

Research Paper

Availability of land and planning of water infrastructure networks in Nigeria

Accepted 17th October, 2014

ABSTRACT

This paper reviewed the availability of land and planning of water infrastructure networks in Nigeria. There are various challenges facing the provision of water supply. The review of the laws based on the stakeholders handling the provisions of water supply. The laws address the role of each of the stakeholders in handling the planning of water infrastructures. The delivery of water services within the six geo-political zones in the country. There are various challenges facing the planning of water supply. The government needs to provide solutions to these challenges with the help of the other stakeholders or agencies such as World Bank, Africa Development Bank, United Nation, China, among others.

Owolabi, Babatunde Oluwaseyi
Department of Urban and Regional
Planning, University of Ibadan, Nigeria
Email: babatundeoluwaseyi@yahoo.com
Telephone: +2348056362930

Key words: water infrastructure, water sector, water supply

INTRODUCTION

There have been proactive global reforms in the entire global water sector in the last decade and reforms in policy formulation, law and regulation, technical aspects among others (ADB, 2012). This trend had become inevitable with the reoccurring water crisis worldwide. Water is vital for the life and health of people and ecosystems. Individuals in some countries in the world lack access to adequate and safe water to meet their basic needs (WaterAid, 2012). It has been reported that about 500 million persons in over 29 countries face water shortage (WHO/UNICEF JMP, 2010). Then over a billion persons worldwide do not have access to safe drinking water (USAID, 2012). In Africa and particularly Nigeria, the entire water sector law has undergone little growth in the last decade and is in dire need of structural reforms to become aligned with contemporary modern global trends (World Bank/FGN, 2012). This is to evaluate current Nigerian law on water resources and suggest expected improvement in compliance with current global water reforms. These Nigerian laws governing the water sector are stated below. In spite of the enormous water resources in Nigeria, only about 65% (46.1 million) of the urban and 30% (22.1million) of the rural populations had access to improved drinking water sources, based on the population

and water supply coverage of the country in the year 2006 (World Bank/FGN, 2012). The total water supply coverage was only 47% which implies that only about 68 million Nigerians had access to improved water supply source, leaving 77 million without access (Data refer to the year, 2007; PPP GDP, 2007; Population, 2007). In fact, trend analysis of Nigerian water supply coverage from the year 1990 to 2006 reveals a declining total coverage, which if unchecked, will result in a total coverage of 52% by this Nigeria Vision's target year of 2020 (Benson, 2011). This will translate into about 58% or 112 million Nigerians being denied access to improved water supply source by Nigeria Vision 2020. More significantly, the trend reveals that Nigeria is diverging rather than converging on the MDG target of 75% for improved water supply coverage by the year 2011. This underscores the need for Nigeria to review its water supply policy and implementation strategies in order to facilitate accelerated attainment of the MDGs and Vision 20:2020 targets (Abdulmutallib, 2012).

In order to obtain a comprehensive picture of the current water supply situation in Nigeria, the total water supply coverage for the years 1990 and 2006 are compared (WaterAid, 2011). In 1990, the improved water

supply coverage was 50% but this decreased to 47% in 2006: a loss of 3% (Vanguard, 2012). Over the same period, Nigerian population changed from 94.5 million in 1990 to 144.72 million in 2006 which meant that 47.3 million Nigerians did not have access to improved water supply source in 1990, while the corresponding figure for 2006 was 76.7 million: an increase of 29.4 million (UNICEF/WHO, 2009). However, the drastic drop in the household piped by from 14% in 1990 to 4% in 2006 is worrisome notwithstanding the increase of 7% using other improved sources (Benson, 2011).

This implies that people have to walk about 1 km or spend at least 30 min to gain access to improved water source. It is clear that if the present trend continues unabated, only 49.9% of Nigerians would have access to improved drinking water sources by Nigeria Vision 2020 and therefore, the National Water Supply Policy of extending coverage to 100% of the population in the year 2015 is thus no longer realistic (Daily Trust, 2012). The reasons for this deterioration are inadequate institutional arrangement, lack of proper management of the nation's water resources, poor data collection, collation and archiving, poor community and private sector participation, epileptic power supply and inadequate awareness about water conservation and management, weak management and executive capacity and low investment level in operation and maintenance which accounts for frequent breakdown of the distribution facilities (Nigeria Vision, 2020). Generally, the access to improved water supply in the six geopolitical zones was higher in urban centres, followed by the small towns and then rural areas. This is expected because development of modern societies has been mainly concentrated in urban centres (World Bank, 2010). However, the pattern was interrupted in the cases of North East where the semi urban access was highest and North West where the rural access (20.33%) was higher than the semi urban access (19.03%). The average (zonal) access is practically the same hovering between 54 and 58.9% except for South West which had the highest average of 65.44% and North West had the least access of 20.3% (World Bank, 2010).

The overall average water supply access over the six zones is compared with the water coverage reported for the year 2008 by Joint Monitoring Programme (2008). It is obvious from the figure above that the urban access was higher by the Joint Monitoring Programme (JMP, 2010) report (2008). The Joint Monitoring Programme (JMP) report was for 2008, these may suggest that there had been improvement in facilities in the rural areas or more likely, urbanization pressure had impacted negatively on the urban facilities; while there was less pressure on the rural facilities (WHO/UNICEF JMP, 2010). This paper discusses the Nigerian laws governing the water sector, Coverage Data on Water Supply in Specific Cities, Challenges of Expansion of Water Coverage, Solutions to Expansion of Water Coverage, Delivery of Water

Infrastructural Facilities and Services, Differentiate Roles of Each Tier of Government and Level of Cooperation in the Provision of Water, among others.

NIGERIAN LAWS GOVERNING THE WATER SECTOR

This is a review of the laws governing the provision and usage of water supply in Nigeria. The laws stipulate that all stakeholders in the provision and usage of water supply infrastructure should adhere to the rules and regulations of water supply in Nigeria. Before embarking on any project pertaining to the provision and usage of water supply, there are various guidelines to be followed. All stakeholders are advised to adhere to the laws. These are:

1. Section 20 Chapter 11 of the Constitution of the Federal Republic of Nigeria 1999 provides that "The state shall protect and improve the environment and safe guard the water, air, land, forest and wild life in Nigeria". Under the second schedule, part 1, item 64 of the same constitution, the Federal Government of Nigeria has exclusive jurisdiction on primary water matters from sources affecting more than one state as maybe declared by the National Assembly. The same constitution grants exclusive legislative powers to the Federal Government of Nigeria such as fishing in rivers and lakes in item 29, maritime shipping and navigation in item 36 all of part 1, second schedule of the 1999 Nigerian Constitution. Therefore, the sourcing, production, supply and distribution of water other than those stated above falls under the concurrent legislative list under part 11 of the 1999 Constitution. Each federating state is permitted by the Constitution to legislate on water matters as it affects such state. Besides the Constitution of the Federal Republic of Nigeria, there are several federal and state laws that regulate the supply and usage on water in Nigeria as water is a complex and multifarious compound (Constitution of the Federal Republic of Nigeria, 1999).

