

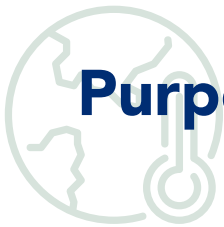


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Climate Risk Assessment: Gatundu Water and Sanitation Company (GATWASCO)



Purpose & Scope

This climate risk assessment is prepared for **Gatundu Water and Sanitation Company (GATWASCO)** as part of the Water Resilience Solutions Hub (WRSH), a facilitated collaboration platform connecting Kenyan and Ugandan water utilities with WASH innovations to build climate resilience. Its purpose is to translate the utility's operational experience of climate-related stress into a structured overview. This is meant to ground the subsequent enterprise matchmaking and co-design phase in prioritized challenges and potential entry points that build on the realities of the WSP.

The assessment is limited to GATWASCO's own service area, assets and operations within the current planning horizon, and draws on operational data, staff input and site observations rather than a full engineering or hydrological study. The scope covers the utility's operational exposure to climate challenges, distinguishing climate symptoms from root causes to provide pointers towards potential types of solutions. Based on the engagement with the WSP, it further identifies entry points for short - and longer term mitigation options and potential for collaboration with WASH enterprises and innovators.

How the assessment will be used

The assessment is meant to provide GATWASCO with a structured climate risk assessment and will be shared with WASH enterprises as the basis for them to develop concrete engagement ideas: proposals for how their solutions could help the utility address specific, identified climate challenges.



PPC under the WRSB

The WRSB seeks to foster Public Private Collaboration (PPC) that goes beyond conventional infrastructure contracting. We are not seeking one-off arrangements in which a private company builds or installs infrastructure, is paid, and the engagement ends there. Instead, we are interested in longer-term collaborations in which WASH enterprises take on an ongoing operational role, assuming delegated responsibility for specific tasks or service areas that currently sit with the utility. What unites these models is that the enterprise takes on genuine, ongoing operational responsibility, relieving the utility of specific recurring burdens while directly addressing one of its priority climate challenges. The utility retains overall ownership and oversight, while the private partner brings specialised capacity, technology, or financing to sustain performance over time, rather than delivering a fixed asset and stepping away.

Concretely, this could take a variety of forms depending on a utility's needs and priorities such as the following examples:

- Wastewater treatment could be offered as a service, with an enterprise designing, financing, and operating a treatment facility and being paid for the treatment delivered. This would spare the utility the upfront capital outlay for the plant and the need to build and maintain in-house wastewater treatment expertise, while still securing reliable treatment performance and treated wastewater as an alternative water source to reduce pressure on water supply.
- Pressure or water quality monitoring could be handled through an enterprise's own sensor and data systems, deployed and maintained at the enterprise's expense, while the utility would commit to paying for water quality data. In this way, the utility avoids the upfront investment in monitoring equipment, does not need to establish its own procedures and staffing for pressure or quality management, and instead reliably receives the data it needs to monitor pressure surges or declines in water quality to respond to emerging challenges and builds more resilient management of its network.
- A specific network section or district metered area that is exposed to specific climate challenges (landslides, flooding/pressure surges or limited water supply) could be placed under a performance-based contract or delegated management, with an enterprise taking on day-to-day operational responsibility for that zone (e.g. non-revenue water reduction, meter management, or preventive maintenance), so the utility is relieved of an operational burden in that zone without having to expand its own establishment, while benefiting from an operator whose performance incentives are aligned with keeping that section running well.



System & Setting

SOURCING

Gatundu Water draws water from 9 intake sources, each intake connected to a separate water treatment system. The total transmission pipeline length is 31km. River yields have declined over the past 8–10 years, a trend the utility attributes to climate change and land-use change in the catchment, increasing agricultural activity on the slopes is also the key driver of siltation and landslide risk downstream. Upstream irrigation abstraction adds further competition for the same water.

TREATMENT & WATER QUALITY

The existing plant is designed for 20,000 m³/day but currently treats around 11,000 m³/day (under 60% of capacity). The treatment plants are in varying condition, including ageing infrastructure that requires rehabilitation and optimisation. A second 20,000 m³/day system, 96% complete and already partially operational, will increase capacity to 40,000 m³/day upon completion in November 2026. Water quality is managed through jar testing to determine alum dosing, but high silt loads from the catchment frequently clog the sand filters, requiring backwashing that can consume up to 15% of total production during the rainy season.

