THE PROSPECTS OF SUSTAINABLE MANAGEMENT OF DOMESTIC WATER SUPPLY AND SANITATION IN KOGI STATE.

Olarewaju Oluseyi Ifatimehin
Salihu Danlami Musa, Kogi State University
THE PROSPECTS OF SUSTAINABLE MANAGEMENT OF DOMESTIC WATER SUPPLY AND SANITATION IN KOGI STATE.

*Ifatimehin, O.O. and Musa, S.D.
Department of Geography and Planning, Kogi State University, Anyigba.

Author of correspondence

ABSTRACT
The ultimate goal of any credible and legitimate government is to ensure sustained improvement in the provision of basic water utility and its effectiveness in the efficient delivery of this service to the citizenry. The importance and implication of efficient delivery of portable water and its management, and also access to hygienic sanitation facilities are of utmost importance to every human sector. Field survey and the review of technical and research literatures were done to generate the data and information used for the study. Simple statistics were used in its analyses and GIS techniques for spatial analysis. It was observed that about 35% of the sampled population has access to clean but untreated water from the boreholes only and 32.9% to untreated polluted water from the stream and lake while 67.1% access the borehole water in different measures. 8.6% access their water through pipe network and the total sanitation coverage is 8.6%. The entire population at the risk of water and food borne diseases. Better alternatives like exploring and exploiting the potential offered by the large subterranean aquifer for the sinking of more boreholes, environmental education and a community-based approach should be adopted for efficient delivery of water supply and sanitation services to the residents of Anyigba.

INTRODUCTION.

Water is one of the most essential resources that support existence of both animals and plants. It plays a key role in the metabolic breakdown of essential molecules as protein and carbohydrates, and the blood in animals and sap in plants largely consist of water, and also aid in food transportation and waste material removal from the body. (Encarta 2006, 2005). Water enhances good health and nutritional status of any population (Meinzen-Dick, 1998) that is why all through the ages, the human race has striven to locate and develop it (Anil-Kumar, 2004). Ogbonna (1997) states that water demand can be classified according to various purposes: Households, Agricultural and Commercial and industrial needs. Its inadequacy in supply to households and its contamination can cause offensive odour and thereby precipitate severe health problems.
Geo-Studies Forum: An International Journal of Environmental and Policy Issues
Volume 4: 1812. 2008

(Ariyo and Jerome, 2004) like water-related illnesses, such as typhoid fever, cholera, diarrhea etc (Hinman et al, 2006) which are prevalent sometimes to an epidemic scale and food shortages become critical (Handidu, 1990).

Nigeria has adequate surface and groundwater resources to meet the current demands for portable water of the citizens. The pattern for water demand differs from time to time and from place to place. As the uneven distribution in space had turned areas of surplus to be areas of scarcity, water shortages are experienced for various needs particularly during the dry season (Handidu, 1990, Ifabiyi, 2000 and Musa, 2005). This spatial variation is mounting potential conflicts in the Northern towns (depletion of underground water), south west (cost of water treatment) and the Delta region (environmental pollution) of Nigeria; these regions are resorting to other alternatives, (Henley, 2000).

Henley (2000) posited that the cost of water deficiencies in public policy is often overlooked, underestimated, or totally unaccounted for. He added that it is only considered as an infrastructure service targeted only to meet the basic needs (consumption) of households but not as an input in many industries. This has a severe implication on the growth of small firms and industries, their productivity and the generation of employment. With the provision of improved and piped water supplies in many urban and rural areas, the economy also benefit from improved productivity on the job, improved worker vigour, as well as reduction of mobility among the labour force (Musa, 2005).

The development of water supply and sanitation services was given a great lift in the 1980s, as the United Nation declared 1981-1990 as the International Drinking Water
Supply and Sanitation Decade (Handidu, 1990). The importance of safe Water supply and sanitation to health, education, economy and production were emphasized; water was said to be not just a commodity but a right to all (Ariyo and Jerome, 2004). The three-tiered government: Federal, State and Local see the provision of water supply and sanitation to the citizenry as priority (Henley, 2000).

The Government had invested a lot into the adequate provision of this utility to the populace, but the rapid population growth is not been accompanied with increase in economic growth and the overlapping functions of government and massive wastes in public expenditure (Ariyo and Jerome, 2004) is stalling the delivery of this essential service to both the urban and rural areas. Currently, it is estimated that only about 50% of the urban and 30% of the rural population have access to reliable water supply of an acceptable quality (Henley, 2000). Nwosah (2003) puts it that the per capita delivery of water and sanitation coverage in Nigeria is in a worst state. The average per capita delivery and sanitation to the population in the urban, small-town and rural areas are 32 litres per capita per day (lcpd) and 40%, 25 lcpd and 15%, and 10 lcpd and 5% respectively. Developments (2007) declared that 30 litres is the average daily water use per person in Nigeria. This is grossly inadequate and below World Health Organization’s (WHO) minimum requirement of 100 lcpd.

