



Masters in Public Infrastructure Management

Water and Sanitation Infrastructure Management in Africa

**Best practices and Lessons Learnt from Rand Water
and National Water and Sewerage Corporation
(NWSC)**

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Presentation Outline

- Introduction
- National Water and Sewerage Corporation
- Rand Water
- Success/best practices
- Lesson learnt
- Challenges
- Future prospects

National Water and Sewerage Corporation (NWSC).

- NWSC is a Government parastatal responsible for provision of water and sewerage services in large urban centers in Uganda aimed at expanding service coverage, improving efficiency and service of increasing labor.
- 100% owned by Government was Established in 1972 under decree No. 34 and revised in 1995 under the NWSC statute of 1995/ NWSC Act of 2000 Cap 317

Vision

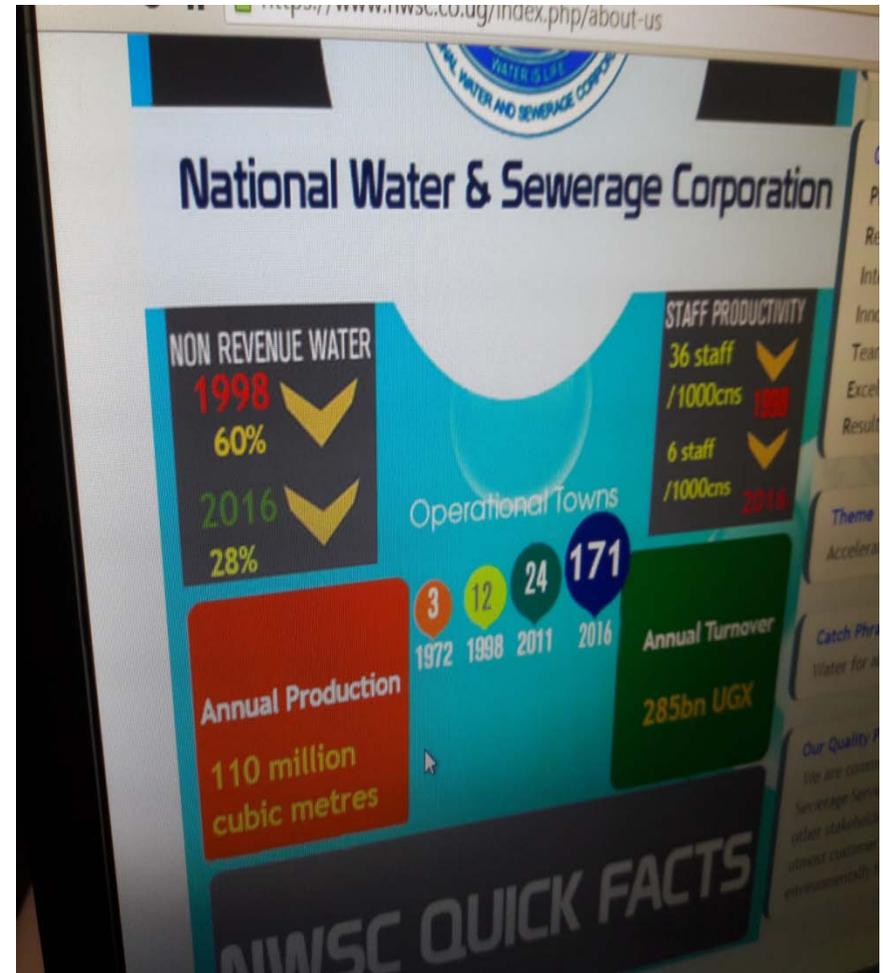
- To be the lead customer centered water utility in the World.

Mission

To sustainably and equitably provide cost effective quality water and sewerage services to the delight of the stakeholders while conserving the environment.