2. Besides the Constitution of the Federal Republic of Nigeria, the next primary law regulating water is the "Water Resources Act 101 OF 1993." This law vest on the Federal Government of Nigeria through the Federal Ministry of Water Resources, the rights to regulate, develop, and license all water operators in Nigeria. This includes planning, development, and usage of Nigeria's water resources, ensuring quality, quantity, distribution, use and management of water, ensuring application of appropriate standards and techniques for investigation, use control, protection, management and administration of water resources, facilitating technical assistance and rehabilitation for water supplies among others. The Water Act gives the Minister for Water Resources very wide powers on water regulation such as to issue licenses of water, storage, pumping or use of commercial scale or construction, maintenance, operation, repair of any

borehole or hydraulic works etc. The Minister may also define places from which water may be taken or used, fix times of actual anticipated shortage of water, amount of water which may be taken to by any person, prohibit temporarily or permanently, taking or use of water that is hazardous to health, revoke the right to use water where such right overrides public interest, require to be examined or license any drilling operations, regulate, place, depth, manner of construction of borehole or well. The Minister in the discharge of his duties is to make provision for adequate supply of suitable water for animals, irrigation, agriculture, domestic and non-domestic use, generation of hydro electrical energy, navigation and recreation, drainage, safe disposal of sewage, prevention from pollution, prevention from flooding, soil erosion, reclamation of land, protection of the environment etc. Besides these wide powers, all dams in Nigeria are under the control, development, maintenance and supervision of the Federal Ministry of Water Resources. They include the Kainji Dam, the Lake Chad Dam etc. These very wide powers have often constrained all other water resources agencies including the National Assembly from exercising control and regulation over the water sector in Nigeria (The Water Resources Act, 1993).

3. This Act provides for the establishment of the water resources training institute for the promotion, development of training programme and courses in water resources and advise Government on water resources training needs etc. The institute is currently located in Kaduna, Nigeria. The National Water Resource Institute Act 1990 (Cap 284, laws of the federation of Nigeria 1990).

4. This Act establishes and regulates all river basin authorities in Nigeria. The Act lists their functions as agriculture, irrigation, fisheries, forestry and veterinary institute. The Act also establishes the 12 river basin authorities as: Anambra- Imo River Basin Authority, Benin-Owena River Basin Authority, Chad River Basin Authority, Cross-River River Basin Authority, Hadejia-Jamaare River Basin Authority, Lower Benue River Basin Authority, Upper Benue, Upper Niger River Basin Authority, Lower Niger River Basin Authority, Niger-Delta River Basin Authority, Ogun-Oshun River Basin Authority, Sokoto-Rima River Basin Authority. These twelve River basin authorities are under the Federal Ministry of Agriculture. River Basins Development Authorities Act 1990 (Cap 396, laws of the federation of Nigeria 1990).

5. This Act provides for the establishment of National Inland Waterways Authority with responsibility to improve and develop inland waterways in Nigeria for navigation. Its functions include provide regulation for inland navigation, develop infrastructure, undertake dredging of water ways, hydrological and hydrographic survey, design ferry routes, operate ferry services, issue licences for local ships, collect river tolls etc. Hence, all inland waterway courses are managed by this authority.

The agency is under the Federal Ministry of Transportation. National Inland Waterways Authority Act 2004 (Cap N47, laws of the federation of Nigeria, 2004).

6. All states in Nigeria has State Water Board Acts which establishes a state water board in each state to manage, supervise, control the use, consumption, maintenance of water and its ancillaries. State Water Boards report directly to the Governors of each state. The Various State Water Board Acts.

7. This Act declares certain federal waterways navigable and provides for their construction, alteration, management and maintenance of these waterways. The Navigable Waters Act 1990 (Cap 287, laws of the federation of Nigeria 1990).

8. The Act establishes the National Maritime Authority to co-ordinate and implement Nigeria's shipping policies and all other matters incidental thereto. National Shipping Policy Act 1990 (Cap 279, laws of the federation of Nigeria 1990).

9. The Act establishes the Nigerian Ports Authority for the purpose of managing and controlling Nigerian ports and harbour undertakings of the Federal Government of Nigeria. The Nigerian Ports Authority Act 1990 (Cap 361, laws of the federation of Nigeria 1990).

10. The Act provides for the establishment of a Nigerian Shippers Council to provide a forum for the protection of the interest of shippers in matters affecting shipment of imports and exports to and from Nigeria and advice the Federal Government on all sundry matters. The Nigerian Shippers Act 1990 (Cap 327, laws of the federation of Nigeria 1990).

11. The Act provides for the establishment of a National Resources Conservation Council Act responsible for the conservation of natural resources of Nigeria and to formulate national policy for national resources conservation including water resources. The National Resources Conservation Council Act 1990 (Cap 286, laws of the federation of Nigeria 1990).

12. This Act provides for consolidation and amendment of laws relating to merchant shipping and other matters related thereto. The Merchant Shipping Act 1990 (Cap 224, laws of the federation of Nigeria 1990).

13. The Acts provides vest all ownerships of minerals in, under or upon any land in Nigeria including its territorial waters and exclusive economic zone on the Federal Government of Nigeria. However, all mineral operators are to obtain licenses from the Federal Ministry of Mines and Power. Section 68 of the 1999 Act states that no person shall or permit any other person to make, without permission of the Minister, any alteration in water supply so as to prejudicially affect the water supply of other persons. Section 72 of the 1999 Act provides that the Minister may grant a lessee or grantee every person a water license under the terms that the minister deems fit. The Mines and Minerals Act No.34 of 1999 (Caps 226 laws of the federation of Nigeria 1990 and minerals act no.34 of



Figure 1. Abuja. Source: Wikipedia (2012).

1999).

14. This Act provides for the regulation and control of electrical installations and the generation, supply and use of electricity in Nigeria including hydrological dams and installations. The Electricity Act 1990 (Cap 106, laws of the federation of Nigeria 1990).

15. Under this Act, NAFDAC regulates the production, distribution and consumption of bottled waters in Nigeria by virtue of the Bottled Water Registration Regulations 1996 LN 18, the Bottled Water Advertisement Regulations 1995 LN 17, and the Bottled Water Labeling Regulations 1996 LN 8. Bottled water includes any water in bottle or cellophane water popularly called pure water. The National Agency for Food and Drug Administration and Control Act (NAFDAC) Act no.15 of 1993, laws of federation of Nigeria 2004.

16. Under this Act, no federal, state, local Government or any authority can perform any acts or duty or functions which may affect the environment without carrying out an environmental impact assessment including water projects. The FEPA has also made several regulations to regulate the environment National Environmental protection management of waste resources Regulations 1991 (UN Watercourse Convention, 1997). The Federal Environmental Protection Agency Act no.59, of 1992, laws of the federation of Nigeria 2004.

17. The Act provides for the exploration of petroleum from territorial waters and continental shelf of Nigeria and vests the ownership of all on and off shore revenue derivable on the Federal Government of Nigeria. The Petroleum Act 1990 (Cap 350, laws of the federation of Nigeria 1990).

18. The Act provides for the implementation of the international convention for prevention of pollution of the sea by oil and provides for remedies against such pollution. Oil in Navigable Waters Act 1990 (Cap 337, laws of the federation of Nigeria 1990).

In summary, in accordance with globalization and modern water reforms, the relevant Nigerian authorities responsible for water law and policy formulation must

take up the challenge. The Federal Ministry of Water Resources, Federal House of Representatives Committee on Water Resources and the Bureau for Public Enterprise must begin to take proactive steps to update Nigerian's water resources policy and law to become compliant with global international standards. The laws and policies will eventually ensure a viable and stronger Nigerian water policy and law to enable Nigeria compete with international global standards.

COVERAGE DATA ON WATER SUPPLY IN SPECIFIC CITIES

Abuja

Nigeria's capital Abuja receives part of its drinking water from the lower Usuma dam (Abdulmutallib, 2012). The capacity of the plant that treats surface water from the dam's reservoir was in the process of being increased in 2012 in order to cater for the growing population of the capital (Abdulmutallib, 2012). The Guara_dam, which was under construction in 2012, is expected to further increase water supply to Abuja and to mitigate against the risk of drought. Wastewater is treated in a 131,200 cubic meters per day plant at Wupa that was completed in 2007 (**Figure 1**). The Federal Capital Territory, through the Abuja Environmental Protection Board, has contracted a private operator to run the plant (Abdulmutallib, 2012). However, when the government apparently failed to pay the operator he walked away, confronting the area with a pollution crisis.

