



SOUTH AFRICA

TABLE MOUNTAIN WATER SOURCE PARTNERSHIP

# INVISIBLE WATER RESERVES, INCREASING WATER DEMAND

## AS THE CITY GROWS, SO DOES ITS APPETITE FOR WATER

The abundant springs and streams of Table Mountain are the reason why Cape Town became established where it is today. And the traditional Khoi name for this area is 'Camissa' – aptly meaning place of sweet waters. As the world expanded, Cape Town grew from a small produce station supplied by flowing fresh water. The original dams on top of Table Mountain were built in the late 1800s to secure a steady water supply for the growing city.

As the city outgrew these central dams, the building of six large storage dams in the Boland mountains, over 60 kilometres away, seemed to be a lasting solution... for a while. But, the reality of life with new water limitations hit home in 2018 when these dams, and Cape Town taps, almost ran dry during a prolonged

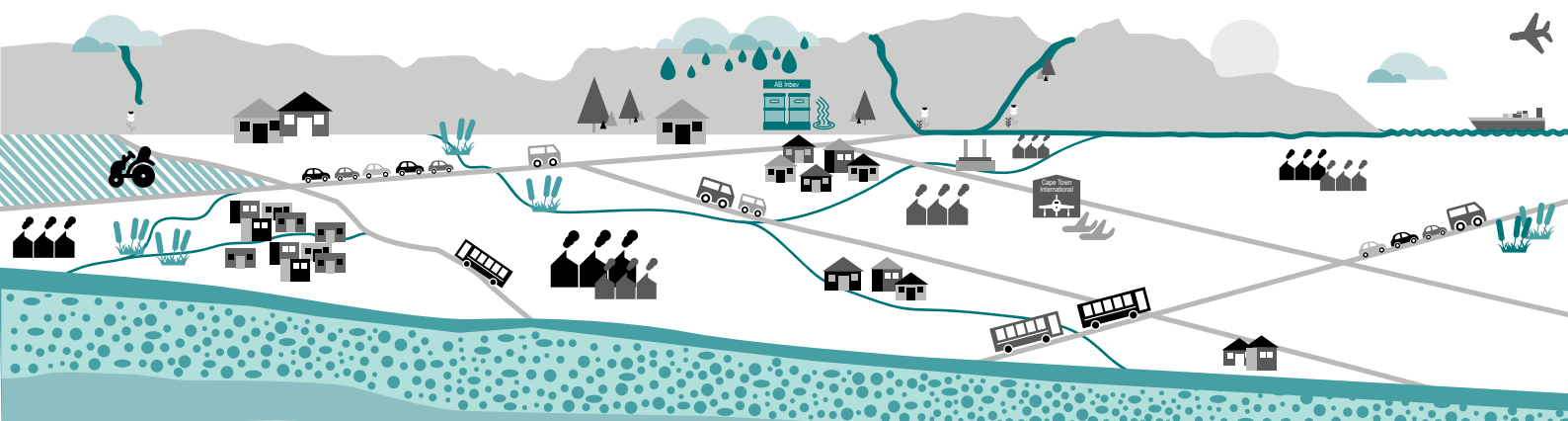
drought. A new realisation was born: reliance on dams alone is not sustainable. We are now looking at alternative additional water sources, both under and around us, through reuse, roof capture and groundwater – this is the new normal.

## GROUNDWATER: HIDDEN RESOURCE, NATIONAL ASSET

At the foot of Table Mountain, Cape Town residential and business areas stretch all the way across the Cape Flats. Down the slopes are springs, followed by rivers and wetlands in the flatter areas. These visible waterpoints are connected to a complex underground source of water that is invisible to the eye, but that nonetheless plays important roles in the landscape.

For one, this underground water feeds some of the surface waters and freshwater ecological hotspots in the city. If Cape Town is to become acknowledged as a globally-recognised Ramsar Wetland City, as it has applied to do, groundwater needs to be well-looked after. Being a Wetland City, for having wetlands of international importance, commits the city to promote the conservation and wise use of urban and peri-urban wetlands, and their socio-economic benefits for local people.

Secondly, this hidden supply provides an extra water source to thousands of Capetonians. Boreholes are dotted across the city. Groundwater is used by the city and public amenities, as well as businesses and private residences. During the drought, it was a relief for those who had a borehole. For those who did not – and who could afford to – drilling a borehole became a priority in order to buy safety from future drought disasters.



