



Assessment of Public Involvement in Urban Water Supply: Lessons from Ibadan City Sector

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Abstract

In many countries around the world, including Nigeria, access to potable water has become an illusion. This paper examined the existing situation of Eleyele and Asejire public Waterworks, reservoirs and water pumping stations in Ibadan. Both secondary and primary information were obtained for this study. Secondary information was obtained from the State Water Corporation and Interview guide was prepared and administered on the head of operation to source primary information. Findings showed that all waterworks, booster and pumping stations have inadequate power supply, inadequacy of chemicals and other important materials for water treatment at treatment plants, frequent damage to water pipes by road construction companies, insufficient and incompetent manpower consequently affecting their performance. The water corporation has about 35,000 customers but less than 2,000 (5.9%) currently have water supply. The water corporation metered public piped water for only 0.7% of the consumers. Government annual monetary allocation between 2010 and 2014 revealed steady increase in the financial commitment to water production in the State. Residential buildings paid N65.80 per meter cubic (M³) of water, religious buildings pay N62.05, industrial and commercial pay N125.00 and N100.00 per M³ of water respectively while areas without meter were categorised into high-density areas pay N1000.00 and low-density areas pay N2000.00 per unit of building. Residents that have access to the public piped water complain of irregular supplies and unhappy to pay for water consumed. The study suggests adequate provision of uninterrupted power supply through replacement of obsolete equipment and pipes, regular supply of adequate purification materials and total avoidance of pipe leakages, proper urban watershed management by appropriate government agency such as the Bureau for Physical Planning and Urban Development to minimise siltation in dams and full implementation of the city master plan.

Keywords

Public piped water, Waterworks, Water shortage, public intervention

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1. Introduction

Water is vital for human survival. Apart from air, it is the next most essential need of the human race (Akange, 2016; Utsev and Aho, 2012). Water is at the centre of human existence and plays a very important role in determining health and social development. Safe drinking water and basic sanitation are crucial to preservation of human health, especially children. Human beings require water for cooking, washing, sanitation, agriculture

and manufacturing processes among other uses. It is universally accepted that adequate water supply for drinking, personal hygiene and other domestic purposes is essential to public health, economic development and human well-being (Adejumo, 2018).

Water demand already exceeds supply in many parts of the world and, as the world population continues to rise at an unprecedented rate, many

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more areas are expected to experience this imbalance in the near future. There is a direct relationship between potable water availability and economic development (Wen-Jun et al., 2018). Potable water shortage is more pronounced in developing countries with an estimated 1.2 billion people in 20 water-scarce developing countries without access to safe water. It was estimated that by year 2020, up to 30 countries, mainly in Africa and Asia, would be in this group. Nigeria is among countries in Africa that are facing water insecurity problem (Muta'ahellandendu, 2012).

In Nigeria, there is wide disparity in public water supply at regional level. The North Central (NC), north-eastern (NE), and north-western (NW) zones of Nigeria have drinking water access of 48.9 per cent, 30.7 per cent, and 50.64 per cent respectively, compared to 73.5 per cent, 40.8 per cent, and 45.9 per cent respectively in the south-western (SW), south-eastern (SE) and south-south (SS) zones (Onabolu et al., 2011). Similarly, there is wide dichotomy between water supply in urban and rural areas (Adeniran, 2018). Urban areas have a higher proportion than those in the rural areas (WHO/UNICEF, 2010). There is also variation in water supply within urban centres. At urban centre level, disparity in water supply has been largely associated to city zoning and political forces. For instance, some parts of Ibadan city do not have water supply over decades, while residents in some areas take water supply for granted.

Institutionally, the rapid increasing socio-economic activities, coupled with spatial urban and demographic expansion of Ibadan over the years are not matched by public investments in the water sector. Political inconsistency has contributed to low public intervention in public water supply. Financial commitment of governments to water supply is not proportional to water requirement by residents. The inadequate investment in water infrastructure over the past few decades has constrained piped water access for an increasingly large fraction of the urban population. In Ibadan, individual household has been struggling through personal effort to secure water for their household use without quality assurance. In view of the forgoing, this paper took a cursory account of constraints to adequate public water supply, examined the previous financial commitment of the state government to water supply and provided possible solutions to the identified constraints.