Lagos

Nigeria's largest city Lagos is surrounded by water from the sea and a lagoon (Lagos Water Corp, 2012). Its clean water supply in the city is about 81.32% (Lagos Water Corp, 2012). But since the raw water in the lagoon is too polluted, the city gets its water from Ogun River and Owo River. The city's oldest water treatment plant, located in

Iju on the Ogun River, was built in 1910 (Lagos Water Corp, 2012). It was expanded in stages to 45 m gallons per day. Another smaller plant was built at Ishashi on the Owo River in the 1970s. The biggest plant so far was commissioned in 1991 in Adiyin with a capacity of 70 m gallons per day (Lagos Water Corp, 2012). It also draws from the Owo River. There are also seven mini-waterworks drawing from local sources with a combined capacity of 18 m gallons per day. The Lagos Water Corporation states that the water produced in the plant meets the highest standards, and that it supplies "safe drinking water in sufficient and regular quantity to over 12.5 million people in Lagos State". However, water is often contaminated in the distribution network and people distrust tap water quality (Lagos Water Corp, 2012). Electricity supply interruptions prevent treatment plants from operating continuously. However, a dedicated 12.15 MW power plant was under construction in 2012 to supply power to the Adiyin, Iju and Akute water treatment plants. Households turn to the numerous private shallow wells that provide water of dubious quality that is often yellowish and smells. Some of these wells have fallen dry, exacerbating water scarcity (Lagos Water Corp, 2012). Or households rely on street vendors, creating a thriving market for "sachet water", purified water packaged in polyethylene pouches. Water vendors called *Mairuwa* sell water from tanks and drums on carts, which are sometimes sold to other vendors that carry water in buckets or gerry cans (Lagos Water Corp, 2012).

Makurdi

In Makurdi, the capital of Benue State, only about 25-30% of the population is served by a crumbling network and inhabitants fetch raw water in buckets from the polluted Benue River (USAID, 2012). In 2008 the construction of a water treatment plant was left unfinished and officials were unable to account for USD 6 million (USAID, 2012). As of 2012, a water treatment plant was under construction as part of the Greater Makurdi Waterworks Project. According to Nat Apir, an independent water consultant, the lack of a modern distribution network will lead pipes to burst and the capacity of the plant is at risk of not being fully utilized (USAID, 2012).

Kano

The existing urban water supply in Kano in 1996 with population of 2,255,000 people demanding the quantity of water 209.1million litres per day and the water supply of 147.0 million litres per day (Federal Ministry of Water Resources (Abuja), 1999). The Northern city of Kano suffers from deficient water supply (Abdulmutallib, 2012). Kano is supplied from local rivers and from groundwater

which is over-exploited (Abdulmutallib, 2012). Public water supply is deficient, so that private water selling points are multiplying and generate profits for their private operators (Abdulmutallib, 2012).

Kaduna

The existing urban water supply in Kaduna in 1996 with population of 2,731,000 people demanding the quantity of water 160.1million litres per day and the water supply of 53.5million litres per day (Federal Ministry of Water Resources (Abuja), 1999).

Owerri

The existing urban water supply in Owerri in 1996 with population of 1,658,000 people demanding the quantity of water 106.5million litres per day and the water supply of 59.5million litres per day (Federal Ministry of Water Resources (Abuja), 1999).

Calabar

The existing urban water supply in Calabar in 1996 with population of 982,000 people demanding the quantity of water 91.9million litres per day and the water supply of 28.8million litres per day (Federal Ministry of Water Resources (Abuja), 1999).

CHALLENGES OF EXPANSION OF WATER COVERAGE

Water is the most common ingredient on earth, but somewhat, it is not so common. 'It has been stated earlier that about 500 million persons in over 29 countries face water shortage (Greg, 2010). Then over a billion persons worldwide do not have access to safe drinking water (UNICEF, 2007). The problems facing the Nigerian water sector are multi-dimensional involving political, social, technical, legal, regulatory problems (Akindele et al, 2002). They include:

1. Lack of basic water needs: This includes non-availability of regular and adequate water supplies, water security, quality, fluoridation and hygiene of water, sanitation needs, urban/rural water scarcity among others.
2. Development of water infrastructure: Nigeria has 37 water corporation boards and 12 river basin authorities with several of our water agencies using obsolete water equipment such as pipes, pumps etc. This has been largely due to poor investments by Government and private sector organizations in the water sector in the last ten years in Nigeria compared to other sectors such as oil and

gas, energy, housing etc.

3. Human management of water resources: The issue of poor human management of water resources is another problem facing the Nigerian water sector. This includes inadequate technical know-how, management expertise and relevance to the sector.

4. Water Policy and law: The Federal and State Governments in Nigeria control all water laws, rules, regulation in Nigeria. There is still no clear Government policy in liberalizing the water sector and encouraging private sector participation. This Government monopoly makes competition and anti-trust policies impossible to implement. Then several of the Government agencies in the water sector perform their functions independently with little or no interfacing with other relevant agencies in the same sector.

5. Inadequate funding of water projects: The problem of funding is a global bane on the development of the water sector and it is not restricted to only Nigeria. However, the Nigeria situation is deplorable considering the high level of poverty, inadequate Government funding, and weak private participation. However, several international organizations have often funded water projects in Nigeria such as the World Bank, the European Economic Community (EEC), IMF, UNDP, international NGOS such as Water Aid have all granted Nigeria several hundreds of millions of dollars for water development and supply. There is little or low participation of private sector participation in the disbursement of these water funds (Patricia and Salman, 1999; Davidson et al., 1992).

6. The non-maximization of the socio economic advantages of water: Easy transportation is one of the socio economic benefits of water transportation as remains the cheapest and safest mode of transportation in the worldwide. Several of our cities are congested with very busy roads, with a comatose railway system and unsafe airspace, Nigeria deserves several water transportation companies to ferry persons and goods safely to their destinations at very low rates. There is the issue of the need for maximum development of our water resources for tourism resorts. Water still remains the cheapest and safest form of electricity via the technology of hydrological dams and the conversion of water energy into electricity. The constant power outage in Nigeria militating against industrial growth has been blamed largely on the inadequateness of water in our water dams such as the Kainji and Shiroro water dams.

7. Water Security and Disaster management: There is still no combined water security outfit in Nigeria. Instead we have in place various Government agencies performing complimentary roles in the manning of the nation's waters. There is also no identifiable disaster management agency responsible for managing disasters such as floods, drought etc. Then there is still large non-compliance with international water security and safety conventions as recommended by the International Maritime Organization

etc.

8. Water Pollution Issues: Nigeria waters still remains one of the most polluted on the globe. The condition of external Nigerian external waters is squalid. Considering the significance of water in the global environmental cycle on the climate, the consequences of polluted water is a polluted environment. Water remains one the most important factors on the climate of the earth. Global temperature, rain, air, winds are determined by the various complex interactive water cycles on earth. El-Nino and El-Nina global water cycles are responsible for balancing the temperature of earth. Salination of ocean water balances the temperature of water itself by creating a constant temperature. Since water is habitat to millions of living species such as fishes, amphibians, water plants, it follows that healthy and safe water results in a healthy and safe environment while environmental pollution is the consequences of water pollution. Nigeria has been facing the problems with water quality and standards for the last twenty years. Water is used for domestic sanitation such as drinking, body metabolism, bathing, washing etc. In addition, water provides ecological sanitation benefits to the environment by cleansing dirt, recycling waste products, soil erosions, redistributing mineral resources through water flows, drainages, water falls etc. These balances eventually result in creating balances in eco systems and assisting living species to survive their environmental distortions.

