POPULATION AND BOREHOLE DISTRIBUTION IN CALABAR URBAN

BY
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Abstract

The fact that the private sector is complementing the role of government in urban water supply in Nigeria does not need to be over-emphasized. However, the phenomenon of drilling boreholes almost in every street is entirely new to residents of Calabar Town. So far, over 112 boreholes have been identified in the sampled area of the town whose population is about a third of a million. The pattern of distribution of the boreholes vis-a-vis population of major residential units is analysed. The result shows an over concentration of boreholes in the peripheral residential area of the town with relatively low population, thus leaving the densely populated central core of the city with less than enough boreholes. Some reasons for the success of the commercial borehole business in the town are given. It is suggested that a hydrological inventory of the ground water reserves through geophysical survey will be of tremendous assistance to those interested in abstraction. Above all, the paper calls for proper coordination and appropriate policy framework or legislation to regulate the sinking of boreholes within Calabar Urban. ***(International Journal of Social Science and Public Policy 2000:3(1) pp 106 - 116).***

INTRODUCTION

Lack of basic information on urban population distribution and infrastructural conditions have made policy makers and development planners to operate with incomplete knowledge. Most urban dwellers in Nigeria are thus unaware of the magnitude of the problem of infrastructural development vis-a-vis population growth and distribution. The commonest complaint is that urban facilities are inadequate and hence urban dwellers in the country have continued to look forward to government as the great provider and the only source of adequate supply. This outlook has made it impossible for our urban dwellers to appreciate the role of the private sector in the provision of social amenities. It is therefore not surprising that the contribution of the private sector in the provision of water for residents of Calabar, at least for the past one decade, might go unnoticed.

Without private commercial borehole operators in Calabar town, it would have been very difficult to obtain potable water. Securing potable water in Calabar started becoming a great problem in the early 90's following the inability of the State's Water Board to match supply with demand. Commercial borehole operators therefore took advantage of the situation and today the

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city is littered with boreholes. The operators of boreholes use their own resources to hire drilling-rigs to dig boreholes for themselves in their own residential apartments and then sell the borehole water to members of the public on a daily basis. It is at present, a very lucrative commercial business in not only Calabar town but also in most other urban centres in Nigeria, e.g. Lagos, Ibadan, Port Harcourt, Enugu, etc.

Surprisingly, eventhough boreholes have proliferated all the nooks and crannies of Calabar town, little or nothing has been documented about them. Infact their number and distribution is unknown, yet new boreholes emerge everyday. To make matters worse, they are not registered by government and therefore not monitored to moderate their activities especially the price at which they sell water to members of the public and even the quality of water that is sold. Set against the above background, this paper examines the spatial distribution of boreholes vis-a-vis population of localities in Calabar Urban. The specific objective is to identify areas with low or high concentration of borehole, and make recommendations accordingly.

THE STUDY AREA AND METHODOLOGY

The study area is Calabar town which comprises of two local government areas, Calabar South Local Government and Calabar Municipality, all located in the Cross River Catchment. The hydrology of the town is rather regional being drained mostly by tributaries of the transnational Cross River whose distance is over 300km in the Nigerian section. The basic area of the Cross River has been computed to be above 50,000km² with a discharge of 2,500m³/S in the rainy season and 900m³/S in the dry season. The town of Calabar is sandwiched between two streams, the Great Qua river and the Calabar River. The town is therefore well drained in terms of surface drainage with coastal plain sands and alluvium as geological materials.

The climate of Calabar is controlled by the South-west winds from March to November and the dry dusty North-east (harmattan) winds sometimes in December and January. The mean annual temperature of the city of Calabar is 26.1°C (Inyang, 1980). The annual total average rainfall is about 3050mm per annum with peaks in July and September (see Table 2). The low level of insolation and reduced rate of evapotranspiration generates a water balance of 1,250mm per annum, making it the highest in Nigeria (Animashaun, 1989).

