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Challenges of Water Resource Development and Management in Zing Town, Taraba State, Nigeria

BY

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Abstract

This study examined the challenges of water resource development and management in Zing town,Taraba State, Nigeria. The study considered issues of sources of water supply in Zing town, the nature of water challenges, impacts of the water challenges on the socio-economic life of the people, water management strategies and prospect of urban water resource development in the study area. 110 questionnaires were systematically administered in ten streets that were purposively selected in Zing town. The data were analyzed using descriptive statistics. The result of the finding indicates that majority (45.5%) of the respondent have their water source from borehole, 18.2% streams, 18.2% hand dug wells and 9.1% from other sources (mostly water vendors). The study shows that 68.2% of the respondents had their water point located outside their households, while only 31.8% claimed to have their water sources located within their compounds (this is mostly hand dug wells). The nature of water challenge in the area ranges from severe (50%), not severe (27.3%) and normal (22.7%). The results also shows that only 34% of respondents claimed to have access to sufficient water daily, while 66% of the respondents hardly have access to sufficient water on daily basis. The study shows that the water management strategy adopted mostly by the respondent ranges from storing water in large container (48.2%), reduce water use (29.1%), increase amount spent on water (13.6%) and others 9.1% (mainly re-use of water). The prospect of water resource development in the study area is very bright with the proposal of a small earth dam in Monkin settlement by the Federal Government of Nigeria. The Monkin small earth dam which is meant to generate 500KW of electricity can be integrated into an urban water supply project in the area. This will assure more reliable water supply all year round. It will also help to overcome some of the challenges of servicing the hand pumps which rendered them inadequate when they break down. This study recommends the need to replace the old and obsolete borehole equipment with new ones and increase the number of boreholes to meet the increasing water demand in the area.

Keywords: Challenges; Management; Monkin; Water Resource; Zing.

Academic Discipline: Environmental Resources/Geography

Method/Approach: Survey/Interview

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INTRODUCTION

Water is one of the world's most valuable resources (1). However, water resources are becoming increasingly scarce in many parts of developing countries particularly sub Saharan Africa owing to increased demand, high population growth, climate change and drought. Over one billion people today lack access to an adequate supply of safe water for household use(2). It has been observed that in 30 years, as many as 5.5 billion people will live in areas suffering from moderate to severe pressure on water resources, rendering the provision of safe water even more difficult (3). Although Nigeria is well endowed with abundant water resource estimated as 22.6 million m^3 surface water and, about 40 million m^3 underground water, it is still faced with the problem of acute shortage of water supply (4). The challenges of increasing water scarcity in urban areas in Nigeria are becoming a source of concern. Water shortage and reduction in quality of water are potential threat to the health and lives of the people in Zing town.

Zing town is an agrarian town dominated by agriculture and trading activities. The town recently has witness rapid growth in its population which has exacerbated water scarcity in the area. The population of Zing town was 12,346 in 1991 and has grown to an estimated 32,643 in 2014 (5). This increase in population as a result of natural growth, migration and urbanizationhas led to increase demand for water. The recent relocation of the Taraba State College of Education from Jalingo to Zing town and its upgrading to a degree awarding tertiary educational institution has intensify this demand for water.

With increasing population and urbanization in the area, the existing hand pump and boreholes are over-stretched, resulting in frequent breakdown of the boreholes and creating acute water shortage in the town.The increased population has also led to increasesocio-economic activities, thereby causing more demand for resources and exerting pressure on the limited resources, water inclusive. This has hampered the efforts to improve potable water supply in the area. This potable water inadequacy has led people to resort to other alternatives such as hand dug wells and open (unprotected) surface waterfrom streams, thereby exposing the people to increase in water-borne and water related diseases in the area. Hence there is need to examine the nature of water challenges and management strategies in the town. This research is therefore aimed at filling this knowledge gap by examining and making documentable findings on the problem and prospect of urban water supply in Zing town.

Materials and Methods

Description of Study area

Zing Local Government Area (LGA) is located between latitude 8^o34' and 9^o 10'N and longitude 10^o 58' to 11^o 30 E. The LGA is bordered to the east by Mayo-belwa LGA, to the south by Jada LGA (both in Adamawa state) and to the west by YorroLGA(in Taraba State) (Fig. 1). It has a total land area of about 1,052km^2 (5). The population of Zing town has grown from 12,346 in 1991, 14,073 in 1996, to 18,155 in 2005 (all estimates). The population of the town is projected to be 32,643 in 2014 (5).