9. Transboundary disputes: There are several transboundary water courses in Nigeria such the River Niger, River Benue and Lake Chad resulting in bitter transboundary disputes between Nigeria and its neighbouring countries. There have been proactive efforts by the Federal Government of Nigeria to resolve these disputes amicably.

10. Dispute Resolution: All water related disputes are resolved by basic resolution process and procedure such as court litigation, arbitration and mediation. Lack of water law specialists, non-involvement of lawyers in water related contracts, non-compliance to contract terms have all increased the potentials of water disputes in Nigeria.

SOLUTIONS TO EXPANSION OF WATER COVERAGE

1. Capacity Building: There are several other factors hindering the growth and development of Nigerian water companies such as finance, technology, manpower, expertise, etc. There will be a need to build institutional capacities for Nigerian water companies through new deliberate water policy and laws (MDGs, 1990 and 2006). It will solve the problems of lack of basic water needs, infrastructural problems, improved human management of water resources through regular training courses, cooperation with experts in other countries etc. Several water companies in Nigeria are small and medium size

companies. Large water projects in Nigeria are contracted to foreign companies such as RCC, Gilmoor, SCC, Sarplast, CGC etc. The largest water companies globally earn billions of dollars from water operations annually. Vivendi makes an annual turnover of over \$48 Billion dollars with an operating profit of nearly \$3 Billion annually and has a staff strength of 290, 000. Vivendi Environment (subsidiary of Vivendi) earns over \$24 Billion annually with an operating profit of nearly \$2 Billion and has a staff strength of over 200, 000. ONDEO owned by Suez earns over \$8 Billion and has an operating profit of about \$3.5 Billion annually with a staff strength of over 17, 000. There is a need for a deliberate policy to develop Nigerian water companies to compete with international standards through consolidation of existing companies, empowerment, assistance, among others (World Bank/ FGN, 2012).

2. Proper Regulation of the water sector: There is need to be proper regulation of the Water sector by reducing the powers of the Minister of water affairs and establishing a Federal or National Water Regulatory Commission as regulation of the entire water sector is beyond a single office (National Economic Empowerment and Development Strategy, 2008-2011). The purposes of this Commission will be multifarious. The proposed Commission will be to regulate all water matters in Nigeria subject to the approval of the Minister. Such regulation will include making bye laws for the water sector, coordinating the functions of all state and local government water boards, registering and regulating all private water agencies in Nigeria, advising the Minister as to current issues on water matters, educating the public on the need to provide adequate drinking water and other values of water, creating checks and balances in the water sector etc.

3. Modernization of all water laws in Nigeria: It has been said that one important factor is overlooked and underutilized in the formulation of global response to water reforms, which is water law (National Water Supply and Sanitation, 2000). The basis of water law formulation should be water rearranged in line with recent global water standards such as supply, clarification of the role of Government and local communities, water tariffs, operations, maintenance, water utilization, quality, water resources development policy etc. Till date, several stakeholders have no understanding of international water law. There is a need to amend certain Nigerian water laws in conformity with standard international water standards (National Water Supply and Sanitation, 2000). There are several new international laws, conventions, treaties which makes the provision and availability of water a basic human right to all mankind. These international conventions should be domesticated into the gamut of Nigeria water laws (National Water Supply and Sanitation, 2000). They include the Ministerial Declaration of The Hague on Water Security in the 21st

Century conducted by the United Nations under the auspices of the World Water forum and held in The Hague at Netherlands on 22nd March 2000, the International round table on Transboundary water management held under the auspices of the World Bank in Berlin, Germany on 27th September 1998, the third world water forum held in Kyoto, Japan in 2003 called the Kyoto declaration (National Water Supply and Sanitation, 2000).

4. Privatization of the Water Sector: Over the last 200 years, the provision of water was viewed as a public service and not a market commodity. Until recently, just 5% of the world water services are run by private companies. But with the privatization programme of the World Bank, water is destined to become one of the biggest businesses in the 21st century by encouraging private sector participation (Daily Trust, 2010). Globally, countries are beginning to privatize the water sector with successes recorded in Britain where ten regional water authorities (RWA) were privatized in 1988 to Suez, Vivendi, RWE, Yorkshire Water etc. Also in South Africa where Bi-water, a British water firm was given concession to provide water services, in Argentina and Philippines where Suez was granted licenses to provide water services and in Bolivia where Bechtel Corporation was granted concession to provide water services (Sudeshna et al., 2008). Privatization will encompass unbundling or deregulation, regulation, private participation, competition and eventually improved services at reduced prices of services. Privatization will ensure private participation in the sector, it has also increase employment, improved water supply, better expertise and improved infrastructure in water services to millions of citizens of these countries. The Bureau for Public Enterprises should formulate a national water law policy which can be used as a model to privatize Nigerian public water corporations and involve private participation in water management (World Bank, 2010).

5. Adequate Funding of Water Projects: The Government should increase funding for water projects nationwide. Fortunately, several international organizations have often funded water projects in Nigeria such as the World Bank, the European Economic Community (EEC), IMF, UNDP, international NGOS such as Water Aid (Matthew, 2006). There should be proper control and supervision of these funds. Private funding for water projects through Nigerian bank loans and international credit agencies should also be encouraged.

6. The maximization of the socio economic advantages of water: Proper water policy will enhance water transportation as it is still the cheapest and safest worldwide. It will also enhance other socio economic benefits of water such as improved electricity via the technology of hydrological dams and the conversion of water energy into electricity. Besides land and crops, water remains the most fundamental component of agriculture ensuring the provision of adequate food

supplies and generating millions of jobs in generating millions of dollars in revenue annually and creating thousands of jobs for Nigerians (ewash, 2013).

7. Water Security and Disaster management: There is an urgent need for the domestication and incorporation of international water laws and conventions on water security and disaster management (BBC, 2005). They include the International Maritime Organization Facilitation Convention, port security and control, hazardous and dangerous goods as in Hazardous Substance Code, safety requirements such as safety of life at sea (SOLAS), Search and Rescue Convention (SARS), International Safety Management codes (ISM), maritime pollution, standard training, certification of personnel and ports, load lines convention, safe containers, tonnage, collision regulation, London Convention, Oil pollution Convention, integrated port safety, health and environmental protection systems etc. Already a national facilitation committee has been set up to incorporate these laws into Nigerian laws made up of the staff of Federal Ministry of Transport, Nigerian Maritime Authority, Nigerian Ports Authority, Immigrations, Customs, security agencies, ship owners, shipping agents among others (BBC, 2005).

Then there is need to formulate a national policy for management of recurrent water related disasters in Nigeria such as floods, droughts, desertification, and fires among others. The Federal Fire Service should be immediately privatized for better efficiency by involving private sector management.

8. Water Pollution: There are national pollution laws governing the pollution of the environment such as the Federal Environmental Protection Agency Act. But with the recent international declarations and conventions, there is need to incorporate these conventions into Nigeria law. The Kyoto Declaration of 2003 that required all industrial countries to regulate their industrial emissions to protect the environment and ozone layer should be domesticated in Nigeria. On water sanitation standards and quality, the National Agency for Food and Drug Administration and Control Act (NAFDAC) and the Standards Organization of Nigeria has both ensuring that consumed water in Nigeria is of international qualitative standards.