Geologically, the area is underlain by clastic sedimentary rocks which are naturally good aquifers when compared with the basement complex rock system. This is because of their high porosity and permeability. In this geological environment ground water therefore abounds.

The survey that yielded the data for this study was conducted in eight residential districts of Calabar town spread over the constituent Local Government Areas. The residential units were selected on the basis of their prominence in terms of population and spatial image, accessibility and presence of boreholes. These categorizations (of the residential units) has been used before now by Sule (1980) and were merely adopted by the author for this study. A sketch map of each residential district was made and the boreholes were inserted as the researcher combed for the boreholes street by street.

A simple questionnaire was designed to find out the cost of borehole installation, daily sales and profits. Both customers and borehole operators were interviewed. Most of the operators were not forthcoming about their profits, eventhough they proffered figures of daily sales.

The Present Pattern of Distribution of Population and Boreholes

The study revealed that there are about 112 boreholes in the sampled area. Table 1 shows the number of boreholes per residential unit. The locality with the highest number of boreholes as could be seen from this table is Efut Abua/Efut Ekondo which has 20 boreholes. It is also incidentally the location with the highest population concentration. This shows that the commercial borehole operators usually consider the population of the area in the siting of boreholes. The location with the least number of boreholes should logically be Henshaw Town with very little population, but this is not so. From Table–1, we discover that it is rather Big Qua with a population of 23,914 persons which had only 5 boreholes, the least number of boreholes.

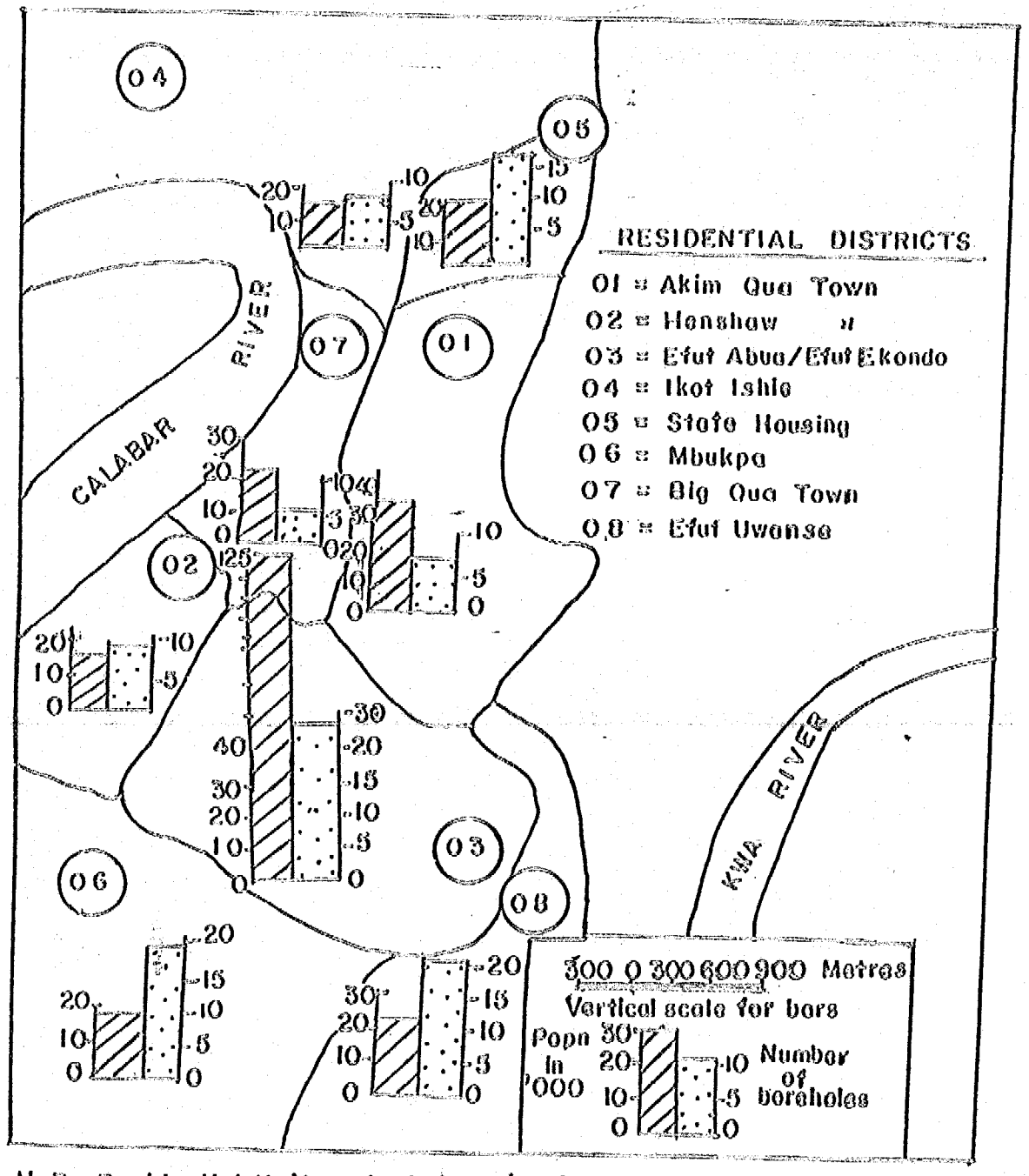
In order to have a clearer picture of the spatial distribution of population and boreholes, the information was graphically represented in a map form in Fig. 1. From the map (Fig. 1), the Efut Abua/Efut Ekondo, residential unit (03) with the largest population figure, as noted before has the tallest bar-graph for both population and number of boreholes. However, the population bar-graph for this location exceeds by far the magnitude of borehole bar-graph by almost two times the length. The situation is repeated for two other settlements, Akim (01) and Big Qua (07). These three settlements which incidentally occupy the centre of the town can be said to be deficient in the number of boreholes when compared with their population. These 3 residential districts are incidentally inhabited by the indigenous people of Qua and Efut ethnic nationalities. Indeed, the greater number of boreholes in especially the Efut Abua and Efut Ekondo area may be attributed to the effect of Land or Plot ownership and the high degree of population concentration.