Like any renewable resource, if we take out more than is going in over the long term, groundwater can run out.

## WHAT IS THE BIG ISSUE?

Unsustainable groundwater abstraction, current and future, represents a critical risk to water resources, groundwater-dependent ecosystems (like wetlands) and the water resilience of the people of Cape Town.

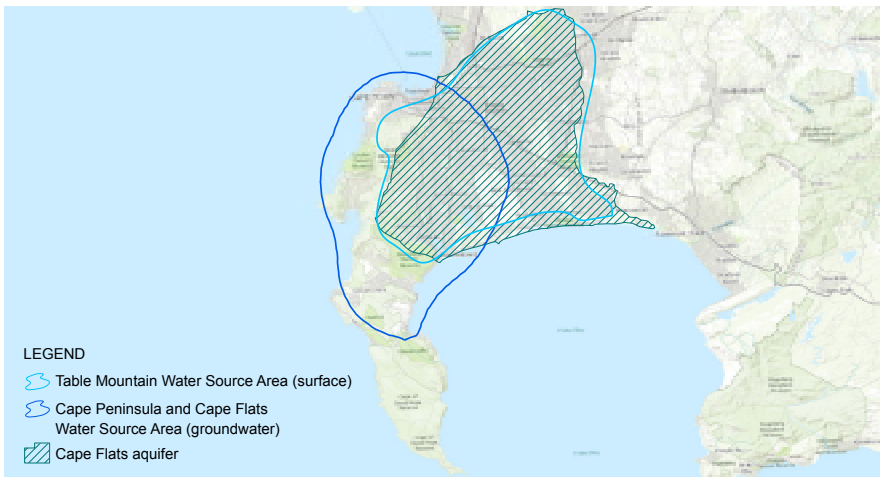
## WHAT ABOUT THE DROUGHT?

The Western Cape and the City of Cape Town experienced a severe drought between 2015 and 2019, resulting in a substantial increase in the number of boreholes and well points that were

created as surmised from an increase in drilling around the city. Associated with this would be an increase in the number of groundwater users and volume of groundwater abstracted. Many of these boreholes are not found on any national or city database, so we do not know how many there are and how much water is used through them.

## WHERE IS GROUNDWATER FOUND IN CAPE TOWN?

Groundwater is found beneath much of Cape Town, feeding the springs around



## WHAT ROLE DOES GROUNDWATER PLAY IN WATER SECURITY?

According to 2016–2018 research, South Africa has 22 surface water source areas that account for 10% of land yet provide half of our country's water. There are also 37 groundwater water source areas around the country, which overlap with key aquifers. These surface and underground water reserves are strategically important for South Africa's water and economic security – and they require specific attention.

Cape Town and surrounding areas fall within two overlapping strategic water source areas – the surface Table Mountain Water Source Area and the groundwater Cape Peninsula and Cape Flats Water Source Area. Groundwater is typically a fallback resource in times of drought. Hence unmonitored and unregulated abstraction of groundwater, especially under an uncertain

changing climate, poses a risk to this water supply source.

As the City of Cape Town diversifies its bulk water, it looks to tap three underground water reserves in the vicinity of the city: the Cape Flats, Atlantis and Table Mountain Group aquifers. The Cape Peninsula and Cape Flats Water Source Area (groundwater) overlaps with the primary Cape Flats aquifer, as well as the groundwater recharge area represented by the iconic Table Mountain outcrop of the Peninsula Formation. The Atlantis aquifer (up the West Coast) and the Table Mountain Group aquifer (now accessed near Steenbras Dam) lie outside of the Cape Peninsula and Cape Flats Water Source Area yet they provide important bulk groundwater contributions to the City of Cape Town.

the city and interacting with some of the wetlands across the Cape Flats. For any Capetonian interested in a borehole, the geology (type of rock and sediment) under a property determines whether there is likely good access to an aquifer or not.

## WHO CAN USE GROUNDWATER?

Groundwater, like all water in South Africa, is a national asset that is regulated by the state. The Department of Water and Sanitation (DWS) controls all aspects of large volume water use. This includes how much groundwater a large-scale user can take out and what to use it for, addressed through a water use license application process. This differs for private and smaller volume commercial users who utilise water volumes that are either within the generally authorised volume for the catchment, or simply utilise water to supply basic human needs. Irrespective of use, all groundwater users need to register their borehole under the City of Cape Town bylaws. In 2019, there were 22 000 registered boreholes.