2. Literature Review

Water supply has been at the hub of international discourse in various international directives and declarations over the past four decades. Many scholars have also researched on the subject matter which underscores the importance of water to the masses. Yet in Nigeria, and mostly in urban settlements where public water is extremely required for survival (Stoler et al., 2012), the common experience is acute water shortage. The usual public tap water has become dry and vandalised in many cities. Access to the public pipe water in Nigeria, and particularly Ibadan region, is getting increasingly low despite the growing demand for potable water, number of people who rely on the public piped water is becoming negligible because of its low reliability (Adejumo, 2018). In cities, quality of piped water cannot be guaranteed, tend to be highly turbid with sediment and access to piped water, whether in the household or public taps, is often highly irregular (UNICEF, 2001).

Public water supply has, over decades, passed through several phases and developments, mostly characterised by too many short-lived and incoherent policies and very little action; lack of proper coordination; excessive international pressures with little local institutional and technical capacities to adapt; multiple agencies with none effectively in charge; lack of political commitment; and corruption (Akpabio, 2012). These factors have contributed to gross failure of governments adopted policies to improve on public water supply.

The havocs of water shortage on human live are numerous. It was discovered that the problems of poor water supply often leave most women and children on queues for several hours and those that cannot endure are forced to travel long miles in search for alternative source of water, which may not be fit for drinking. In the light of this, mothers are prevented from domestic work and most children are kept away from school (Adeleye et al., 2014). Households' water-use demand and willingness to pay for improved water services in Ijebu, Ogun State was examined by Coster and Otufale (2014). The study revealed that household per capita expenditure on water is N60 (US\$0.38) per day an equivalent of N1,800 (US\$11.5) per month which are significantly higher than current connection charge for public piped per month.

The study carried out in Iju-Ishaga, Lagos revealed that inadequate number of booster station, incessant power failure, frequent cases of pipe leakage and vandalism are common problems impeding adequate water supply. In addition, the study suggested that pipe leakages and vandalism can be eradicated if durable pipes are used and effective monitoring is adopted whenever there is road construction or maintenance works. Power failure is a rather endemic problem therefore, establishment of more power generation and transmitting plants appears the major step forward in this area (Amori et al., 2012).

In America, the federal government directly and indirectly influences how groundwater is managed in the United States. Public participation in water supply include: federal agencies monitoring groundwater directly or with partners through measurements at wells and springs using satellites or other remote sensing devices to provide information on groundwater flow, storage, depletion, and other characteristics that help inform state and local groundwater management (Folger et al., 2018). The effort was to ensure water security for the common people. The challenges of public water utilities and public water supply systems have technical, social, economic, legal, institutional and environmental dimensions (Jideonwo, 2014).

The past few years have seen some private sector involvement in urban and small-town water provision in Ghana, as the government strives to improve access to water supply services for its citizens in line with millennium development goals. Since 1995, both central and local governments have entered into various forms of public-private partnerships (PPPs) contracts (Albert, 2013). Management contract has emerged as a popular form of water supply PPP in Ghana.

Strategic management and provision of sustainable public water supply is essential and crucial for the future of the world's economy, economic and industrial development, protection and improvement of public health, improving the quality and standard of living, ecosystem preservation as well as poverty alleviation and eradication especially in developing countries (McDonald et al., 2014)

The challenges faced in public water supply in most cities of developing countries are increasing population size, poor operational efficiency of existing facilities, leakages, low reticulation coverage and poor cost-recovery (Balogun et al., 2018). These are very relevant to most Nigerian cities. The population is far increasing above the provision of infrastructural facilities. More importantly, most of the states in Nigeria still rely on facilities built by the colonial administration when the population was very low