The study area is located in the sub humid climate zone characterized by well defined wet and dry season. Average rainfall is about 850mm^3 annually and mean temperature of 30^{o}C. Temperature and evapo-transpiration are high for a greater part of the year. The study area falls under the guinea savanna vegetation zone characterized by grasses interspersed with tall trees and shrubs. There is no perennial stream in the study area. Ground water is the sole source of domestic water in the town.Zing town is underlain by crystalline rocks of basement complex origin dominated by low rising hills and rock outcrops. The underground aquifer is poorly developed. The existence of basement complex rocks near the surface in the valleys results in poor aquifer since the rocks are mainly igneous and metamorphic and so impermeable. Aquifers occur only where these impermeable rocks are deeply weathered or have cleavages, joints, fissures and shattered belts (6). This is expressly manifested by the drying-up of hand dug wells and streams which constitute the dominant source of water supply to the people in the dry season. The urban water supply in the town relies heavily on boreholes and hand dug wells, since there is no any large river that passes through the town. The water supply from the boreholes often suffers from breakdown of the pumping machine and high cost of fuelling the generators. The hand dug wells also dry up in the peak of the dry season, thereby exposing the people to acute water shortages.

Materials and Methods

In an effort to achieve the stated objectives of this study, a number of relevant research instruments and methods were employed, which include primary and secondary data collection methods. This were done through the use of structured questionnaires to households in Zing town and the officials of the department of Natural Resources in the Local Government council and Taraba State Rural Water and Sanitation Agency in Jalingo town. In addition to this, field observation and informal interviews were conducted. Secondary information were also used.

In selecting households to be considered for the study, ten (10) streets were purposefully selected. Three (3) streets in the low density parts of the town and seven (7) streets in the densely populated parts of the town were selected. In each of the ten (10) selected streets, eleven (11) households were systematically selected. In this way, the first household in the street is selected and after that, we count three (3) houses and the fourth household is selected. This is done until eleven houses are selected in that street. A total of one hundred and ten houses (110) were selected in the study area. In each of the selected household, questionnaire was administered to the head of the household and in his absence, to any adult member of the household who could either be a male or female. In this way, a total of 110 questionnaires were

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administered in the study area. The descriptive statistics was used to analyze the data for frequency count, mean and percentages.

Result of the findings

The result of the findings shows that majority (45.5%) of the respondents obtain theirwater source from boreholes in the area,18.2% have their water source from hand dug wells and another 18.2% from seasonal streams in the area (Table 1). Most of these wells are uncovered; some might even be closed to gutters or pit toilets. With this unprotected water sources, the residents are exposed to various forms of water-borne and water related diseases in the area.

Table 1: Sources of water in the study area

S/NO	Water Sources	Frequency	Percentage (%)
1	Hand pump Boreholes	50	45.5
2	Hand dug well	20	18.2
3	Rivers and streams	20	18.2
4	Others (buying from vendors)	10	9.1
5	**Total**	110	100

Source: Fieldwork, 2014.

Location of water point

Most people (68.2%) in the study area have their water point located outside their compound while only 31.8% of the respondents (Table 2) claimed to have water source located in their compounds. This implies that people living in the study area do walk for some distance to fetch water for their use. The study also revealed that most of the water collection is done by the house wives with their children using bowl/buckets and Jeri-cans.

Result of the study shows that about 43% of the people have their sources of water less than 500m away from home while the rest are above 500m away. This indicates that more than half of the population have their source more than 500m away. This situation does not meet the requirement for the standard accessibility to water supply which states that an environment is said to be accessible to water supply if there is availability of at least 20 litres per capita per day of improved water supply from a source within one kilometre of the user's dwelling (4). Base on this, one can safely infer that the study area (Zing town) has very low access to water supply.