As much as there is both business and private borehole use in Cape Town, the City itself is diversifying its bulk water provision by including more groundwater. Current expansion work in the Cape Flats water source area will contribute an additional 6% to Cape Town's bulk water supply in the next few years.

## HOW IS IT MONITORED?

South Africa's strategic water-producing landscapes were delineated from research during 2016 and 2018. In 2018, these strategic water source areas were recognised in the National Water and Sanitation Master Plan.

In January 2018, at the height of the drought, DWS introduced new rules which say all private boreholes must be metered and that the amount of groundwater abstracted must be recorded on a weekly basis and submitted to the DWS. While it is necessary to monitor what we want to manage, many people are concerned that this rate of reporting is unmanageable.

Another practical and transparent way of monitoring needs to be found that ensures that we understand whether groundwater use over time is sustainable.



## CITIZEN SCIENCE RESEARCH IN CAPE TOWN

From 2018 to 2020 WWF worked on an AB InBev-funded pilot project, inviting Capetonians to participate in groundwater research and asking them what groundwater information they would like to be regularly informed of in future. The aim was to grow a groundwater monitoring network in Cape Town's residential and business areas, in order to better understand how groundwater responds to both borehole pumping and rainfall recharge.

WWF also wanted to grow our understanding of how many boreholes there actually are in residential areas. All this information is critical if we are to understand how much water is being utilised and how the aquifers are responding to abstraction.

In 2019, WWF appointed Information and Communication Technology specialists iCOMMS, to run a public groundwater information survey, and hydrogeology consultants GEOSS to establish a citizen science groundwater monitoring network in two pilot areas: Newlands and Epping/ Airport Industria.

The groundwater monitoring will be done using 12 data loggers - six in each area - fitted onto boreholes in private residences, schools and businesses.

The first study area, Newlands, is a suburb that is home to several springs and that has some industrial groundwater use in addition to mostly private groundwater use. The hydrocensus in the Newlands area suggested a steep increase in boreholes drilled over the drought period. About 50% of boreholes surveyed were drilled between 2017 and 2019.

The second study area is the mixed residential and industrial area surrounding Epping and Cape Town International Airport which also saw a rise in borehole drilling during the drought.

In Newlands, 90%\* of boreholes were not officially noted on city or national databases and in the business study area, it was 14%\*. This study has highlighted that our concern was justified. These findings have also shown that private borehole owners are far more numerous than previously anticipated. It confirms that we need to work at improving our monitoring of groundwater throughout Cape Town to protect this precious resource from unsustainable use.

Contributors:

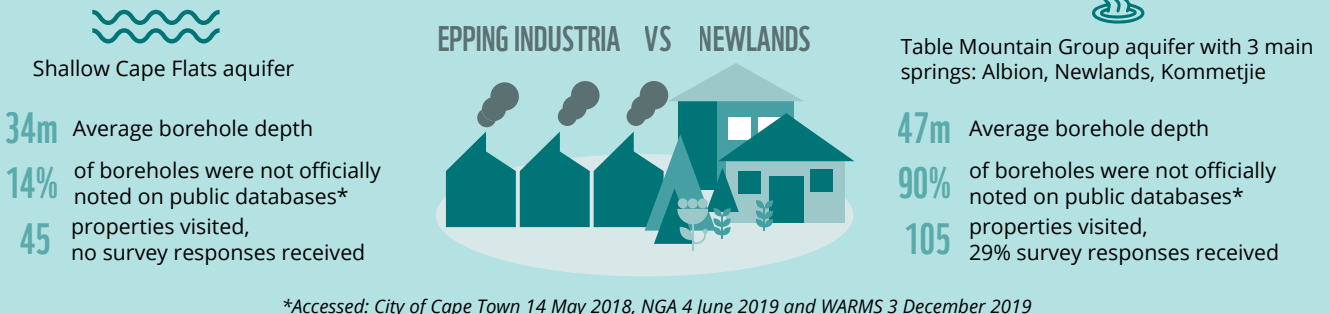


## WHAT NEXT?

The dataloggers placed at the various boreholes will be visited every three months, in order to read data with every change of season. Over time, this will give us a pattern of water level fluctuations. With increased funding, more areas will be identified and loggers can be installed and added to the monitoring network.