3. Study Location and Methodology

The study was carried out in Ibadan the capital of Oyo state, located between latitude 7° 02' 49" and 7° 43' 21" N longitude 3° 31' 58" and 4° 08' 20" E (Figure 1). Mean annual rainfall is about 1,205 mm, mean temperature is 28°C, ranging between 18°C and 37°C, while relative humidity is high all year round at about 74.55%. Both primary and secondary information were collected for the study. Interview guide was designed and conducted on the Director of Operation, Oyo State Water Corporation to elicit primary and secondary information. The study sourced information on the Eleyele and Asejire waterworks. The information collected includes the past and present conditions of the reservoirs with respect to the quantity of water produced, major challenges confronting the corporation at water production centres, distribution routes and storage points and, government financial commitment to water production among others. Other information collected includes the difficulties encountered by the corporation management staff and tariff system in the state.

4. Limitation of the study

During the period of data collection, the main challenge encountered was unavailability of information on the annual financial commitment of the present administrative government to public water provision. This could be deliberate and for political reasons. The information provided by the relevant ministry ended with the last budget operationalised by the previous administrative government.

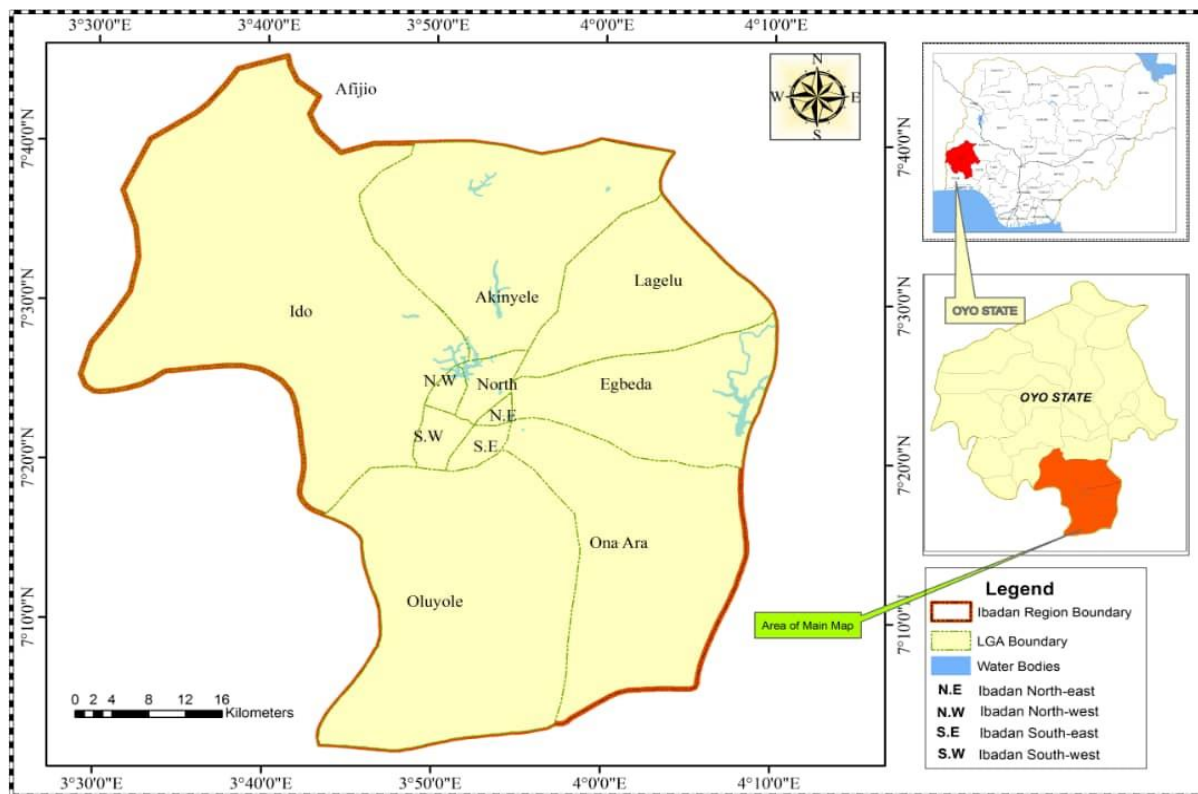


Figure 1: Map of Ibadan Region in Oyo State Context

5. Historical evolution of water provision during the colonial administration

Public water supply started in Nigeria early in the twentieth century in a few towns managed at the lowest administrative level. Amongst the early beneficiaries were Lagos, Calabar, Kano, Ibadan, Abeokuta, Ijebu Ode and Enugu. The schemes were maintained with revenue from water sales with virtually no operational subvention from the government. With the creation of regional governments in the early 1950s; the financial and technical responsibilities for developing new water schemes were taken over by the regional governments who also assigned supervisory high-level manpower to oversee operations and maintenance (Adeleye, et al., 2014). Provision of water for domestic and other uses in both rural and urban centres is one of the most intractable problems in Nigeria and has become a major government preoccupation during the colonial period. The colonial administration saw the improvement of domestic water supplies as a necessary and vital component of the general effort to improve environmental sanitation, health and social welfare of the people.

The colonial administration started intervention in water provision with measures to protect and sustain the people’s traditional sources of drinking water. The measures included deeping and concreting of the walls of existing wells. The

periods also witnessed the fencing of spring heads and the construction of concrete structures to store and protect spring water (Akintola et al., 1980). At the same time, the colonial government designated some settlements as “first class towns” which were then favoured in the provision of social amenities in which water is inclusive.