9. Resolving Transboundary disputes: Fortunately, there are abundant international precedents to follow in the resolution of international transboundary disputes. Usually, the mode of managing transboundary water courses is by consensus of all the adjoining countries and states (Peter, 2005). At the 1st Petersberg Round Table on Global Water Politics Declaration held in Germany in 1998, it was agreed by all attendants that "Water is an avenue for intensive cooperation and an exchange of corresponding experiences." At the Berlin Conference for Transboundary Water Management held in 1998, the framework for transboundary water management was

summarized to include among others the "sharing benefits and cost of water, proper management and financing of these transboundary waters, expanded cooperation between commissions, legal framework for resolutions of transboundary disputes, among others." Besides consensus, compliance and its effects have become the new targets of international conventions as agreed at the "Geneva Strategy and Framework for monitoring compliance with agreements on transboundary waters, 1999." Round table discussions and negotiations have already been used to resolve transboundary water disputes in the Baltic Sea region of Europe in 1999 and ongoing Nile Basin water dispute resolution. Nigeria should endeavour to domesticate these international conventions into our local laws (Patricia, 2007).

10. Dispute Resolution: There is need to train specific water law experts in Nigeria. Existent basic dispute resolution options such as court litigation, arbitration and mediation leaves room for improvement. Water related contracts require insertion of standard dispute resolution and compliance clauses.

DELIVERY OF WATER INFRASTRUCTURAL FACILITIES AND SERVICES

The three tiers of government deliver water supply to the Nigerian through investment in the water sector and subsector. The required investments for water subsector amount to about USD 180 billion. This translates into yearly investments of about USD 3.7 billion in the first decade, USD 5.1 billion in the second decade and USD 9.2 billion in the third decade. The largest part of this amount (USD 105 billion) is accounted for by investments into water supply and water treatment infrastructure. The remaining required investment volume is split between infrastructure deployments for water dam, irrigation, dams with hydropower components, rainwater harvesting systems and drainage systems. Federal government is involved in the delivery of water supply to the people at the national level; state government provides water for its citizens at the state level and local government at the local level.

DIFFERENTIATE ROLES OF EACH TIER OF GOVERNMENT AND LEVEL OF COOPERATION IN THE PROVISION OF WATER

Three levels of government share the responsibility for the delivery of water supply services.

Federal Government

The Federal Ministry of Water Resources, which had been

part of the Ministry of Agriculture for a period until 2010, is responsible for large water resources development projects and water allocation between states (WaterAid, 2012). There are 12 River Basin Development Authorities under the Ministry, responsible for planning and developing water resources, irrigation work and the collection of hydrological, hydro-geological data. They also provide water in bulk to cities from dams. A Utilities Charges Commission was established in 1992 to monitor and regulate utility tariffs, including those of State Water Agencies. However, as of 2000, it was not functional (Sudeshna, 2008).

State Governments

The responsibility for potable water supply is entrusted to State Water Agencies (SWAs) or state water departments in the 36 Nigerian states. The SWAs are responsible to their state governments, generally through a State Ministry of Water Resources. SWAs are responsible for urban water supply and in some states also for rural water supply. As of 2000, 22 states had separate state rural water agencies, mostly set up to implement a UNICEF program. In 2010, Lagos state set up a State Water Management Office under the Lagos State Water Corporation. It took the responsibility for managing water supply challenges under the Lagos State water Corporation (2012).

Local Governments

The Local Government Authorities (LGAs), of which there are 774, are responsible for the provision of rural water supplies in their areas although only a few have the resources and skills to address the problem. Only few LGAs have rural water supply divisions.

FUNDING OF WATER FACILITIES AND SERVICES BY GOVERNMENTS

While all three government levels are supposed to participate in financing water investments, local governments often do not have the resources to do so. State and federal levels also provide only limited funding. Thus, most public water investments in Nigeria are financed by donors. The sharing of oil and tax revenues between different levels of government is a politically sensitive issue in Nigeria, which is divided between a Muslim North and a mostly Christian South and where one region in the South accounts for all oil revenues (National Water Resources Master plan, 1995). Between 1948 and 2001, nine commissions, six military decrees, one Act of the legislature and two Supreme Court judgments have attempted to define fiscal interrelationships among the

component parts of the federation without resolving the issue (Water Supply and Sanitation Interim Strategy Note, 2000). Federal revenues include about 90% of government revenues, including oil royalties and import duties. These are pooled with the more limited state and local revenues, and the pooled resources are then shared by the three levels of government according to an agreed formula (USAID, 2007; UNESCO, 1999). After independence the federal government received 40% of revenues and the states 60%, an arrangement that would benefit the oil-producing region in the Niger Delta. Local governments had no share. After the Biafra War the share of federal government was increased to 80% in 1968, but was subsequently decreased again. Since the 1976 Local Government Reform, local government receives its own share of revenues. As of 1999, the share of local government was 20%, the state share was 24% and the share of the federal government and for special projects was 56% (Akindele et al., 2002).

MECHANISM FOR COST RECOVERY

Water supply in Nigeria, the largest African country and the continent's biggest oil exporter, is characterized by low levels of access to an improved water source. Responsibility for water supply is shared between three levels of government – federal, state and local (World Bank/FGN, 2012). The federal government is in charge of water resources management; state governments have the primary responsibility for urban water supply; and local governments together with communities are responsible for rural water supply (World Bank/FGN, 2012). The responsibility for sanitation is not clearly defined. Water supply service quality and cost recovery are low (World Bank/FGN, 2012). Water tariffs are low and many water users do not pay their bills. Service providers thus rely mostly on occasional subsidies to cover their operating costs. Investments are mainly financed by foreign donors and fall short of what is needed to achieve a significant increase in access (World Bank/FGN, 2012).

Water coverage rates in Nigeria are amongst the lowest in the world (World Bank/FGN, 2012). Access to an improved water source stagnated at 47% from 1990 to 2006, but increased to 54% in 2010. In urban areas access actually decreased from 80% to 65% in 2006, but it then recovered to 74% in 2010. However, in urban areas access to standpipes substituted (Figure 1) to a large extent to piped water access (World Bank/FGN, 2012). The statistics on access to water are conflicting due to divergent definitions, indicators and methodologies applied by different agencies. There is hardly any sector monitoring.

According to the World Bank, in 2010 water production facilities in Nigeria were “rarely operated to capacity due to broken down equipment, or lack of power or fuel for

Table 1. Data on funding and cost recovery.

Data	
Access to an <u>improved water source</u>	54% (2010)
Continuity of supply (%)	not available
Average urban water use (liter/capita/day)	not available
Water tariff	Flat residential fee of USD 3 per month in Lagos and USD 11 per month in Kaduna (2007)
Share of household metering	24% in Lagos, 16% in Kaduna (2007)
Annual investment in water supply	Naira 82.5 billion (USD 0.5 billion) in 2010, corresponding to US\$3/capita/year
Financing of investments	Mainly by external donors
Institutions	
Decentralization	No decentralization to the municipal level
National water company	No
Water regulator	No
Responsibility for policy setting	Federal Ministry of Water Resources and State Ministries of Water Resources and 36 State Water Agencies (water supply), unclear (sanitation)
Sector law	No
Number of urban service providers	36 State Water Agencies
Number of rural service providers	Water and Sanitation Committees (number not available)

Source: Wikipedia (2012)

pumping.” The operating cost of water agencies is pushed up by the need to rely on diesel generators or even having to build their own power plants, since power supply is erratic. Equipment and pipes are poorly maintained, leading to intermittent supply and high levels of non-revenue water (Falkenmark, 1993 and 1994). As of 2000, about 80% of all government-owned water systems in small towns were non-operational. Through investments and capacity building for communities, the functionality of water points can be increased in the short term. For example, in focus communities supported by UNICEF in Kwara State, functionality has improved from 53 to 98%, and in Kebbi State the functionality of boreholes has improved from 12 to 88%. However, it is not clear what

the long-term functionality of these facilities is (Abdulmutallib, 2012).

