

EGU2020

# DON'T BLAME THE RAIN EXPLAINING CAPE TOWN WATER INSECURITY IN THE AFTERMATH OF DAY ZERO

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# **WATER INSECURITY, A GLOBAL THREAT ?**

**The next decade, about 700 million people will risk to be displaced as they might not have enough safe drinking water available.**

**Exacerbated by more frequent and severe droughts, water insecurity represents a major global risk.**

**However, droughts and the resulting water insecurity overwhelmingly affects the most disadvantaged people of our society.**

**According to the World Economic and Social Survey, poor and marginalized groups are likely to experience the worst impacts of water shortages.**



# RESEARCH AND SOCIETAL CHALLENGES RELATED TO WATER INSECURITY

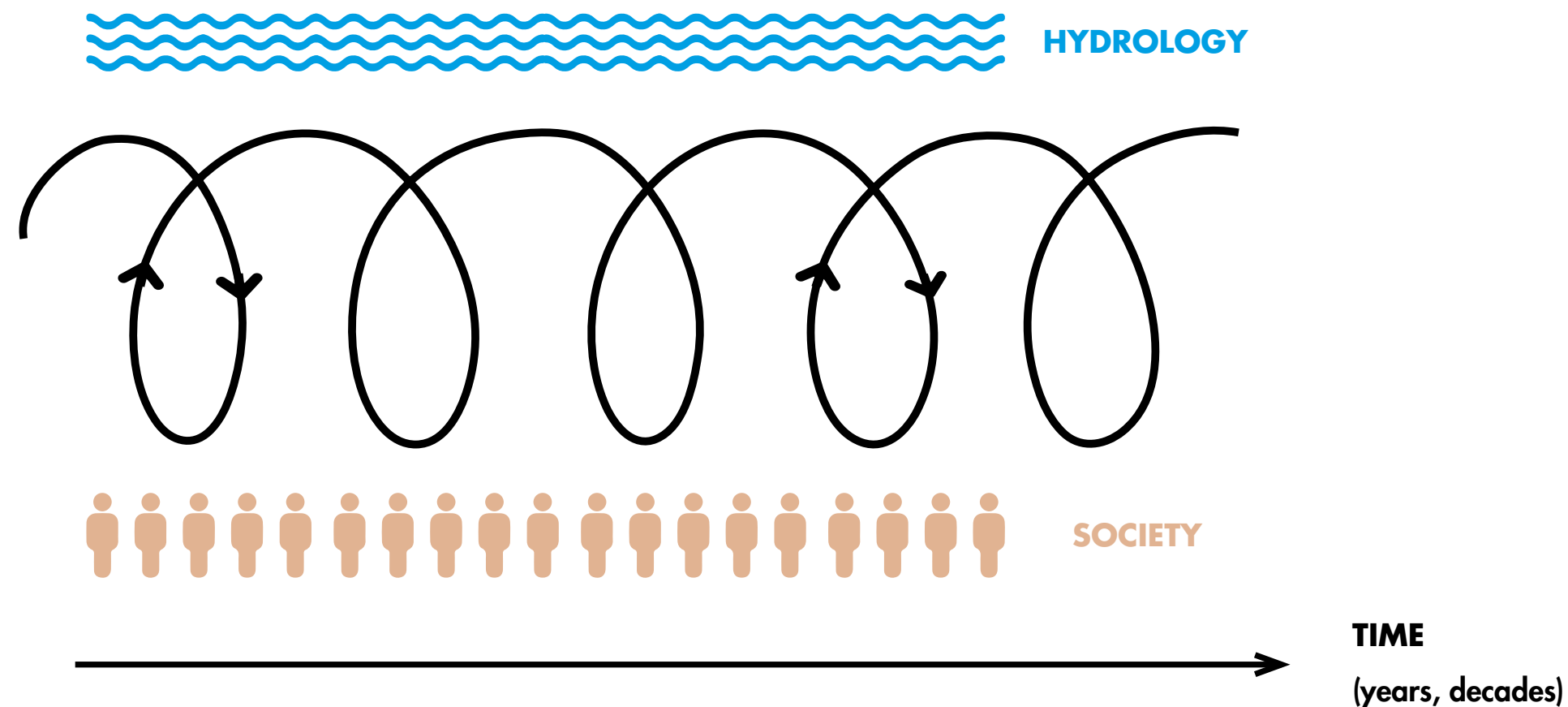
Current definitions, discourses and policies that address water insecurity, are environmentally deterministic: they either over-simplify and disconnect human-water dynamics or disregard the politics thereof.

As a result, those definitions often fail to understand and therefore address the political causes and societal implications of water insecurity.



# SOCIOHYDROLOGICAL UNDERSTANDING OF WATER INSECURITY

Sociohydrology describes water insecurity as a result of the human and water systems coevolution. The legacy of water insecurity emerges from the complex interactions between human and nonhuman systems, i.e. supply demand cycle, reservoir effect, legacy effect.