WSP INTRODUCTION

Operating cost coverage: 92%

Tariff: 107-150 KES per m³
(residential)

Metering ratio: 100%

NRW: 41%

Collection efficiency: 96%

Water Quality: 100%



STORAGE & DISTRIBUTION

System-wide storage totals around 3,000 m³, spread across small tanks of 50–225 m³ with no monitoring sensors. The fully gravity-fed system includes transmission mains ranging from DN300 to DN110. There is also limited pressure monitoring/ management, and no pressure break tanks in the gravity-fed scheme. The network is organised into 108 DMAs, covering only about 10% of total connections. In some areas water is rationed to one day a week, while other areas like Gatundu town receives 24/7 supply. The fastest-growing and highest-revenue connection area is along Kenyatta Road.



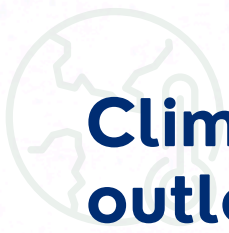
NRW

The utility stands at a system-wide NRW of 41%. DMAs are read manually via analogue bulk meters, with the NRW of each DMA determined monthly against billing data. The utility's ERP (Utility Master) currently covers billing and CRM only, with the NRW module still pending activation.

SANITATION

Decentralised wastewater treatment is being considered for estates along Kenyatta Road, Bob-Harries Road and in satellite towns to enable wastewater reuse for irrigation on adjacent community farms and reduce competing demand for river water. Connected households would be charged an additional tariff equivalent to 75% of the water supply tariff. The idea is still at the concept stage.





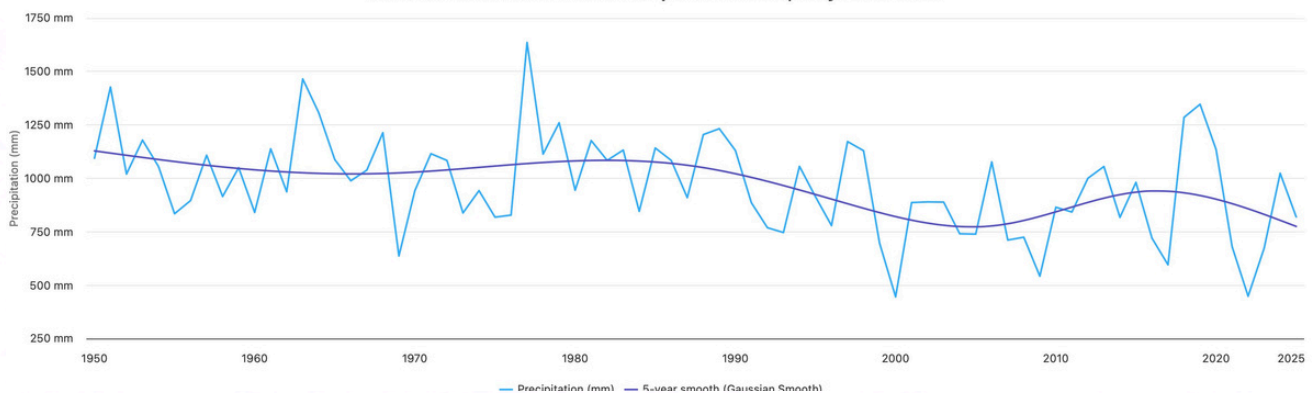
Climate context and outlook

Gatundu sits on hilly, steeply sloped terrain, with Kimende and Mundoro in Gatundu North identified among Kiambu County's most vulnerable areas due to their terrain and history of heavy rainfall. County meteorological assessments link landslide risk to unpredictable rainfall and soil oversaturation, particularly in elevated areas.

Observed Kiambu rainfall data indicate declining annual precipitation alongside a recent increase in very heavy rainfall days (>50 mm/day), suggesting greater variability in water availability alongside continued exposure to intense rainfall events. For a utility operating in Gatundu's terrain, these conditions have implications for both water availability during dry periods and infrastructure resilience during intense rainfall.

These climate pressures provide important context for the key risks to Gatundu's water system, particularly declining source yields, limited storage capacity, and exposure of transmission infrastructure to flooding and landslides. Climate projections indicate that these pressures could intensify, reinforcing the importance of preparing for greater variability and strengthening resilience ahead of future climate extremes.

Observed Timeseries of Annual Precipitation Kiambu, Kenya 1950 - 2025



Source: [Kiambu County Climate Change Action Plan 2023– 2027](#)

Map source: <https://climateknowledgeportal.worldbank.org/country/kenya/climate-data-historical>

Assessment Summary

KEY CLIMATE RISKS

Five main climate risks were prioritised for Gatundu Water ahead of the field visit:

- Declining river yields and upstream competition
- Siltation and treatment plant performance
- Non-revenue water
- Flood damage to intake & transmission pipes
- Storage capacity constraints.

