

Sustainable Water Supply and Management in Nigeria: Challenges in the Niger Delta Region

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Abstract:- Water sustains large human activities without adequate care. Portable water supply is vital for health and survival. In Nigeria, the Niger Delta region often suffers from the availability of portable water. The demand is on the rise and the available water is continuously under threat. Discussed in this paper are threats to sustainable water supply and management which include; equipment and infrastructure decay, lack of accessibility and maintenance, poor management, indiscriminate dumping of refuse in ponds, rivers and other water bodies, oil leakage from exploration activities and high rate of abstraction attributed to high demand for portable water caused by population increase in the region. The strategies suggested for remediating these challenges include; adequate management of water resources by government and related stakeholders, public sensitization, surveillance of water projects, efficiency of water use, efficient waste disposal systems and effective legislation and policy implementation for sustainable water supply and management in the Niger Delta.

Keywords: Sustainable Water, Water Supply, Water Management, Challenges, Niger Delta, Nigeria.

I. INTRODUCTION

Water is vital for almost all human activities (Akeh *et al.*, 2006). It is a very important resource and its use cuts across domestic, industrial, and agricultural purposes (Akeh *et al.*, 2006). Sustainable water resource management puts into consideration the long term future needs of water (Arimoro, 2020). In other words, the concept describes how water resources are managed to meet the needs of both current and future generations (Olalekan *et al.*, 2019). Water supply is considered sustainable if it is effective, reliable, and consistent and does not negatively impact the environment (Tanto *et al.*, 2019).

The worldwide requirement of water by man is about 150 to 300 litres each day for domestic purposes (Olalekan *et al.*, 2018), as such; the world is in need of portable water to ensure sustainable human development of a constantly growing human population (Ringler, 2010). He projected that by 2050, more than half of the world's population will suffer from water stress. Nigeria has two large rivers (rivers Niger and Benue) that are centrally placed; and also smaller

rivers, lakes, and creeks scattered inland particularly over the southern region. Despite these abundant water bodies in the country, statistics show that less than half of the 85 million urban dwellers and 58% of the total population have access to portable water supply (Abaje, 2009). This is not surprising because human activities, climate change and poor management of water resources by government have led to the shortage of reliable water supply in Nigeria. The Niger Delta region of Nigeria is located in the southern part of the country covering a total area of 25,640 km². The region occupies about 7.5% of Nigeria's total landmass. It has many fresh and salt water swamps, lakes and scattered islands. A good number of the communities in the region dwell by the coasts of seas, estuarine and mangrove swamps (Ashton-Jones, 1998; Ogbe, 2005).

Any nation that undermines the development of water resources is jeopardizing its health and socio-economic well-being. One of the major challenges facing sustainable water production, supply and management in the Niger Delta region of Nigeria is an increase in population which brings about a reduction in the quality and quantity of water. The reduction in available water supply by half has made the residents to depend on a surface and ground water that is contaminated and untreated (Aguo 2004; Kokpan, 2006; Chukwuemeka, 2007). Another challenge is oil spillage caused by the constant oil exploration activities that has led to the pollution of water bodies (Dokpesi *et al.*, 2012). Also, large amounts of human, industrial and agricultural wastes are often deposited in the water bodies leading to high occurrence of faecal-oral infections like cholera, typhoid, and diarrhea. The degree of water sustainability and management varies depending on water quality and level of development of the area. Unlike in most developed countries, water sustainability and management in Nigeria is not regulated by the water agencies which include Federal and State Ministries of Water Resources, State Water Agencies, Federal and State Universities of Agriculture and Environment (Okoye, 2015). In a bid to raise quality water supply from 40% to 100%, the Federal government of Nigeria put forward a water policy in 2000. The policy was also to make water affordable and accessible to all. Unfortunately, this policy has not been fully implemented thus defeating the reasons for its enactment (Ekong *et al.*, 2012).

Few researchers in the Niger Delta region have directed efforts towards determining the challenges of sustainable water supply and management in a region faced with water shortage. It is against this backdrop that this article is written. The aim of this article is to highlight the challenges facing sustainable water supply in the Niger Delta and what the communities in the region can do to ensure the sustainable management and supply of water.

