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**A REVIEW OF UNBILLED WATER CONSUMPTION FROM WATER UTILITY COMPANIES: A CASE STUDY OF GREATER LOKOJA WATERWORKS, NIGERIA.**

**<sup>1</sup>Ataguba, Clement Oguche; <sup>1</sup>Idenyi, Akowe Atulukwu and <sup>2</sup>Idusuyi, Osagie Felix**

<sup>1</sup>Department of Civil Engineering, Federal Polytechnic, Idah, Nigeria

<sup>2</sup>Department of Civil Engineering, Federal Polytechnic, Bauchi, Nigeria

**ABSTRACT**

This paper examined the current practice of supplying water at free cost to consumers from the Greater Lokoja Waterworks in Kogi State, North-Central Nigeria. Concern for the sustainability of such an approach on the long run was expressed, more especially at such a time as now when government revenue base is dwindling. It is observed from literatures that tariffs charged on consumers have been a major source of funds to complement government subsidies in financing the operations of public utility companies in other states in Nigeria. Benefits of such a good tariffs and subsidies plan for water utility companies as obtainable in developed countries were highlighted. The paper also discussed the need for the Kogi State Government and the Greater Lokoja Waterworks to conduct a willingness to pay (WTP) study on the different categories of consumers in the town with a view to introducing an equitable tariff. Other sources of revenue generation by the waterworks as suggested in this paper included connection fees for new customers, infrastructure development levy, etc. as these have not been applied in the waterworks A framework for revenue generation has been prepared from the study showing different revenues options available to the waterworks which can easily be adopted for sustainability. The benefits of this framework among others include significant improvement in the health and sanitation status of consumers of the improved water source from the waterworks, who are incidentally residents of Lokoja in Nigeria.

**Key Words:** Unbilled water, tariff, non revenue water, subsidies, willingness to pay,

**Introduction**

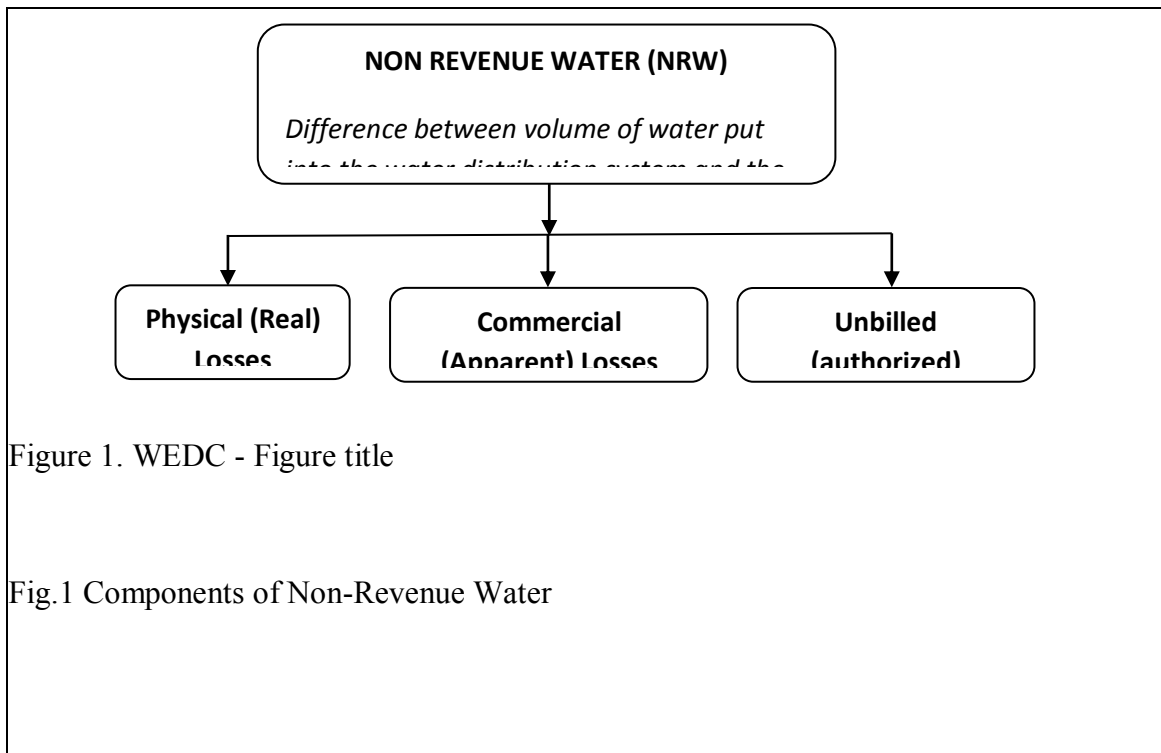
Water is an indispensable commodity which supports the existence of both flora and fauna. The importance of safe drinking water to any community worldwide cannot be overemphasized. Water resources management is considered as an important aspect of sustainable development as water relates significantly to the environment, the economy and the society (K' Akumu, 2006).