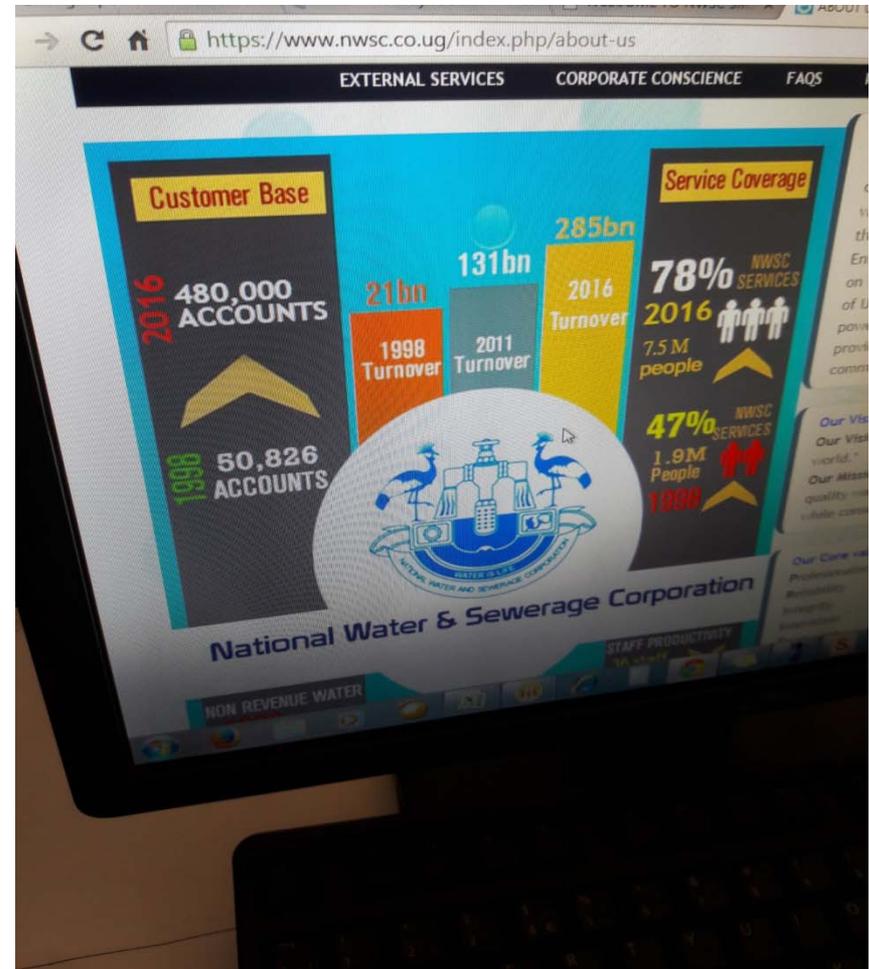
NWSC Background Cont'd

- NWSC is a model water service provider in Africa.
- Its service coverage is at 78% for the whole of Uganda, 76% of Kampala and only 6% of sewerage service.
- It produces 100million m³ of water per annum with a service 9,760kilometers of water mains.
- It has only three sewerage conventional plants and 27 waste stabilization ponds with a total sewer network length of 556.2km



NWSC Background Cont'd

- NWSC work force is estimated to be 2,860 by June 2016.
- Estimated number of the annual new water connections is 30,000.
- The total customer base is approximately 480,000 customers of which 99.9% are metered.
- They operate at an annual budget of 285 billion



Local sites visited -Bugolobi sewage treatment works

- Follows three main stages sewage treatment i.e. preliminary, secondary and sludge treatment.
- Digestion and drying, exist alongside wastewater treatment.
- Preliminary treatment, deals with removal of suspended solids and organic matter in sewage by use of metallic bar screens etc
- Secondary stage/sewage purification is by bacterial activity. The process is known as bio-filtration. The bacteria remove organic matter dissolved in sewage for their own growth and replication.