The policy of the colonial administration was continued by both the federal and regional governments long after political independence in 1960. The objective of the policy was to create a marked dichotomy between the major urban centres on the one hand and the rural areas and towns on the other in terms of government attention to, and quality of, water supply (Areola and Akintola, 1994). The colonial policy provided pipe-borne water for Ibadan city, Lalupon, Erunmu and Ejioku all in Ibadan region. The three less-developed settlements benefited from water supply because of their locational advantage. These settlements are located along Asejire water scheme pumping system route. Other parts of Ibadan region that enjoyed pipe-borne water before the creation of Oyo State in 1976 developed their water schemes for private use. These areas are institutions such as Cocoa Research Institute of Nigeria (CRIN), University of Ibadan and the International Institute of Tropical Agriculture (IITA).

6. Development of modern water supply scheme in Ibadan

The first modern water supply for Ibadan city became fully operational in 1942, when the construction of the Eleyele reservoir on Ona River was completed. The reservoir has a catchment area of about 323.8km² an impoundment area of 156.2 hectares and a storage capacity of 29.5 million litres of water. The water was treated and pumped out at the rate of about 13.6 million litres a day. Eleyele waterworks served Ibadan city until 1972 when the Asejire water supply scheme was completed. The Asejire scheme has a capacity of about 85 million litres per day, of which 80 percent is used for domestic purposes (CBN, 1999).

During the period between 1942 and 1972, the population of the city grew rapidly due to rural–urban influx from different parts of the nation. Some pull factors for migrants were establishment of University of Ibadan, University College Hospital, the Polytechnic Ibadan and other research institutions. The dwindling capacity of Eleyele Waterworks to provide water for Ibadan city led to the construction of the Asejire scheme on river Osun at a cost of 25 million naira (Areola and Akintola, 1994). The combined storage capacity of Eleyele and Asejire was 109 million litres per day.

7.1 Public water Production, Distribution and Tariff

7.1 Water production and distribution

The amount of water produced per day in each of water works (Eleyele and Asejire) is far below the quantity required to meet the need of the growing population. Eleyele waterworks was designed to produce 63,000M³ per day while Asejire was built to supply 150,000M³ per day. The study revealed that the Eleyele waterworks produced 39,938M³ per day while Asejire waterworks supplied 93,188m³ per day. The amount of water supplied was grossly inadequate for over 3.5million people resident in Ibadan, which require about 402,500,000m³ per day. The blame of acute shortage and low supply was on the various challenges ranges from management problems, financial shortages, inadequate materials, shortage of power supply to recurrent fault on the production plant to pollution of raw water.

