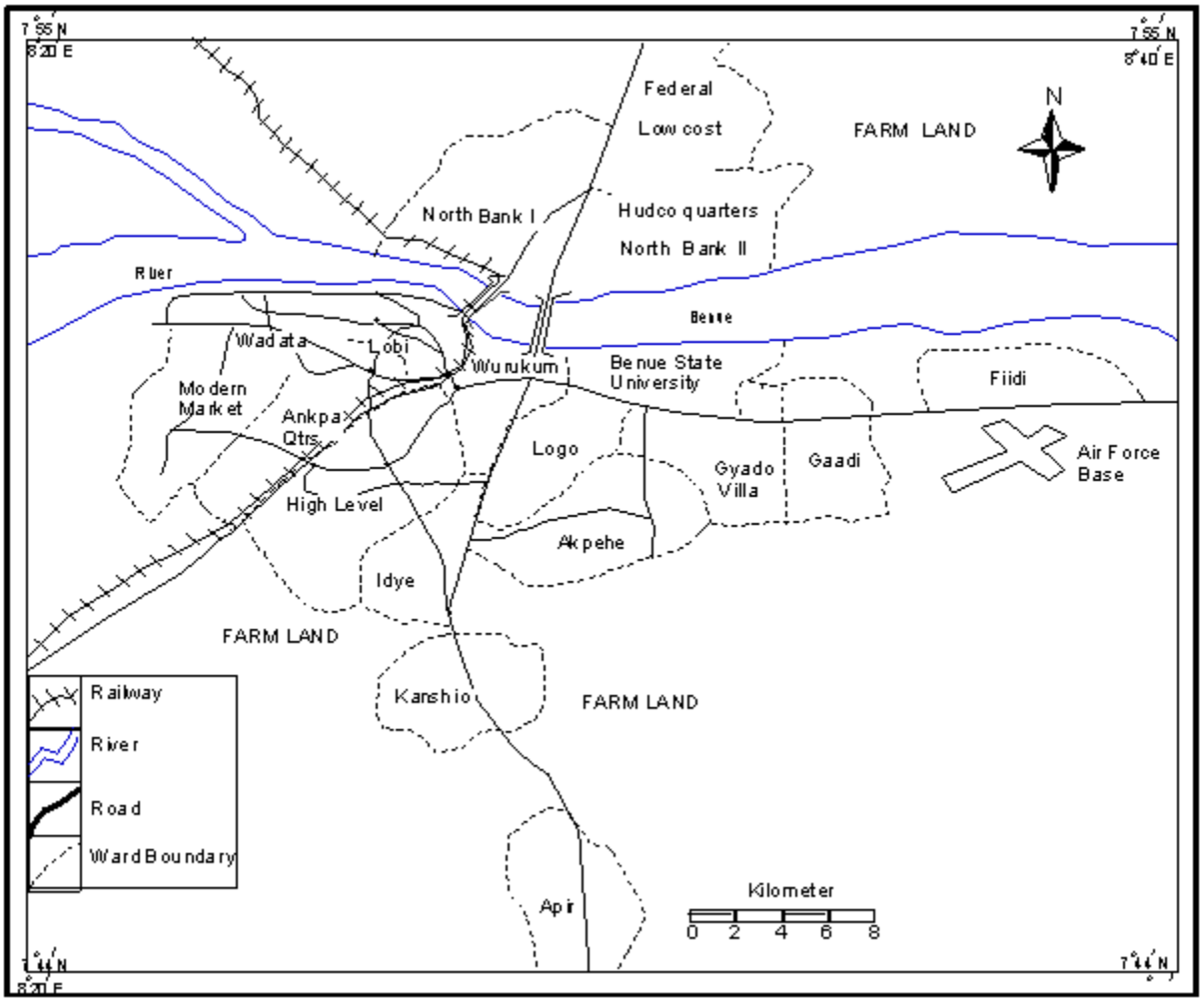

Figure 1.1: Map of Makurdi Town Showing Residential Areas.
Source: Ministry of Lands and Survey, Makurdi

3.0 MATERIAL AND METHOD

Data on water supply to need deficit on residents' livelihood activities in Makurdi Urban Area were collected using sample size of 400 respondents out of which 394 respondents returned their questionnaire. Three sampling techniques were employed for the study. First, stratified sampling technique was used to stratify the study area into eleven residential areas, secondly, systematic random sampling was used to select five streets from each residential area bringing the total to fifty-five (55) streets. One street out of every five streets was selected and one house out of every ten houses on the street was selected for questionnaire administration. Purpose sampling technique was used in questionnaire administration and the choice of purposive sampling technique was due to variations in water needs for livelihood activities in the study area.