Access to safe drinking water and sanitation was proclaimed as a human right by the United Nations in 2010 (OHCHR, UN-HABITAT and WHO, 2010). Water is considered a social good, believed to be cheap, abundant and heavily subsidized by the government (Ricato, 2015). Water is equally considered an economic good which implies that equity and fairness in pricing water is very important for the sustainability of the water supply system (Rogers *et al.*, 2001). Water should not be wholly regarded as a social good as held by Ricarto, (2015) though there may be some social usage. However, the fact that it is heavily subsidized by government is an indication that it is an economic good – with price. Moreover, the economic nature of water is clearly seen in many Nigerian villages, towns and cities where the commodity is supplied from lorry tankers and non-propelled trolleys to consumers even by the informal sector at some price (Ataguba, 2015). Water pricing is a vital economic tool for improving the efficient use of water for social equity and financial sustainability (McPhail *et al.*, 2012). The concept of unbilled water consumption is one of the components of Non-Revenue Water (NRW). This refers to water which is accounted for but no revenue is collected for such consumption.

There are two categories of unbilled water consumption: unbilled metered water consumption and unbilled unmetered water consumption. In the former, the consumer lines are metered while in the latter, the consumer lines are not metered. Figure 1 shows components making up non-revenue water which are Physical Losses, Commercial Losses and unbilled water consumption.

Water utility companies worldwide carry out their basic function of provision of cost effective, environmentally safe water to consumers and generate revenues based on set tariffs charged on consumers on monthly basis to enable the utility companies carry out operations and maintenance activities. A water tariff refers to the price set on water supplied by a public water utility. A financially sustainable water utility company is normally effective and efficient in the provision of water services that meet their needs for the lowest possible cost (OECD, 2008). Good water tariffs provide basis for improved sustainable water service to the consumers and efficient use of water resources (McPhail *et al.*, 2012). As it is the practice in other cities in Nigeria, subsidies from the government and revenues from tariffs charged on consumers for water service provision, have been identified as the major source of financing the operations and maintenance activities of any public water utility company (FGN, 2000)

The aim of this paper therefore, is to raise awareness over the possible inability of government to sustain the present practice of providing unbilled water to residents of Lokoja from the Greater Lokoja Waterworks. It is believed that equitable tariffs charged on consumers will ensure efficient use and guarantee the availability of funds that will sustain the water supply.



### 1. The study area and historic development of water supply schemes

Lokoja, the capital of Kogi State Nigeria is located at 7°48’N and 6°44’E. The town is also a confluence town; where two major rivers Niger and Benue meet. The town assumed the status of a state capital in August 1991 following the creation of Kogi State. Prior to the creation of the state, Lokoja served as the headquarters of the old Kogi Local Government in old Kwara State. The town had a moribund 200,000 Litre capacity water works with River Niger as the water source. With the growth in population of the town as a result of the new status assumed in August 1991, the old waterworks inherited could not cope with the population growth at that time.

The old Lokoja waterworks was rehabilitated by the state government between 1991 and 1992 with an expansion of the daily treatment capacity to about 1,000,000 Litres. This was equally grossly inadequate for a population of about 104,000 inhabitants of Lokoja as at then. In order to ameliorate the sufferings of the inhabitants of Lokoja, the state government through different institutional supports/activities drilled Mark III hand operated borehole water schemes at different locations within the town. These projects were executed under the Kogi/Unicef Water Agency, the defunct Directorate for Food, Roads and Rural Infrastructure and UNDP between 1992 and 1998. These schemes were however, not sustainable, as broken down schemes could not be rehabilitated but abandoned. Different decentralized motorized borehole water schemes were then embarked upon between 1998 and 2007 to meet the per capita water demand of the

inhabitants of the town. These schemes were located in Lokongoma Phase II, Commissioners' Quarters, Adankolo, Kabawa, Zariagi, Workers' Village, Gadumo, etc while Felele has a rich reserve of groundwater with high water table where hand dug wells are common (KGWB, 2008).