The performance of water production and distribution units of the water cooperation has been abetted by the construction of reservoirs in the city. The reservoirs were built to aid storage and distribution of purified water to different parts of Ibadan. Water produced at each of the waterworks (Eleyele and Asejire) is channel into reservoirs and booster stations for distribution into residential and industrial areas. The booster stations, on the other hand, facilitate distribution of water to communities

on a higher elevation above the level of distribution pipe. Water distribution from booster station is done either by pumping or gravity. The pumping requires electricity but gravity is by relief. The topography of Ibadan has been a blessing to some areas where it was used effectively to aid water distribution by gravity.

The major and largest reservoir with 44,500 m³ was established at Agodi. It stores treated water from Asejire waterworks and discharges water to different part of the city by pumping and gravity device. Some parts of the city such as: the University College Hospital (UCH), Basorun Reservoir, Oke Ibadan, Oje, and Bere among others receive water from Agodi booster station by pumping while Challenge and Apata were supplied water by gravity. Other reservoirs in Ibadan are located in Basorun community, Letmauck Barracks (Mokola) and Oke Itunu. The Eleyele Waterworks supplies water to the reservoirs at Mokola and Oke Itunu. However, the Oke Itunu reservoir is supplied water by the Agodi and Sango reservoirs (Table 1).

Table 1: Location of reservoir/booster stations in Ibadan

S/n	Location of Reservoir/ Booster Station	Source of water	Capacity
Reservoir			
1	Agodi	Asejire	44,500
2	Basorun	Asejire	22,500
3	Letmuck Barracks (Mokola)	Eleyele	22,500
4	Oke-Itunu	Agodi/ Sango	11,250
Booster Station			
1	Agodi	Asejire	44,500
2	Beere	Asejire	On-line boosting
3	Sango	Asejire	On-line boosting
4	Mokola	Eleyele	On-line boosting

Source: Oyo State Water Corporation, 2017

The Eleyele waterworks pump treated water to Sango reservoir where water is discharged to Oke Itunu. The Water Corporation has also established some booster stations to complement the performance of the available reservoirs. It is noteworthy that the Agodi reservoir serves as both reservoir and booster station. Other booster stations at Bere, Sango and Mokola are on-line boosting aiding water distribution.

7.2 Public piped water tariff system

Most Nigerian water supply connections are not metered. It is a major challenge for water cost recovery in Nigeria and perhaps some other developing countries. The Oyo state Water Corporation has adopted two distinct methods to bill the consumers: flat rate and meter systems. Flat rate is applied on residential unit where the corporation

cannot provide meter. The latter method involves the use of meter machine to determine the amount of water consumed by a unit of building. Metered areas are categorised into residential, religious, industrial and commercial. Residential buildings are charged N65.80 per meter cubic (M³) of water, religious buildings pay N62.05, industrial and commercial pay N125.00 and N100.00 per M³ of water respectively. The areas that have not been metered are categorised into high density and low-density residential areas with flat rating (no meter charges). High-density areas pay N1000.00 per unit of building while low-density buildings pay N2000.00 per building. Furthermore, the study revealed that only 21 buildings were metered in Agodi I Water Corporation District Area, 14 in Agodi II, 112 in Egbeda, 12 in Bodija, 26 in Jericho while only 28 buildings were metered in Oke Ado district area. The water corporation disclosed that about 0.7% of the public piped water consumers have meter. This must have affected the revenue collection and the turnover of the corporation.

The task of revenue collection has been seriously affected because of irregular supply of water. Consumers are not ready to pay for service not enjoyed. At the production points (Eleyele and Asejire), there are problems that affect regular production. Water distribution is equally affected by pipe leakages due to their age and obsolete nature. It was disclosed that the corporation has about 35,000 customers but less than 2,000 buildings currently have water supply. Similarly, the mentality of residents that water is a social commodity has made revenue collection difficult. Consumers do not feel obliged to pay for public piped water used. Staff development and training is insufficient, thus the corporation is deficient in terms of innovation. Water pilfering and illegal connection to water pipe by fraudulent residents have caused serious setback for efficient performance of the water corporation.