II. LITERATURE REVIEW

➤ *Water Resources in Nigeria:*

Nigeria sits on a total landmass of about 94,185,000 hectares of land, out of which the major water bodies covers 10,812,400 hectares, making up about 11.5% of the land

surface (Ita *et al.*, 1988; FAO, 2012). The country is indeed blessed with numerous water resources. The north central and core northern parts of Nigeria with very low rainfall have most of the country’s dams; mostly used for irrigation and hydroelectric power (HEP) while the southern and western parts of the country with high rainfall have many seas, lakes and rivers. The country is properly drained with five drainage systems which include; Niger-Benue river system, lake Chad, Cross river basin, Anambra river basin and Ogun-Osun basins. Lake Chad which makes up about 20% of the Nigeria landmass is the only internal drainage system in the country while the Niger-Benue basin is the largest basin occupying 63% of the Nigeria landmass (Asokoro-Ogaji, 2011).

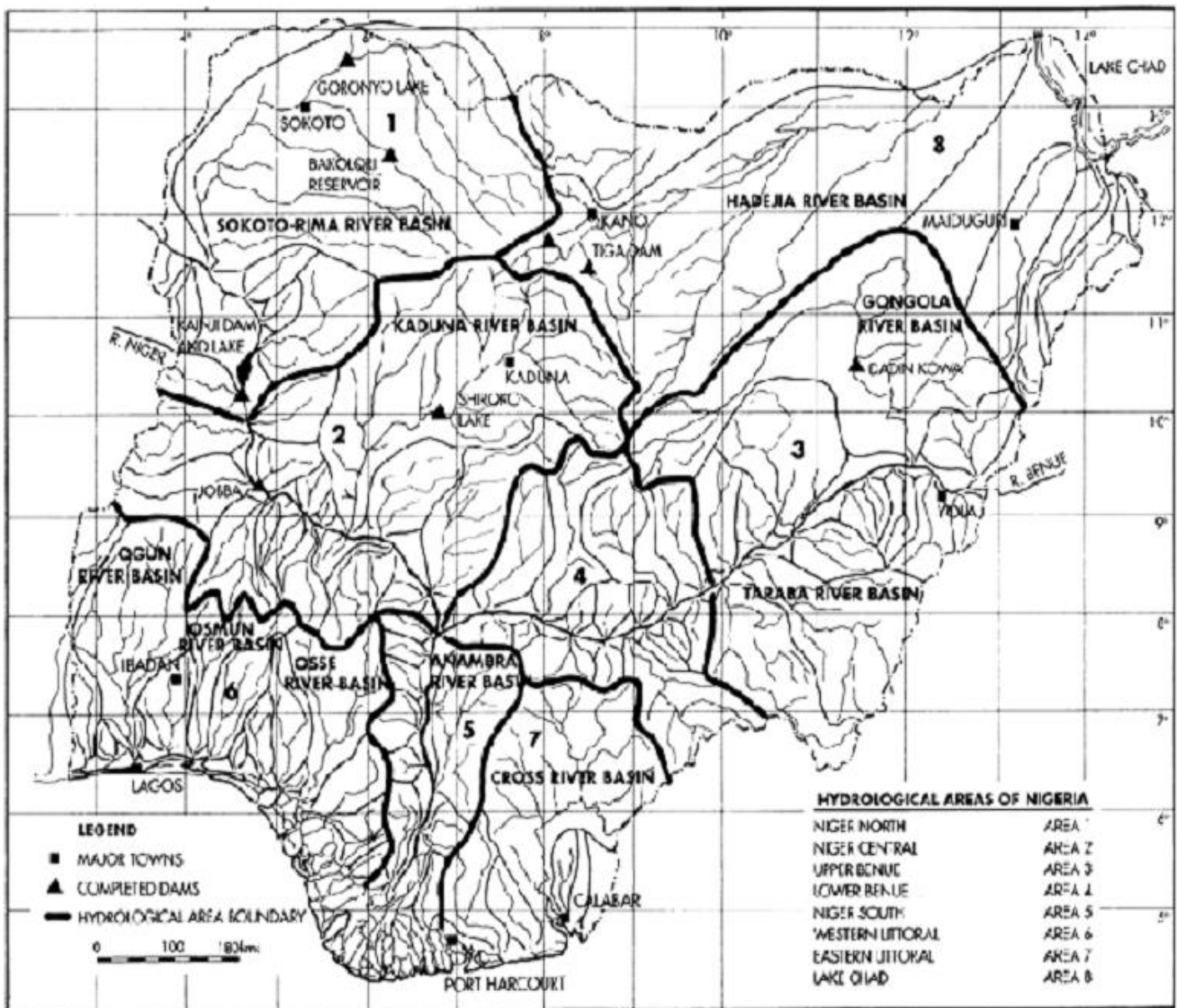


Fig 1 Map of Nigeria showing the drainage systems
Source: Lohdip et al. (2013).