Table 1: Population of some Residential Units and Present Number of Boreholes in Calabar

Residential Units	* 1991 Population	** No. of Boreholes
Akim Qua	35,288	7
Big Qua	23,914	5
Ikot Ishie	14,213	8
State Housing	20,803	17
Efut Uwanse	21,769	20
Efut Abua/Efut Ekondo	125,084	28
Mbukpa	15,197	19
Henshaw Town	3,376	8
Total	259,644	112

Source: * National Population Commission: Final Results of the 1991 Population Census of Nigeria
** Fieldwork by the Author as at 1998.

Fig. 1 : SPATIAL DISTRIBUTION OF POPULATION AND BOREHOLES IN CALABAR TOWN



N. B. Residential Units adopted and only slightly modified from Sule, (1980).

The second pattern of distribution as can be observed from the map is that in which the borehole bar-graph exceeds the population bar-graphs, giving the impression that the number of boreholes far overwhelm the population of these localities. The settlements that fall under this category are the Housing Estate (05), Efut Uwanse (08) and Mbukpa (06). The situation in the State Housing Estate is not at all surprising as it belongs to the High grade residential unit with very affluent population who can afford private boreholes. Most of the residents here are in the upper-income bracket and can afford the resources to drill own boreholes. The high number of boreholes here in relation to the population is therefore expected due to its residential integrity. The situation in Mbukpa (06) and Efut Uwanse (08) may be attributed to the low population figures given these locations by the National Population Commission. The population figures for these two settlements are very doubtful and like the State Director of the National Population commission said "the population of localities within urban centres are problematic as all we can offer are total figures for each urban centre" (State Director of NPC, Personnel Comm.). In general, the impression that is created by the picture in State Housing, Mbukpa and Efut Uwanse is that they have more than enough boreholes to their population.

