

Water, Sanitation, People & the Growing Services Demand in Urban Settings

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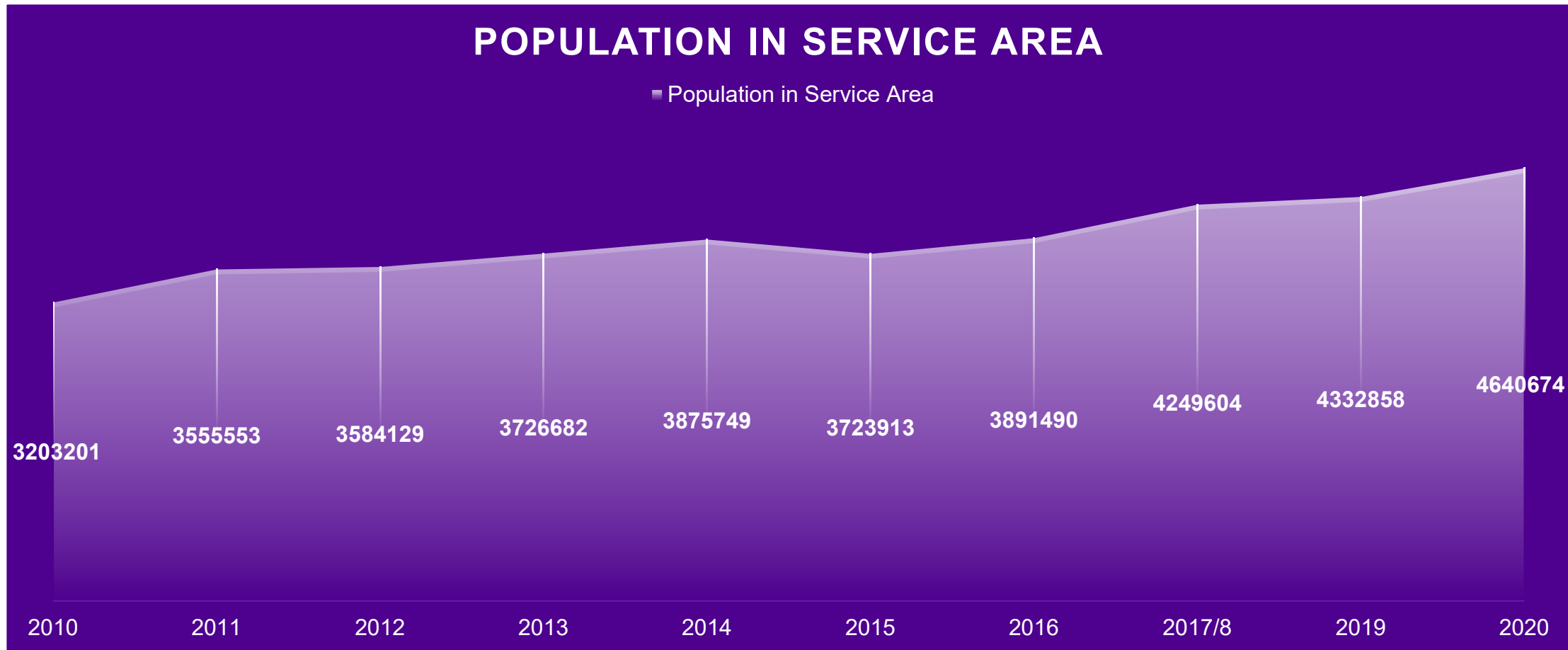
Introduction

- The urban population is fast growing especially in low and low-middle income countries
- Over 55% of the world population are presently living in urban areas; By 2050, 68% of the world's population is expected to be living in cities (UN, 2018), 90% of the urban population growth being in Asia & Africa
- Urban growth is closely related to the three dimensions of sustainable development: economic, social and environmental; upscale & balance is critical!