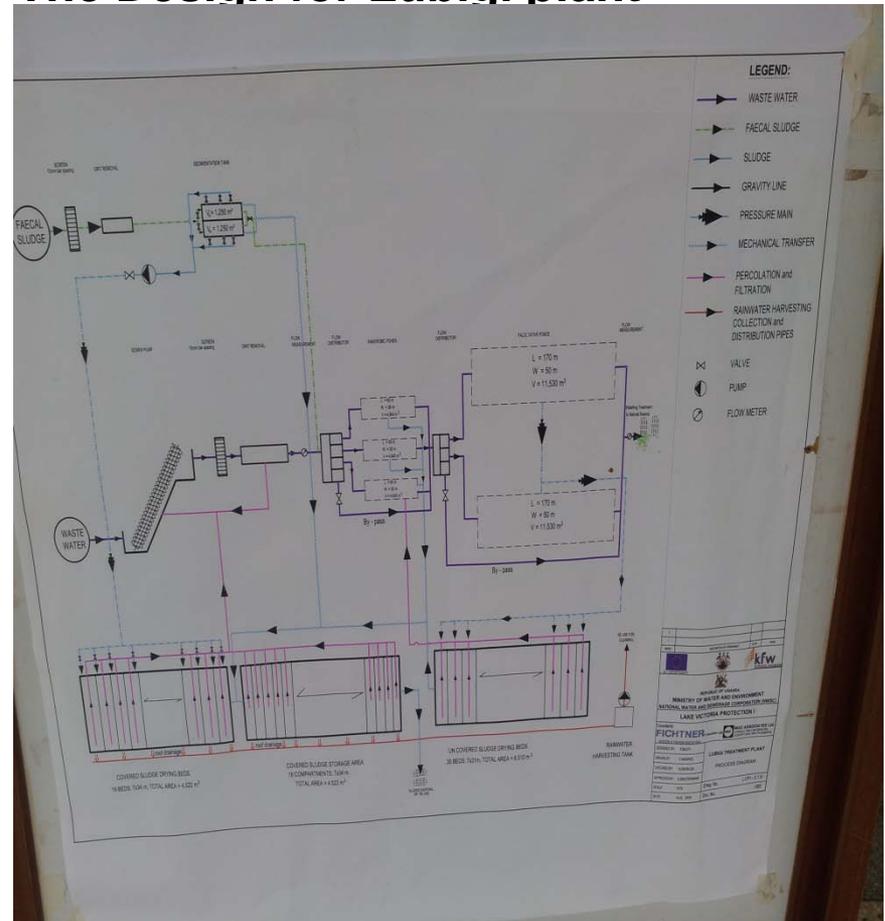
Local sites visited -Bugolobi sewage treatment works

- The sludge removed in the sedimentation tanks is pumped into sludge digesters where its digested anaerobically
- After about 8 weeks the purified sludge is pumped into sand drying beds where it is further purified.
- Any water that drips from the sludge digesters and sand drying beds is pumped back into sewage treatment. Farmers collect the dried sludge for use as manure in crop and flower gardens.

Local sites visited-Lubigi Faecal Sludge and Waste Water Treatment plant

- This is a unique project in East Africa commissioned in May 2014 in Kampala City as part of the Lake Victoria project intended to reduce pollution in Lake Victoria.
- Combines both faecal sludge and waste water treatment with a capacity to treat 400m³ of faecal sludge and 5,000m³ of waste water from both septic tanks and pit latrines.
- Initially planned to treat 4.5million liters per day but current capacity exceeds the designed capacity.

The Design for Lubigi plant



MPIM Team during the site visit at Lubigi faecal sludge and waste water treatment plant in April 2016



