

35th WEDC International Conference, Loughborough, UK, 2011

THE FUTURE OF WATER, SANITATION AND HYGIENE:
INNOVATION, ADAPTATION AND ENGAGEMENT IN A CHANGING WORLD

**Issues and challenges of decaying urban water
infrastructure in Nigeria**

J. A. Otun, I. A. Oke & A. M. Oguntuase, Nigeria

BRIEFING PAPER 1197

A reconnaissance survey of some public water utilities (PWUs) in Nigeria reveals with dismay their increasingly poor working conditions due to frequent breakdowns; ageing and poor asset management of these urban water infrastructure (UWI). Several attempts made in the past to rehabilitate these UWI have not positively changed their level of deteriorations. Presently, their overall assessment grade is best described as fairly poor as most of these assets have only 10 -35% of their expected useful life remaining, low capacity utilization and assets require a significant level of maintenance. Consequently, their service delivery and coverage has been so poor across the country resulting in various environmental and socio-economical problems which have been of great concern. Hence this paper is focused at highlighting and discussing the issues and challenges of these decaying water assets in PWUs in Nigeria.

Introduction

Generally, water infrastructure refers to either physical or non-physical facility or asset developed or utilized by various water utilities (WUs) involved in potable water supply or irrigation water service delivery. The major physical water infrastructures and facilities include dams and reservoirs, water pipes and appurtenances, water pumps, water storage tanks or reservoirs, treatment plants, canals, and turn-outs. The non-physical infrastructure refers to the non-tangible arrangements such as asset management, governance, laws, and institutional set-ups developed and implemented to ensure a good water service delivery (Nikolov and Peitchev, 2008; Khatri and Vairavamoorthy, 2007).

In Nigeria, these WUs are either in the public or private domain, and those operated as public water utilities (PWUs) dominating in number, sizes and coverage. A few privately owned and managed WU exists in some private organizations, industrial and residential estates and communities for domestic, irrigation or industrial water supply. According to Otun(2003) the services rendered by these privately owned water utilities (POWEs) are more reliable though more expensive than that of the PWUs. Since the few existing POWEs are limited in sizes, yet to be fully developed and have less coverage across the country, this paper focuses more on the water assets of these PWUs in urban areas of Nigeria.

The infrastructure assets and facilities owned and operated by these PWUs are usually complex by nature and require robust management practices. Sound knowledge of the location, characteristics, estimated people served, capacity and utilization, cost characteristics, risk exposure and safety requirements of assets are required to best manage them and make sustainable improvements in service delivery (DWAf (2008).

Conditional survey of urban water infrastructures in Nigeria

Some reconnaissance surveys and review study carried out in 2010 in some PWUs across Nigeria shows that the conditions of over 75 water treatment works in urban areas of Nigeria can be best described using a simple condition assessment grading criteria (Kleiner et al., 2008) as fairly poor; with clearly evident deteriorations requiring some significant level of maintenance. The capacity utilization of these PWUs is below 45% in most cases and have only 10 -35% of their expected useful life remaining. Overall, the service delivery output has been poor (averaging less than three hours of effective service a day) due to their ageing assets. Also notably recorded are the frequent breakdowns of these assets typically due to poor maintenance

attitude in the country, outdated equipment and machines, poor quality spare parts, delayed to non routine inspection and haphazardly organized repair works.