Introduction

- More housing, education, health care, decent work and a safe environment is needed at a matching rate to achieve sustainable urban growth
- These needs hinge on successful water and sanitation services
- Managing water is however ‘wicked’, complex, and expensive with no one way of doing it and no known permanent solutions; many countries are yet to master sustainable management models

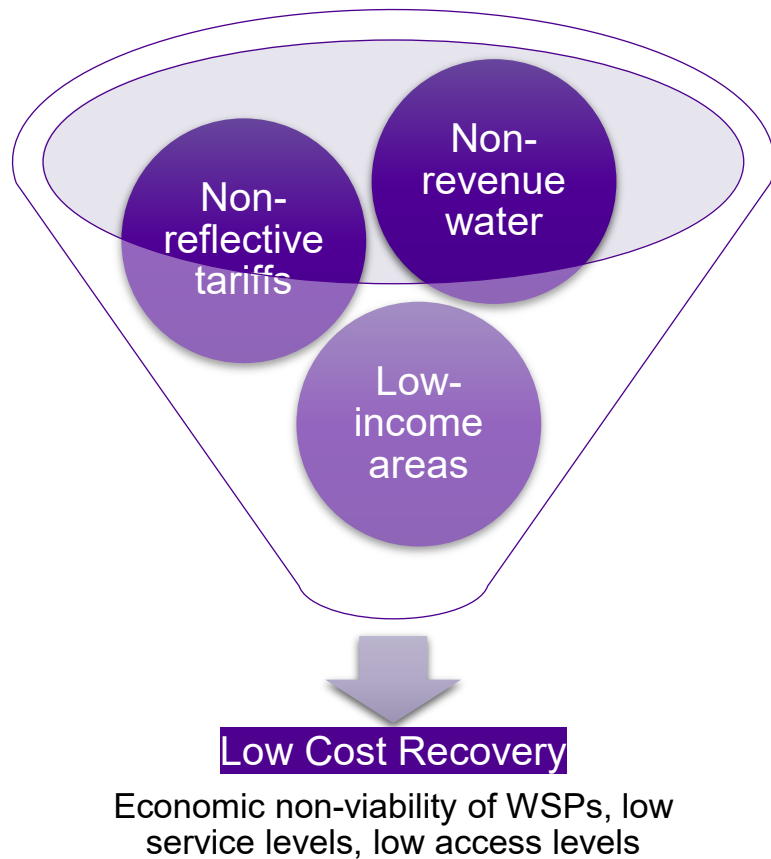
Population growth: Nairobi City



Dynamics & challenges of water services provision in developing economies

Case of Nairobi City, Kenya

Overarching issues in service delivery



- **A strategic policy shift to commercial orientation for WSPs meant more focus on their financial sustainability**
- Balancing btw affordability (pro-poor policies) & commercial viability is one but not the only present challenge for WSPs
- Internal mngt. issues & govt. investments add to these