Through sociohydrology, this article manages to connect the hydroclimatic with the social processes which shape the status of water resources and their use.





# POLITICAL ECOLOGY'S PERSPECTIVE ON WATER INSECURITY

Political ecologists explain the political legacy of water insecurity.

They retrace historical and socio-political processes that produce unsustainable water use and uneven distribution of hydrological risks.

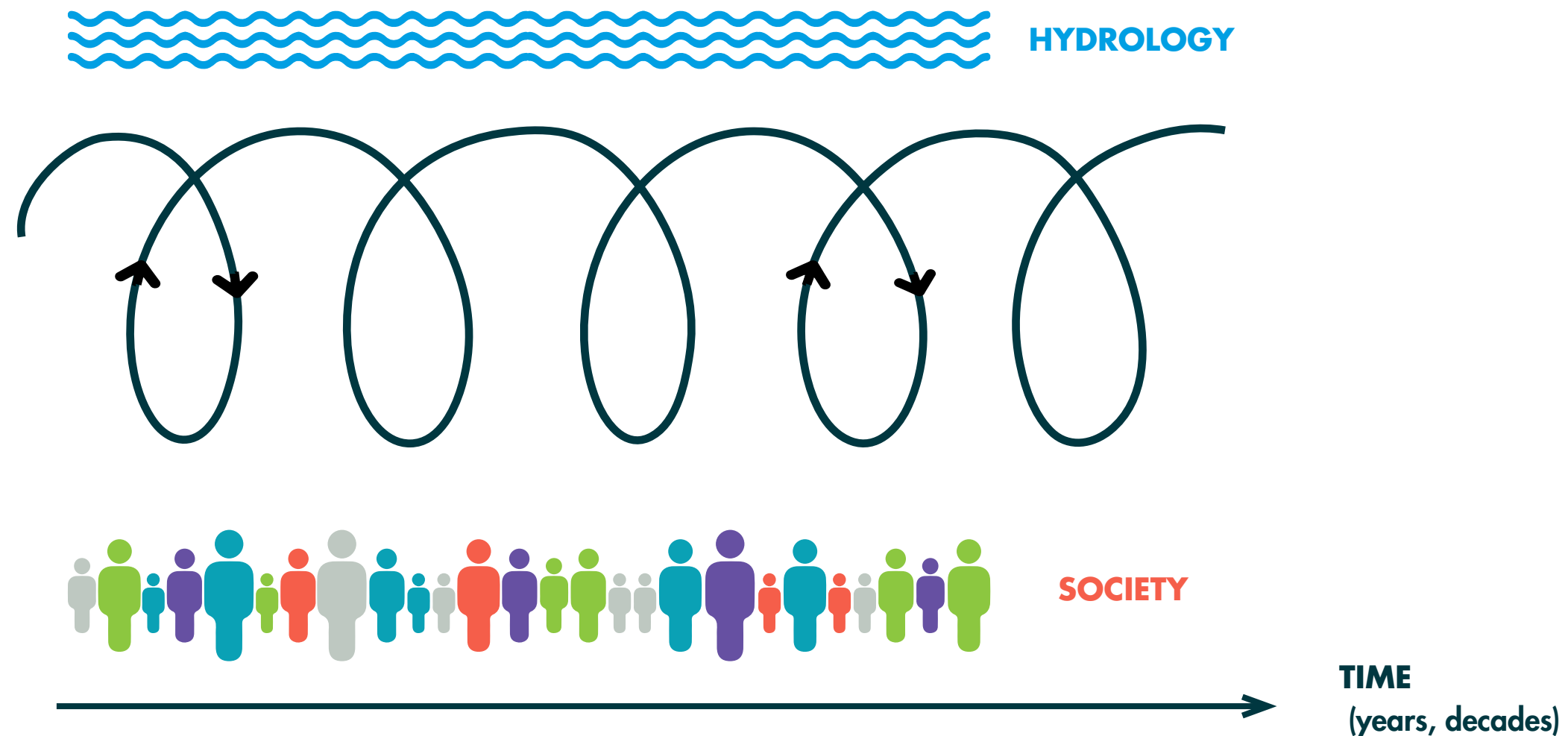
In those processes, they mostly analyse the power structures and dynamics that ultimately determine different levels of water insecurity.





