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Challenges Associated with Pipe-borne Water Infrastructure in Erelu Waterworks Zone, Oyo State, Nigeria

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Abstract-* The current study explores the infrastructural weaknesses that make Erelu waterworks zone inadequate in Oyo State, Nigeria. A mixed methods approach was adopted using GIS mapping, observation, archival research, and interviews. The Erelu Water Works is characterized by several systemic infrastructural malfunctions. The dam faces siltation through urban runoff, and residential encroachment. The treatment infrastructures are seriously out of date, with faulty aeration tank, manual lime dosing, inefficient high lift pumps, and abandoned Booster stations. The 12-inch main pipeline (6.8km) designed to transport the water to the Sooro Booster station has been punctured by many household connections to this pipe. As a result, 90.83% of the registered users in Oyo, Awe, Ilora, Akinmorin, Fiditi, and Iware towns are without water supply. The attempts by the government to rehabilitate the facility have been unsuccessful as can be seen from a ₦10 billion Fiditi Earth dam that was started in 2011 and had to be abandoned by 2020. Another attempt was made in 2019 through a ₦1.4 billion rehabilitation funded by the World Bank, but it too could not succeed because of lack of counterpart funds. There is an urgent need for upgrading and rehabilitation of Erelu pipe-borne water infrastructures. There is the need to expand the Dam and water treatment units, replace and extend the pipelines, rehabilitate and provide more Booster stations, and provide adequate funding to restore services.

I. INTRODUCTION

Infrastructure development is key to attaining sustainable development, especially for water supply, sanitation and health, agricultural development, and energy production.Sub-Saharan African countries face specific challenges around infrastructure financing, systemic and repeated malfunctioning, and decentralized infrastructure types. Poor access to improved water in Nigeria increased vulnerability to water-borne diseases and contributed to high mortality rates among children under five(Adeniran, et al 2021).Water is undoubtedly the most important natural resource the country has and is unfortunately the most undervalued and neglected natural resource(Federal Ministry of Water Resources 2016). The development of potable water infrastructure started in Nigeria in the early 20th century [Federal Republic of Nigeria 2000]. Amongst the early beneficiaries were Lagos, Calabar, Kano, Ibadan, Abeokuta, Ijebu Ode and Enugu. The schemes were maintained with revenue from water sales with virtually no operational subvention from the government. With the creation of regional governments in the early 1950s, the financial and technical responsibilities for developing new water schemes were taken over by these regional governments, who assigned supervisory manpower to oversee operations and maintenance. The regional governments were, however, slow in setting up independent bodies to develop, operate, and manage the water supply. The first water corporation was formed in the western region in 1966, which took over all the assets and liabilities, including the existing staff. The staff of the Water Division of the Ministry of Works was also transferred to the new corporation (Ishaku et al. 2011)

Access to piped water infrastructure in Nigeria is declining due to a lack of extension, deteriorating distribution networks, and rapid population growth, limited technical manpower, lack of budgetary funding, and inadequate tariff recovery (Adeoti and Fati 2020)

Erelu Waterworks was one of the projects constructed by the Water Corporation of Western

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Nigeria. It was constructed on Awon River along Iseyin Road. The Erelu waterworks zone being investigated is positioned between latitudes 7° 40' and 7°56' north of the Equator and longitudes 3°51' and 3°59' east of the Prime Meridian. Awon River basin is located between latitudes 7° 45' and 8° 12' north of the Equator. The longitudes are between 3° 45' and 4° 05'east of the Greenwich meridian (Oyelami 2012). Erelu waterworks zone represents the major urban conglomerate within the entire region.