The third pattern is peculiar to Ikot Ishie Town (04) and Henshaw Town (02) where the bar-graphs constructed for both their population and boreholes were almost equal or equitable. The situation in Henshaw Town is understandable in that most residents are indigenous to the place and the population is small. In the case of Ikot Ishie, "the survey was done for the settlement exclusively without taking the adjourning settlements like Eburutu Barracks, Federal Housing and the TTC axis into consideration. The water supply situation in both Henshaw and Ikot Ishie towns has improved since the coming of the boreholes but not as equitable as the bar-charts show. However, what the result suggest is that there is, at least, a borehole to 200 persons within this two locations.

On the whole, the above analysis clearly reveals three major patterns of borehole concentration relative to population. Firstly, the boreholes are rather heavily concentrated in the peripheral residential areas of Calabar with relatively sparse population (State Housing, Efut Uwanse and Mbukpa). This section of the town, going by our analysis, might not be very profitable for siting more commercial boreholes. Secondly, the central core of the city which is mostly inhabited by 'indigenes' has less than enough boreholes for the bourgeoning population (Efut Abua/Efut Ekondo, Akim and Big Qua). This section of the town may be most attractive to commercial boreholes. Thirdly and finally, we have the category with equitable distribution of boreholes per population (Ikot Ishie and Henshaw Town). Though these two settlements appear as if they do not require more boreholes, they can really make do with more commercial boreholes.

The Success of Commercial Boreholes in Calabar

The success of commercial boreholes in Calabar town may be attributed to three basic factors, namely, environmental, economic and institutional factors:

The environmental factor

The physical environment of Calabar favours the accumulation of groundwater and hence its abstraction. First, the town has the highest water balance in Nigeria (see Table 2).

The information in table 2 shows that Calabar is not in deficit in terms of groundwater recharge but has a comfortable balance. This observation is based on R.C. Ward (1975) conclusion that:

"Groundwater is derived from a number of sources, although relative importance of these was debated in the past, it is now clear that virtually all groundwater is composed of precipitated atmospheric moisture which has percolated down into the soil and subsoil layers, and that only a minute proportion can be attributed to other sources (Ward, 1975). The current raw water balance,

Table 2: Calabar: Water Balance 1990 - 1997

Year	Total Rainfall (mm)	Total Evaporation (mm)	Raw Water Balance (mm)
1990	2495.5	830.0	1665.5
1991	2487.3	658.3	1829.0
1992	2846.3	646.2	2200.1
1993	2574.9	517.7	2057.2
1994	2882.4	632.7	2249.7
1995	3586.8	681.5	29053.3
1996	3049.2	618.6	2430.6
1997	3280.0	687.1	2592.9

Source: Computed from Records of University of Calabar Climate Station

of Calabar that is, rainfall minus precipitation, for 7 years, is 2561.9mm. This is a tremendous amount of water per unit area. The geological setting of the town also favours groundwater reserves. Geologically, the area is underlain by coastal plain-sands and alluvium which are very porous and permeable and therefore make very good aquifers. Indeed the success ratio of borehole programmes has been low in the Basement Complex areas and relatively high in the sedimentary rock areas, where aquifers are less patchy and occur more continuously (Ayoade and Oyebande, 1978).

Table 3 shows that boreholes located in places underlain by sedimentary rocks give higher water yields than those places where we have basement complex rocks.

Under the prevailing conditions of high water balance and a reasonably high water yield due to the nature of the geology, borehole drilling therefore has more than a 50% chance of success and has actually succeeded in many places in Calabar.

The institutional factor

The institutional arrangement for urban water supply in Nigeria started when the Colonial Administration saw the link between clean water and health and decided to create an administrative unit in the Health Department to cater for municipal water supply (Faniran, 1991). This unit later moved into the department of public works and, then next was the establishment of parastatals in the form of boards and corporations.