A cesspool emptier delivers sewage waste for treatment at Lubigi plant



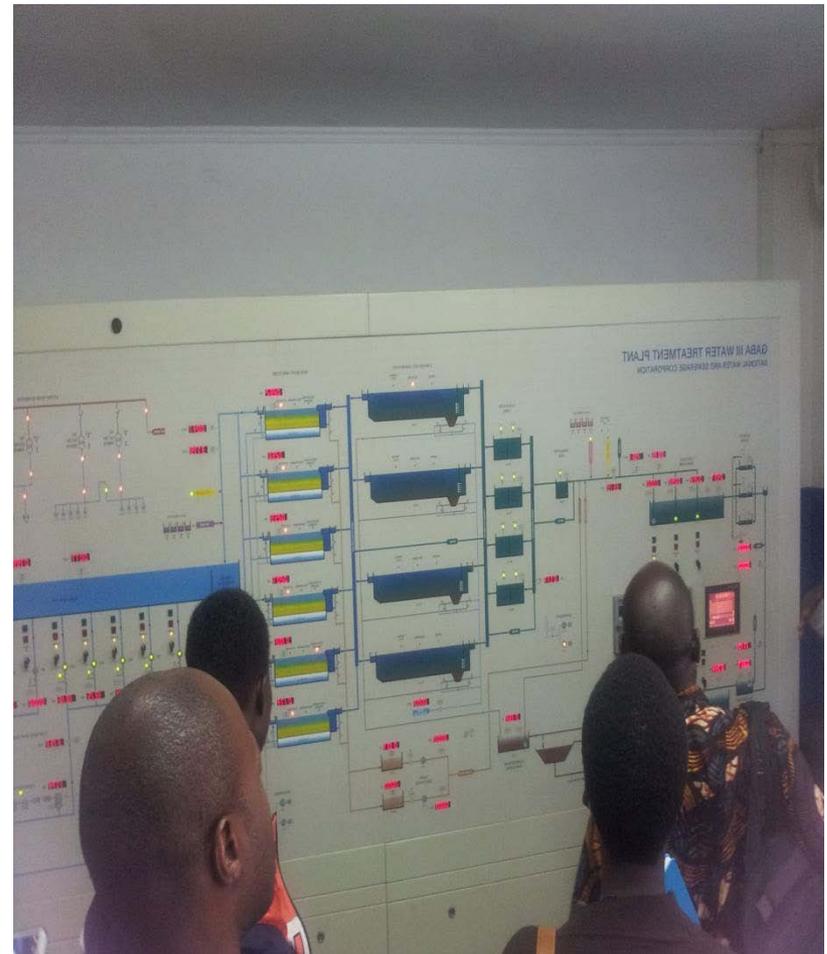
Sludge cakes ready for sale at Lubigi



Local sites visited-Gaba Water Works.

- Constructed in 1928, has had three (3) successive reconstruction projects: Gaba I, II, III.
- Gaba I and II were a result of over stretching of Gaba water works due to increased demand for water, increased effects of algae and pollution of the shores of Lake Victoria.

Gaba II water treatment plant and the computerized network monitoring system



Water under going the treatment process in Gaba II plant



Water under going the treatment process in Gaba II plant



NWSC uses GIS to support planning, monitoring and resource allocation of its infrastructure



Gaba III treatment plant- At Katosi



- Gaba III targets a population of over 4.5million people by year 2025 and over 7million people by year 2040.
- Project's aim is to improve the water supply and sanitation situation in Greater Kampala Metropolitan to improve health through enhanced access to safe water and thereby contributing to the poverty eradication efforts

Rand Water (South Africa)

- A South African sole bulk water supplier of potable water to Johannesburg as well as Gauteng province and other areas of SA.
- Is the largest water utility in Africa established in 1903
- Falls under the ministry of Water and Sanitation

Vision

To be a provider of sustainable, universally competitive water and sanitation solutions for Africa.

Mission

To deliver and supply world class affordable, reliable, and good quality water and related services to all stakeholders through;

- Safe, efficient transport, sustainable and innovative business practices;
- Empowered employees;
- Mutually beneficial strategic relationships;
- Legislative compliance and best practice

Rand Water (South Africa)

- Rand Water's operates a pipeline network some 3,056 km long, two big combined pumping and purification stations (at Vereeniging and Zuikerbosch), four booster pumping stations (Zwartkopjes, Palmiet, Mapleton and Eikenhof) and a number of enclosed reservoirs.
- Purifies an average of 4,500 megaliters of water per day and distributes via a network of 60 reservoirs and 300km of large pipeline to 17 service authorities
- Serves over 13million customers as well as mines and industries
- Service area covering 18,000 square kilometers

International Sites Visited -Leeuwkuil Waste Water Treatment Plant

located in Veereening'

- Uses two technologies: biological treatment filters constructed in 1950 with a capacity of 60 million liters per day

The activated sludge process constructed in the 1980's with a capacity of 20 million liters per day.