8. Government financial commitment to water production

The budgetary allocation of Water Corporation of Oyo State has been steadily increasing in the past five years. The budget allocations for water production for 2010 - 2014 are shown in Table 2. The monetary allocation revealed that there has been steady increase in the financial commitment to water production in Oyo State. Study revealed that the end has not justified the means. The few of residents that

have access to the public piped water complain of irregular supply and are consequently unhappy to pay for water consumed (Adejumo, 2018).

Table 2. Financial allocation to water production in Oyo State

Year	Amount	In US Dollar (million)
2010	N1,870,000,000.00	\$9.5
2011	N2,660,000,000.00	\$13.5
2012	N2,530,000,000.00	\$12.9
2013	N6,100,000,000.00	\$31.1
2014	N10,830,000,000.00	\$55.2

Source: Water Corporation of Oyo State (2015)

9. Challenges of water production and distribution in Ibadan

The problems of water supply in Ibadan city can be viewed from two perspectives, namely Water Corporation and consumers consisting of the general public.

(a) The main challenge combating effective performance of the Corporation is incessant power failure and fluctuations at the waterworks and booster stations which, apart from causing frequent interruptions in water supply, lead to pipe bursts when subjected to frequent alternating stoppages and gushes of water flow.

(b) Defective plumbing by contractors who connect water pipes crudely and those who tap water without proper authorisation from the ministry in charge. Water pilfering through illegal connection has been a major constraint to excellent performance of the public water supply to the city.

(c) Distribution is acritical problem as far as the provision of safe and potable public water supply is concerned in most developing countries including Nigeria. Ibadan is not left out of this serious problem militating against adequate public water supply. In Ibadan city, the physical landscape in addition to poor technology has made it difficult to evolve, operate and maintain an effective distribution system for public water supply. The multiple high hills in the city have hindered free flow of water consequently caused government to build some booster stations itemized in Table 1.

(c) Frequent damage to water pipes by road construction companies. The study encountered some respondents at Jericho area of Ibadan Northwest Local Government Area who lamented that they had been cut off from the water supply in the area due to Eleyele-Dugbe road dualisation

project. They disclosed that the community discovered that the water service pipe to the area was damaged during the road construction and had not been repaired.

(d) Inadequacy of chemicals and other important materials for water treatment at treatment plants is another recurrent constraint on regular water supply in Ibadan region.

(e) Long delivery dates given by overseas manufacturers for water pumping and treatment materials hamper effective performance of the waterworks.

(f) Aged treatment plant was mentioned as causing recurrent fault on the machine and increase in maintenance cost. The factor is a major cause of regular inconsistent supply of water in Ibadan and other parts of Oyo State.

(g) Insufficient and incompetent manpower was discovered during the interview. The problem is compounded because there is no regular staff development programme for the existing personnel of the corporation. The limited resources committed to this sector are not sufficient to sponsor the top professionals in the corporation for training as and when due.

10. Probable solution to the public water supply challenges in Ibadan

The study revealed that both Eleyele and Asejire waterworks have some similar problems confronting the supply of water. These range from irregular power supply, inadequate chemical for water purification, aged machinery, to insufficient and incompetent manpower. The situation at booster stations was not encouraging because all the stations in Ibadan suffer above problems. However, quality of service would greatly improve if there is adequate provision of uninterrupted power supply, replacement of obsolete equipment and pipes, regular supply of adequate purification materials and total avoidance of pipe leakages. The government was advised to replace the old pipe made of lead with plastic material in order to reduce the risk of lead intake. Land use control by appropriate government agency such as the Bureau for Physical Planning and Urban Development to reduce activities that pollute the streams that supply raw water into the reservoirs. This observation seeks for city master plan with adequate watershed management.