In 2008, the Kogi State Government obtained a facility of 63 million USD from the African Development Bank for the construction of a new 10 million gallons (45.5 million litres) per day capacity water treatment plant called the Greater Lokoja Waterworks to cater for the water needs of the growing population of the town. This project was executed by the China Geo-Engineering Corporation (CGC) Nigeria Limited. The first phase of the project was completed and commissioned in 2011 while the last phase, which is the reticulation work, was completed in 2014. The new waterworks, which has a capacity of 45.5 million litres and reticulation network that far exceeds the previous expanded one, now supplies water to every part of Lokoja metropolis (homes, industries, institutions, hospitals, etc) via house connections and public stand pipes (Observer, 2011 cited in Bagaji *et al.*, 2011). Areas of the ancient town hitherto not served now enjoy this water supply service from the water works. Figures 2 and 3 show the model of the Greater Lokoja Waterworks as designed and the water intake structure on River Niger respectively as completed.

1. Ensuring availability and sustainability of water supply from Greater Lokoja Waterworks.

It has been observed by Dighade *et al.*, (2014) that most of the water utilities in developing countries are struggling to provide customers with a reliable level of service. This argument is not far-fetched as revenue generation from such service provision is very low compared to the cost of supplying water to the consumers. Subsidies from government and revenues from tariffs charged on consumers for water service provision have been identified as the major source of financing the activities/operations of any public water utility companies (EUWI, 2012).

Most of the State Water Agencies (SWA) in Nigeria have limited financial capabilities in the form of sufficient income to off-set their expenditures. The greater part of the funds available for their daily operational expenses, such as salaries and electricity are drawn from the State Government (SG) which pays them directly (Macheve *et al.*, 2015). In the subsisting practice at the Greater Lokoja Water Project, the Kogi State Government has assumed full responsibility for the entire financing of the project. Water consumers in Lokoja pay nothing for the water they consume. While this paper is not advocating for the total recovery of the costs invested in putting the water supply project in place through tariffs from consumers, it strongly perceives great danger should government become unable to sustain the present arrangement any time in the future. The foreseen danger becomes even more real especially now that government revenue base is dwindling. When the total subsidies currently enjoyed would no longer be forthcoming, the waterworks would be without funds; consequently, it would become in-operational

The operations of the Greater Lokoja Waterworks are still being run or managed by the contracting firm, CGC Nigeria Limited even after completion. The contracting firm managing this waterworks has not been able to enforce any tariff on consumers for the following reasons:

The distribution lines to consumers have not been metered and flat rate tariffs based on government subsidies have not been adopted.

The government probably sees the provision of safe water services as a necessary “political tool” and “free service” arising as part of dividend of democracy instead of a subsidized service.

Based on the above points, water is supplied from the Greater Lokoja Waterworks to consumers in Lokoja metropolis unbilled thereby giving rise to the *Unbilled Water Consumption* prevalent at present in the town. The problem envisaged here is that of sustainability of such an approach by the government in the midst of dwindling financial base of governments at all levels in the country. This phenomenon leaves us with the question: How sustainable will the activities of the Greater Lokoja Waterworks be with no revenue collected from water consumers as tariffs for water services?

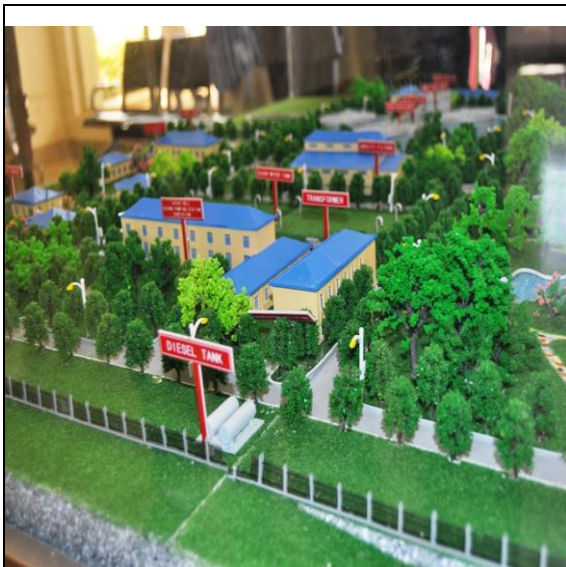


Figure 2. The model of the Greater Lokoja Waterworks.