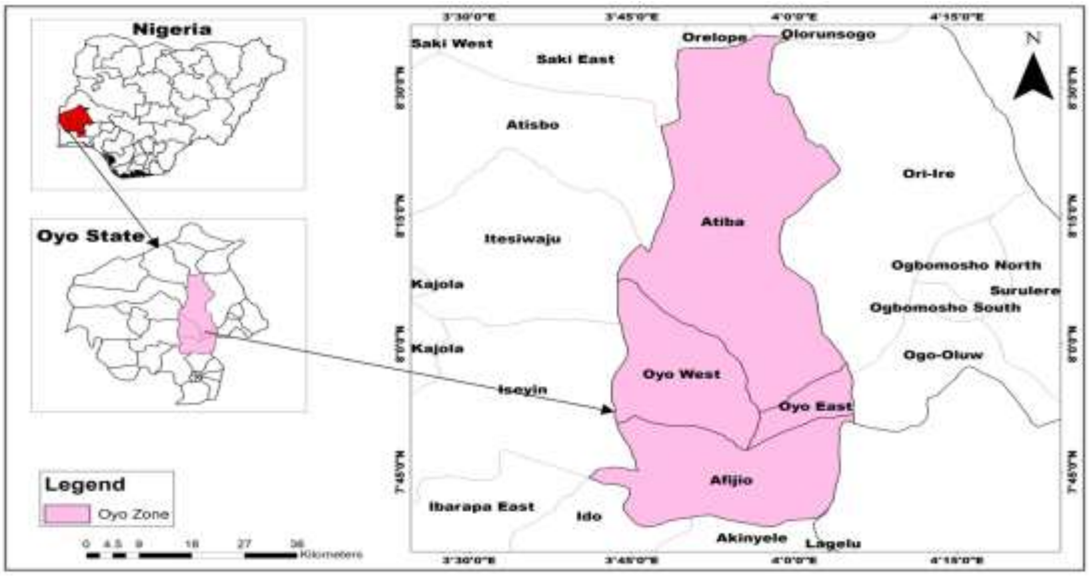

Figure 1.1: Map of Erelu Water Zone

The water scheme was commissioned on the 30th of November, 1962, by the then Commissioner for Works and Transport in Western Nigeria, MrAdeniyi Williams. The Water Corporation of Oyo State evolved out of the then Western Nigeria Water Corporation through the Enabling Water Corporation of Oyo State Edict No 24 of 1977 and as reviewed by the Water Corporation of Oyo State Amendment Law of 2006. The Water Corporation of Oyo State is a public utility fully owned by the Oyo State government. It is responsible for the provision of potable water to the urban areas of the state (Oyo State Government 2024).It was established to provide potable water for the residents of Oyo and the neighboring towns like Ilora, Awe, Akinmorin, Fiditi, and Iware. Erelu Waterworks was built to produce 7,500 cubic meters (7,500,000 liters) of potable water per day. The water treatment plant utilizes a conventional method.The scheme was about 6.4kilometers from the township in 1962.

Research Method

The research adopts a mixed-methods research design involving qualitative, spatial, photo elicitation, personal observations, and maps of secondary sources. Qualitative components include interview information granted and archival records offered by stakeholders as well as personal observations. Spatially, aerial photos were subjected to GIS analysis to reflect the extent to which the urban has outgrown the Erelu water infrastructure. Coordinates of the urban water points were also taken and mapped. Spatial approach also involve sourcing information from topographical maps. Related maps were employed in someinstances.more importantly, related literatures were extensively consulted. Based an the diverse nature of data, thematic analysis was used.

II. THE RESULT

2.1 Erelu Dam

Erelu Dam was constructed on the Aawon River,which is geographically situated between latitudes 7°45'1" and 8°12'1" N, and longitudes 3°04'51" and 4°00'51" E. The river basin encompasses a land area of approximately 2,644.018 square kilometers (2,644,018,1073.60 square meters) and contains a total stream length of 916.5 kilometers (Oyelami, 2012c). Erelu Dam is fed by channels with a combined length of 563.431 kilometers, representing 61.48% of the basin's hydrological resource potential. The remaining 353.07 kilometers (38.52%) of channel length are located downstream of the dam (Oyelami, 2012a). The topographical profile ofthe Aawon River basin gradually ascends from an elevation of 650 meters along the Ogun River to approximately 1,350 meters at its source, around Arojosu in Oriire Local Government Area (Oyelami, 2012b) (see Figure 2).

Erelu Dam is constructed at a location where the Precambrian Basement Complex of southwestern Nigeria is intersected by the Aawon River. The dam site rests on migmatite formations. Quartzite formations in the area are generally massive and occur as elongated ridges trending northwest-southeast, which crosscut the predominant Migmatite. Schistose Quartzites are also present within south-western Nigeria, characterized by alternating layers of Mica, Quartz, and Feldspar. The Dam catchment areais 243.36 square kilometers, and water volumeis approximately 2,975,635.29 cubic meters. Erelu Dam water level has remained stable at a predetermined standard level, even during dry seasons (Olasunkanmi et al., 2021).