Each risk is addressed in its own section on the following pages.

POTENTIAL ENTRY POINTS

Potential entry points for PPC were identified for each risk and are described in the following sections:

- Decentralised wastewater treatment for irrigation reuse
- Integrated water-system monitoring and data services
- Delegated management of high-loss DMAs

These entry points are indicative and are not meant to be exhaustive and enterprises are encouraged to propose other collaborative solutions.





Declining River Yields & Upstream Competition

11,000	30,000	60%	92%
m ³ /day abstracted, 9 intake sources	m ³ /day current demand	treatment capacity utilised	O&M cost coverage ratio

Water production from Gatundu's rivers has declined over the past decade. This is attributed to climate change and land-use change in the catchment, compounded by over-abstraction and competing upstream demand for irrigation. Water production is approximately 11,000 m³/day, against current demand of around 30,000 m³/day. High-tariff bulk water purchases are currently used to bridge the shortfall.

Water treatment capacity of GATWASCO is 60% utilised, with the existing 20,000 m³/day system producing 11,000 m³/day. A second 20,000 m³/day system, 96% complete and already in partial use, will bring the capacity to 40,000 m³/day upon full completion in November 2026. Even so, it will not fully resolve the underlying yield issue.

As a **mitigation measure**, the recently approved tariff revision aims to strengthen the utility's funding base and address its 92% OCCR, a shortfall previously linked to an outdated tariff structure. The utility will also transition from alum to polymer or PAX, supported by DANIDA, to improve treatment efficiency.

Monitoring of source-specific abstraction is currently not in place, preventing a clear distinction between a genuine decline in yield and upstream abstraction pressure. This lack of concrete source-level data limits the ability to understand the problem and make informed decisions.

ENTRY POINTS

Decentralised wastewater treatment for irrigation reuse. This would recover discharge for sale to farmers — easing upstream competition for river water at the source. It connects directly to the similar reuse opportunity identified for the Kenyatta Road estates.

Source & abstraction monitoring, delivered as a data service, would enable the utility to distinguish genuine river-yield decline from upstream irrigation abstraction. No source-specific monitoring currently exists, representing a gap in the utility's operational data.



Siltation & Treatment Plant Performance

12,000

m³ silt removed
since start of 2026

11,000,000

KES cost for single
desilting operation

15%

total production used
for backwashing

Rising siltation at the intake is a significant issue facing GATWASCO owing to settlements and agricultural activities encroaching into forest catchment areas. In early 2026, 12,000 m³ of silt was removed at a cost of 11 million KES, with a second round forecast before the end of the year. This is a large expense following a multi-year gap, against a recommended cycle of twice yearly at 2 to 3 million KES per round.

Mitigation measures have centered on reactive desilting and catchment tree-planting (20,000 to 30,000 seedlings annually). A few interventions are under consideration to address siltation at the source: tube settlers and a forest-based coffer dam to trap silt at the source, alongside rehabilitation of compromised intakes, and a dredger (approx. 70 million KES) as an alternative.

Treatment plant performance is highly affected by silt clogging the sand filters, which requires frequent backwashing that can consume up to 15% of total production during the rainy season. High turbidity drives increased Alum dosing, affecting water production, quality, and raising operational costs. Backwash water is currently channelled to a lagoon behind the treatment system rather than reused.

Monitoring: The intake and treatment plant currently lacks any automation or digital monitoring, covering water level, quality, or abstraction volume. Without it, silt build-up and water-quality changes go undetected until treatment performance has already been affected.

ENTRY POINTS

Intake-based digital monitoring covering water level, turbidity/quality, and abstraction volume, delivered as a paid data service. This would enable early detection of the silt build-up and water-quality shifts before treatment performance degrades.

A financing/delivery model (e.g., build-operate-transfer or equipment-as-a-service) for the coffer dam or dredger, with backwash-water recycling paired with additional storage to address the rainy/dry-season timing mismatch.



Non-Revenue Water (NRW)

41%

System-wide NRW (against a 20% benchmark)

52

out of 108 DMAs established have over 50% NRW

~10%

of total connections covered by established DMAs

System-wide NRW stands at 41%, driven by ageing infrastructure and poor-quality meters. This is compounded by tariff underfunding, with a single unsustainable tariff structure in place since the utility's formation in 2006, only recently replaced. The revised tariff was gazetted on 4 October 2024, valid through 30 June 2029, with residential rates averaging an estimated KES 107–150/m³.

Mitigation measures: Gatundu has progressively replaced ageing infrastructure and poor-quality meters while expanding DMA coverage to 108 zones. The WSTF-funded project supported approximately 8,600 meter replacements and 100 DMAs. Strainers installed in 20 DMAs have improved meter functionality and reduced losses in these zones.