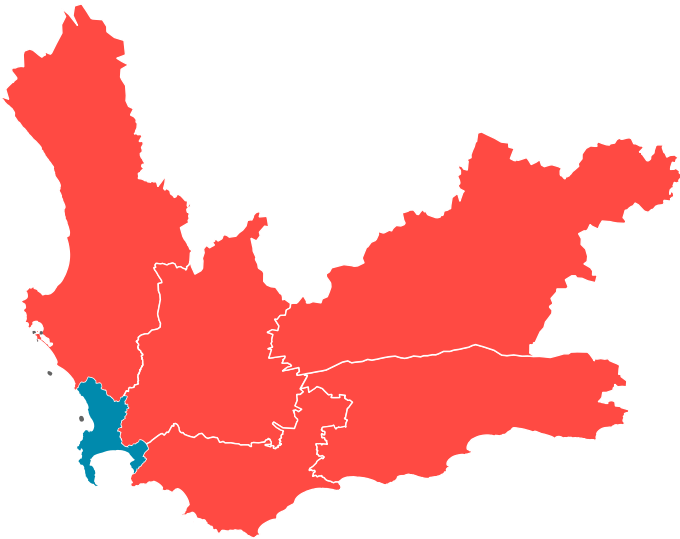
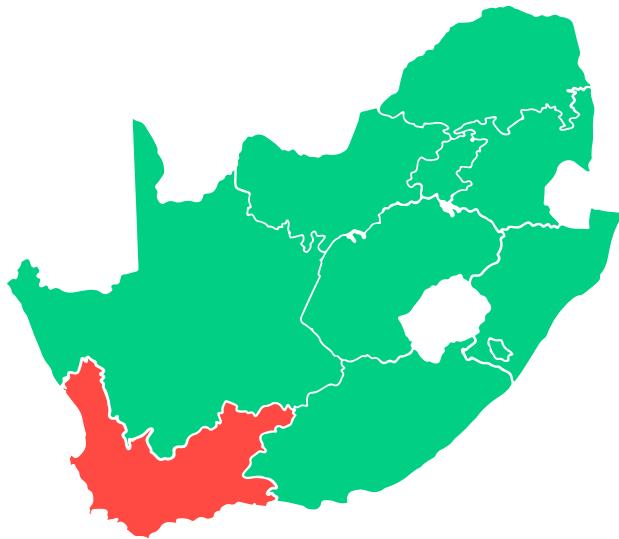
# AN ALTERNATIVE FRAMEWORK TO EXPLAIN WATER INSECURITY

Through sociohydrology and political ecology this article explains how water insecurity can be socially and politically produced over time, and unequally distributed across space.



The paper does so through an analysis of urban water insecurity before and after the occurrence of an extreme drought event.

# EXPLAINING CAPE TOWN'S WATER INSECURITY



## CITY OF CAPE TOWN

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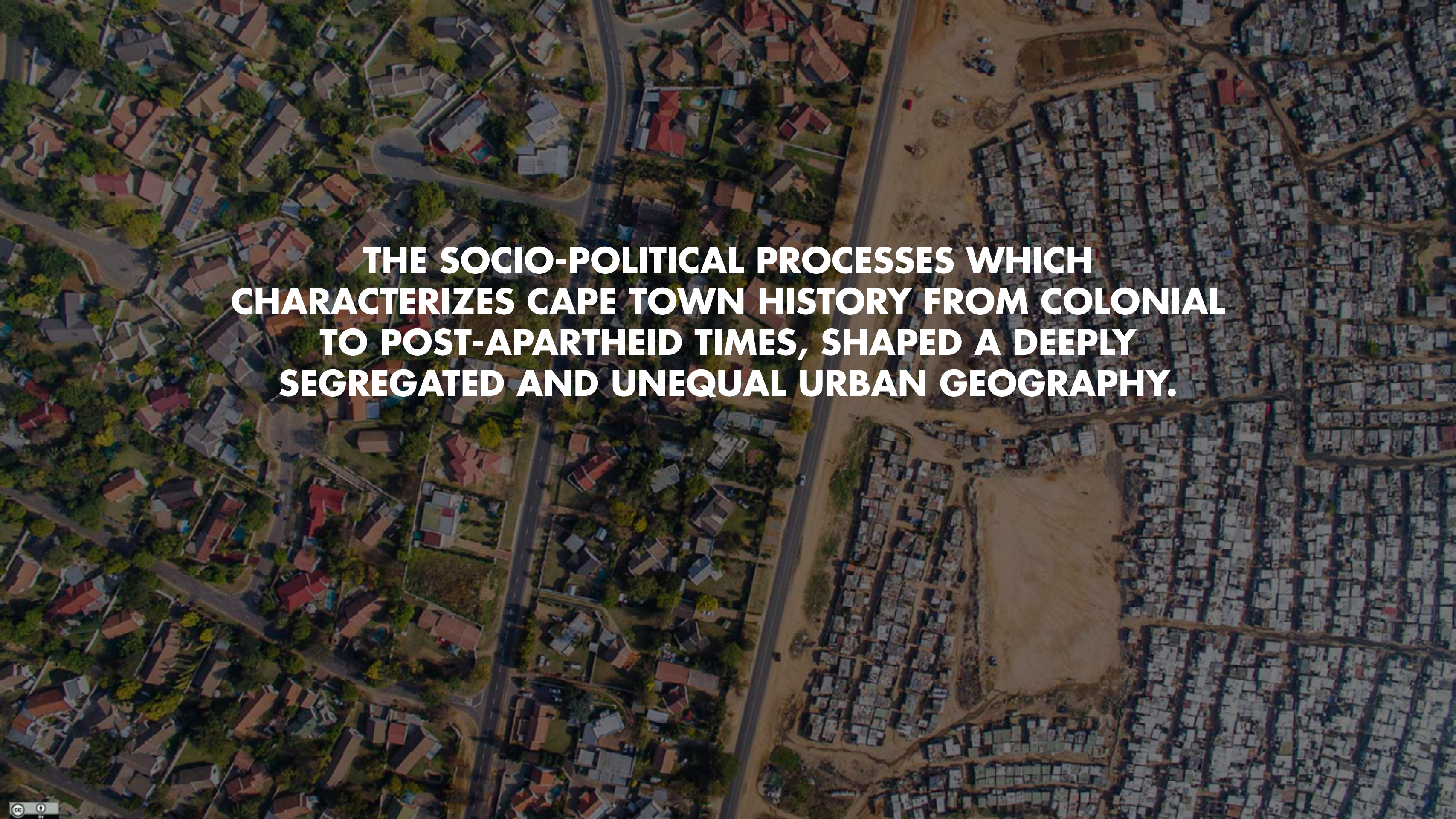
Country	South Africa
Province	Western Cape
Area	2,445 km <sup>2</sup>
Population	4,000,000
Density	1,500/km <sup>2</sup>