Source: [www.fmi.gov.ng/latest/33623](http://www.fmi.gov.ng/latest/33623)



Figure 3. The intake of the waterworks on River Niger.

Source: [www.fmi.gov.ng/latest/33623](http://www.fmi.gov.ng/latest/33623)

2. Benefits of good tariffs and subsidies plan for Greater Lokoja Waterworks in the provision of water services to consumers

A well designed tariffs and subsidies plan would provide a link between the interests of the consumers and the water service provider (WaterAid, 2009). The overall aim is to take into consideration the classes of consumers vis-à-vis the issue of equity and sustainability in water service provision. Equitable access to water services helps to develop a broader customer and revenue base necessary for commercial viability, sustainable services and capacity to accommodate the unserved in water service provision (WaterAid, 2009)

The followings key points highlight the need for the Greater Lokoja Waterworks to design and implement a good tariffs and subsidies plan as a water utility company as it is obtainable in Europe, United States of America, Brazil, Turkey, etc (Macheve *et al.*, 2015):

Effective operations and maintenance activities of the waterworks can be enhanced by a good revenue base from both water tariffs and subsidies from the state government. The introduction of water tariffs will help the utility company in carrying out some of the O&M activities from time to time without necessarily waiting for the appropriation from the government.

Dependence solely on subsidies from the dwindling financial base of the state government can lead to underfunding of the operations and activities of the waterworks, hence the need to develop tariff plan to complement the subsidies.

It makes the consumers have a full sense of belonging and commitment to the success and sustainability of the water supply project by prompt payment of water bills, minimizing waste and hence enhancing effective use of water.

### 3. The way forward on tariffs and subsidies plan for Greater Lokoja Waterworks

Water can be free in any other form but the cost of treatment of water in the waterworks and its distribution cannot be freely charged on the consumers. In order to avert an undesirable state of the waterworks becoming in-operational due to the dearth of funds, it may be necessary to consider imposition of partial subsidies. This could be in the form of low/below-cost tariffs. The involvement of the consumers through such tariffs goes a long way in ensuring that the project is self funding and sustainable.

#### 1. The need for a willingness to pay (WTP) study

User fees are only accessible as revenue if they can be collected by the relevant agency. Therefore, the duo of Kogi State Government and the management of the Greater Lokoja Waterworks should initiate a study to determine the willingness of consumers to pay for the water services provided, bearing in mind the different categories of consumers in the town. Willingness to pay is the maximum amount of money a consumer is ready to offer in order to enjoy an improvement in the quality of water at his/her disposal (Haq *et al.*, 2007). WTP itself is a function of other factors such as income of consumers, supply availability and reliability, cost of alternative sources compared to proposed or existing water charges, perceived benefits, level,



quality of services, etc and it decreases with increase in the price of water (Adepoju and Omonona, 2009; Littlefair, 1998; DFID/RWSG, 1997).

In a nutshell, the following are suggestions that could be considered in setting the way forward for this utility company in the area of ensuring the availability of water and sustainable management of the activities of the waterworks:

1. The Kogi State Government should liaise with the executing contracting firm to install meters on the consumer lines in the metropolis with the aim of charging the consumers for water consumption thereby generating revenue for the water utility company.
2. Alternatively, tariff plans for water consumption can be designed by commissioned experts to enable Kogi State Government generate revenue for daily and routine O&M activities. This can be done by commissioning a willingness to pay study to determine what the consumers can pay for the water services they get.
3. A good financial base from tariffs and subsidies is a good foundation for reinvestment and expansion of the Greater Lokoja urban water supply system. Therefore, a dedicated account which should be insulated from conventional and routine government expenditure pattern and influence should be maintained
4. There is the need to monitor the network system regularly to ascertain if there are other NRW challenges on the network of the waterworks.
5. Adequate attention should equally be paid to capacity development and training of technical staff in the areas of tariffs and subsidies design and management as well as O&M with the aim of optimizing the operations of the waterworks and revenue generation.
6. There is a need to conduct a willingness to pay study as highlighted above to determine what the consumers can pay for the water services they enjoy taking into cognisance the different categories of consumers.