Furthermore, the background and current situation with these water infrastructural assets in Nigeria are summarily given as follows:

- There was a rapid development of water infrastructure between 1st and 4th National developmental plan in Nigeria in the 70s and early 80s; but currently experiencing poor rate of expansion. Enormous amounts to the tune of over 3 billion dollars have been spent on the major engineering and ancillary works of these water assets in these PWUs (Iliyas, 2006, JICA 1995).
- With an average of three (3) water utilities, including sources, treatment plants, and distribution facilities, exists in each of the 36 states and Federal Capital Territory (FCT); being poorly operated and managed leading to poor water service delivery levels; (below 50% of urban population served) and low capacity utilization falling in most cases below 60%.
- Huge maintenance backlogs on infrastructure; with little improvement after several rehabilitation attempts by EU, World Bank, DFID, ADB etc. across the country.
- PWUs have lost valuable resources and skills in the past years.
- Lack of infrastructure information hampers informed asset management decision-making; currently there is a poor knowledge of the locations of some of the water assets and knowledge of what assets are critical in publicly owned water utilities; (i.e misplacement of most engineering drawings).
- Unwillingness to pay for poor water services provided by PWUs; Leading poor revenue generations and their inability to plan and pay for future repairs and replacements of all their water infrastructures.
- Ageing infrastructure has been allowed to decay over the years resulting in a growing replacement need and large re-investment cost. (Dysfunctional and dilapidated facilities well over 70 years exist in Lagos (Iju Water Works), Kano, and Zaria Water utilities) Otun (2005).
- Lack of plan and funding for Infrastructure Asset Management (IAM) is resulting in further neglect and deterioration of these assets to the extent that they are now operated below their installed capacity.

It is obvious from Figure 1, that the service deliveries of PWUs in Nigeria have cyclical problems in nature and are indicative of the poor maintenance culture and the subsequent low generated revenues from their respective dissatisfied customers, are all inter-woven. The resulting situation shown in figure 2 has not changed in the past few years but has gone worst and now seriously constitutes one of the most formidable stumbling blocks to livelihood and sustenance of urban dwellers, industrialization and national development.

The low performance still recorded from these PWUs after several multi-billion dollars projects by the African Development bank (ADB), World Bank Rehabilitation project (NWRP, 1992-1998) and recent EU WSSRP intervention projects; is a clear indication that the required solution to these dilapidated physical infrastructures need to be deeply reviewed through a long term systematic process, to guarantee their future sustainability and operation in a more proactive way.

Issues of decaying urban water infrastructures in Nigeria

The most critical issue on UWI in Nigeria is that associated with the ageing infrastructure. In UWI in Nigeria are ageing and almost reaching the end of their useful life resulting in low capacity utilization, (between 30 – 67 %), poor service delivery coverage and low service delivery performance. Similarly, these UWI are now placed at increased high risk for leakages, blockages and breakdowns. The high cost of replacing these infrastructures, particularly after frantic efforts of rehabilitating them has not yielded much positive results has created some concerns for the government whose investment in the water sector has gone below 10% of the total national capital budget in the past 20 years.

Other critical Infrastructural issues relates to the constrained operating conditions and environment where there is no adequate regulatory provisions (no bench marking, code of practice, law etc.) for UWIs and their operators, PWUs, asset management is rarely carried out, bad maintenance attitude, inadequate and inconsistent financial disbursement for O&M, lack of genuine spares, low institutional capacity, low investment in the water sector (few to non modern infrastructures) and corruptive attitudes and tendencies and aging workforce that carries away the much stored vital asset information in their heads, and creating a big knowledge gap after their retirement.