The institution saddled with the responsibility of providing portable water to residents of Calabar is the Cross river State Water Corporation popularly called Water Board which is located along Ndidem Usang Iso, Road, Calabar. About 10 years ago, virtually all improved water supply, whether treated or untreated from boreholes, for domestic needs, was obtained from public water supply system operated by the Water Board in Calabar. These were usually metred and charged for at a cost determined by the Water Board. Large industrial and commercial establishments in Calabar also enjoyed this. Similarly many hospitals and schools also benefitted from the public water supplies. All these became a thing of the past and history since about 1990. All the taps in the town went dry and have remained so except for occasional pittance that is piped only to a few privileged locations.

Table 3: Example of Water Yields From Boreholes Located in Different Rock Formations in Nigeria

Geological Formation	Location of Boreholes	State	Depth of Borehole (Metre)	Static Water Level Metres	Yield Litres/ Hours
Coastal Plainsands	Ota	Ogun	53.0	9.4	22,730
Alluvium Sedimentary Rocks	Abor	Bendel	64.0	18.2	40,914
Alluvium Sedimentary Rocks	Epe	Lagos	72.5	15.8	55,006
Basement Complex	Ilorin	Kwara	28.9	3.9	16,275
Basement Complex	Dambanki-Gume	Kano	76.0	36.5	3,364
Basement Complex	Maiga-mola	Kano	77.6	37.0	31,858

From Table (4) it is clear that the volume of water being pumped by Water Board to residents of Calabar has been decreasing in both quantity and quality over the years. And as the saying goes "necessity is the mother of invention". In other words the drilling of boreholes in Calabar town is the fallout of the inability of the Water Board to meet the water demands of the town.

There is therefore no doubt that we have a situation where there is in existence, an imbalance between water demand and the supply. Animashaun (1989), a decade ago, analysed the water demand and supply situation in Calabar for over 7 years and discovered an imbalance of over 50 percent deficit. Precisely, he observed that while the water demand within the town of Calabar as at 1989 stood at 549452m^3, only 439561.9m^3 was supplied, leaving a deficit of 109890m^3.

Inspite of the poor performance of the State Water Board, State budgetary allocations to this sector is on the decline (see Table 5). During the 1981-85 National Development Plan, Water Supply in the State received 4.5%, this rose in 1998 to 13.11% and dropped this year 1999 to 3.27%. The latter figure of 3.27% translates to N53 million in monetary terms. However, the year 1998 with the highest sectoral allocation will be remembered as one of the driest years in Calabar in terms of public water supply as the taps remained notoriously dry for a good part of the year and have remained so till date.

Table 4: Current Sectoral Allocation for Water Supply and Other Basic Needs in Cross River State (milion).

S/No.	Items	Sectoral Allocation 1981-85	** 1998	**1999
1.	Water supply	4.5	13.11	3.27
2.	Agriculture	N.A	4.80	13.11
3.	Education	4.70	6.74	3.95
4.	Health	6.13	3.06	2.30
5.	Housing	5.0	11.97	5.44
6.	Sewage Drainage and Refuse Disposal	2.3	1.03	0.37
7.	Transport (Road & Bridges)	4.8	8.90	12.36

Source: *(i) National Planning Office: Fourth National Development Plan, 1981 - 1985, Lagos
**(ii) Cross River State Approved Budget for 1998 and 1999 - Budget Office, Calabar.

The weak attention given to water supply especially last year by the government as reflected in the 1999 budget might give the impression that the state is better-off in the area of water supply. In the contrary this author has observed that without the advent of borcholes, the town of Calabar would have faced one of the worst water crisis since its existence.

The economic factor

Profit is the single most appropriate word with which to describe the main intention of commercial borehole operators in Calabar town as well as in other urban centres in Nigeria. The business of borehole drilling is capital intensive requiring at least between ₦100,000.00 to ₦350,000.00 (see Table 6). All those investing on boreholes therefore would wish first to recover their money and then go on into profiteering. Indiscriminate prices are thus charged depending on the location, quality of the water, the season and whether or not there is public power supply from NEPA (National Electric Power Authority). Table 7 shows the daily income of borehole operators in Calabar Town. Infact, one of the negative aspects of the commercialization of ground water in Calabar today is that residents are paying more and more for a resource that was once provided free to them by Government as huge profits are squeezed out of the public on a daily basis. There is outright exploitation of the poor and downtrodden by the affluent and the powerful using boreholes. Infact, some residents believe that there is a secret pact between the State Water Corporation and the Borehole operators to give them time and free hand to make some money from the sale of water to the public. Even though this suspicion may be unfounded, there is clearly a total lack of monitoring of the activities of this economically motivated commercial borehole operators who seem to have formed a Cartel to undo members of the public. Generally speaking, there are no standards or regulations set for them in terms of quality or even selling price per unit volume of