Table 2: Location of water point

S/NO	Location of water point	Frequency	Percentage (%)
1	Within the compound	35	31.8
2	Outside the compound	75	68.2
3	**Total**	110	100

Source: Fieldwork, 2014

Nature of water challenges in the study area

The nature of water challenge in the study area can be referred to as critical because most of the respondent affirmed that there is high scarcity of water in the study area. When asked to describe the nature of water challenge in the area, half (50%) of the respondents describe it as severe. This is a situation where the residents have less than 50% of their daily water need. 27.3% describe the nature of water challenge in the area as not severe. This is a situation where the residents have access up to about 50% but less than 60% of their daily water need. On the other hand, 22.7% (Table 3) of the respondent believe that the water challenge is normal, meaning the water is available even though it is not sufficient. This is a situation where the respondents have access to about 70% of their daily water need.

Table 3: Nature of water challenges in the study area

S/NO	Nature of water challenge	Frequency	Percentage (%)
1	Severe	55	50
2	Not severe	30	27.3
3	Normal	25	22.7
4	Total	110	100

Source: Fieldwork, 2014.

ISSN 2349-4379

Accessibility to water supply

Access to water is measured by the number of people who have reasonable means of getting an adequate amount of water that is safe for drinking, washing and for essential household activities. The result of the findings shows that only about 34% of the respondents claimed that they have sufficient water on daily basis while 66% (Table 4) insist that they do not have access to sufficient water daily. The findings of the study show that water supply in the study area is very poor. This shows that most of the respondents hardly have access to water on daily basis for their domestic and other purposes, thereby constituting a threat to the socio-economic activities of people living in the study area.

Table 4: Accessibility to water supply

S/NO	Access to water	Frequency	Percentage (%)
1	Yes	36	32.7
2	No	74	67.3
3	Total	110	100

Source: Field Survey, 2014

Oral interviews show that the borehole in the area does not run most of the times. Sometimes, it runs for some hours a day for a week or more in a month or even months. The workers in-charge of the boreholes complained of inadequate fuel/diesel to run the generators and sometimes frequent breakdown and lack of capital for maintenance. This situation makes water supply in the area irregular and unpredictable.

Increasing number of people now rely on buying water from street vendors whose sources of water is sometimes not certain. Most often, the water sold to the people are either fetched from stream or ground well. These sources of water are unprotected and susceptible to water borne diseases. Also the cost of buying water is becoming expensive in the area. This development has serious implication on sanitation at homes.

Water storage system in the study area

In order to have sufficient water most people in the study area resort to storing water for future use when they have the opportunity to do so. Water is been store in different containers ranging from Clay pots (25.5%), Drums (either plastic or metallic)(29.1%) and overhead tank as shown in Table 5.

Table 5: Water Storage Strategies in the Study Area

S/NO	**Water Storage Facilities**	**Frequency**	**Percentage (%)**
1	Clay pots	28	25.5
2	Drums	32	29.1
3	Overhead Tank	15	13.6
4	Others (Jerry cans, buckets etc)	35	31.8
5	**Total**	110	100

Source: Field Survey, 2014

Water management strategies in the study area

Water resource management is having the right amount of water available for particular use at the right time, and with the right quality (7). As a measure of water management, most of the people after sourcing their water, they store them in different plastic, metallic, and earth-pot containers for domestic use. Besides, water used for domestic activities are put in to multiple uses (re-use), before discharging it. The majority of the respondents (48.2%) (Table 6) in the study area adapt to storing water in large container (Plastic or Metallic Tanks) while 29.1% mitigate water challenge by reducing water use. 13.6% manage their water challenge by increasing amount spent on water and 9.1% re-use before finally discharging the water.

ISSN 2349-4379

Table 6: Water management Strategies in the Study Area

S/NO	Water Management strategies	Frequency	Percentage (%)
1	Storing water in large container	53	48.2
2	Reduce water use	32	29.1
3	Increase amount spent on water	15	13.6
4	Others (re-use of water)	10	9.1
5	**Total**	110	100

Source*:* Field survey, 2014

Challenges of water supply in the area

The supply of water in Zing town is neither adequate nor regular. This can be attributed to so many problems. Firstly, there is unstable electricity and lack of fund to procure diesel/fuel to run the generators. The erratic power supply does not allow regular pumping of water to the people, thereby resulting in intermittent water supply. As a result of this, subsequent boreholes constructed in the area were the hand pump boreholes. Some of the older boreholes in the areas have been grounded for years now without any effort to rehabilitate them. The newly constructed hand pump boreholes also often breakdown partly as a result of mal-handling by the users and partly as a result of pressure from the population dependent on such boreholes.