11. Conclusion and Recommendation

The foregoing analysis leads to the conclusion that inadequate supply of treated water is causing problem of poor sanitation, economic and social backwardness and poor health condition leading to low life expectancies. If this problem is not well addressed it can affect the sustainable development of the city and the country as a whole.

Water services can be delivered through public, private or community-based institutions. Water pricing for these services is a substantial aspect underpinning the understanding of water as an economic good. Cost recovery of these services is vital to ensure their long-term utilisation and sustainability. All consumers should be appropriately metered for effective cost-recovery, starting with industrial and commercial consumers to communal outlets down to domestic consumers. However, a careful application of cross-subsidies among users and cost-sharing between users and government should be applied to protect the poor. It is required of the government to establish as a matter of urgency the political spirit to declassify water supply as a “free service” in their political agenda but as a “user pay service”. The public should understand that qualitative water service is capital-intensive and cannot be rendered as a free service. In addition, the existing water tariff system in Oyo State is due for upward review in order to sustain the facilities to meet immediate and future demands. This will enable the corporation to cater for the challenges facing the Waterworks and the Corporation at large.

It is essential that public water agencies should aim at prioritising quality control. This is because quality control is one of the essential mechanisms for improving the production of safe and potable water. For this reason, it is best that water agencies should devote more resources (funds, personnel and materials) towards enhancing improved quality control measures as this will guarantee steady supply of safe water for public consumption.

In addition, materials needed for water treatment such as reagents, alum, fluoride, and chlorine must be supplied regularly to boost the process of quality control. Also, there is need to ensure proper staffing for the quality control unit so that the sector can be effectively manned. The staff should be trained and developed so that they can acquire the needed skill. The existing water laboratories in public water agencies should be well-

managed, ensuring regular supply of chemicals and reagents needed for their full operations.

The Water Corporation has to evolve task force and effective maintenance crew to forestall frequent cases of pipe leakages and vandalism either through road construction and building development. The monitoring force should monitor areas where road construction is ongoing. Closely related to this is the case of inadequate number of booster stations to aid effective water distribution especially areas with high elevation. Water distribution pipes that are lead-free should be installed and monitoring Unit should be empowered to ensure the safety of such pipe and proper installation by contractors.

Incessant power failure is a rather endemic problem that has to be addressed holistically. The enhancement of power generating and transmitting plants appears to be the major step forward to assured regular production and distribution of public water. There should also be other alternative sources of power apart from the hydroelectric power (HEP) to help in the case of power failure. Government should put in money for installation of generators and for fuel purchase or they should work on the use of solar energy.

This research also recommends that proliferation of responsibilities of water provision between federal and state government should be discouraged. The state government should be responsible for water provision within their area of coverage. The involvement of the Federal government encourages duplication of efforts and consequently results to wastages. However, the state may seek for Federal government supports when there are serious challenges. Also, the state should

ensure community involvement in community-based water project design in order to encourage functionality and sustainability of the project.

State governments are enjoined to articulate new policies to encourage wide consultations among all relevant stakeholders in order to minimise the spectre of abandoned and non-functional water projects. The state government is to develop realistic implementation plans with timelines for all existing water policies to enhance water supply. The local government authorities in each state should be specially empowered to provide mini-water schemes in their areas of jurisdiction while two or more local governments could also collaborate to provide large water schemes.

Involvement of private investors through the public private partnership (PPP) should not be underestimated if the public water supply will thrive in Ibadan city and Nigeria at large. This strategy should encourage reasonable tariff system and efficient water production. Yet government will be involved in public water production chain to ensure quality control while the concept of free water supply will change.

Government should evolve water conservation policies which involve the careful use of water resources for sustainable development as a way to maintain public water in term of quality and quantity, modest use of water, redistribution of water, protection of urban watershed particularly that of Eleyele Dam and periodic removal of plant near and or on water in the Dam, reduction in water pollution along the streams that supply water to the Dam.

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