Water supply is not provided efficiently in Nigeria (USAID, 2011). For example, State Water Agencies are massively overstaffed. In 2000, there was about 70 staff per 1,000 customers in State Water Agencies, compared to a best practice ratio of 3.5 (Benson, 2011). Non-revenue water often exceeds 50%.

THE PRESENT CHALLENGES IN THE WATER SUPPLY IN NIGERIA

1. Lack of appropriate policy, legal, regulatory and institu-

tional framework;

2. Lack of commitment and political will by the political class to treat water supply as both a welfare and economic matter.
3. High population growth which results into an ever increasing demand for water supply services against a diminishing trend in supply thereby creating a large demand to supply gap.
4. Ever increasing rate of urbanization resulting in shortages of water supply services in urban and semi urban areas.
5. Poor community participation in water supply matters, creating the impression that these services are government business.
6. Low managerial, executive and institutional capacities at the states and local government levels.
7. Rehabilitation and replacement of dilapidated water supply infrastructure and facilities; and expansion of coverage to un-served populace.
8. Fragmented and uncoordinated water resources development policies and programmes.
9. Lack of reliable data on water supply rendering effective planning, implementation and evaluation very difficult.
10. Low involvement of OPS, PPP, NGOs, CBOs, Civil Societies and the End-users in water supply and service provision.
11. Inappropriate pricing and tariff collection mechanisms for water supply services.
12. Inadequate public awareness about water conservation and public health hygiene.
13. Lack of appreciation of the fact that water is a finite resource and an economic and environmental good for which realistic tariff should be charged to recover at least operational and maintenance costs.
14. The colossal unaccounted for water (losses, leakage or unbilled) in urban water systems exceed 60% in any urban centre.
15. Lack of appropriate water supply facilities/infrastructures; and
16. Lack of adequate capacity to predict the impact of climate change as it affects rainfall characteristics and variability and other water sources.

THE SOLUTIONS TO PRESENT CHALLENGES IN THE WATER SUPPLY IN NIGERIA

1. Provision of appropriate policy, legal, regulatory and institutional framework.
2. Commitment and political will by the political class to treat water supply as both a welfare and economic matter.
3. Increase in the provision of water supply Services.
4. Creating forum for community participation in water supply matters, creating the impression that these services are not only for governments.
5. Improving managerial, executive and institutional

capacities at the states and local government levels.

6. Rehabilitation and replacement of dilapidated water supply infrastructure and facilities; and expansion of coverage to un-served populace.
7. Provision of coordinated water resources development policies and programmes.
8. Providing reliable data on water supply rendering effective planning, implementation and evaluation.
9. Involvement of OPS, PPP, NGOs, CBOs, Civil Societies and the End-users in water supply and service provision.
10. Appropriate pricing and tariff collection mechanisms for water supply services.
11. Adequate public awareness about water conservation and public health hygiene.
12. Creating an avenue for appreciation of the fact that water is a finite resource and an economic and environmental good for which realistic tariff should be charged to recover at least operational and maintenance costs.
13. The colossal unaccounted for water (losses, leakage or unbilled) in urban water systems exceed 60% in any urban centre should be avoided.
14. Provision of appropriate water supply facilities/infrastructures.
15. Adequate capacity to predict the impact of climate change as it affects rainfall characteristics and variability and other water sources should be created.

FUTURE CHALLENGES AND SOLUTIONS

The total drinking water demand by 2020 is 33.89 million litres per year disaggregated into: 8.65, 5.50 and 19.74 million litres per year for Rural, Small Town and Urban inhabitants, respectively (Caroline, 2003). These translate into 280,000, 89,000 and 148,000 water points in the rural, small town and urban areas. In other words, these require the provision of 43,000 water points across the country, annually. The potential negative impact of these declining water supply scenarios on the well-being and productivity of Nigerians is obvious and worrisome. It is therefore necessary for Nigeria to rehabilitate, upgrade and expand its water supply facilities in order to meet its MDGs and Vision 20:2020 targets for improved water supply coverage. To achieve this, it is imperative to:

1. Introduce reforms in the establishment, management, operation and maintenance of water supply schemes and services;
2. Articulate a comprehensive water supply policy which focuses on the weak and most vulnerable in the society;
3. Establish a National Integrated Water Resources Management Commission;
4. Devolve greater responsibilities to States and Local Government Councils in the provision of water supply facilities and services;

5. Establish effective and sustainable Public Private Partnership for the provision of water supply services and infrastructure;
6. Develop an effective and reasonable tariff regime (e.g. Increasing Block tariff or Uniform Volumetric Charge) that will facilitate partial cost recovery for sustainability.
7. Develop a robust and effective operations and maintenance programme to ensure sustained water supply services.

HOUSEHOLD'S COST OF WATER SUPPLY FROM PUBLIC AND PRIVATE SOURCES

Tariffs and cost recovery

Flat rates for unmetered connections: Most Nigerian water supply connections are not metered. The metering ratio varies from 7% in Katsina to 16% in Kaduna and 24% in Lagos in 2007 (Sudeshna et al., 2008; World Bank/FGN, 2012). Unmetered customers are charged a flat rate independent of consumption. For unmetered residential customers the monthly flat rate was USD 3 in Lagos, USD 5 in Katsina and USD 11 in Kaduna. In Yobe state it was only Naira 100 (USD 0.60) per month, the lowest level in the country according to the Yobe State Water Corporation. The tariff revenues covered only 2% of the costs of supplying water.

Tariffs for metered connections: Metered customers are either charged a linear tariff, as it is the case in Lagos, or an increasing-block tariff, as it is the case in Katsina and Kaduna. Under the increasing-block tariff, the tariff per cubic meter increases stepwise with consumption beginning at a consumption of 30 m³ per month with a total of 3 to 6 blocks. The residential tariff for the first block of consumption is USD 0.19 per m³ in Kaduna and USD 0.44 per m³ in Katsina. Tariffs for commercial and industrial users are higher. The average water tariff for metered customers was Naira 50 per m³ (USD 0.30) in Oyo state and Naira 16 per m³ (USD 0.10) in Taraba state in 2009.

Tariff collection: Outdated information systems and inconsistent billing practices cause additional revenue losses. The revenue collection rate is very low. In some areas it is less than 10% of billed amounts. There are significant arrears, particularly from government agencies.

Tariff adjustments: Each state sets its own water tariff. Tariff adjustments need to be approved by the State Executive Council through a lengthy procedure. Being unable to cover their operating costs, and unable to secure regular revisions of the tariff, the State Water Agencies receive financial assistance from the state governments. The subsidies are inadequate and unpredictable.

Vendor prices: Surveys of street vendors in Lagos, Kaduna and Katsina show that they charge as much as 20 times more than the State Water Agencies. The poorest families pay more per month than some of the richest who can afford a connection. The amount paid, for a very limited volume of supply from private water vendors, can be four to ten times that of one month's much larger volume of tap supply.

NATURE AND AMOUNT OF WATER SUBSIDIES BY GOVERNMENT TO WATER CORPORATION FOR OPERATIONS AND MATERIALS

Service providers thus rely mostly on occasional subsidies to cover their operating costs. Occasional subsidies provided by the governments are low for operation and purchase of materials needed for the smooth running of the organization. The service providers look up to foreign donors for assistance. Investments are mainly financed by foreign donors and fall short of what is needed to achieve a significant increase in access (Benson, 2011).