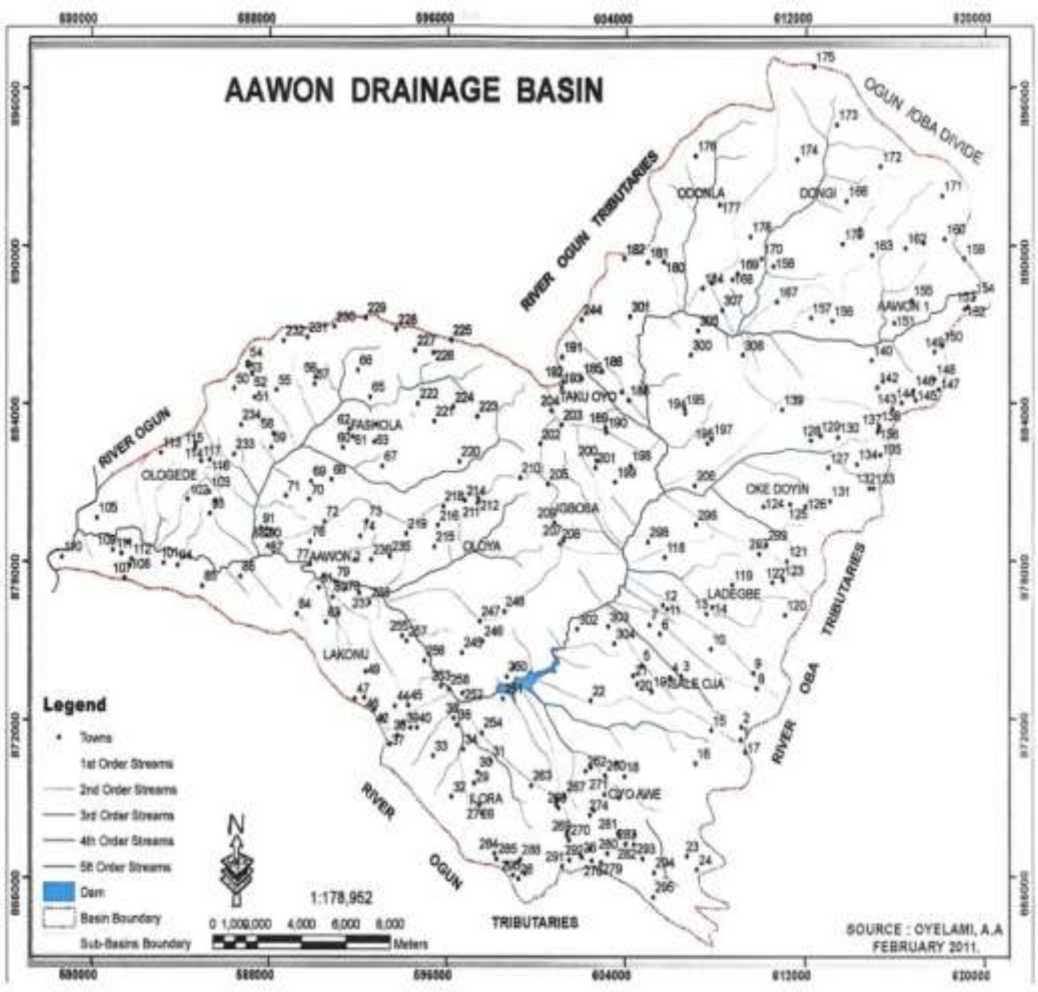

Figure II: Aawon Drainage Basin Showing the Locationof Erelu Dam. Source

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2.2 Water Treatment Infrastructure at Erelu Waterworks

The water treatment process at Erelu Waterworks comprises eight distinct stages, each supported by distinct infrastructure. These stages include: (i) the Water Abstraction House, (ii) the Low Lift Pump House, (iii) the Aeration Chamber, (iv) the Flocculation Chamber, (v) the Sedimentation Chamber, (vi) the Filter Beds, (vii) the Quality Control Laboratory, and (viii) the Clear Water Tank. Water abstraction refers to the extraction of water from Erelu Dam for the production of potable water (Castle Water, 2025).The Intake House is situated within the dam, near the embankment edge. It is engineered to collect water from three different depths, likely to accommodate the progressive siltation of the dam over time. The Low Lift Pump House contains two pumps, each with a capacity of 300 cubic meters per hour. This facility is equipped with raw water abstraction valves for intake and a mud valve to discharge silt and sludge sediments downstream. The pumps are powered by electric motors rated at 380 kilowatts, and water is conveyed to the subsequent treatment stage via a 12-inch iron pipe (OSMEWR 2025)

The third stage is the aeration chamber. Aeration involves introducing large volumes of air into the water and subsequently venting the air. This process supplies oxygen to bacteria, facilitating the treatment and stabilization of residual wastes in the water (Drinking Water Extension, 2019). At Erelu, two air blowers installed beneath the aeration chamber mix atmospheric oxygen with raw water delivered from the low lift pumps, primarily to eliminate odors.

Following aeration, water enters the flocculation chamber, where an alum (aluminum sulfate) solution is dosed via piping from the chemical room and isthoroughly mixed with water. Alternative coagulants such as ferric sulfate or ferric chloride may also be employed. Flocculation promotes the aggregation of suspended particles into larger, heavier clusters known as flocs (ChemREADY, 2025). The Erelu Waterworks is equipped with two alum dosing tanks, each with a capacity of 2,000 liters. The use of coagulants is essential for the removal of suspended solids from raw water (Water & Wastes Digest, 2022).

Next, water flows into the sedimentation tanks, where sedimentation occurs naturally under quiescent conditions maintained for approximately five to six hours. This stillness allows gravity to settle heavier particles, forming sludge at the tank bottom (Bidatek, 2025; Aosts, 2025). This stage produces clear water often patronized by tankers that collect water for non-consumption purposes.

The next stage is the filtration chamber. Filtration serves to physically eliminate suspended solids, pathogens, and various contaminants, thereby substantially enhancing the quality and safety of the water. This process is employed to remove impurities such assediment, bacteria, viruses, suspended particles, parasites, algae, fungi, chemical and biological contaminants,and debris, thereby ensuring the provision of safe drinking water. Specifically, filtration reduces or eradicates harmful substances and guarantees water that is both clean and safe for consumption (Engineering Sales, 2025; GenesisWater Tech, 2025; Water & Wastes Digest, 2025).