Secondly, the local government unit in-charge of the water resources in the area claimed that they are faced with the problem of inadequate funding as the government funds were not forthcoming and will not be enough to adequately maintain the equipments to guarantee adequate water supply in the area. The local communities sometimes tax themselves by contributing token amount to effect minor repairs on the boreholes.

Thirdly, it is observed that most of the boreholes and pumping machines in the area are now obsolete and need replacement with new modern equipments. Fourthly, the lack of surface water resources such as river in Zing town and the basement complex nature of the underlying rocks and associate poor aquifer contribute to the water challenges in the area. This has put pressure on the underground water resources.

The Prospect of water resource development in the study area

A site has been identified in Monkin community in Zing LGA as a potential hydro power dam sites for development. The Upper Benue River Basin Development Authority (UBRBDA) undertook pre-feasibility studies of the Small Hydroelectric Power (SHP) sites. The Monkin SHP has a capacity of 900kw of energy (8). The Federal Ministry of Water Resources was appropriated fund in the 2014 budget for the execution of various projects in the country including the Monkin Earth Dam. Request for expression of interest (EOI) from consultant on the construction of the Monkin Small Earth Dam, Zing LGA, Taraba State was published on 4th June, 2014 (9). The Monkin dam is estimated at $26,971 per kw and the potential number of people that will benefit from it is 18,900 (10). The dam has a discharge of 3.17 m^3/sec (11). The Monkin small earth dam which is meant to generate 500kw of electricity can be integrated into an urban water supply project. This will require raw water intake, a treatment plant complex, transmission mains and distribution network, ground level and overhead reservoirs.

With an increasing population in Zing town, water demand cannot be met by groundwater abstraction alone as is presently the case by the use of hand pumps and artesian wells. The Monkin earth dam project will therefore go a long way in meeting the increasing water demand in Zing town and the immediate communities as it grows into the future. The water project is hoped to significantly minimize some of the water borne and water related diseases in the area. The impoundment of surface water of the Monkin earth dam project will assure more reliable water supply all year round. It will also help to overcome some of the challenges of servicing hand pumps which rendered them inadequate when they break down.

Conclusion

This study examined the challenges of urban water resource and management strategies in Zing town. The study specifically focused on the sources of water supply, nature of water challenges, various water management strategies adopted and prospect of urban water resource development in the study area. The data used for the study were collected through numerous sources which include structured questionnaire, interview schedules and secondary materials. The result of this study indicates that water shortage is a serious problem in Zing town with implication on the health and socio-economic lives of the people. The study findings shows that the people in the study area rely on hand pump boreholes, hand dug wells and surface streams. The water supply from the electric powered and hand pump boreholes are sometimes not reliable as a result of power failure, lack of diesel, broken down pumps, obsolete equipments and non maintenance of equipment. In response to the water challenges, the people have resorted to reduce water use, re-use of water, storage of water in large containers and increasing the amount spent on water purchase.

The current research was not specifically designed to evaluate the quality of water used in the study area and their effects on the people. Also the sample size could be a limitation to this study. However, further research might explore the quality

aspects of water supply in the study area. One of the more significant findings to emerge from this study is that it has shown that despite the challenges of urban water supply in the study area, the future for urban water supply in Zing town is bright. A proposal for water resource development is already in the pipeline and when completed will provide surface water supply (that is treated and pumped) to the town. This will help to overcome the challenges of urban water supply in the study area.

Recommendations

Based on the findings of this research, the following recommendations are made;

1. There is the need to include Zing urban water supply project to the ongoing Monkin small earth dam project in the area. This will reduce the current pressure on the ground water resource of the area and improve potable water supply to the town.
2. There is the need to replace some of the old and obsolete borehole equipments in the area with modern ones.
3. There is need to allocate more funds to the water sector in the town. This will help in ensuring regular maintenance and fuelling of the generators and broken boreholes in the area.
4. With increasing population and urbanization in the town, it is pertinent to increase the number of existing boreholes. This is because the existing boreholes are proving inadequate to meet the water demand in the study area.
5. Much attention should be focused on maintenance, since both the electric powered and hand pump boreholes are fragile, necessitating frequent maintenance.
6. There is need to engage in public private partnership (ppp) in the area of water supply. This will reduce the reliance on government for construction and maintenance of boreholes.

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