➤ *Water Resources in the Niger Delta:*

The Niger Delta region contains many water bodies like sea, rivers, creeks, streams, ponds, tributaries, distributaries, lakes and marshy areas. Some of the water bodies found in the region include; Forcados river, Bonny

river, Andoni river, Brass river, Imo river, Benin river, Nun river, Sombreiro river, Ijala creek, Eja-Etan, Ifie-Kporo, Ubeji creek, Dodo river, Ramos river, Jeddo, Ekpan river, Orashi river, Ughewhe stream, Egbo stream, Ifie-Kporo river and Ekurede-Itsekiri creek (Nduka and Orisakwe,

2011). The resources found in these water bodies include; fishes, shell foods, crabs, shrimp, salmonids, krill, prawns, water snails, crayfish, lobsters and periwinkles. The water bodies are home to diverse aquatic life and serves as a means of transport, food, job provision as well as recreational activities. The rivers provide water for

industrial, domestic and agricultural uses (Alexander, 2012). The Port Harcourt and Onne free zone port in the region are important routes for export and import. Also, the large water bodies in the region contribute to global oxygen supply which is vital for survival.

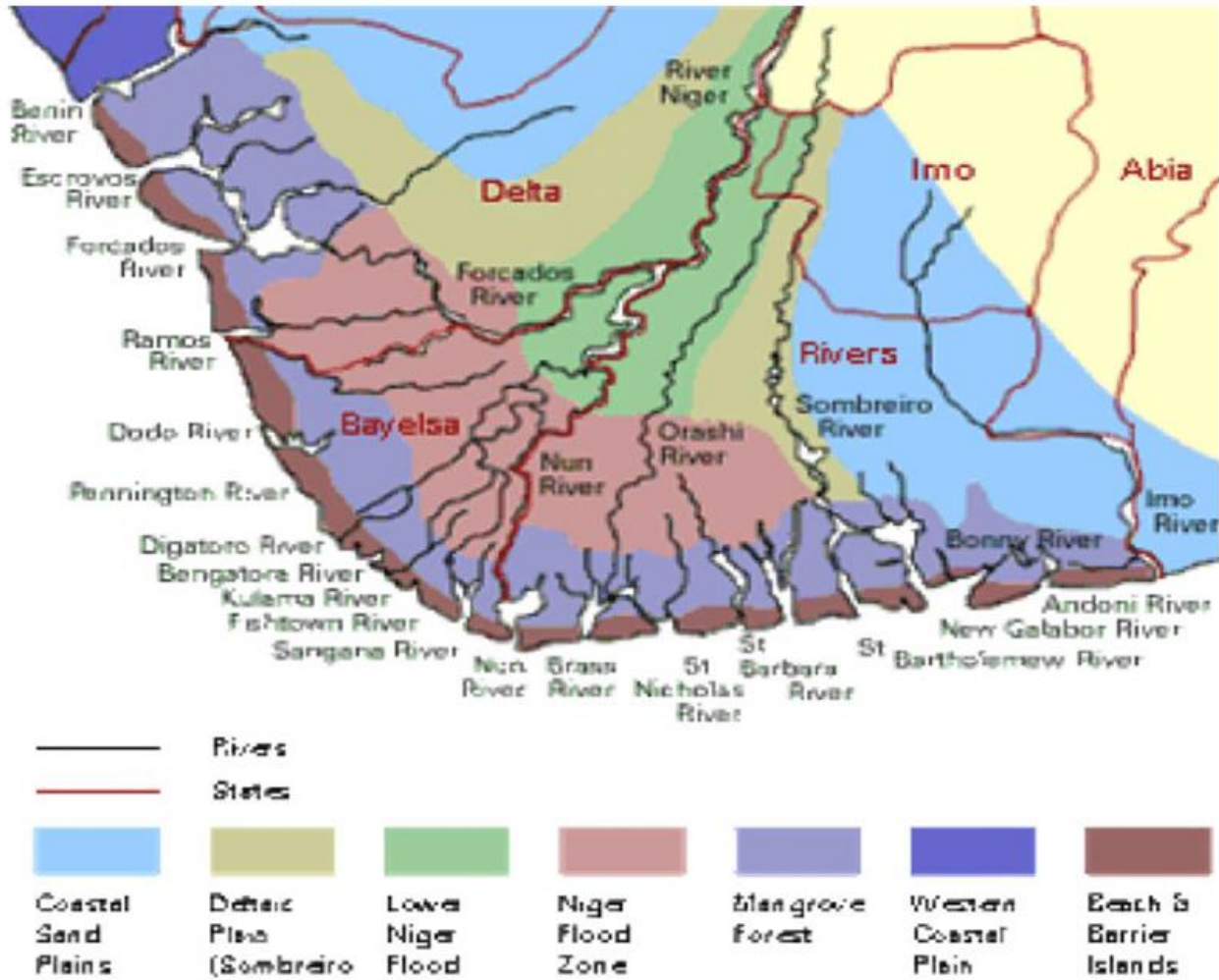


Fig 2 Map of Niger Delta in Nigeria showing the different water bodies
Source: Nduka and Orisakwe (2011).