# I. EXPLAINING THE LEGACY OF CAPE TOWN'S HUMAN-WATER SYSTEM

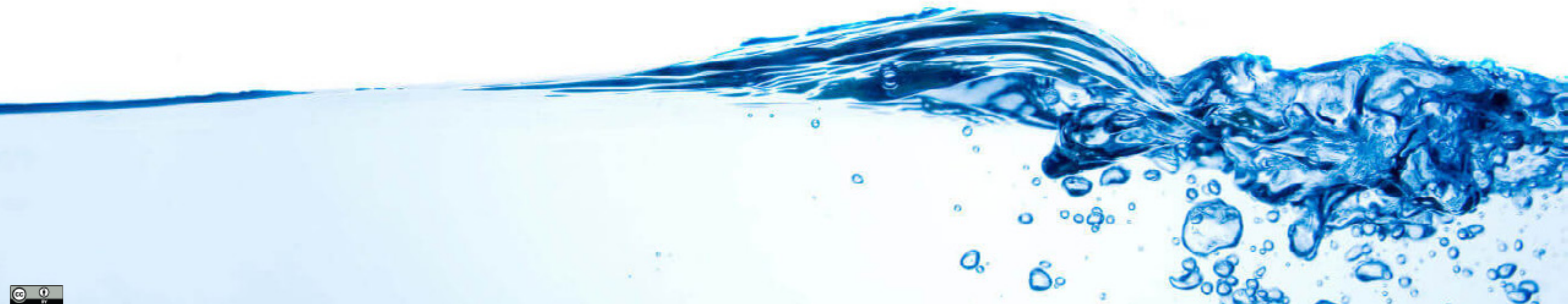




**THE SOCIO-POLITICAL PROCESSES WHICH  
CHARACTERIZES CAPE TOWN HISTORY FROM COLONIAL  
TO POST-APARTHEID TIMES, SHAPED A DEEPLY  
SEGREGATED AND UNEQUAL URBAN GEOGRAPHY.**