Challenges in asset management of water infrastructures in Nigeria

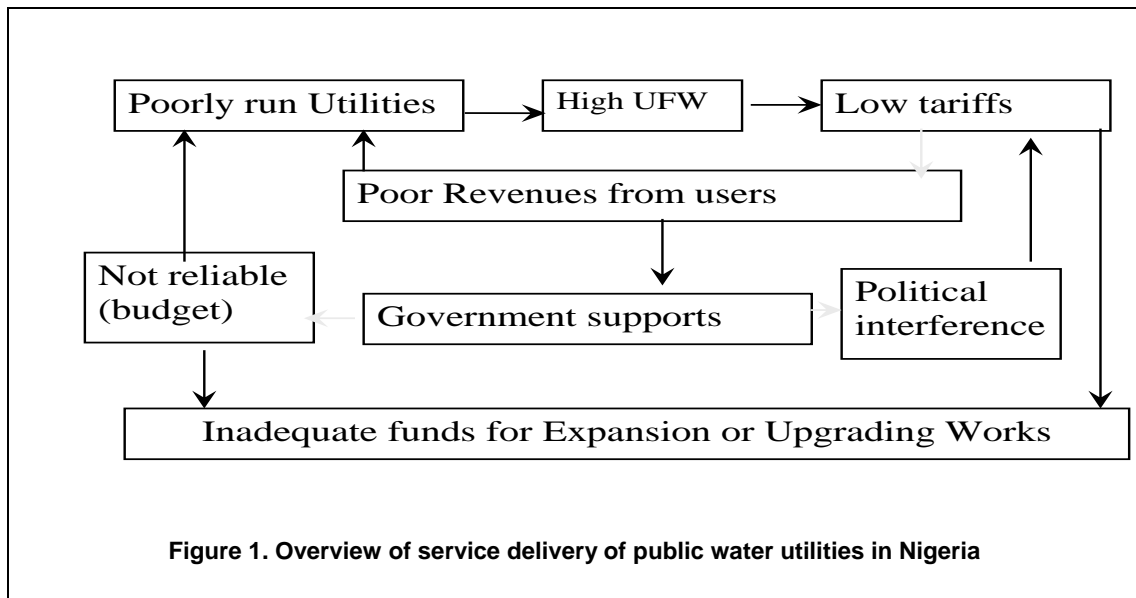
The current challenges with urban water infrastructures in Nigeria are enormous and they are briefly mentioned in this write up due lack of space; They include introducing modern state of the art equipment and upgrading infrastructures in PWUs, generating adequate funds for financing infrastructural development and rehabilitations; creating attitudinal change in maintenance culture; and all-inclusively developing and implementing a comprehensive Water Infrastructural Management strategic plans (WIMS) for each PWUs in Nigeria.

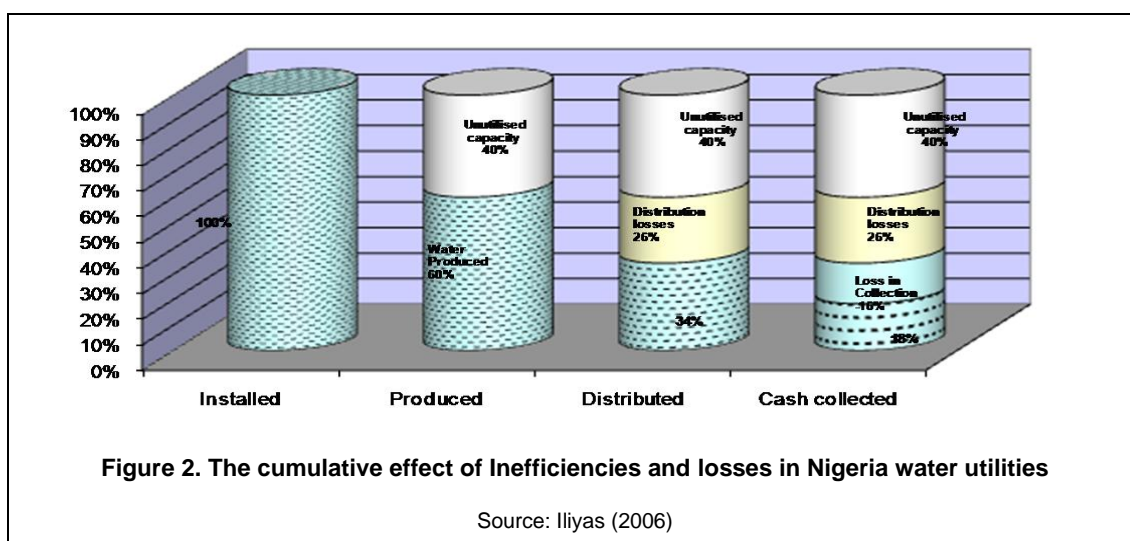
As our systems are fast ageing and deteriorating, the status quo will definitely result in increased public health and environmental risk. It is therefore imperative to embark on the following redress actions to inevitably avoid the total collapse or failure of the entire water infrastructural services in Nigeria.