SPECIFIC LOCAL AND POLICIES INITIATIVES INCLUDING CASE STUDIES

Nigeria's National Water Supply Policy, approved in 2000, encourages private-sector participation and envisages institutional and policy reforms at the state level (Daily Trust, 2012). However, little has happened in both respects. As of 2007, only four of the 37 states - Lagos, Cross River, Kaduna and Ogun States began to introduce public-private partnerships (PPP) in the form of service contracts, a form of PPP where the responsibility of the private sector is limited to operating infrastructure without performance incentives (Vanguard, 2012). While the government has a decentralization policy, little actual decentralization has happened (Berlin Conference, 1998). The capacity of local governments to plan and carry out investments, or to operate and maintain systems, remains low despite efforts at capacity development (Online Nigeria, 2009; OOSKA news, 2012). Furthermore, the national policy focuses on water supply. In 2003 a "Presidential Water Initiative (PWI): Water for People, Water for Life" was launched by then President Olusegun Obasanjo (Online Nigeria, 2009). The initiative had ambitious targets to increase access, including a 100% water access target in state capitals, 75% access in other urban areas, and 66% access in rural areas. Little has been done to implement the initiative and targets have not been met.

In 2011 the government voted in the United Nations in favor of a resolution making water a human right (Benson, 2011). However, it has not passed legislation to enshrine the human right to water in national law (World

Bank/FGN, 2012). The country is not on track to reach the Millennium Development Goal for water (Global Water Politics Declaration, 1998). While not being a national policy, apparently this grass-roots initiative has met with some success (Global Citizen, 2009; World Bank/FGN, 2012). Governments welcome the support of communities, civil society and external cooperation from interested bodies for the provision of water supply to the Nigerian Lagos Water Corporation (2012).

Communities

In some communities in rural areas, water committees (WASCOS) have been formed to operate and maintain water facilities. These committees are supposed to collect their own water tariffs. Donors such as the African Development Bank have set a requirement that at least 30% of members of WASCOS must be women. In 1993 the Government committed itself to strengthen community participation in rural water supply in a policy document. As of 2000, the policy had not been disseminated or implemented in all government or donor-financed programs.

Civil society

Nigeria's Water Sector has a vibrant and dynamic civil society implementing several initiatives to address sectoral crisis. The Society for Water and Sanitation (NEWSAN) is the umbrella network of WASH NGOs, while the Water and Sanitation Media Network www.wash-jn.net comprises Journalists reporting the sector. A leading non-governmental organization in the sector is Bread of Life Development Foundation which manages the eWASH weblog www.assemblyonline.info on water news in Nigeria.

External cooperation (Private Participations)

The most important external partners in the Nigerian water supply sector are the African Development Bank, the European Union, Japanese JICA, UNICEF, USAID, the NGO WaterAid and the World Bank. The African Development Bank and the World Bank provide loans to the government; the European Union, Japan International Corporation Agency (JICA) and USAID provide grants to the government; UNICEF and WaterAid receive grants from governments and donations from the public to implement their projects in cooperation with, but not through the government (Clarke, 1991).

African Development Bank

In February 2012 the African Development Bank approved

a USD 100 million soft loan to improve water in the northern city of Zaria. The project will be implemented by the Kaduna State Water Board. It also approved an Urban Water Supply Project in the cities of Ibadan and Jalingo in Oyo and Taraba States in 2009. Both urban projects include the installation of water meters, hygiene promotion as well as the construction of toilets at schools, health clinics, market places and parks. Unlike the newer project in Zaria, the older project supports reforms at the state level to separate regulatory from operational functions, and the introduction of public-private partnerships. The ADB also finances a Rural Water projects in Yobe and Osun States approved in 2007. The project aimed to increase the functionality of rural water supply facilities in the two states, estimated to be below 50% in 2006, to 100% in 2012 (ADB, 2012).

The ADB finances the entire costs of these projects without requiring a contribution by the Nigerian state. The ADB has invested USD 905 million in the sector since 1971.

China

In 2005 China signed a grant agreement with Nigeria to drill 598 boreholes in 18 states and Abuja. The amount of the grant and the implementing agency were not specified (China-Africa Cooperation, 2005).

European Union

The EU supports a Water Supply Sector Reform Programme in six states (Anambra, Cross-River State, Jigawa, Kano, Osun and Yobe) with 87 million Euros grant funding. The Nigerian state, at all three levels of government, and local communities are expected to contribute another 31 million Euros.

Japan International Corporation Agency (JICA)

JICA provides grants for rural water supply in three states, Oyo, Kano and Yobe.

UNICEF

UNICEF has supported rural water supply and hygiene in communities and schools across the country since 2002. Its interventions have been financed by DFID and the European Commission. A total of 6,960 new safe water sources (boreholes, dug wells and protected springs).

USAID

USAID supports rural water supply and hygiene education

in Northern Nigeria, in 46 communities in Bauchi, Kano and Sokoto States. USAID is partnering with Nigerian non-governmental agency Women Farmers Advancement Network (WOFAN) and WaterAid.

WaterAid

WaterAid, a British NGO, promoted the integration of water supply and hygiene education using a community-based approach and low cost appropriate technologies. It works closely with Nigerian NGOs, including the Benue NGO Network (BENGONET), Society for Water in Nigeria (NEWSAN), Justice Development and Peace Initiative (JDPI), Community Based Development - NGO (CBD-NGO), Women Empowerment in Nigeria (WEIN) and the Bol Development Association (BOLDA). It works in over 100 communities in the states of Bauchi, Benue and Plateau. It has developed a vulnerability ranking, based on criteria suggested by communities themselves, to help communities in selecting themselves where resources should be allocated. Such a participatory and transparent decision-making process is of particular importance in a context of low trust and poor governance (WaterAid, 2011, 2012).

In January 2012, it has been tasked by the government with the task of facilitating monitoring and evaluation of government water and hygiene projects in Nigeria. According to the Minister of Water Resources, President Goodluck Jonathan is interested in an independent assessment of sector performance and NGOs are well placed to undertake this task.

World Bank

The World Bank has completed seven water projects since 1985 and had three on-going projects in 2010. Total investment for the 10 projects is about US\$1.4 billion. The First Urban Water Reform Project (US\$120 million) targets 13 towns in the states of Kaduna, Ogun and Enugu. The project also aims to establish state water policies, and to foster the engagement with the private sector. The second Urban Water Reform Project worth US\$200 million, supports the extension of the piped network in Calabar, and the rehabilitation of water treatment plants and distribution systems in Lagos as well as another three towns in Cross River State. Under a Privatization Project, the Federal Capital Territory (FCT) Water Board is being assisted with US\$25 million (World Bank/FGN, 2012). In 2012 the World Bank approved a US\$ 400 million National Urban Water Sector Reform Project for Lagos, Kaduna, Ogun, Enugu and Cross River State.

Conclusion

Nigeria is faced with the challenges of providing adequate

water supply for her citizen as a result of poor managements of water infrastructure and lukewarm activities on the part of governments. The stakeholders order than the governments in making sure that there is availability of water supply to the people have yielded little, due to various difficulties faced with the people or government officials in the country. The governments need to revisit the laws governing water provision and usage in the country.