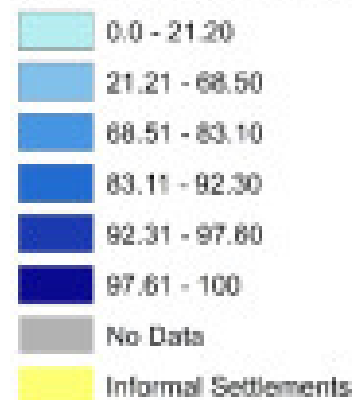
# URBAN SEGREGATION IN CAPE TOWN



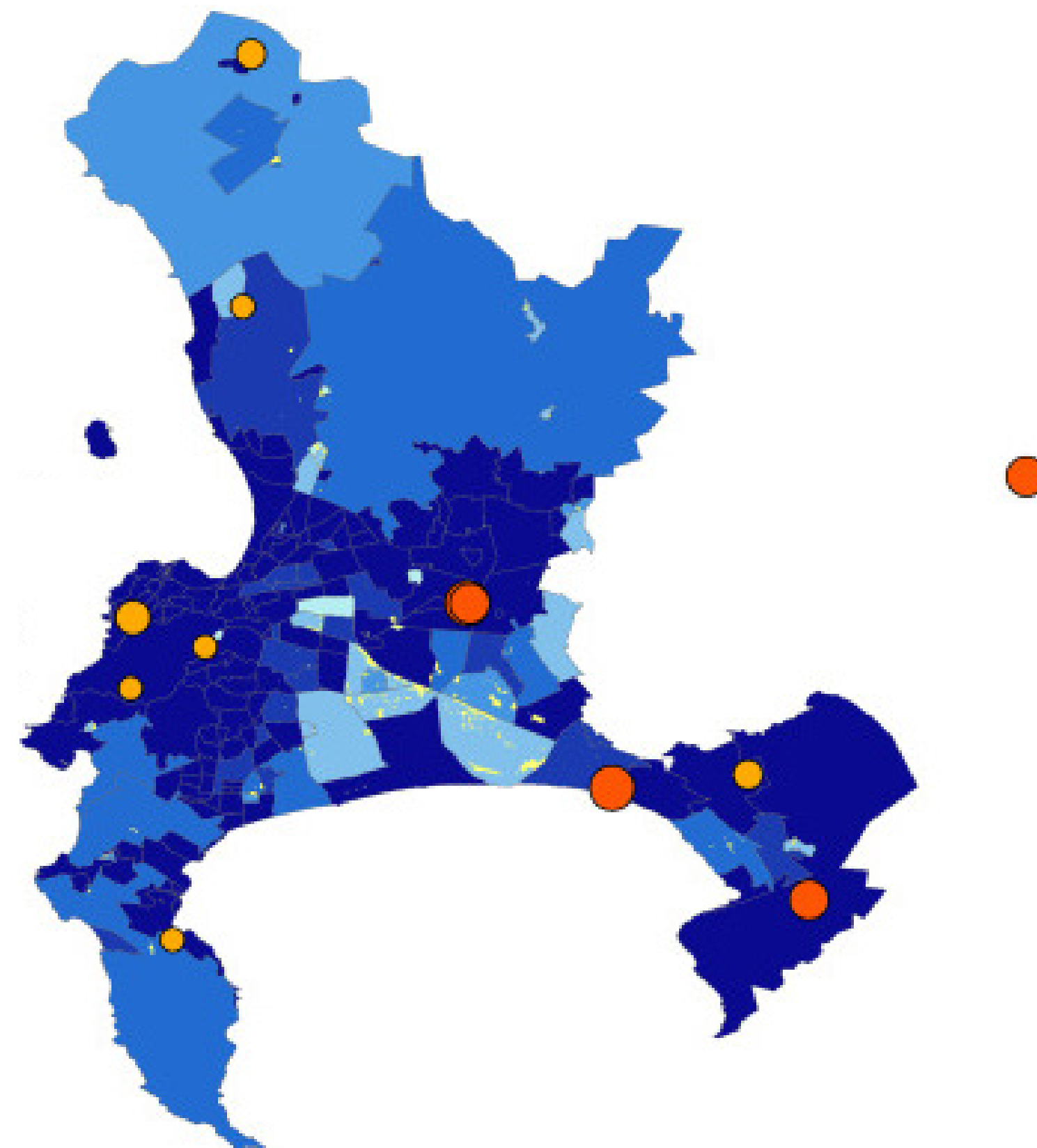


# SEGREGATED CITY AND UNEVEN WATER ACCESS

## % of Access to Water



## Water Treatment Works in Million Litres/Day



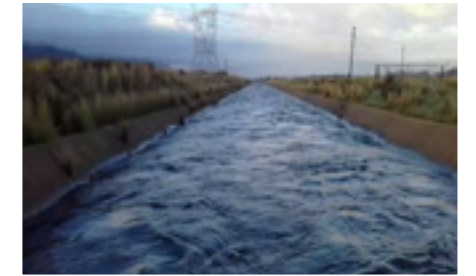
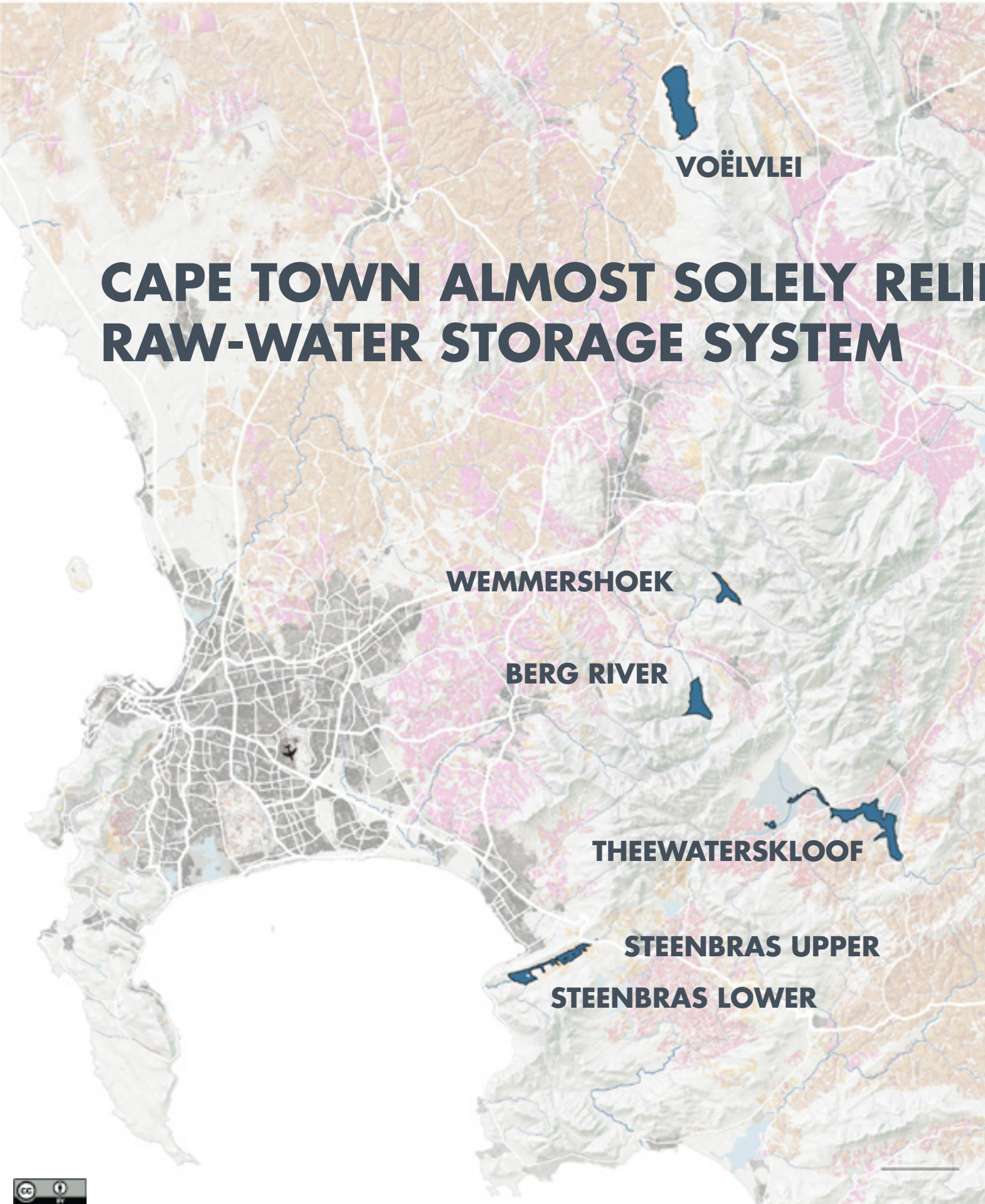


An aerial photograph of a large concrete dam and its reservoir. The dam is a long, curved structure with a textured surface, situated in a valley. The reservoir is a large body of blue water that fills the valley. In the background, there are steep, rugged mountains under a blue sky with scattered white clouds. The surrounding landscape is green with sparse vegetation. A road runs along the base of the dam, and a small structure is visible near the dam's crest.