#### **7. Development of a Revenue generation framework.**

This study has equally prepared a framework for revenue generation mechanism for adoption by the authorities of the Greater Lokoja Waterworks. This framework is as shown in Table 1. The framework proposes the source of revenue, what the revenue is meant for, how to apply the respective source of revenue, the methodology of revenue collection and the organization responsible for revenue collection. The possible benefits derivable from this framework, if implemented include the following:

1. Provision of water to every segment of water users in the town is made possible, as all categories are considered. Water is made available to residents at their door steps or close to their door steps, no matter their location and status.
2. Consequent upon (a) above, there would be a reduction in the loss of man-hours that would have been spent in search of water.
3. There would be a significant corresponding improvement in the health and sanitation status of residents of Lokoja metropolis and environ.
4. All the above benefits would translate into an enhanced and robust economy for Lokoja metropolis and environs as only the healthy can engage in economic and commercial activities.
5. The monthly revenue collection interval suggested in the framework also guarantees the regular availability of funds for the operations and maintenance activities of the waterworks.

## Conclusion

The conception and subsequent execution of the Greater Lokoja Waterworks by the Kogi State Government to ameliorate the sufferings of the people of Lokoja metropolis in the area of water shortage is a right step in the right direction which stands commendable always. It is expected that water consumers in Lokoja will readily accept making contributions towards improving the financial base of the Greater Lokoja Waterworks if that would ensure improvement in the quality of water services to them; after all they had paid a lot more either to the informal water service providers at the rate of 2:50 NGN per litre of water or to sink private wells in the past. It is therefore imperative that appropriate water user fees regime be established at least from a willingness to pay study. The Kogi State Government and the management of the Greater Lokoja Waterworks may explore other ways of charging fees or levies, as shown in Table 1, with long term potential of generating funds for full recovery of the financial cost of the water supply project. Such levies/fees may be in the form of infrastructure development levy, connection fee payable as new customers connect, etc.

**Table 1: Proposed Framework for revenue generation for Greater Lokoja Waterworks (Modified from Wijk-Sijbesma, 1989)**

Source of revenue	Applicability	Purpose (for what?)	Organization Responsible	Methodology



Monthly flat rate tariff	Suitable for low income water users with private or shared taps in high density areas.	For repayment of AfDB credit facility, O&M of the water works and contribution towards recurrent costs of the activities of the waterworks.	The waterworks with the support of the representatives of the water users.	Collection of the monthly water rates by the waterworks
Monthly graded rate tariff	Suitable for middle level income water users in with private or shared taps in low density areas.	For repayment of AfDB credit facility, O&M of the water works and contribution towards recurrent costs of the activities of the waterworks.	The waterworks with the support of the representatives of the water users.	Collection of the monthly water rates by the waterworks
Water metering	Suitable for installation in government offices and premises where administration is easy and efficient	For repayment of AfDB credit facility, O&M of the water works and contribution towards recurrent costs of the activities of the waterworks.	The waterworks with the support of the representatives of the water users (government official).	Meter reading, billing and rate collection by the waterworks through banks.
Sale of water at public stand taps	Applicable in areas without private or shared taps	To promote water use efficiency. To contribute towards the construction, maintenance and possible expansion of the system.	A representative of the waterworks or community representative on behalf of the waterworks to be put in charge of this revenue collection	This will involve the sale of water at the public stand taps to water users without private or shared taps
Infrastructure Development levy	For existing water users on the water supply network	Financial contribution towards recurrent costs of the activities of the waterworks. To contribute towards the O&M and possible expansion of the system.	The waterworks with the support of the representatives of the water users.	Collection of annual Infrastructure Development Levy as fixed by the waterworks
Connection fee	For connection of new water users to the water supply network	Financial contribution towards recurrent costs of the activities of the waterworks	The waterworks.	Collection of connection fees from prospective consumers by the waterworks

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