➤ *Sustainable Water Supply and Management in the Niger Delta:*

Government at all levels is involved in making sure water is available for future generations (WHO and UNICEF, 2015). Government at the federal level manages water and its resource. The State and local governments distributes it to urban and rural dwellers respectively. Government and all relevant stakeholders (managers, technical assistants, financiers and consultants) should contribute towards mitigating the challenges facing the sustainable management and supply of the scarce but important resource. Some of these challenges include;

➤ *Equipment and Infrastructure Decay:*

The supply and management of water has been adversely affected by the decay of infrastructure and failure of the available equipment to serve its purpose. Some of the

water works in the region, Bayelsa State for instance is in deplorable state and the only operational vehicle present has not been used for a long time. The limited electricity supply, outdated water plants and small coverage all constitute a threat to the supply and management of water in the region (Chukwu, 2015).

➤ *Inequitable Access and Cost Recovery:*

More than half of the region’s population lack access to water services and even the few poor persons that have access to water services end up paying more for it. Because majority of the supply line are unmetered, the water regulators use estimated billing. An average of #400 (\$0.91) is charged for a tenement and #600 (\$1.37) for a flat (Chukwu, 2015). Those who can’t afford the bill or lack access to the water pay more for it. Poor maintenance and

operations causes' epileptic water supply and together with high tariffs results in consumer's unwillingness to pay.

➤ *Rapid Population Growth:*

The sustainability of water resources in the Niger Delta region is also at risk because of its growing population. The oil rich region is constantly attracting people and this has placed an increase in the demand for water resources. Consequently, the quality and quantity of the water have reduced.

➤ *Lack of Maintenance:*

Water shortage and also its pollution has been caused by the failure of residents and even the authorities to either replace or repair broken water pipes. Over half of the water enroute to high density residential areas are wasted before it gets to homes because of bad pipes and even in the homes, the non-conservative attitude to water use leads to more wastage. This has been made worse by the absence of metering to regulate usage.

➤ *Misappropriation of Water Funds:*

Funds released by the government for the management and sustainable development of water resources are been mismanaged and diverted to personal accounts resulting in the deterioration of the water sector in the Niger Delta. The failure of government agencies to monitor water projects and lack of accountability has contributed to hampering sustainable water supply and management in the Delta.

III. INDUSTRIAL POLLUTION

The massive oil exploration going on in the Niger Delta has led to oil spills that have made the water bodies unfit for consumption and use. This have in turn affected the livelihood of the people who depend on the water. Oil spills occurs several times in a given year resulting in water pollution (Amadi *et al.*, 2012). Over 2000 incidents of oil spills have occurred in the Niger Delta since 1969 when exploration activities began (Saviour, 2020). Most people in the region also make use of the water bodies as their waste bins. They dump their wastes into water bodies polluting it. The Koko river in Delta State is an example where toxic wastes were dumped into water bodies in the area (Alexander, 2017). Port Harcourt, the capital city of Rivers State is one of the most populated city in Nigeria that produces both domestic and industrial untreated wastes; which are discharged into water bodies. These wastes increases water temperature and heavy metals in water and also create an environment for water plants to thrive causing a problem to water transports (Alexander, 2017). Effluents from industries and agro-allied wastes also pollute water and reduce their sustainable supply.

➤ *Open Defecation:*

The most common problem of access to portable drinking water in the Niger Delta is the floating toilet or jetty latrine found in the region. It is an overhung, shanty-like toilet structure built over water bodies. This toilet system is mostly seen in coastal communities in Cross river, Delta, Akwa Ibom and Bayelsa. The latrine is built on water

bodies to allow for open defecation which pollutes the water and makes it unavailable for use without proper treatment (Chukwu, 2015).