With enough data collection points there is scope to feed data into a database, from which this information can be communicated to Capetonians so they know more about groundwater levels, number of boreholes and water quality and quantity being drawn in their areas. This effort will be underpinned by an extensive public awareness drive and a close review of how groundwater and water source areas can be protected in other parts of South Africa.

## GROUNDWATER SURVEY IN CAPE TOWN



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| <p><b>Residents' concerns:</b> Groundwater quality and cumulative impact of unregulated groundwater use</p> <p><b>Usage:</b> groundwater predominantly for irrigation &amp; domestic purposes</p> <p><b>Loggers</b> installed to monitor groundwater use in Epping area</p> <p><b>Age of boreholes:</b> 30% drilled in the last five years, 27% in past 10 years, 42% older than 10 years</p> | <p><b>Residents' concerns:</b> Iron in the water and cumulative impact of unregulated groundwater use</p> <p><b>Usage:</b> Varied from &lt; 5 000 litres/ month to 750 000 litres/ month</p> <p><b>6</b> <b>Loggers</b> installed to monitor groundwater use in Newlands</p> <p><b>Age of boreholes:</b> 50% drilled in last three years, 30% in past 10 years, 12% older than 10 years</p> |
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# PRIORITIES & PARTNERSHIPS

With great potential comes great responsibility.



The Table Mountain Water Source Area (surface) and the Cape Peninsula and Cape Flats Water Source Area (groundwater) are the only ones completely overlain by an urban environment.



The Table Mountain Water Source Area is the smallest surface water-producing landscape, with a size of 465 km<sup>2</sup>. It overlaps with the groundwater Cape Peninsula and Cape Flats Water Source Area, a total size of almost 60 km<sup>2</sup>.



The Cape Flats aquifer is extremely vulnerable to water pollution due to its high overlap with an urban area and the sandy nature of the Cape Flats aquifer.

## EVERYONE'S BUSINESS, BUT WHO'S PRIORITY?

With only 1% of the Earth consisting of surface fresh water, we need to use water wisely. Consider then that the world's stores of groundwater amount to 30% and we might think this is an untapped resource tipped in our favour in times of drought and increasing global warming. But this resource is mostly unmonitored and poorly managed. To ensure there is a fair share of these freshwater reserves for everyone for a long time, we need to be sparing with its use. We also need to measure how much groundwater is being used and monitor how aquifer water levels respond over time to this use.

All boreholes should be registered on one or more central databases. In reality, this is not the case.

## THE FUTURE OF OUR WATER?

South Africa is on a quest to diversify its sources of water. DWS have formulated bold initiatives that aim to shift the mix of water sources from 73% surface water in 2000 to 60% in 2040. This requires the expanded use of alternative water sources, such as groundwater, water reuse, desalination and freeing up of runoff water through alien plant clearing.

## WHAT IS WWF DOING ABOUT GROUNDWATER?

With a focus on South Africa's high rainfall water source areas, WWF is committed to building community-public-private Water Source Partnerships, strengthening good governance of shared water resources and collectively addressing the key threats in these critical water-supplying areas. The Table Mountain Water Source Partnership is the first of its kind and the first to focus on groundwater too - with the intention to use the learnings across the country.

## PARTNERSHIPS, A TRUE POWERHOUSE

Partnerships in water source areas are vital for investing in the shared asset of South Africa's fresh water. As a water scarce country, water security must be a top priority. The way to enable a water-secure future is through effective partnerships and integrated catchment management.

The Table Mountain Water Source Partnership, formed in 2020, brings together government, the private sector and local communities to focus on groundwater. With initial funding from AB InBev, followed by the Danish Embassy's financial support, this collaboration aims to improve our understanding of groundwater and fast track the monitoring and management of this resource.

## POWERING THE TABLE MOUNTAIN WATER SOURCE PARTNERSHIP

With its first meeting held virtually in mid-March 2020, this partnership is moving forward. AB InBev has been the catalytic funder, with aligned business interest in the Newlands spring for their local brewery. Following the work started by AB InBev, the Danish Embassy will continue to fund this work as it believes in a monitored approach to realise the sustainable potential of groundwater. Denmark is 100% supplied with groundwater and has applied its experience with groundwater in supporting the sustainable management of it in South Africa since 2018. Their contributions will help take this work to scale.

To date, other members in this partnership include the Water Research Commission, University of Cape Town, University of Western Cape, City of Cape Town, the national offices of the Department of Water and Sanitation as well as GreenCape.



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