Descriptive statistics of frequency and percentage was used to analyse the data collected and one-way analysis of variance (ANOVA) was used to test the deficit between water need and supply for livelihood activities in the study area.

4.0 RESULT AND DISCUSSION

Table 1: Daily Water Need- Supply Deficit for Livelihood Activities in the Study Area.

Livelihood Activities	Water Need per day in Liters'	Water supply per day in liter's	Water Need-Supply Deficits in liters'
Beans cake (akara)	100	75	25
Palp (akamu)	200	125	75
Gruwel /soya milk	250	175	75
Okpa/ moimoi	150	100	50
Engine grinding	70	50	20
Akpu/garri	300	225	75
Restaurants	500	300	200
Laundry services	750	500	250
Car/motor washer	500	250	250
Sachet/bottle water factories	3000	2000	1000
Block industries	2000	1225	775
Rice mill industries	7000	3000	4000

Source: Field survey, 2020.

Table 1. shows that there is daily water need to supply deficit for livelihood activities for both household and non-household livelihood activities. The table reveals that rice milling industries have 4000 liters' deficit, followed by sachet and bottle water factories with 1000 liters' deficit, block industries with 775 liters while engine grinding and beans cake have the least deficits of 20 and 25 liters respectively. Further interaction with the people during the field survey revealed

that residents with water related livelihood activities depend on water board to supply them with water needed for their daily livelihood activities which they said failed most of the time to meet their daily water need which in turn affect their livelihood activities. The hypothesis formulated to ascertain the deficit between water need and supply chains in the study area, was tested using one-way analysis of variance (ANOVA). The researcher selected the level of significance at 5% (p-value).

Table 2. Analysis of Variance for the Study Hypothesis

	Sum of squares	**Df**	**Mean square**	**F**	**Sign.**
Between Groups	1923834.375	1	1923834.375	.775	0.388
Within Groups	54641106.25	22	2483686.648		
Total	56564940.63	23			

Source: Output from SPSS 20.0.

A one-way analysis of variance was conducted to test the study hypothesis. There was a statistically significant deficit of water need to supply for livelihood activities at $p<0.05$ level, $F(1, 22, 23) = 0.775$, $p=0.388$. Since the calculated p-value (0.388) is greater than the p-value (0.05), the null hypothesis which states that there is no significant deficit between water need and supply chains in the study area is rejected and the alternative accepted.

5.0 CONCLUSION

The study concludes that the process of water need and supply for livelihood activities should be stepwise in accordance with the participatory and managerial capacity of the study area to enhance water related livelihood activities. The study recommends there is need to put in place a suitable water management system so as to avert the water need to supply deficit in the study area.

REFERENCES

Yu, S.X. & Shang, J.C. (2002). Optimization of the supply and demand system of urban water resources. Journal of Natural Resources, 17 (2), pp. 229-233.

Obeta, M.C. (2012). Community Participation in the rural water supply sector of Enugu State, Nigeria American Journal of Water Resources vol. 4 No. 3, pp.58 – 67. Doi: 10.12691.

Omeje, F.U.; (2012). Access to water and it impacts on rural livelihood: study of communities in six selected local government council of Enugu State, Nigeria. Retrieved from www.UNN.e-library.com on 3rd April, 2020.

FAO (2006). Demand for irrigated products in sub-Saharan Africa. Water Report No. 31, Food and Agricultural organization of the United Nations, Rome.

Huang, L.G. & Yin, L.; (2014). Models of water strategy based on linear regression, advanced materials research, 955-959, pp. 3355-3360.

United Nations Department of Economics and Social Affairs, Population Division (2013). World Population Prospects: The 2012 Revision, Volume II, Demographic Profiles (ST/ESA/SERA/345); United Nations: New York, NY, U.S.A.

Noemi, M.; Richard, S.; Gaviil, K.; and Donatella, S. (2015). Water scarcity and future challenges for food production. MDPI Journal on open access water. Available on line: doi:10.3390/w7030975, www.mdpi.com/journal/water.

Alcamo, J.; Doll, P.; Kasper, F.; Siebert, S. (1997). Global change & Global scenarios of water use and availability: An application of water Gap 1.0; University of Kassel: Kassel, Germany.

Jimenez, B.E.; Oki, T.; Amell, N.W.; Benito, G.; Cogley, J.G.; Doll, P.; Jiang, T.; and Mwakalika, S.S. (2014). Fresh water resources. In climate change 2014: Impacts, Adaptation and Vulnerability Part A: Global and Sectoral Aspects. Cambridge University Press, UK and New York, NY, U.S.A. pp 229-269.