# **EXPLORING THE SOCIO-HYDROLOGICAL PROCESSES THAT HAVE SHAPED CAPE TOWN'S WATER INFRASTRUCTURE THROUGHOUT HISTORY**



# CAPE TOWN ALMOST SOLELY RELIES ON A RAW-WATER STORAGE SYSTEM

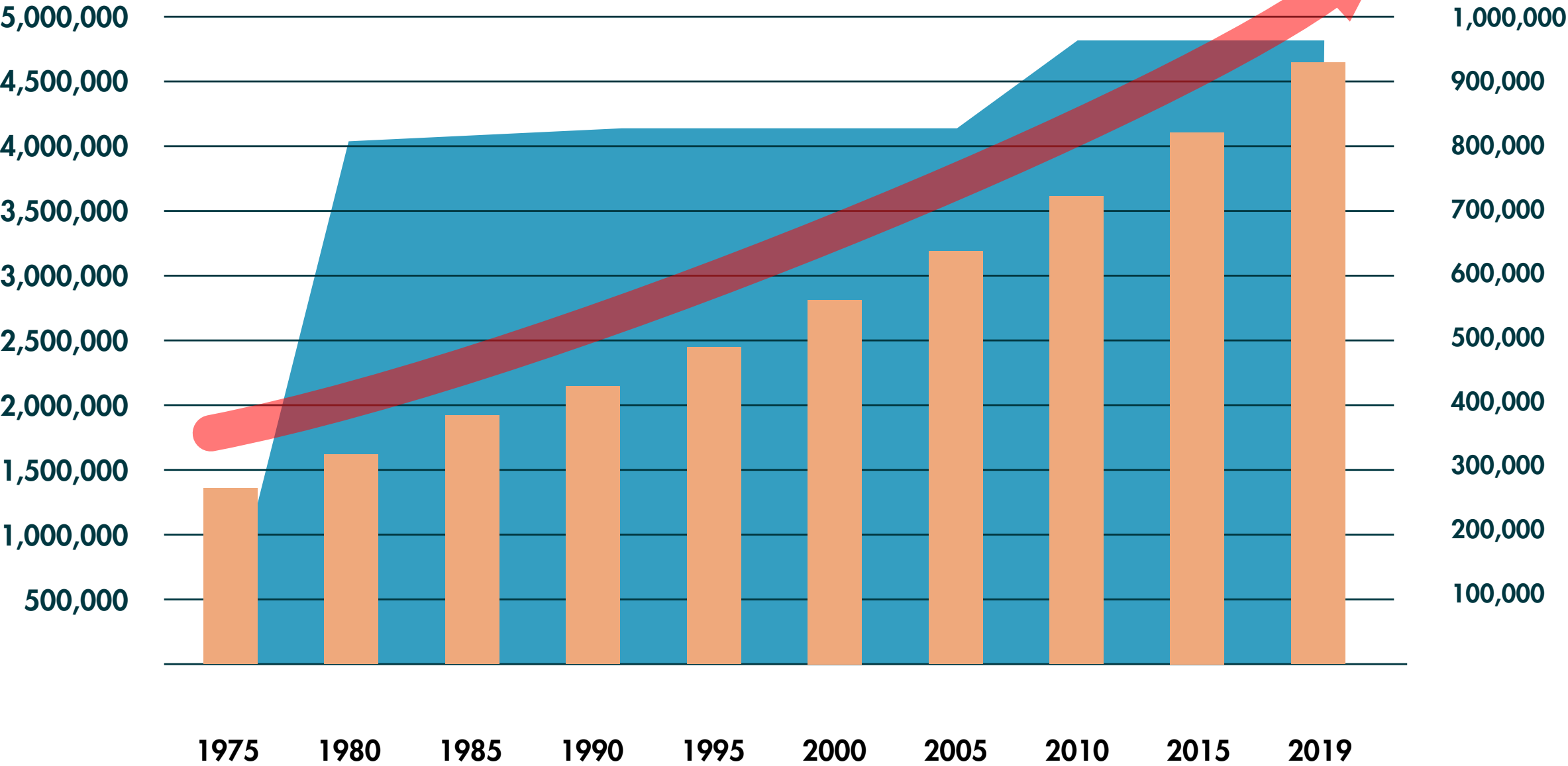




# CAPE TOWN'S WATER SUPPLY SYSTEM ALLOWED THE CITY TO GROW...

ESTIMATED POPULATION  
OF CAPE TOWN

CUMULATIVE STORAGE  
CAPACITY (ML)





# ...AND ENABLED (UNEVEN) HIGH WATER DEMAND




WATER CONSUMPTION PER UNIT (LT/UNIT/DAY) - 2013





The legacy of Cape Town water security is one of segregation (racial, spatial and economic) and uneven water consumption amongst higher classes and most privileged Capetonians.



An aerial photograph showing a stark contrast between two types of urban development. On the left side of the image, a suburban neighborhood is visible, characterized by large, detached houses with red-tiled roofs, green lawns, and mature trees. A paved road runs vertically through the center of the image, separating this area from the right side. On the right side, a densely packed informal settlement or slum is visible, with small, closely situated buildings and a lack of greenery. A large, sandy, cleared area is visible within the settlement. The text is overlaid on the image, centered horizontally and spanning across the road.

**Sociohydrology, is able to explain how water overconsumption was most probably enabled by a supply-demand cycle. More precisely, the complex system of dams and water reservoirs while making water available, also enabled economic growth and increased water consumption.**





Political ecology is useful to describe how and why this overconsumption of water was not equally distributed across Capetonians.

Apartheid, segregation, and most recently neoliberal policies have increased the urban segregation and diversified the Citizens' economic and physical access to water.