The government is currently and vigorously pursuing a participatory approach in the sustainable management and development of its water resources (Surface and groundwater), through the National Water and Sanitation Policy (NWSP) with its general objective as:

“provision of sufficient portable water and adequate sanitation to all
With this policy statement, NWSP intends to achieve the Millennium Development Goals (MDGs) of water supply and sanitation by effective service coverage, access, and reliability to quality services through meeting the minimum water requirement of urban centres, small-town and areas of 120, 60 and 30 litres per day respectively (FMWR, 2000).

Anyigba, a rapidly growing semi-urban university town (Ifatimehin and Ufuah, 2006a) is also riddled with insufficient and severe polluted water supply and poor sanitary facilities (Babatolu, 2006 and Ifatimehin and Ogbe, 2007) in spite of rich underground aquifer. The rapid growth of the town is witnessing an increase in the standard of living as well as in the purchasing power of the residents, thereby generating multiple contributing factors on the need for water: for food, personal hygiene, housing, aesthetic value etc. The low rate in the awareness to environmental problems among the residents and their poor socio-economic background are contributing factor to the poor sanitary condition (Ifatimehin and Ufuah, 2006a, and Ifatimehin and Ufuah, 2006b), thereby precipitating typhoid occurrences among them (Ifatimehin and Ogbe, 2008).

This research aims at achieving the following objectives:

i. To examine the status of water supply and sanitation in Anyigba;

ii. To ascertain the prospects for the development of an effective water supply and sanitation infrastructure;
iii. To suggest how best to manage and sustain an efficient service delivery that will be affordable by all.

THE STUDY AREA.

Anyigba is located in Dekina Local Government of Kogi State, Nigeria on the Igala Plateau in the northern part of the of the Anambra basin. Its three-dimensional positions are: Latitude 7°15’-7°29’N, longitude 7°11’-7°32’E and an average altitude of 385 meters above sea level (Fig 1.). It has a total land mass area of 42 sq. km² has an estimated population of about 71,323 as at 2006. The study area falls within the tropical wet and dry (Aw) climatic region and the guinea savanna. The annual mean rainfall and temperature are 1250mm and 25°C. The geologic and hydrogeologic features provide a high quality subterranean groundwater deposit of enormous quantity in the aquifer. It is dominated by lateritic soil type, which is heavily weathered and deficient in mineral reserves. Patches of hydromorphic and rich loamy soils are also found along the only perennial stream (River Ofu) at northern edge of the town. Lake Aabuja also serves as a source of water to many households. The Land Use and economy of the area is predominantly agrarian but with prospects of changing because of the transformation initiated in the economic landscape by the University (Ifatimehin and Ufuah, 2006b).
MATERIALS AND METHODS

Field survey was conducted to generate various types of data. The GPS was used to mark the 3-Dimensional location of the seven water sources identified. The land use map of Anyigba with scale of 1: 50,000 and the GPS data were digitized and imported into ArcView environment for spatial analysis. Field observation was adopted to ascertain the vulnerability of water sources to pollution and/or contamination. Questionnaire and oral interview were employed to collect data on water sources, water supply, access to sanitary facilities, access to water, problems of water supply and ways of ameliorating the problems posed by water supply.

Other data and information were sourced from technical reports of government and water consultants, textbooks, internet, journal etc.

640 copies of the Questionnaire were administered based on point location of water sources (Boreholes). At the marked point for each borehole water sources, a 0.3km radius was drawn. 0.3km was chosen because it is the specified limit for borehole distance to service areas (Hamil and Bell, 1986). At 0.3km, a circumference was drawn for the primary catchment area and also at 0.5km for the secondary catchment area. Within the perimeter of the circle of 0.3km radius, 80 copies of the questionnaire were administered and additional 20 each was equally shared based on the four (4) cardinal points within perimeter of 0.3km and 0.5km. A total of 160 copies of the questionnaire were administered per water source. The university was an exception, because it has two boreholes, which are pipe-networked to cover the residential, academic, and students’ hostels. Two radii of 0.5km and 0.8km were drawn to accommodate students and staff living outside the campus and around the university community. So within the first
perimeter 160 copies of the questionnaire were administered, and within the second perimeter 40 were administered each at the 4 points (320) as shown in Figure 2. 40 copies of the questionnaire were administered to each of the 4 wards (cardinal points based) identified to be out of the perimeters (i.e. areas outside the primary and secondary catchments of the water sources).