REFERENCES

- Abdulmutallib AA (2012). "Nigeria: In Kano, 'Water, Water Everywhere'". allAfrica.com. Retrieved April 12.
- African Development Bank (2012). The African Development Bank in Action. Activities in the Water and Sanitation Sector in the Federal Republic of Nigeria, February 2012, retrieved on April 11.
- African Development Bank (2012). "Urban Water Supply and Sanitation for Oyo And Taraba States, Project Appraisal Report". Pp. 16. Retrieved April 12.
- African Development Bank (2012). Makes USD 100m loan for better water and sanitation in Nigeria, February 16.
- Akindele ST, Olaopa AB (2002). Fiscal federalism and local Government finance in Nigeria.
- BBC (2005). "Lagos: Water, water everywhere". Released on 12 September, 2005. Retrieved 12 April 2012.
- Benson A (2011). National Project Coordinator of the World Bank-Assisted National Urban Water Sector Reform Project." Nigeria needs N215b annually to develop water infrastructure", Daily Times, March 28.
- Caroline S (2003). "Water Poverty Index as a Tool for Poverty Reduction", 3rd World Water Forum: Water, Poverty and Development; held March 16 -23, Kyoto, Japan. <http://www.waterforum.jp/worldwaterforum3/themeWwf/en/sessionDetail.do?7B0id=329%7B9.html>.
- Clarke R (1991). Water: The international crisis. London, Earth scan, pp.193. <http://www.infoforhealth.org/pr/m14/m14bib.shtml#30> Accessed 20-05-09.
- Daily T (2012). "Abuja's water infrastructure imperatives". Releases 29 February. Retrieved 12 April 2012.
- Daily T (2010). "Yobe charges least water tariff in Nigeria." Released on 7 October. Retrieved 12 April 2012.
- Davidson J, Myers D, Chakraborty M (1992). No time to waste, Poverty and the global environment. Oxford. Oxfam, 217:36. <http://www.infoforhealth.org/pr/m14/m14bib.shtml#135> Accessed 24-05-09.
- Data refer to the year (2007). PPP GDP (2007) & Population (2007). World Development Indicators database, World Bank, September 10, 2008. Note: [http://en.wikipedia.org/wiki/List_of_countries_by_GDP_\(PPP\)_per_capita](http://en.wikipedia.org/wiki/List_of_countries_by_GDP_(PPP)_per_capita) Accessed 03-06-09.
- Patricia J, Salman AS (1999). Lead C, Legal Department, World Bank, Washington DC, USA Press release, World Water Council, 20th March, 1999.
- Falkenmark M (1993). Water scarcity: Time for realism. Populi 20(6): 11-12. Jun. <http://www.infoforhealth.org/pr/m14/m14bib.shtml#135> Accessed 24-05-09.
- Falkenmark M (1994). Landscape as life support provider: Water-related limitations. In: Graham-Smith F, ed. Population-The complex reality. Golden, Colorado, North American Press. pp. 103-116. <http://www.infoforhealth.org/pr/m14/m14bib.shtml#135> Accessed 24-05-09.
- Forum on China-Africa Cooperation (2005). China and Nigeria Sign Water Supply Project Agreement, 19 October.
- UN Watercourse Convention (1997). Gardner-Outlaw & Engelman, Sustaining water, easing scarcity. A second update, Washington, DC,

- Population Action International, pp.69.
- Global Citizens Corps (2009). What's at Stake?, Who it Affects?, <http://www.globalcitizencorps.org/issues.thm> Accessed May 18, 2009.
- Global Citizens Corps (2009). <http://www.globalcitizencorps.org/issues.thm> Accessed 18-05-2009.
- Greg M (2010). Community-led water and sanitation projects take root in Nigeria, UNICEF, 23 September.
- Japan International Corporation Agency (2012). Rural Water Supply and Sanitation in Nigeria, retrieved on April 11.
- Lagos Water Corporation (2012). "Lagos woos investors in wastewater". Retrieved 12 April.
- Lagos Water Corporation (2012). "Organisation History". Retrieved 12 April.
- Lagos State Water Corporation (2012). "Welcome to the Official Website of the LSWC.". Retrieved 12 April.
- Matthew G (2006). Water, Sanitation, and the Modern City: Colonial and post-colonial experiences in Lagos and Mumbai, Human Development Report Office Occasional Paper.
- Millennium Development Goals Drinking Water Supply and Sanitation Coverage (1990 and 2006). Country Estimates by Types of Drinking Water and Sanitation Facilities. http://www.childinfo.org/files/mdg_country_regional_tables.pdf Accessed 21-05-09.
- National Economic Empowerment and Development Strategy-2 (NEEDS-2) (2008-2011), Water, Strategic Framework –Development of Physical Infrastructure, (2008) p182. National Water Supply and Sanitation Policy (2000), pp5.
- National Water Resources Master Plan (1995). As sited in Draft National Water Resource Policy (2004) p2. Ministerial Declaration of The Hague on Water Security in the 21st Century.
- Nigeria Vision (2020) Program Report of the Water and Sanitation Sector National Technical Working Group.
- Online Nigeria (2009). Water Resources Development and Utilisation, <http://www.onlinenigeria.com/water/?blurb=521> Accessed 20-05-09.
- OOSKA news (2012). Abuja Faces Wastewater Challenge After Treatment Plant Contractor Walks Off, 19 October .
- Patricia L (2007). A Remark at the Canadian Launch of UNFPA's State of the World Population Report (2007). <http://www.acpd.ca/acpd.cfm/en/section/unfpa2007/articleID/392> Accessed on 22-05-09.
- Peter OE (2005). Fiscal Federalism: Theory, Issues And Perspectives, Daily Independent, 29 August.
- PBS / Pulitzer Center on Crisis Reporting (2012). "What's Causing Water Shortages in Ghana, Nigeria?". pp. Minutes 1–4 of the video. Released on 15 March. Retrieved 1 August 2012.
- Stimson Global Health Security (2009). "Lagos: Growth without infrastructure". Retrieved 12 April 2012.
- Sudeshna B, Vivien F, Yvonne Y, Heather S, Quentin W (2008). "Cost Recovery, Equity, and Efficiency in Water Tariffs: Evidence from African Utilities". African Infrastructure Country Diagnostic. World Bank. p. 5.
- The United Nations World Water Development Report (1999). Water in a Changing World, Facts and Figures, pp3. http://www.unesco.org/water/wwap/wwdr/wwdr3/pdf/WWDR3_Facts_and_Figures.pdf
- United Nations Economic and Social Council Geneva Strategy and Framework for Monitoring Compliance with Agreements on Transboundary Waters.
- UNICEF/WHO (2009) Joint Monitoring Program (JMP) Definitions. http://www.wssinfo.org/en/122_definitions_html Accessed 21 May.
- UNICEF (2007). Water, Sanitation and Hygiene in Nigeria, February.
- USAID (2007). Nigeria Water and Sanitation Profile, ca.
- USAID (2011). In Sokoto, Water is Life, 16 December.
- USAID (2012). Access to Water Sanitation and Hygiene (WASH), no date, retrieved on April 11.
- Water Supply (2000). Sanitation Interim Strategy Note. pp.3 <http://assemblyonline.info/water/2/waternigeria.pdf> Accessed 04-06-09.
- Water Aid Nigeria (2011). Sector finance and investments, retrieved on April 11.
- Water Supply (2012). Sanitation Sector Reform Programme. retrieved on April 11 (2011).
- Water Aid Nigeria (2012). Where we work, retrieved on April 11, 2012.
- Water Aid Nigeria (2012). Federal Government tasks Water Aid in Nigeria to lead monitoring and evaluation of WASH projects, 17 January 2012.
- WHO, UNICEF (2008). Joint Monitoring Programme (JMP) MDG Assessment Report 2008 for Water Supply and Sanitation: Progress on Drinking Water and Sanitation: Special Focus on Sanitation. <http://documents.wssinfo.org/resources/documents.html> Accessed on 20-05-09.
- WHO / UNICEF Joint Monitoring Programme (2010) for Water Supply and Sanitation, retrieved on April 12, 2012.
- World Bank (2010). New Project to Bring Clean Water to 50,000 Households, 22 April.
- World Bank/Federal Republic of Nigeria (2012). Water Supply & Sanitation Interim Strategy Note, November 2000, retrieved on April 11.
- Vanguard (2012). "Lagos: Water everywhere but none to drink". pp. 3 April. Retrieved 12 April 2012.

Cite this article as:

Oluwaseyi OB (2014). Availability of land and planning of water infrastructure networks in Nigeria. *Acad. J. Environ. Sci.* 2(8): 152-166.

Submit your manuscript at:
www.academiapublishing.org/journals/ajes