Disinfection constitutes the final stage in the treatment of potable water before its distribution to consumers. At the Erelu waterworks facility, chlorine and lime are utilized for this purpose. Gaseous chlorine is injected into the clean water tank from a Chlorine gas cylinder placed outside. Chlorine functions as both an oxidizing agent and disinfectant;it effectively eliminates harmful microorganisms. Lime plays a vital role in potable water treatment by softening the water, elevating the pH level, and facilitating the removal of heavy metals and other impurities, thereby rendering the water safe for human consumption. The disinfection process prevents the transmission of waterborne diseases such as cholera and typhoid, while also maintaining water quality throughout the distribution network (Safewater, 2025;Graymont, 2025; Suez, 2025).

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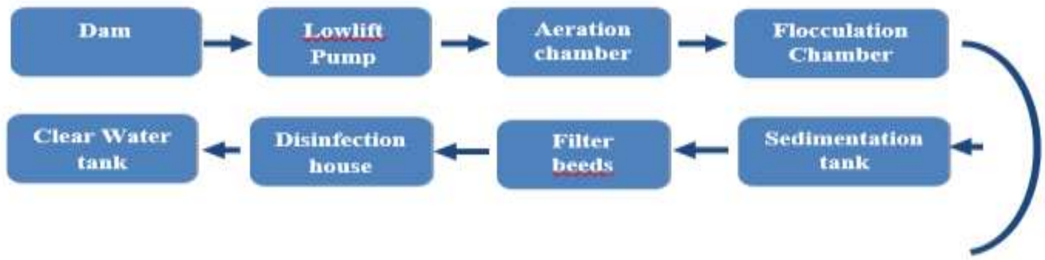


Figure III: Stages in the treatment of Potable Water at Erelu Waterworks

2.3 PotableWater Distribution Infrastructure at Erelu Waterworks

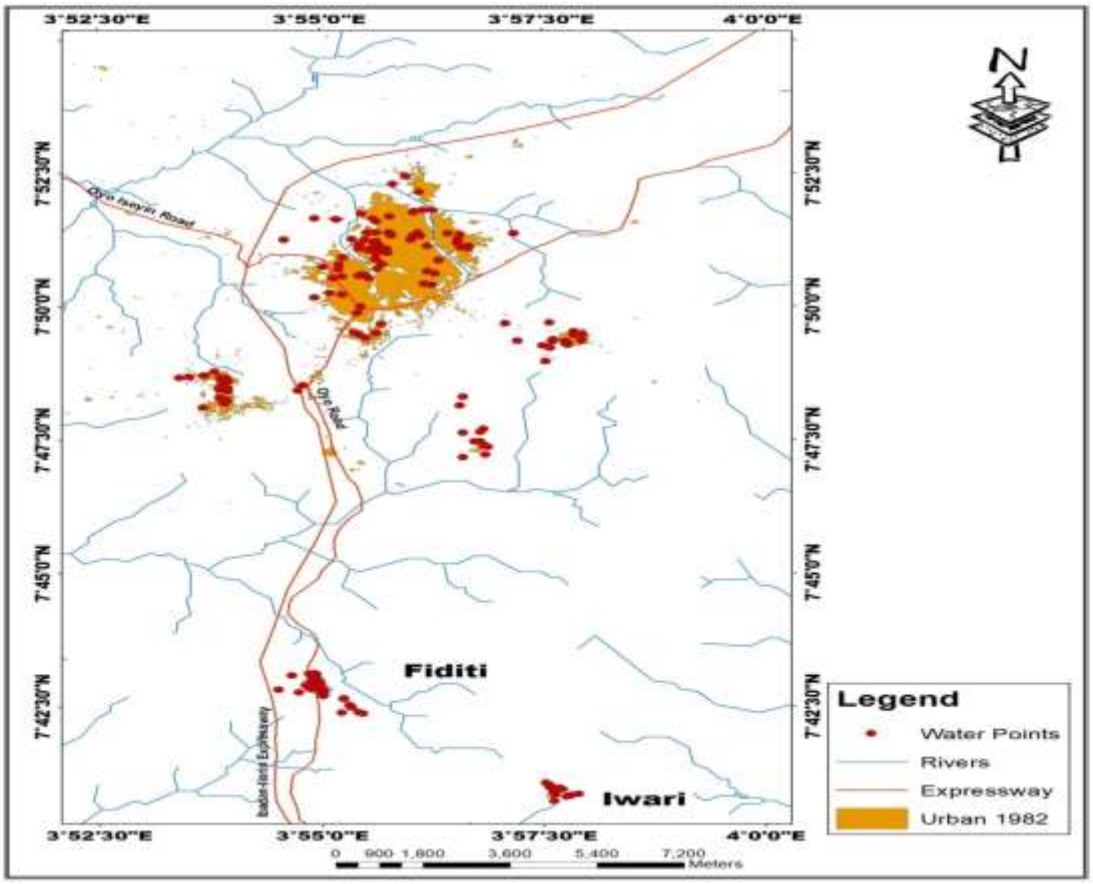
The potable water distribution infrastructure comprises High Lift Pumps, Arterial Main, Booster Stations, and Water Distribution Pipes. The High Lift or booster Pump is by the treated water Tank and serves the critical function of conveying treated water into the Arterial Main. According to the stakeholders at Erelu Waterworks, the High Lift Pumpshave the capacity to deliver 233.33 cubic meters (233,333.33 liters) of water per hour. The installation of two such pumps was intended to facilitate continuous, 24-hour water pumping operations, with each pump operating on a 12-hour rotational basis. Analysis of the Oyo NE topographical map of 1962 indicates that the pump is required to push water from Erelu waterworks, located at an altitude of 800 meters above sea level, to the Booster Station on top of the Sooro quartzite ridge at an altitude of 1,150 meters. This corresponds to a vertical height of 350 meters anda horizontal distance of 6.4 kilometers. The Sooro Booster Station was to utilize gravitational force for the distribution of treated water to the residents of the Erelu water zone.