While another 640 copies of the questionnaire were administered in the areas outside the secondary catchments areas, this is to accommodate the population that may solely depend on the other water sources such as the stream and lake.

All the residents have access to rain water; we are therefore going to be silent about in the analysis.

A total of 1280 questionnaires’ were administered, and 1198 returned and collated for analysis. Simple percentages, tables and mathematical expression were used in the analysis.

![Figure 2: Showing how questionnaires were administered](image)
RESULTS

WATER SUPPLY

Water Sources

A total of 804 (67.1%) respondents source their water from the borehole, but 412 source only from the borehole while the remaining 392 supplement their needs from traditional sources: either from the stream [313(38.9%)] or Lake [68(8.5%)] or from both sources [11(1.4%)]. Of the all sample population only 412 (35%) have access to clean but untreated water while 32.9% have access solely to polluted and untreated water sources (The stream and Lake). The Venn diagram (Fig. 3) shows the representation of water supply from the three categories of water sources: Borehole, Stream and lake.

![Venn diagram](image)

**Access to water**

Table 1 reveals that only 8.6% (103) of the sample population had access to water from protected boreholes (pipe-borne) while the remaining access water either by hand-carried water containers (fetching), tankers or truck pushers.
Table 1: Access to water

<table>
<thead>
<tr>
<th></th>
<th>Borehole</th>
<th>Stream</th>
<th>Lake</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Tankers</strong></td>
<td>419</td>
<td>526</td>
<td>-</td>
<td>945</td>
</tr>
<tr>
<td><strong>Truck Pushers</strong></td>
<td>168</td>
<td>63</td>
<td>59</td>
<td>290</td>
</tr>
<tr>
<td><strong>Pipe borne fetching</strong></td>
<td>103</td>
<td>-</td>
<td>-</td>
<td>103</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>804</td>
<td>674</td>
<td>158</td>
<td>298</td>
</tr>
</tbody>
</table>

*Source: Authors’ survey, 2006*

The residents end up paying unit rates for the water they access through Tankers, Truck Pushers and also fetching at the boreholes sites owned by the public sector. Table 2 shows the unit cost of water in the town. On further analysis, the average unit rates per litre of the borehole water from source site and retailing are 34k and 85k respectively.

Table 2: Cost of water

<table>
<thead>
<tr>
<th>Water container in litres (l)</th>
<th>Price from the water source Site (₦)</th>
<th>Retailing price (₦)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Borehole</td>
<td>Stream/Lake</td>
</tr>
<tr>
<td>20l Jerrycan</td>
<td>5.00</td>
<td>-</td>
</tr>
<tr>
<td>25l Jerrycan</td>
<td>10.00</td>
<td>-</td>
</tr>
<tr>
<td>50l Jerrycan</td>
<td>25.00</td>
<td>-</td>
</tr>
<tr>
<td>Drum</td>
<td>40.00</td>
<td>-</td>
</tr>
</tbody>
</table>

*Source: Authors’ survey, 2006*

**Demand for safe water from the borehole**

Babatolu (2006) puts the total borehole water supply at 900,000 litres daily from the four boreholes: 500,000 litres from the university boreholes and 400,000 litres from the community boreholes. Access to safe water from the borehole is relatively high (67.1%). Majority of the population (72.1%) average daily water usage per day is less than 50. From table 3, the average per capita delivery to the population is 42.2 lcpd.
Table 3: Demand for Safe water

<table>
<thead>
<tr>
<th>Litres</th>
<th>No. of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>14</td>
<td>1.7</td>
</tr>
<tr>
<td>21 – 30</td>
<td>193</td>
<td>24.0</td>
</tr>
<tr>
<td>31 – 40</td>
<td>168</td>
<td>20.9</td>
</tr>
<tr>
<td>41 – 50</td>
<td>205</td>
<td>25.5</td>
</tr>
<tr>
<td>51 - 60</td>
<td>121</td>
<td>15.1</td>
</tr>
<tr>
<td>Above 60</td>
<td>103</td>
<td>12.8</td>
</tr>
<tr>
<td>Total</td>
<td>804</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Authors’ Survey, 2006

Clean water (borehole) coverage is 35%, with average per capita water delivery of 42.2 lcpd, and sanitation coverage of 8.3%. While 67.1% of the population accesses this clean borehole water in various quantities based on their socio-economic status, the average cost for an individual is ₦14.28 daily (₦428.40/month), and ₦35.70 daily (₦1,071.00/month) from the community borehole sites and vendors respectively. This price system allows households an extra incentive to make efficient use of the water at their disposal (Ogbonna, 1997).