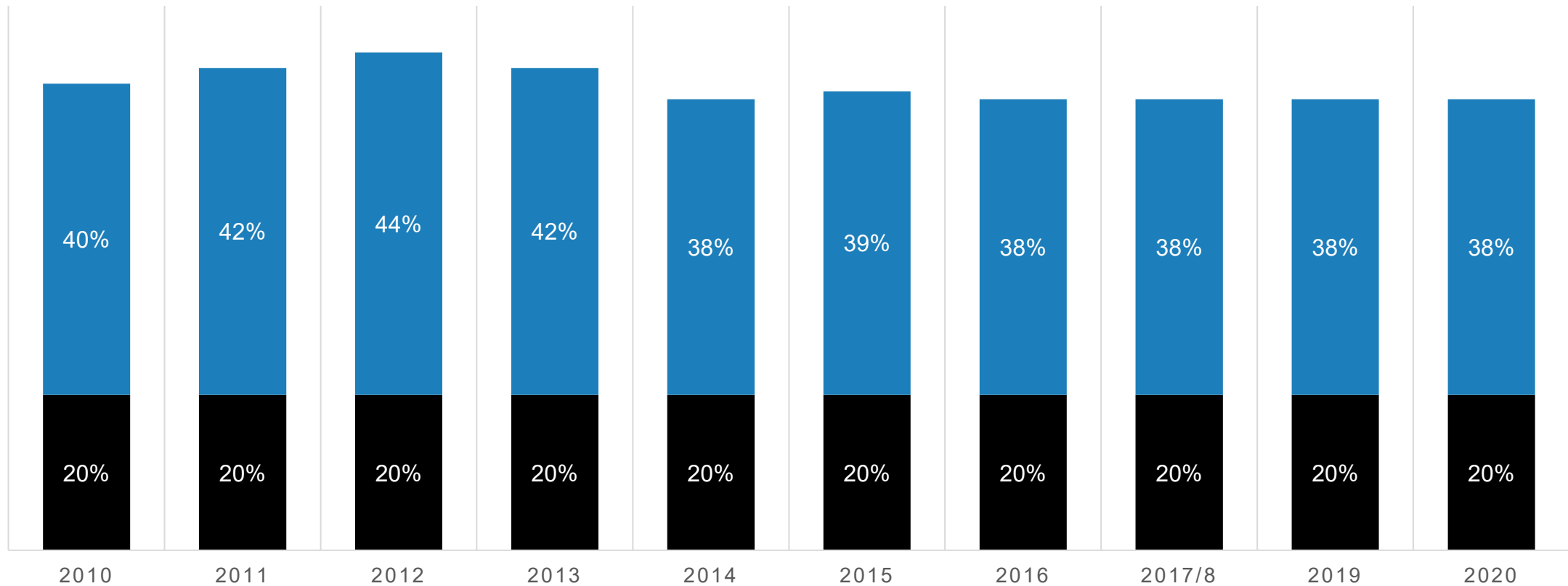
Issue 1 Non-revenue water

- Defined as water which is not billed and does not earn revenue
- NRW is further categorized into ***unbilled authorized consumption*** (e.g., water for fire hydrants, pipeline flushing, water fountains etc.) and ***water losses***
