

# Off-grid Cities: Elite infrastructure secession and social justice



*Photograph by Christina Culwick Fatti*

## ***City sector profile*** ***Water in the City of Johannesburg***

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*This document has been prepared as part of the NRF-funded project entitled Off-Grid Cities: Elite Infrastructure Secession and Social Justice. The insights and data used in this City Sector Profile are drawn from desktop research and fieldwork conducted between 2021 and 2023. This document aims to provide a brief overview of water in the City of Johannesburg in relation to the investment of private households and businesses in alternative water sources.*

## **Introduction**

Johannesburg, South Africa's major economic and industrial hub, is increasingly facing a plethora of water-related problems resulting from ageing and under-maintained infrastructure, the impacts of climate change, worsening pollution, and growing water insecurity due to a mismatch between demand and supply. The demand-supply mismatch is driven by a combination of factors including: increasing rainfall variability (in turn driven by climate change); delayed investment in raw water dam infrastructure; growth in population and households; changing consumption patterns, especially where households are getting wealthier; under-investment in water-distribution infrastructure; and inadequate infrastructure maintenance. The City of Johannesburg (CoJ) is under increasing

pressure to balance economic growth, environmental sustainability, and address poverty and inequality through meeting its growing population's service demands. Against this background, this City Profile explores the CoJ's current water challenges, how the City has responded to these as well as some of the strategies that residents have adopted.

## **An overview of water and the City of Johannesburg**

Despite its relatively small land area (1 645 km<sup>2</sup>), Johannesburg contributes 14% to the country's Gross Domestic Product (GDP) and accounts for over 44% of Gauteng's economic activity (COGTA, 2020). Johannesburg

attracts both local and international immigrants in search of economic opportunities, access to services and political asylum. Once heavily dependent on mining, the city's economy has since diversified and is now predominantly based on the secondary and tertiary sectors including finance and business services (32%), community services (21%), wholesale and retail trade (18%) and manufacturing (13%) (CoJ, 2017). Both population growth (through natural increase and migration) and economic activity place strain on the City's limited water resources.

Johannesburg is situated on the divide between the Orange River basin and the Limpopo River basin, and is one of the few urban areas across the world that is not located near a major water source (Mckenzie and Wegelin, 2008). The City does not have enough locally available water sources to meet the needs from its residential, industrial and economic sectors. Thus, the City depends on inter and intra-basin transfers to meet its water demands (Purvis and Dinar, 2020).

The bulk of Johannesburg's water comes from Lesotho through the Lesotho Highlands Water Project (LHWP), a bi-national infrastructure project. The Vaal Dam, which is Johannesburg's main water source, is fed from the LHWP together with other smaller, local catchments. Water extracted from the Vaal Dam is purified through the Vereeniging and Zuikerbosch purification systems before being sold by Rand Water, the bulk water

supplier, to Joburg Water (and other municipalities in the Gauteng City-Region). Joburg Water is the entity through which the CoJ delivers water and sanitation services to its residents. In terms of the Water Services Act, the CoJ is the water services authority while Joburg Water is the water services provider (Mushongera, 2022). Like City Power, Joburg Water is an income generating entity, and accounts for a large portion of the CoJ's revenue (CoJ, 2020).

## **Access to water in the City of Johannesburg**

South Africa's post-apartheid government has worked hard to increase the proportion of residents with access to piped water, whether in a dwelling or yard, or through a community standpipe. The 2022 Census reveals that 65% of households in Johannesburg have access to piped water within their dwelling with an additional 20% with access to piped water in their yard or from a communal tap (Stats SA, 2023). While Johannesburg residents are generally well-connected to the water infrastructure network, the reliability of water services is a cause for concern.

Residents across various neighbourhoods in Johannesburg continue to bemoan water interruptions and in some cases, some residents have gone for several months with dry taps (Bain, 2023).

In 2023, the Minister of Water and Sanitation, Senzo Mchunu revealed that

Rand Water is struggling to meet the demand from consumers in the province. According to the Minister, water demand exceeds supply by 9% (eNCA, 2023).

The GCRO's QoL survey has shown an increase in water interruptions in the GCR over time, with 36% of respondents in 2023/24 reporting that they experienced interruptions daily or weekly. These interruptions disproportionately affect residents in low-income communities, who often lack the financial means to afford alternative water sources during periods of insecure water supply. Additionally, neighbourhoods in high-lying areas often experience low water pressure and intermittent supply when the reservoir levels drop as demand outstrips supply (Patrick, 2023). Factors such as infrastructure failure, electricity interruptions, high water consumption and municipalities' debt to Rand Water have exacerbated water challenges.

Recent reports highlight that 48% of the water that is supplied to the CoJ by Rand Water is lost as non-revenue water (Carnie, 2024), either through leaks (physical losses) or is used but not paid for by consumers (economic losses). This non-revenue figure is exceptionally high if measured against the global average of 15% (eNCA, 2023). It is estimated that 25% of the water that is distributed into Johannesburg's water

reticulation systems is physically lost through leakages (News24, 2024).

As climate change accelerates, projections indicate that the CoJ will increasingly experience droughts and heatwaves – all of which undermine the City's water security, and are likely to undermine the City's ability to ensure reliable water supply (CoJ, 2021).

## **Unsustainable abstraction**

As the demand for water continues to increase, Rand Water has been over-abstracting water from the Integrated Vaal River System and in the process, exceeding its current licence limits. Rand Water is licenced by the Department of Water and Sanitation (DWS) to abstract 1343 million cubic litres a year, and yet in 2023 was reported to be abstracting 1 650 million cubic litres a year to supply municipalities (Odendaal, 2023).