Table 5 Cost of Installation of Borcholes as Indicated by Borchole Owners

Residential Area	Cost of Borehole Installation (N)			
	50,000	100,000	150,000	200,000 & above
Akim Qua	1	0	0	4
Big Qua	0	0	2	2
Ikot Ishie	0	1	1	3
State Housing	0	0	1	4
Mbukpa	0	0	0	5
Efut Uwanse	0	0	1	4
Efut Abua/Efut Ekondo	0	0	1	4
Henshaw Town	1	1	0	3
Total	2	2	7	29

Source: Author's Fieldwork, 1998

* Over 70% of those interviewed claimed to have invested over N200,000.00 in one borchole.

Table 6: Daily Income of Borehole Operators

Residential Area	**Daily Income of Borehole Owners (N)		
	0 - 500	500 - 1000	1000 - 2000
Akim Qua	0	4	1
Big Qua	0	5	0
Ikot Ishie	2	2	1
State Housing	0	4	1
Mbukpa	0	3	2
Efut Uwanse	1	3	1
Efut Abua/Efut Ekondo	0	5	0
Henshaw Town	4	1	0
Total	7	31	6

Source: Author's Fieldwork, 1998.

**Only 40 borehole owners were interviewed with the spread of 5 in each residential area. The average daily income is N500 - N1000 and if we take the lower limit of just N500.00, it translates to N14,000 per month and N168,000 per annum.

borehole water and they are not registered anywhere. And for a country that has fully adopted capitalism, privatization, and profiteering and all the economic jargon aimed at finally crushing the masses out of existence economically, it is to say the least a very dangerous trend. One may not be surprised if the local commercial borehole operators who incidentally have all the characteristics of the 'comprador bourgeoisie', go all out to campaign and call for the scrapping or outright sale

of the State's Water Corporation in order to give them a free hand to do their business. Indeed, the "free world" (privatization) syndrome has already been extended to urban water supply and may remain so as it joins other well known apparatus of organized oppression, domination, and enslavement of the common man. And should they (the oppressors) take water, what do you guess will be taken next? Did I hear you say air?

CONCLUSION

[illegible] total number as boreholes are dug daily. A preliminary characterization of the distribution of the boreholes vis-a-vis population of residential units within the town shows three distinct patterns. Firstly, the boreholes are heavily concentrated along the peripheral residential areas of the town with low populations e.g. Housing Estate, Mbukpa, etc. These areas appear to have more than enough boreholes. Secondly, the central core of the city which is essentially inhabited by the natives has less than enough boreholes for the rather high population e.g. Efut Ekondo/Efut Abua axis. Thirdly, sections of the town like Henshaw Town and Ikot Ishie seem to have just enough boreholes. Any attempt to site more boreholes around here may be unprofitable and should therefore be done only after a careful market survey. Furthermore, indiscriminate exploitation of the groundwater reserves to the level of exceeding the safe yield limit in the face of unknown and unpredictable replenishment through surface sources is most likely. Secondly, impure borehole water might be sold to the unsuspecting members of the public without control. Thirdly, residents might be forced to pay exorbitant water bills in the future. There is thus, need to address these problems through proper coordination and appropriate policy framework. In addition, there is an urgent need to embark on a hydrological inventory of the groundwater reserves of the town through geophysical exploration by resistivity sounding. Finally, the government should accord the private commercial borehole business commensurate priority since they now play a major role in urban water supply.

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