The Sooro Booster Station was designed to store 3,633.995 cubic meters (960,000 gallons or 3,633,995.31 liters) of treated water, representing 50% of the maximum daily water delivery target. It serves as the primary reservoir for Oyo, Awe, Ilora, Akinmoorin, Fiditi, and Iware. Additionally, two supplementary Booster stations with capacities of 269.9 cubic meters (71,300 gallons or 269,899.86 liters)each were constructed specifically for Fiditi and Iware, which are relatively far from the Sooro Booster station. These auxiliary stations were intended to store treated water sufficient to meet the daily requirements of these two distant urban peripheries (Erelu Structural Plan, 1961).

Archival records indicated that the water distribution network consisted of galvanized iron pipes with diameters of six and four inches. The main pipeline is a straight line from Sooro Booster Station, passing through Oyo town to Fiditi (20.7 km). Water pipelines of six and four inches in diameter branched both left and right at right anglesto designated urban districts in Oyo,Aafin to Awe (5 km), Idigba to Akinmorin (6 km), Idigba to Ilora (2.3km), and Fiditito Iware (6.3 km). Urban districts within and outside Oyo that fell along the same direction were served by a single six-inch pipeline. The secondary roads within Oyo Township were extensively used as water service lines. This was particularly so of traditional districts. Beyond the original 1961 design, developments during the 1970s and 1980s equally necessitated the extension of pipelines to specific targets such as Housing Estates, Federal Government College, Industrial centers, and Government agencies. In all instances, streets and access roads were supplied via four-inch iron pipes. Water flow was regulated by multiple vault systems.

2.4 Water Delivery Infrastructure at Erelu Waterworks

Erelu Waterworks uses three modes of water delivery: household direct connection, public tapsystem, and tanker loads. Emphasis here would be on public taps. The traditional districts were comprehensively and adequately served by public water points as of 1972. Records obtained from the Erelu Waterworks office indicated the presence of 357 public water points.However, only 101 were identified during the field mapping exercise.The distribution is as follows: Awe 9 (8.91%), Akinmoorin 4 (3.96%), Iware 8 (7.92%), Fiditi 16 (15.84%), Ilora 13 (12.87%), and Oyo 51 (51%). They were installed at regular intervals throughout the traditional districts of the zone. Of note here was that even isolated compounds were adequately served as at 1972. The allocation of public water points was based on the principles of equity rather than population, resulting in smaller settlements receiving a disproportionately appreciable share of



III. CHALLENGES ASSOCIATED WITH PIPE-BORNE WATER INFRASTRUCTURE IN ERELU WATERWORKS ZONE

3.1 Urban Land Erosion and the Siltation of Erelu Dam.

Okoli et al (2024) conducted research to provide information about the water volume characteristics of Erelu Dam. A bathymetric survey involves the measurement and mapping of underwater topography to ascertain the depth and morphology of the submerged surface (Melaren Engineering Group, 2026).The maximum and minimum depths were established to be 6.03m and 0.56 m, respectively, in 2023.These indicated that the Dam is shallow. According to the linear and areal analysis results, the inflow point of a stream into Erelu Dam has become significantly shallow due to the accumulation of substantial debris loads transported annually by the stream.

A close study of the map generated, however, clearly shows that the said river is the one that drains the metropolis. The watershed of the stream stretches southwards through Awe, Kosobo, Durbar, St Bernard, Owode, Isokun,Gedu, Farinu, and Oroki. The northern extension of the watershed encloses Elegbede (Awe), Oriawo, Low cost (Federal and State),Medina, Owini, Obada, Ilupeju I and II, Ahoyaya, and all streams draining these extensive urban basins. All the streams draining these extensive urban basins merge into one before discharging

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directly into Erelu Dam. The stream drains nearly two-thirds of the total Oyo urban space, carrying considerable loads from exposed and disturbed surfaces. Unfortunately, the urban space that attracts the highest development between 2000 and 2026 is within the basin. Consequently, the dam has experienced an urban effect in terms of an extensive and very rapid rate of siltation, resulting in large shallow areas with fringes overgrown by aquatic vegetation.

Thesurface area of EreluDam has equallysuffered an immense reduction over time; this was calculated to be 13,106 hectares (131.06 square kilometers) by Ufoegbune and Eruola in 2011. And by 2021, Olasunkanmi et al. carried out another study indicating that the surface area of the dam has reduced to 120.94 hectares or 1.2094 square kilometers. Furthermore, the dam's perimeter fence has been severely encroached upon, with residential developments extending to the Dam edges. This encroachment would posea significant challenge to any prospective expansion or rehabilitation efforts.