- Water losses are either physical losses through leakages (real) or losses by illegal connections, metering errors or unmetered connections (apparent)
- A sector benchmark of 20% NRW has been set by the regulator

$$\text{NRW}(\%) = \frac{\text{Non-Revenue Water Volume}}{\text{System Input Volume}} \times 100\%$$

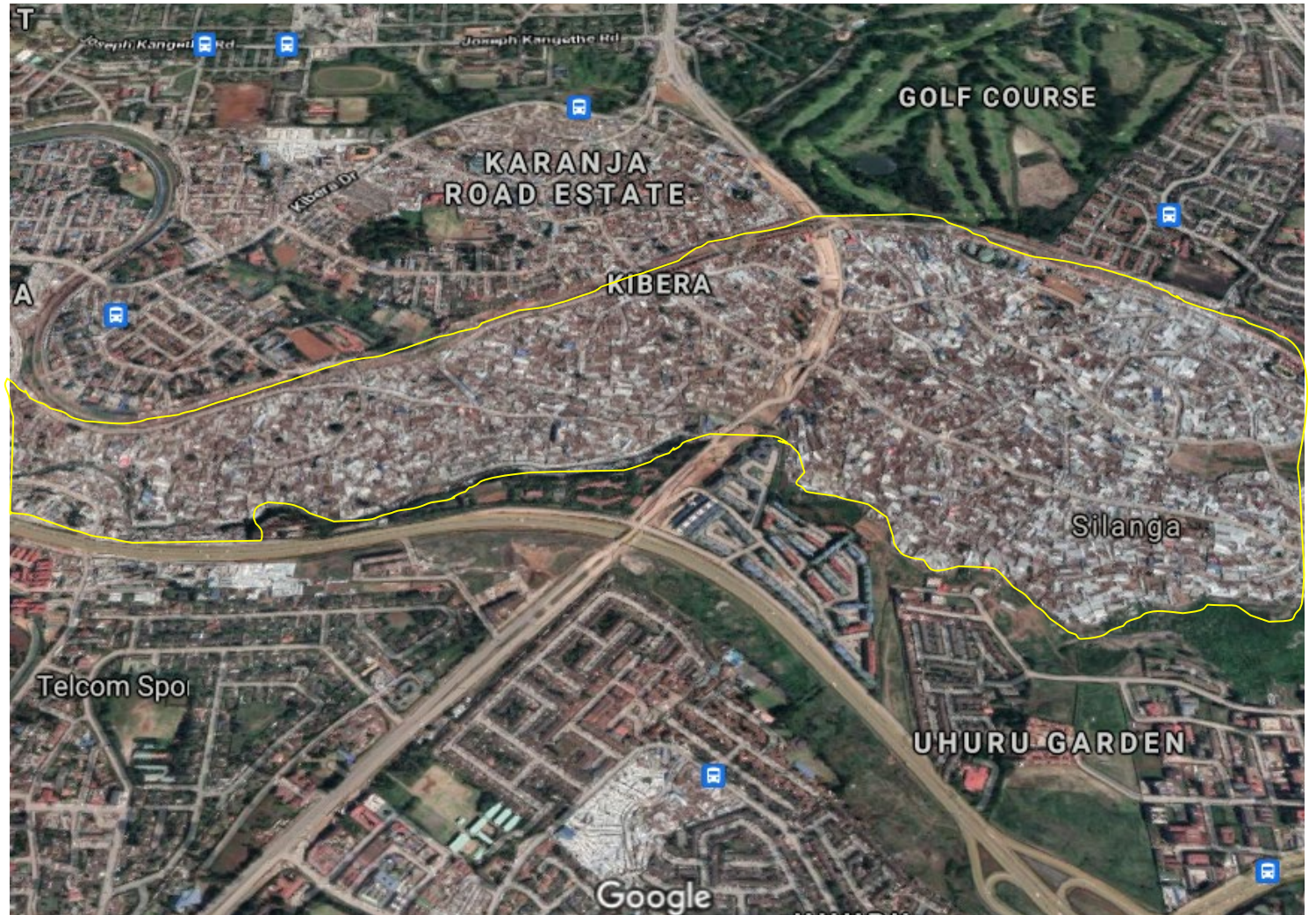
NRW: Nairobi Water Company (2010-2020)