➤ *Iron And Salt Water Contamination:*

This is a common challenge of sustainable water supply and management in the Niger Delta. The WHO recommends a minimum standard of 1.6 mg/L of iron (Fe) in water but the water extracted from boreholes in areas like Twon-brass, Kolo, Kpansia, Swali and Etegwe goes beyond this level which is harmful to health when consumed. The exposure of the iron containing water to air brings about an oxidation of Fe^{2+} to Fe^{3+} which is a rust coloured substance that comes out of the water; staining the water tanks, pipes, cans, cooking utensils and other materials it comes in contact with. Apart from reducing the aesthetic value of these materials, it also causes odour, changes the taste and colour of water, increases the turbidity and bacterial growth thus the water becomes unsafe for public use. (Ngah *et al.*, 2005; Abd-Elhamid *et al.*, 2008).

Some inhabitants now depend on rainwater for domestic purposes. For drinking, they make use of sachet or bottle water (Oteri *et al.*, 2003; Chang *et al.*, 2011; Egbai *et al.*, 2013). This is because the boreholes in some areas of the Niger Delta have provided salt water instead of freshwater. The saltwater from the sea infiltrates into the boreholes changing the water to brackish. This is common in areas like Burutu, Obuguru and Deghele in Delta State; Borokiri in Port Harcourt; Okrika, Bonny and Opobo in Rivers State; Kpansia, Swali and Etegwe in Yenagoa; Brass, Kolo, Gbarantoru and Nembe-Bassambiri in Bayelsa State; Iwuokpom and Ibeno in Akwa Ibom State. The high salt concentrations in the borehole water were found to be above the WHO recommendations of 17.10 mg/L which is likely to cause health problems when consumed.

➤ *Solutions to the Challenges Facing Sustainable Water Supply and Management in the Niger Delta:*

Indeed, sustainable water supply and management in the Niger Delta is facing numerous challenges as stated above, the following are suggested possible solutions that can mitigate the effects.

➤ *Awareness:*

Sensitizing Niger Deltans on ways of managing sustainable water supply in their communities should be the first step towards improving quality water supply. An understanding of the socio-economic and environmental context of water management will help the people to learn how people consume water and how water consumption can be reduced. Most importantly, they learn the benefits of traditional sustainable water supply methods, which could be implemented as additional sources of water supply in their communities.

IV. SURVEILLANCE AND MAINTENANCE OF WATER PROJECTS

Rapid response to equipment failure and maintenance of water pipes should be implemented in water agencies. One way of achieving this is by automation of the system. Improving the service delivery system for water to create a sustainable supply requires prompt execution of water projects. In Bayelsa State, the Centre for Marine Geosciences has established hydrogeological monitoring wells in coastal aquifers at important locations along the Nigeria coastline. If this is also implemented in the hinterlands and in other Niger Delta States, it will be useful in monitoring freshwater movements.

➤ *Political Will:*

The general public should realize that sustainable water supply is expensive. To this end, government should classify water supply as a user pay service and not a free service. This will help generate funds to sustain and manage quality water supply.

➤ *Cost Recovery Approach:*

Cost recovery is essential for the continuous management of water. Individual, communal, commercial, and industrial consumers should all be metered and their bills should be based on their usage of water. Government can also share water cost with the poor so that they can still have access to portable water even with their little income.

➤ *Efficiency Of Water Usage:*

This is the amount of water used by a population. Less water can be used to achieve more with water saving strategies and technologies that are adapted to all economic sectors. This will increase water availability to all.

➤ *Efficient Waste Management:*

Good waste management practices using the waste management principles of reduce, reuse and recycle would cut down waste disposal on water bodies. Industrial and domestic wastes are often deposited on water bodies thus the development of an efficient waste disposal system independent of water bodies would sustain water supply in the Delta. The use of sanitary landfills for domestic wastes and incinerator for disposal of toxic wastes will prevent the contamination of water sources thus increases its sustainable supply.

➤ *Effective Legislation And Policy Implementation:*

The government should enact and implement laws and policies that would regulate access to water to prevent over abstraction and abuse of water resources. These policies and laws will also remove the bottlenecks in the system and cut down corruption.

V. CONCLUSION

Sustainable water supply and management in the Niger Delta requires a combined effort of government, public and private sectors as well as individuals to ensure the optimum use, development and protection of water. Access to

portable water supply has been worsened by numerous challenges like corruption, inequitable access to water, infrastructure and equipment decay and oil pollution among other factors which have greatly impacted the sustainable supply and management of water in the region. It is the responsibility of the government to help sustain quality water supply by adopting different approaches like surveillance and management of water projects, cost recovery, policy implementation and water use efficiency. Government and all relevant stakeholders should be involved in combating the challenges facing sustainable water supply in the Niger Delta. It is recommended that government should evaluate and regulate all sectors that are saddled with the responsibility of managing and supplying water in each Niger Delta community.

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❖ *Conflicts of Interest*

The authors declare that there are no conflicts of interest.

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