These are all in dilapidated state and require urgent rehabilitation to be able to serve the over whelming demand.

The sewage treatment processes in SA are similar to ones at Bugolobi only that after the treatment, 6kgs of chlorine is added to the waste before it stays for 48hours in the maturation pond, and flows for 45kilometers to meet the receiving river.

The Volume of waste water received at the waste treatment plant in SA is more than double the one of Bugolobi in terms of capacity.

The MPIM Participants listening to a brief at Leeuwkuil Waste Water Treatment Plant in SA



A SNAPSHOT OF SOME OF THE INFRASTRUCTURE AT LEEUWKUIL WASTE WATER TREATMENT PLANT



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AGEING INFRACTURE AT LEEUWKUIL WASTE WATER TREATMENT PLANT



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Best practices

- Rand water sponsoring Master. In Public Infrastructure Management in partnership with PACB in three universities
- The bi-products of faecal sludge into cakes in Lubigi used as fertilizers to boost agriculture production.
- Use of IT in monitoring the infrastructure network at national water.
- Rand water produces portable/bottled water ready to drink.

Lessons learnt

- Integration of I.T in operations and maintenance is key in sustainability of infrastructural projects.
- The nomenclature of the Ministries responsible for water differ in both countries; Uganda “Ministry of Water and environment”, South Africa “ Ministry of Water and Sanitation”.
- Rand water produces bottled potable drinking water.
- Rand water customers more than double those of NWSC (i.e, Rand 13million, NWSC 7.5million.)
- South Africa seems to have give due emphasis to both water and waste disposal compared to NWSC
- Both countries have a gap in faecal sludge and waste water treatment.
- Water treated as a scarce in resource in SA while in Uganda it is seemingly abundant but wasted.
- SA waste water systems ageing and need urgent reconstruction/expansion.
- Both SA and Uganda lack Water development Master

Challenges - NWSC

Challenge

- Overwhelming demand for water about 24% of the population have no access to water.
- Poor quality of drinking water.
- Old infrastructure network
- High costs of operation and maintenance.
- High water losses (non revenue) for NWSC is approximately 28% far higher than the one of Rand Water est. at 4%
- Land tenure systems in Uganda affecting development and expansion of water networks

Solution

- Extended Gaba III to increase on the supply
- Water rationing in highly demanding areas
- Employed GIS in monitoring the network
- Secure land on the hilly areas in advance to allow for future reservoir constructions
- Need to work hand in hand with UNRA to ensure road reserves for transmission pipes
- Planning for funds for very big network projects in the growing up towns

Challenges – Rand Water

Challenges

- Half of SA 824 treatment works are in poor/critical condition
- Fewer fresh water and low yielding sources leading to shortage.
- Pollution of water sources increases cost of purification and threatens aquatic life

Solutions

- Conservation of an environment
- Increase of sales tariffs at all levels will lead to economic consumption of the product.
- Consider processing sea water and pump to the interior
- Set and enforce strict regulations on pollution

Future prospects

NWSC

- Envisaged to expand its mandate to all major urban centers in Uganda.
- To contextualize and redefine the goals and aspirations
- Sewerage services need to be prioritized or given much attention in terms of funding otherwise 6% VS 76% of water is not adequate for a utility organization.

Rand Water

- Rehabilitate/Expand current water and sewerage systems to meet the current and future demands
- Bulk water transfer from the sea though it is viewed as an expensive venture
- Scarcity of water resource due to growing demand

Policy proposals

- Unlike Uganda, South Africa considers water as a fundamental human right and explicitly state so in their laws; water providers are required to access at least 25 liters per day to poor household for free; Uganda's should therefore borrow from this policy
- Water supply should be VAT exempt
- Government should prioritize construction of Water and Sewerage systems in upcoming towns and small towns in the country.

End of Presentation
God bless you All