■ Sector Benchmark ■ Non-Revenue Water



Low-income settlements

- Unregulated vendors
- Cartels frustrating devp. for own commercial benefits
- Vandalism
- Non-cost reflective tariffs (low or very high tariffs)
- Limited capability for infrastructure development (wayleave problems)
- Inability to pay for water and sanitation services





Tariffs

- Utilities in Kenya have tariffs at 28% above the unit cost of water billed to compensate for NRW (2020)
- To cater for the low-income areas, the same WSP may different tariffs in different areas (risk of consumer apathy from areas with higher tariffs)
- Adjustments of tariffs to reflect costs is politically unattractive & hard to achieve by WSPs. Some tariffs therefore remain non-cost reflective.

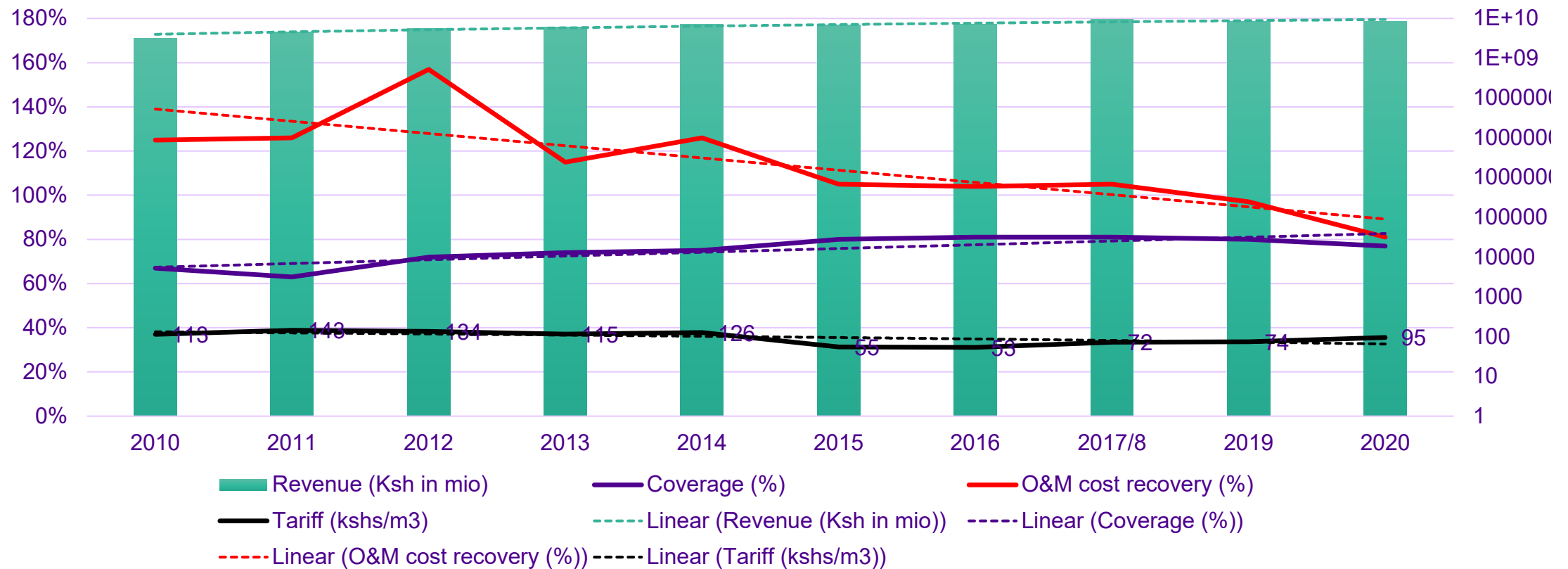
Full cost recovery

- At over 150% O+M Cost Coverage, a utility is considered to have attained full cost recovery, that is, able to meet O+M costs, service debts and renew its assets.
- O&M cost recovery stood at 95 % in 2020

% O+M Cost Coverage	Cost Components
100%	O+M Cost
101-149%	O+M Cost + Debt Service + Minor Investments
$\geq 150\%$	Full Cost Recovery