The utility has established **108 DMAs**, prioritised based on consumption rather than loss severity, covering only around 10% of total connections. NRW has improved in at least one DMA, falling from 79% to 59%; however, 52 DMAs still report NRW above 50%. Commercial losses account for a further estimated 10–15% of NRW, indicating that high losses remain widespread.

Monitoring remains largely manual, using analogue bulk meters, with no remote reading or system-wide pressure monitoring. Utility Master is operational for billing and CRM, but its NRW module is not yet activated. The meter-testing bench is non-functional, limiting routine meter verification and performance monitoring.

ENTRY POINTS

Delegated management: Management of selected high-loss DMAs against defined NRW-reduction targets, incorporating digital meter reading, data management, leak detection, rapid response and targeted meter-strainer installation.

Pressure monitoring and management: Pressure monitoring and management as a service, including sensors and break tanks, to address pressure-surge risks across the network.

Flood Damage to Transmission and Intake Infrastructure

Gatundu's landscape is particularly prone to landslides, increasing exposure of critical infrastructure. Prolonged drought through FY2022/23 was followed by intense rainfall, placing significant stress on intake and transmission infrastructure. In FY2023/24, floods swept away approx. 600 metres of the transmission main, knocking the entire system offline for more than two months. The transmission lines remain highly exposed to landslides during each rainy season.

Mitigation of this risk currently relies primarily on post-event rehabilitation activities, with no systematic mitigation strategy in place. This leaves the transmission system vulnerable to recurring flood-related disruption, particularly given the exposure of the transmission line to landslides during the rainy season.

Monitoring of the intake and transmission line is limited. With no intake meter, the volume entering the transmission main cannot be measured directly, limiting the utility's ability to quantify losses along this section. There is also no confirmed system for early warning of deterioration or failure.



ENTRY POINTS

Intake metering and transmission-line telemetry: Installation, operation and maintenance of intake meters and flow/pressure telemetry as a paid data service. This would improve visibility of transmission performance and support targeted intervention.

Delegated maintenance and rapid-response support: A service provider could undertake routine inspection and maintenance of the landslide-exposed 4 km corridor, with standby rapid-response repairs and flood-resilient rehabilitation of vulnerable sections.



Insufficient Storage Capacity

~3,000 m ³	50–225 m ³	1 day
total storage capacity, system-wide	storage per tank	per week supply in some areas

GATWASCO has **limited storage capacity**, at approximately 3,000 m³ system-wide, distributed across small tanks of 50–225 m³. The network was originally designed with limited storage as production was not considered a constraint. This limits its ability to buffer seasonal variability, including heavy rainfall and dry-season supply constraints, while also managing rainy-season pressure surges.

Additional storage proposals have been submitted to increase system capacity, but contracts have not yet been awarded. Two large, disused storage tanks at the treatment plant were identified during the field visit; their condition and rehabilitation potential remain unassessed. Limited storage contributes to water rationing, with some areas receiving supply only one day per week, although Gatundu town receives 24/7 supply.

Mitigation measures: Proposals for additional storage capacity have been developed and submitted, but the construction contract has not yet been awarded.

Monitoring: No sensors are installed in the storage tanks, leaving the utility without automated overflow or dry-run alerts across its existing storage capacity.

ENTRY POINTS

Tank-level monitoring: Installation and ongoing management of tank-level telemetry, providing overflow and dry-run alerts as a monitoring service.

Storage rehabilitation and expansion: Technical assessment and rehabilitation of the two unused treatment-plant storage tanks, including potential integration of backwash-water recycling.



Closing remarks

GATWASCO's resilience is constrained by the interaction of declining and competing water sources, increasing treatment challenges from siltation, exposure of critical transmission infrastructure to flooding and landslides, high NRW, and limited storage capacity. Climate variability adds pressure across these risks: periods of reduced water availability can compound declining source yields and limited storage, while intense rainfall can increase siltation and the exposure of infrastructure on steep terrain. The observed climate signals and projected changes suggest that these pressures could become more difficult to manage over time.

Building resilience will therefore require a combination of better operational visibility, targeted infrastructure investment and stronger day-to-day management of vulnerable parts of the system. Across the five risks, the potential entry points identified in this assessment cluster around a common gap: the near-total absence of monitoring across the network, alongside opportunities for more targeted, delegated management of the system's highest risk zones.

These opportunities provide a basis for WASH enterprises to develop practical, longer-term collaboration models that strengthen GATWASCO's ability to anticipate, absorb and recover from climate-related disruption.



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