1. Development of water asset database for effective water infrastructural management (required to provide information on detecting and locating leaks in pipelines, measuring and assessing pipe conditions and performance, and mapping pipeline systems as well the associated customers served from the networks). Without data; no plan. Comprehensive asset management plans can be developed, based on the asset data.
2. Facilitating the establishment of enabling environment for effective asset management system in Nigerian water sector (creating a regulatory framework and monitoring and evaluation procedures (assessment benchmarking, standardization; and code of practice procedures etc.) and advocacy for its implementation among PWUs operators.
3. Financing assets development and management (requires large investment as was experienced during the 1st to 4th developmental plans in Nigeria).

Conclusion

Presently, urban water infrastructures in PWUs in Nigeria are ageing, deteriorated, and poorly managed. Consequently, in order to have a robust over hauling of these water assets in Nigeria, there is need to develop and implement a more detailed asset management program for PWUs. This will definitely lead to better operational decisions and greater ability to plan and pay for future repairs and replacements of all their water infrastructures. Effective asset management enables better targeting of investments to improve the performance of the water assets, which is a key part of providing better services.





Keywords

Urban water infrastructures, Asset management, Water utility, Assessment.

References

- DWAF (2008), Water Services Infrastructure Asset Management for Municipal Managers & Management, Making it Happen Workshop , organized by Department of Water Affairs and Forestry (DWAF), Municipal Indaba: September 2008.
- Iliyas M. (2006), State of Urban Water Supply In Nigeria, 1st National Water Supply and Sanitation Forum, organized by Federal Ministry of Water Resources, Abuja
- JICA (1995). National Water Resources Master Plan (NWRMP), Japanese International Cooperation Agency (JICA), report submitted to Federal Ministry of Water Resources (FMWR), Abuja
- Khatri, K.B. and Vairavamoorthy K., (2007), Challenges For Urban Water Supply and Sanitation In the Developing Countries, a Discussion Draft Paper for the session on Urbanisation at UNESCO-IHP workshop in June 2007, Delft, Netherland.
- Kleiner, Y.; Rajani, B.B.; Sadiq, R (2008), Drinking water infrastructure assessment: The National Research Council of Canada perspective, NRCC-51298,
- Nikolov, V. and Peitchev, T. (2008), Challenges in asset management of the water supply and wastewater infrastructure in the Republic of Bulgaria, Water Asset Management International Vol 4. No. 2,
- Otun J.A., (2005). ' Operation, Maintenance and Management of Urban Water Supply Systems' a paper delivered at a workshop on Operation and maintenance of Urban Infrastructures, under the FGN / World Bank Community Based Urban Development Project, NWRI, Kaduna.
- Otun J.A., (2003), "Issues and implications of water pricing in urban Nigeria". WEDC Publications, In "Towards the Millennium Development Goals, Actions for Water and Environmental Sanitation", edited by Peter Harvey, Loughborough, UK, PP. 277-280.

Contact details

Name of Principal Author OTUN Johnson Adebola.
 Dept. of Water Resources Engineering,
 Ahmadu Bello University Zaria, Nigeria.
 Tel: +2348035887828
 Email: jotun@abu.edu.ng

Name of Second Author OKE, Isaiah Adesola.
 Dept. of Civil Engineering, Obafemi Awolowo
 University, Ile-Ife, Nigeria.
 Tel: +2348032323276
 Email: okeia@oauife.edu.ng

Name of Third Author OGUNTUASE A. M.
 Address Dept. of Civil Engineering,
 Federal University of Technology, Akure, Nigeria.
 Tel: +2348035072003 Email: awoguntuase@yahoo.com