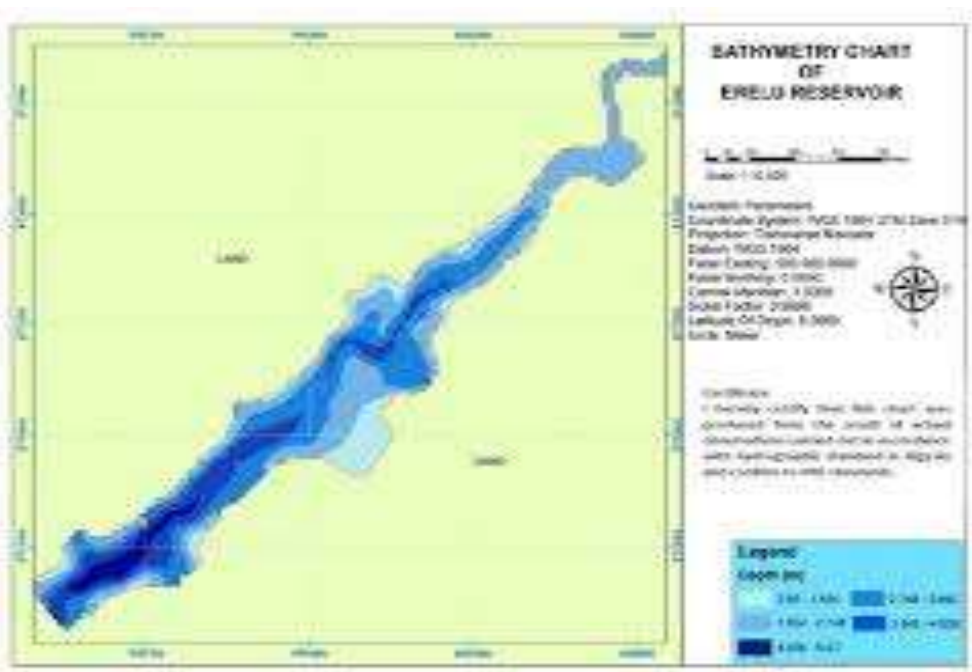

Figure 9: Bathymetric Chart of Erelu Dam

3.2 Water Treatment Facilities are Old, Outdated, and Partly Damaged

The Aeration Chamber is faulty, and the process has been skipped, such that water flows directly from the low lift pump to the flocculation chamber. The metal tank for the mixing and dosing of lime is faulty, and this is being manually carried out by staff members. One of the two available high lift pumps has developed mechanical faults, and water cannot be pumped on 24-hourshifts. All three Booster stations in Erelu waterworks zone have been abandoned for decades. The available high lift pump is aged and might not be able to meet the required water pumping pressure and volume. Critical water treatment infrastructure—including sedimentation tanks, filtration tanks, disinfection units, and clean water storage tanks- is experiencing varying degrees of overuse, wear, and deterioration. The diminished operational efficiency is due to their advanced age. The facilities were originally designed to serve the population of 1962, and are now grossly inadequate to provide for the current urban demands. Water Supply and Sanitation in Nigeriahttps://en.wikipedia.org.

Field observations also identified public water taps in Fiditi and Ilora that now stand approximately 2.5 meters above the current ground surface, an indication of prolonged urban land degradation. Additionally, many public taps, exposed water pipes, control valves, and air vents have been vandalizedby scavengers, especially in Oyo. Areas designated as road setbacks, originally employedfor water pipeline installation, have been repurposed for the construction of buildings, marketing outlets, burial sites, and industrial facilities,prompting numerous complaints from private individuals, government agencies, and institutions to the management of the Erelu.

Urban construction activities have increasingly subjected water pipelines to erosion, corrosion, and physical damage. Field investigations revealed that water pipes installed in 1961 were typically buried at an average depth of three meters below the ground surface. These pipes predate the construction of most current roadways. Over the past six decades, the development of roads, gutters, and other urban infrastructure, coupled with associated erosive forces, has exposed these water pipes to environmental stresses, resulting in significant realignment, deterioration, and breakage. This phenomenon is particularly evident in locations such as Alebiosu, Moja, Oke Loogun, Akunlemu, Oranyan, Olooro, Ilora-Akinmoorin Road, Ilora, and Fiditi (refer to Plate 2),and overall water supply reliability. The power supply to water infrastructure is unreliable, leading to frequent shutdowns and reduced water production. The power supply issue has led to residents experiencing days without water, impacting the use of water kiosks and overall water supply reliability (Oludare,2021)

Plate 2: Water Service Pipe Exposed to Erosion, Corrosion, and Damage

3.3 Public Direct Connection to the High Lift Pipe (Arterial Main)

The high-lift water pipeline, extending 6.8 kilometers and constructed with 12-inch pipes, was originally designed to transport treated water from the waterworks to the booster station located atop the Sooro quartzite ridge. For over fifty years, the pipeline remained protected beneath forest cover without sustaining any damage. However, due to urban encroachment, the pipeline is now entirely situated within a built environment and has been extensively perforated to meet the water demands of the newly emerging neighborhoods (see Plate 1). This extensive drilling has resulted in increased leakage and a significant reduction inthe pressure with which water can move within the pipe. The numerous perforations in the high-pressure pipeline have caused severe adverse effects on the water distribution system.