Status of Sanitation Facilities

The sanitary facilities in this part are inadequate; this obviously indicates the socio-economic condition of the majority of the residents. Table 4 indicates that about 81.7% do not have access to safe sewage disposal facilities. About 27.4% of the sampled population was shown to discharge their waste directly to the environment with no consideration to health consequences.

Table 4: Sanitation pattern among households

<table>
<thead>
<tr>
<th>Sanitation facility</th>
<th>No of Respondents</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pit Latrines</td>
<td>651</td>
<td>54.3</td>
</tr>
<tr>
<td>Open Field</td>
<td>244</td>
<td>20.4</td>
</tr>
<tr>
<td>River/Lake</td>
<td>84</td>
<td>7.0</td>
</tr>
<tr>
<td>Flush Toilets</td>
<td>219</td>
<td>18.3</td>
</tr>
<tr>
<td>Total</td>
<td>1198</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Authors’ survey, 2006
The 8.6% of the population that have access to pipe-borne borehole water, also have access to sufficient sanitary facilities. The remaining population of over 90% is exposed to particularly water borne diseases (cholera and typhoid) and water based diseases such as guinea worm, urinary and rectal shistosomiasis (Musa, 2005 and Ifatimehin and Ogbe, 2007)

IMPROVING DOMESTIC WATER SUPPLY AND SANITATION

Certainly, there is a problem with domestic water supply and sanitation in this part of Kogi State. From various studies of the water-resources potential, Anyigba is located in a sedimentary basin (Ayoade and Oyebande, 1978; Olofin, 1992 (cited in Ogbonna 1997) and Babatolu, 2006) and have a well developed water aquifer (Adebayo and Umar, 1999 and International Zoomal Ltd, 2002). With the absence of surface water resource in Anyigba, ground-water resource development is the only alternative to salvaging water crisis. Adequate supply of water to the population will ensure better health to many inhabitants and reduce the incidence of water borne diseases as mentioned earlier.

The four boreholes in the town are grossly inadequate for the population. The allocation of more boreholes was simulated in the ArcView GIS environment based on the 0.3km specified distance of borehole to service area and 0.04km away from points of contamination (Hamil and Bell, 1986). 18 additional boreholes sites and 8 public sanitation facilities around each boreholes result from the simulation (Figure 4).
And when the possibility of these boreholes being pipe-networked was considered to facilitate easy access to water (prevent long distance trekking for water), a 1km radius was adopted. Figure 5 shows this simulation and the number of possible boreholes and sanitation facilities.

With this simulated result, it is pertinent that Government will have to invest a lot of fund to develop these proposed facilities to meet up with the domestic water supply and sanitation of the residents. And if these are met, a sustainable management approach
needs to be employed where these projects can be effectively monitored and sustained. This can be achieved through the following steps:

1. Community participation from design to operation stages on Water supply and sanitation projects;
2. Adopting an appropriate pricing system to prevent the abuse of these facilities and at the same time making it affordable to all;
3. Environmental education on the cost and benefits of water as a scarce but essential resource, its fragility (rate of replenishment and contamination) and implications to both health and economy when abused, and personal hygiene;
4. Encouraging the exploration of other clean alternative water sources, particularly rain water. Rain harvesting can serve as a viable supplement to the existing source of water.

CONCLUSION

In conclusion, it is quite evident that the available source of portable water in Anyigba is inadequate and needs to be improved upon. This improvement is required also in the area of sanitation, which is presently very poor. They measures suggested in the study, for the improvement of the quality of water supply in Anyigba, that is increase in the number boreholes, pipe-networking of the boreholes and sanitation facilities; community involvement in water and sanitation projects among others will not only alleviate the problems of water supply in the area but will also ensure that the energy formerly expended in searching and carrying water is better utilized for more productive work (Musa, 2005)
REFERENCES


Anil Kumar, M. (2004), Plan for augmentation of capacities for water supply system in GIS (Study Area MCH). B. Planning thesis, Department of Urban and Regional Planning, School of Planning and Architecture, Jawaharlal Nehru Technological University, Hyderabad.


Developments (2007), Water: the works; Department for International Development, UK, Pp3-4

Encarta 2006 (2005), Water; Encarta Microsoft, Ltd.


Nwosah, G.C. (2003), Options for small-town water supply and sanitation in Nigeria; Towards the Millennium Developments Goals. Proceedings, 29th WEDC International Conference, Abuja