## **Johannesburg's response to water challenges**

The CoJ has implemented a series of measures to manage water insecurity and where demand exceeds supply, including tariff restructuring, water restrictions, water shifting, and the War on Leaks (WoL) programme. Joburg Water has also urged residents to report all burst pipes, leaks and open hydrants through any of its social media channels or direct calls and messages.

In 2015, the WoL programme was initiated in an attempt to proffer solutions to non-revenue water losses. This was a tripartite initiative by the South African Department of Water and Sanitation, Rand Water Board, and the Energy and Water Sector Education Training Authority. The WoL programme focused on repairing water leaks, capacitated the water sector with the skills required to repair and maintain water infrastructure, and educated communities on water conservation and demand management. While the WoL programme, which ran until 2019, has been marred by allegations of corruption (Special Investigating Unit, 2024), such programmes are critical in cities like Johannesburg that lose significant volumes of water through ageing and dilapidated infrastructures.

## **Water restrictions**

In October 2022, Rand Water, imposed level 2 water restrictions to deal with excessive demand, which outstripped its supply capacity (Dlamini, Petersen and Maree, 2022). The imposed level 2 was aimed at reducing 20% of total water consumption. Residents were urged to use water sparingly and adhere to the following restrictions:

- No filling or topping up swimming pools.
- No watering gardens between 06:00hrs and 18:00hrs on any given day
- No washing vehicles and cleaning pavements using hose pipes.

- May only water gardens by using either a bucket or a watering can.

## **Restrictive tariffs**

Since August 2016, the CoJ has been implementing ‘water restriction tariffs’ to curb excessive water usage and consumption, and to create a culture of responsible consumption. Through this initiative, ratepayers are charged an additional amount should their monthly water consumption exceed 20 kilolitres (Kiewiet, 2012).

Restrictive tariffs are also in place across other municipalities in the GCR. While restrictive tariffs have been put in place to promote a culture of ‘responsible consumption’, the recent years have also seen a general increase in water tariffs due to various reasons. Because Johannesburg’s water is managed through a series of pump stations, the significant increases in cost of electricity from Eskom has directly increased the cost of supplying water by Joburg Water (Patrick, 2023).

## **Water shifting and cuts**

Joburg Water has adopted a ‘water shifting’ initiative to curb water losses and help restore capacity at various reservoirs. The plan involves moving or shifting water from one system to another to ensure a balanced and equitable supply of water to municipal customers and residents. Under this

initiative, areas with less water consumption and communities which are mostly affected by supply shortages. The Minister of Water and Sanitation, Senzo Mchunu has since instructed water service officials, including Rand Water, to implement water shifting in Gauteng (Molapo, 2023). Apart from the water shifting strategy, CoJ has also responded to water insecurity through other mitigation strategies such as closing reservoir outlets at night to ensure that there is sufficient capacity so that all households in the reservoir supply area can receive water for at least a portion of the day. In affected areas, temporary measures such as providing water tanks and water trucks have also been implemented.

## **Johannesburg's Just Transition Plans**

The CoJ has adopted a just transition plan aimed at shifting the city towards a low-carbon and sustainable economy while ensuring social equity and justice (CoJ, 2021). The CoJ's just transition plan is guided by four key instruments namely, the Climate Action Plan, the 2040 Growth and Development Strategy, the National Development Plan, and the Presidential Climate Commission's Just Transition Framework.

The City's plan in the water sector aims to address challenges such as water scarcity,

ageing infrastructure, poor service delivery, and social and economic inequalities.

## **Residents' responses**

The responses by residents vary across different socio-economic groups and take different forms. In the face of ongoing water challenges, residents have come up with various coping mechanisms such as investing in alternative water infrastructure like boreholes and water tanks. In many instances, these investments are made by wealthier residents with available resources. Although improving their situations, a reduced reliance on municipal water systems has some potentially negative outcomes for social justice as it weakens the municipality's capacity to collect revenue and subsidise poor communities (Culwick Fatti and Khanyile, 2023; Water Institute of South Africa, 2020). Some residents in Johannesburg are also turning to drawing water from rivers or streams to meet their water needs (Fuller, 2006).

A series of water related protests across neighbourhoods in Johannesburg are indicative of the dissatisfaction by residents with water supply in the City. This dissatisfaction has been noted in the most recent QoL survey (Hamann, 2024)

## **Off-grid Cities: Elite infrastructure secession and social justice**

The Off-grid Cities project, funded by the National Research Fund (NRF), has explored how private households and businesses in South Africa have invested in alternative electricity and water sources. The project has interrogated the imaginaries (motivations, justifications) and practices (financing, regulating, implementing) of elite infrastructure transitions in order to critically consider their outcomes for the current and future city in four dimensions: political, environmental, infrastructural, and financial. The research focused primarily on Cape Town and Johannesburg, and adopted an interdisciplinary approach including interviews, surveys, document analysis, geographical information systems (GIS) and visual methods. The core objective of the project is to explore how elite infrastructure transitions need to be integrated into debates on, and practices of, producing cities that are environmentally sustainable and socially just. The project builds on the social justice literature and introduces it into climate change scholarship in the global South, recognising that the actions of one social group affect resource allocation in highly unequal cities, and that the infrastructures of elites tend to be absent from urban climate thinking.

More information about the project can be found on the project website <https://offgridsa.wordpress.com/>

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### **Suggested citation:**

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