Notably, water from the Erelu waterworks no longer reaches the booster station on Sooro Hill, where

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gravity was intended to facilitate the distribution of treated water to all consumers in the zone. Consequently, the primary service areas— Oyo, Awe, Ilora, Akinmoorin, Fiditi, and Iware-have been disconnected from Erelu water services. Conversely, the new beneficiaries are recent settlers who have occupied areas along the high-lift pipeline starting from the 2000s, including Olooro, Second Gate, EAUED, Oroki Express, Koso Express, Liresa, Ojegbolu, Sabo Market, Oranyan, and Sooro.By this, 90.83% of the waterworks registered household subscribers had been completely cut off. Erelu Potable water is now available for 9.17% of recently registered households (8.81% in Atiba LGA, .36% in Oyo West LGA).

Plate 1: 12 Inches High Lift Pipe Connected Directly by household.

3.4 Coverage of Erelu Physical Infrastructure is Low.
The pattern of urban expansion up to 1992 demonstrated that development was predominantly concentrated in and around the traditional districts. The distribution of public water taps was notably confined within these traditional areas (see Figure 8). However, from the mid-1990s onward, urban growth in Oyo increasingly extended outward, moving away from regions served by the Erelu potable water infrastructure. Furthermore, the limited number of developments situated along the water pipeline emerged after the reliability of these lines for service delivery had diminished. An examination of Table 1 reveals that only 25.78% of the present urban area was in existence in 1992.Larger estates, housing schemes, family layouts, and private developments that emerged after 1992did not feature significantly in the list of those that ever subscribed to the services of Erelu Waterworks, as indicated in Table 1.

Table 1: Increments to Urban Space in Erelu Waterworks Zone (1973 to 2023)

Year	Area (sq/km),	Area Increase (Sq/km)	Area Increase Percentage	Cumulative Percentage
1972	6.56	-	- -	- -
1973 - 1982	9.30	2.74	3.06	3.06
1983 - 1992	29.64	20.34	22.72	25.78
1993 - 2002	44.74	15.1	16.87	42.65
2003 - 2012	79.69	34.96	39.06	81.71
2013 - 2022	96.06	16.37	18.29	100
Total		89.51	100	

Source: Authors' calculation, 2026.Urban Expansion in Erelu Waterworks Zone.

3.5 Inability of Government to Effectively Finance Infrastructural Development Projects
In response to the ever-increasing population as manifested in urban expansion, and the dwindling significance of Erelu Waterworks in the zone, construction of a new Earth Dam commenced at Fiditi in 2011. About 10 billion Naira was set aside for the project in the 2016 federal government

budget. The dam was designed to have a hydraulic structure and programmed to be completed in nine months. By 2020, it was obvious that the Dam had been abandoned. Likewise, in 2019, 1.4 billion was earmarked for the rehabilitation and extension of Erelu Waterworks.The project was financed by the World Bank, Federal and State governments.The present state ofabandonment was attributed to the inability of the Oyo State government to pay its own counterpart fund(Oyo Insights 2018,PM Parrot 2019,Tribune 2020, Campus Reporter 2020).

The physical impact of the rehabilitation efforts is felt in terms of 12-inch and 16-inch pipes stocked at a location very close to Erelu Waterworks. Summarily, it can be deduced that Erelu Waterworks suffers inadequate funding.

IV. OVERVIEW OF PIPE-BORNE WATER INFRASTRUCTURE IN NIGERIA

The results of the national health survey and infrastructure assessment confirm the decreasing contribution of pipe-borne water systems in Nigeria. More than 86% of the population of the country does not have access to a safely managed drinking water source, which is not contaminated on-premises (Edefo, 2025). The majority of the active supply points that do have a basic infrastructure are compromised by biological and/or chemical contamination, reflecting a widespread deterioration in the safety and operational quality of utilities in urban areas (Victor et al., 2025).

The amount of water that every average urban person receives daily tells the degree of the infrastructure deficit. According to national assessments, the per capita water availability for each person has reduced to nine litres per day (Ogunkolu et al., 2023). The total water amount is below the WHO minimum of 50 to 100 litres per person per day necessary for basic health, hygiene, and metabolic needs, which shows a great domestic deficit (Ezugwu et al., 2021).

This is the pattern of low coverage for utilities on the urban population as seen in recent localized municipal data. Today, during urban water resource surveys, only 15.4% of surveyed households reported using pipe water from the tap as their main source of water (Akoteyon, 2019). On the other hand, 53.8% of households have to use private boreholes for water supply, while 30.8% of households rely on commercial water vendors, illustrating the shift from public water supply to private sources (Oyerinde & Jacobs, 2022).

Financial tracking shows that a very significant difference exists between the capital needed for the recovery of the water sector and the amount of money invested in the water sector budget. Nigeria requires annual investments of around $8 billion to achieve basic water and sanitation goals; however, budget allocations are always less than $1 billion annually (Abubakar et al., 2022). A funding deficit of more than 85% also renders municipal water boards incapable of replacing aging pipes and upgrading aging treatment plants, or extending water networks to meet increased urban population (Amaefule et al., 2023).