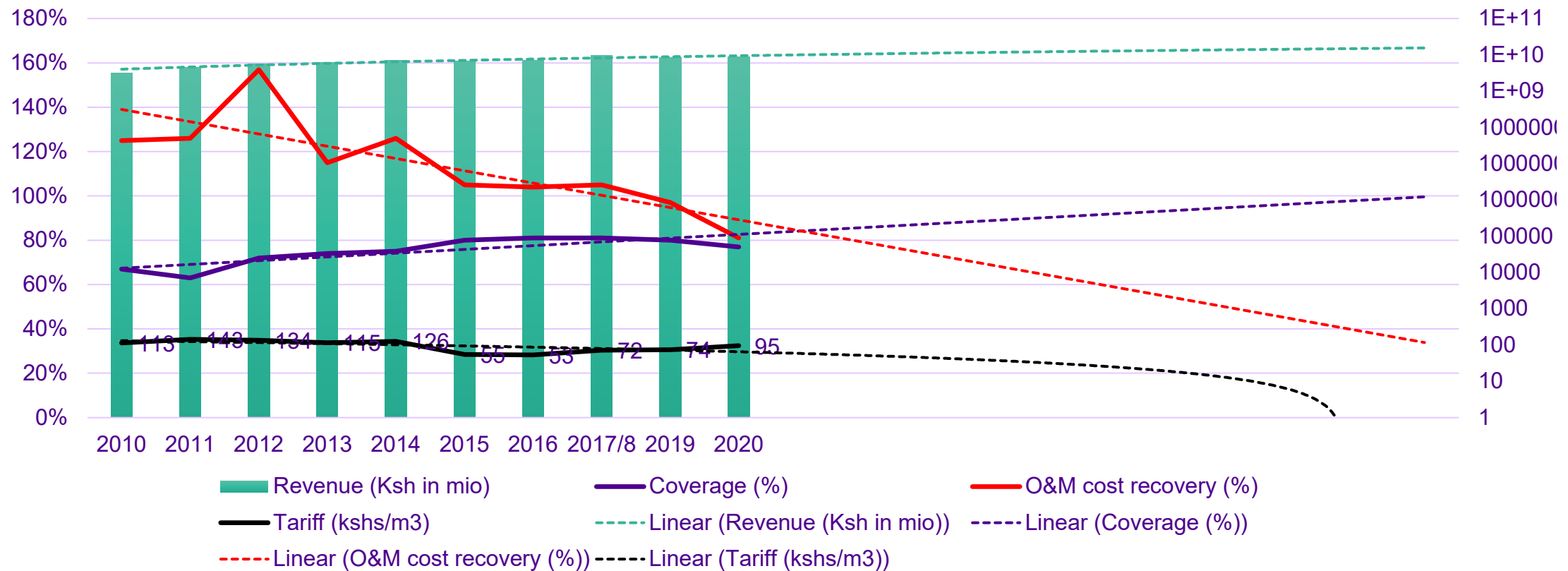
Trend: Revenue, Cost Recovery, Coverage

Nairobi City Water & Sewerage Company (perf. indicators 2010-2020)



Towards 2030-business-as-usual scenario

Nairobi City Water & Sewerage Company (projected to 2030 BAU scenario)



Causes, Effects & Impacts

Cause	Emerging low-income settlements	Fragile enforcement or public participation mechanisms	Water Management Issues
Effect	<ul style="list-style-type: none"> • Non-cost reflective tariffs (low or very high tariffs) • Cartels (illegal alliances by private vendors to frustrate public efforts) • Vandalism • Unregulated vendors • Limited capability for infrastructure development 	<ul style="list-style-type: none"> • Vandalism, • Thriving cartels, • Unregulated vendors • Illegal connections 	<ul style="list-style-type: none"> • Non-revenue water through unmetered connections, illegal connections, leakages
Impact	<ul style="list-style-type: none"> • Decline in full cost recovery - economic viability of WSPs uncertain in the long-term • Limited chances of closing the water access gap • Diminishing service levels 		

Towards 2030-business-as-usual scenario

- Steady growth in ***connections & revenue***
- Coverage will be at close to 100% by 2030, however, this is only possible if the trend in cost recovery reverses upwards
- O&M costs already surpassed revenues in 2020 & depict a ***declining ratio of revenue to O&M*** (cost recovery ratio)
- Tariffs also reducing

Options for addressing the Water & Sanitation challenges

1. Participatory Systems Dynamics Modelling

Involves investigating urban water management (UWM) **problems** and **potential sustainable solutions** through a **participatory process**

Local experts and residents of a targeted development e.g. planned residential area participate in a series of workshops

Such urban integration is important for drawing expert & tacit knowledge, secure additional budgets and to align various project plans e.g. scheduling public works and water infrastructure development

Applied in modelling sustainable solutions for Ebbsfleet Garden City, UK (*Pluchinotta et al., 2021*)