Degradation of the public pipe-borne system is also associated with the growing incidence of water-borne disease epidemics in the cities. The Nigeria Centre for Disease Control (NCDC) has reported significant outbreaks of cholera, such as 111,062 suspected cases and 3,604 deaths in a single outbreak year (Eneh et al., 2024). CFRs often surpass international safety limits of 1% and clearly demonstrate the public health hazards of failing municipal piped water systems (Ogunniyi et al., 2025).

The deterioration of pipe-borne water infrastructure in Oyo State is a critical issue affecting the availability and quality of water supply. The Oyo State Water Corporation has identified several challenges impacting the performance of water schemes, including faulty filter media, frequent bursts on distribution networks due to aged pipelines, and ongoing road expansion works that have destroyed and buried distribution networks (Oyo State Water Corporation. (n.d.). These issues contribute to significant water losses and reduced functionality of water supply systems.

Several factors contribute to the deterioration of pipe-borne water infrastructure in Oyo State. Aging infrastructure is a primary concern, with many pipelines and treatment facilities being outdated and in need of rehabilitation. For instance, water schemes operate at extremely low functionality due to frequent bursts on the distribution network caused by aged pipelines. Additionally, inadequate funding and maintenance have exacerbated the problem, leading to a decline in water supply capital allocation and increased dependence on groundwater sources (Soliu & Bilewu, 2021).

The physical size of existing municipal pipeline systems has not been able to follow the pace of urban population growth. During the Urban Water Resource Survey, only 15.4% of surveyed households reported using pipe water as their main source of water (Akoteyon, 2019). On the other hand, 53.8% of households have to use private boreholes for water supply, while 30.8% of households rely on commercial water vendors, illustrating the shift from public water supply to private sources (Oyerinde & Jacobs, 2022).As new suburban areas and informal settlements spring up around cities, public water mains are rarely extended to them (Gilbert & Shi, 2023). This creates a gap between the new urban districts and pipe-borne water sources. New urban districts have become totally detached from the water supply of the municipality (Aliyu & Amadu, 2017).

The apparent withdrawal of political interest in maintaining central pipe-borne networks stems from the immense fiscal burden of grid rehabilitation (Ali, 2026). Revitalizing subterranean pipe networks requires massive capital investments that remain invisible to the public, prompting administrations to favor superficial, highly visible infrastructure projects instead (Pointet, 2022). Additionally, the rapid proliferation of decentralized self-supply alternatives such as private motorized boreholes and sachet water industries has relieved immediate public pressure on the state (Shuaibu et al., 2025). Multilateral development banks and international non-governmental organizations (INGOs) have stepped in to fund major water rehabilitation projects whenever a state network faces total collapse (Waziri & El-Sadiq, 2023). This dynamic creates a severe moral hazard, where state governments deliberately underfund their own water maintenance budgets, knowing that external international aid will eventually step in to prevent a total humanitarian crisis (Harman, 2026).

The deterioration of water infrastructure has a profound impact on communities in Oyo State. Residents often experience prolonged periods without water due to frequent outages and maintenance issues. This situation affects daily activities, productivity, and overall quality of life. Moreover, the reliance on untreated water sources poses health risks, as communities may resort to using contaminated water from rivers or streams, leading to further health issues. The reliance on deteriorated water infrastructure poses severe health risks, including the transmission of diseases like diarrhea and cholera. Poor sanitation and inadequate disposal of feces are significant factors increasing the incidence of diarrhea among children. The lack of access to clean water also contributes to environmental degradation, as communities may resort to using untreated water from rivers or streams, leading to further contamination (Ayiti, 2024).

V. THE WAY FORWARD

The deterioration of Erelu waterworks infrastructure highlights the urgent need for improvements in the potable water supply situation. There is an urgent need to strengthen the public water system and promote safe water practices as a way of reducing the health risks associated with traditional water sources. Everyone must have safe and easy access to adequate water facilities and services such that clean drinking water is secured and usable.

Efforts to address the deterioration of pipe-borne water infrastructure in Erelu waterworks zone should start with plans to resuscitate the waterworks, focusing on the rehabilitation, upgrading, and expansion of the scheme.

Comprehensive project rehabilitation, involving the dam, water treatment facilities, water distribution and extension infrastructures, and water delivery systems, is recommended. Previous partial approaches involving only the dam at Fiditi, sedimentation tank, and 16-inch pipes in Oyo were never completed. This

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may involve partnerships with international organizations with interest in the improvement of water supply infrastructure. Investment in infrastructure and management reforms by international donors would enhance the sustainability and effectiveness of water supply services in the State.

Community-based interventions like giving communities a direct stake in decision-making and accountability, involving data collection on leakages or vandalism, and infrastructural malfunctioning in the neighborhood

Promoting safe water practices such as responsible water usage campaigns, rebates or discounts can be offered occasionally to residents who install water-saving fixtures, use the work of arts and murals to promote water safety, water conservation, and the dangers of water-related pathogens. Addressing these challenges requires comprehensive strategies that enhance public health outcomes and promote sustainable development.

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