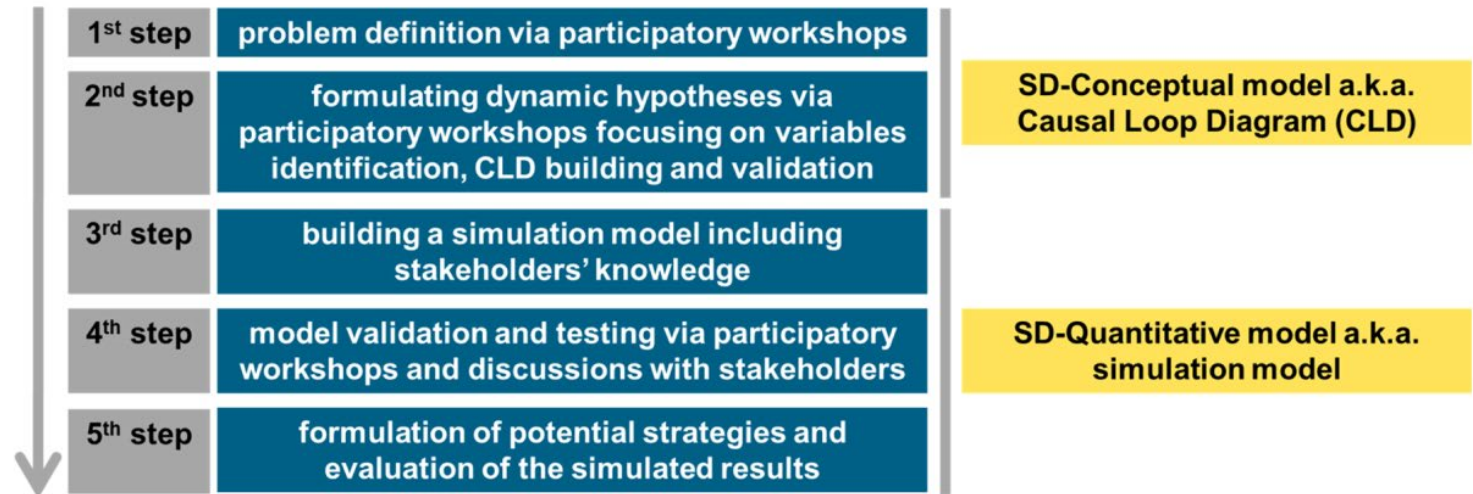


Fig. 1. Modelling process using System Dynamics.

Pluchinotta et al.

2. Last-mile alternative supply models

- Regularizing private vendors operating in low income areas (ongoing)
- Increasing water kiosks & water points in low-income areas (ongoing)



*President Kenyatta commissions the Muthua community water supply project on February 12, 2021
Image: MAUREEN KINYANJUI*

3. Security, law & community engagement



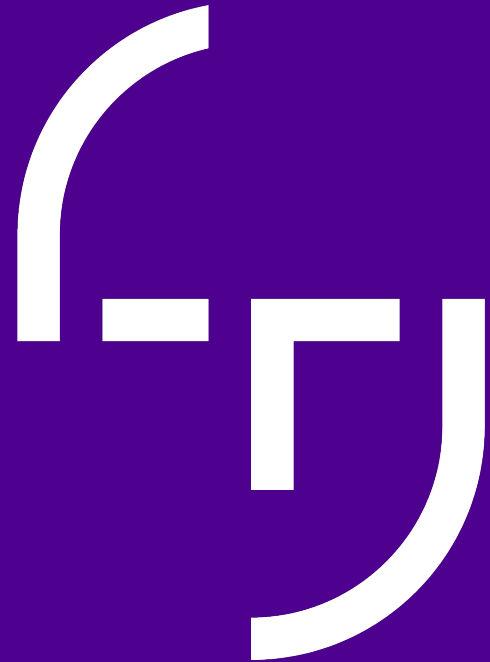
- Community vices such as ***lawlessness*** and ***corruption*** are a major deterrent to development, dealing only with these vices is likely to half the sector challenges
- The impacts of these vices include: *Vandalism, thriving cartels, illegal connections, wastewater pollution, unmetered connections, incomplete infrastructure projects*

4. Sector best practices

- Monitoring, information management & communication of sector progress
- Active civil society & international cooperation educating, creating public awareness & offering technical cooperation
- Anchored on a progressive policy framework

References

1. Nieuwenhuis, E., Cuppen, E., Langeveld, J., & Bruijn, H. d. (2021). Towards the integrated management of urban water systems: Conceptualizing integration and its uncertainties. *Journal of Cleaner Production*, 1-11. doi:<https://doi.org/10.1016/j.jclepro.2020.124977>
2. Pluchinotta, I., Pagano, A., Vilcan, T., Ahilan, S., Kapetas, L., Maskrey, S., . . . O'Donnell, E. (2021). A participatory system dynamics model to investigate sustainable urban water management in Ebbsfleet Garden City. *Sustainable Cities and Society*, 1-13. doi:<https://doi.org/10.1016/j.scs.2021.102709>
3. State Department of Water. (2014). *Standards for Non-Revenue Water in Kenya*. Nairobi: Ministry of Environment, Water & Natural Resources.
4. UN. (2021, June 01). Population Division: Publications. Retrieved from United Nations: https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Oct/unpd_2018_wup_keyfacts.pdf
5. WASREB. (2020). *IMPACT A Performance Report of Kenya's Water Services Sector - 2018/19*. Nairobi: Water Services Regulatory Board (WASREB).
6. WASREB. (2021, June 01). *Tariff Guidelines*. Retrieved from WASREB: <https://wasreb.go.ke/tariff-guidelines/>



**Human
Potential
Unlimited.**