## II. CAPETONIANS' EXPERIENCES OF THE 2015-2017 DROUGHT





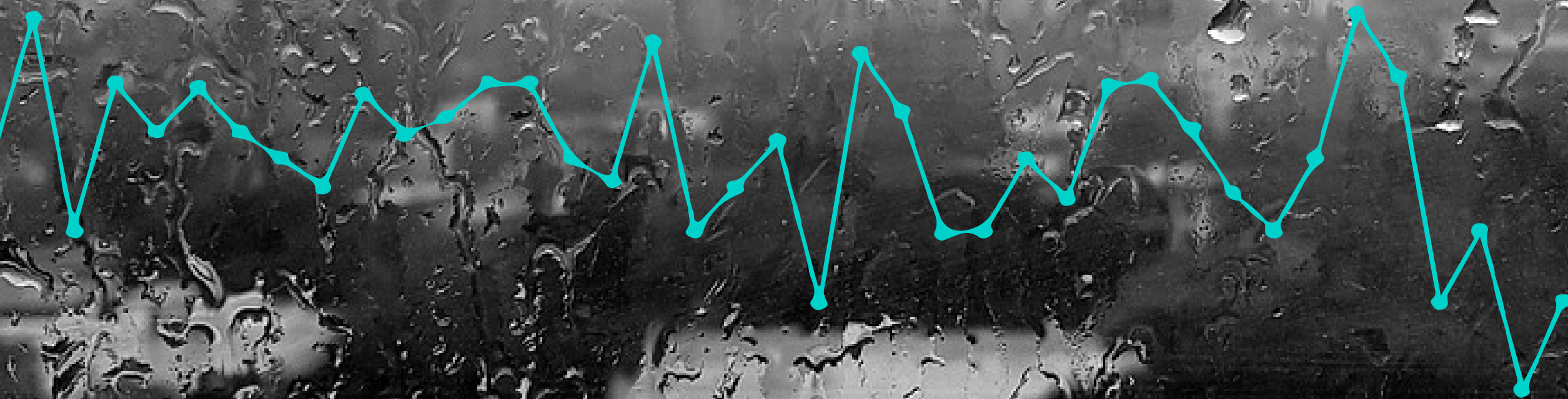


**WHAT HAPPENED TO  
CAPETONIANS AFTER  
THE OCCURRENCE  
OF THE SEVERE AND  
PROLONGED 2015-17  
DROUGHT AND THE  
RESULTING DAY ZERO  
CAMPAIGN?**

**TO WHAT EXTENT THE  
RESULTING WATER  
INSECURITY ACROSS  
CAPE TOWN'S  
METROPOLITAN AREA  
RELATES TO THE  
PHYSICAL SHORTAGE OF  
WATER THAT OCCURRED  
AFTER THE DROUGHT?**



# WHEN IN 2015/17 CAPE TOWN EXPERIENCED A METEOROLOGICAL DROUGHT...



Precipitations dropped from 780 mm/y in 2014, to an average of about 250 mm/y for 3 consecutive years.



...  
**CAPE TOWN SURFACE  
WATER SCHEMES  
ALMOST RUN DRY**

**The water level  
of Cape Town's major dams,  
reached the 22.8%,  
which translated to 12.3% of  
usable water in early 2018.**





An aerial photograph of Cape Town, South Africa, taken during the 'blue hour' of sunset. The iconic Table Mountain dominates the background with its flat top silhouetted against a clear, deep blue sky. The city of Cape Town is spread across the foreground and middle ground, with numerous buildings illuminated by the warm, golden light of the setting sun. Some buildings have their interior lights on, creating a glow. The overall scene is a mix of natural beauty and urban development.

# DAY

# ZERO

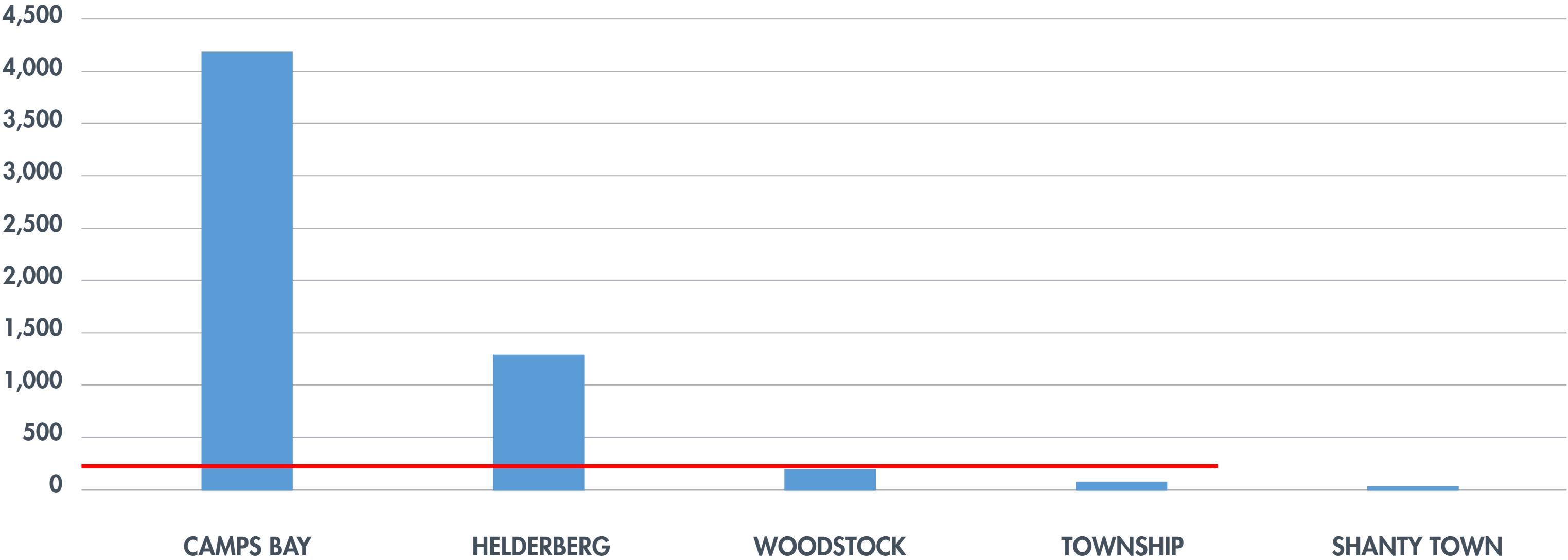


# HOW WAS DAY ZERO EXPERIENCED ACROSS THE CITY OF CAPE TOWN?



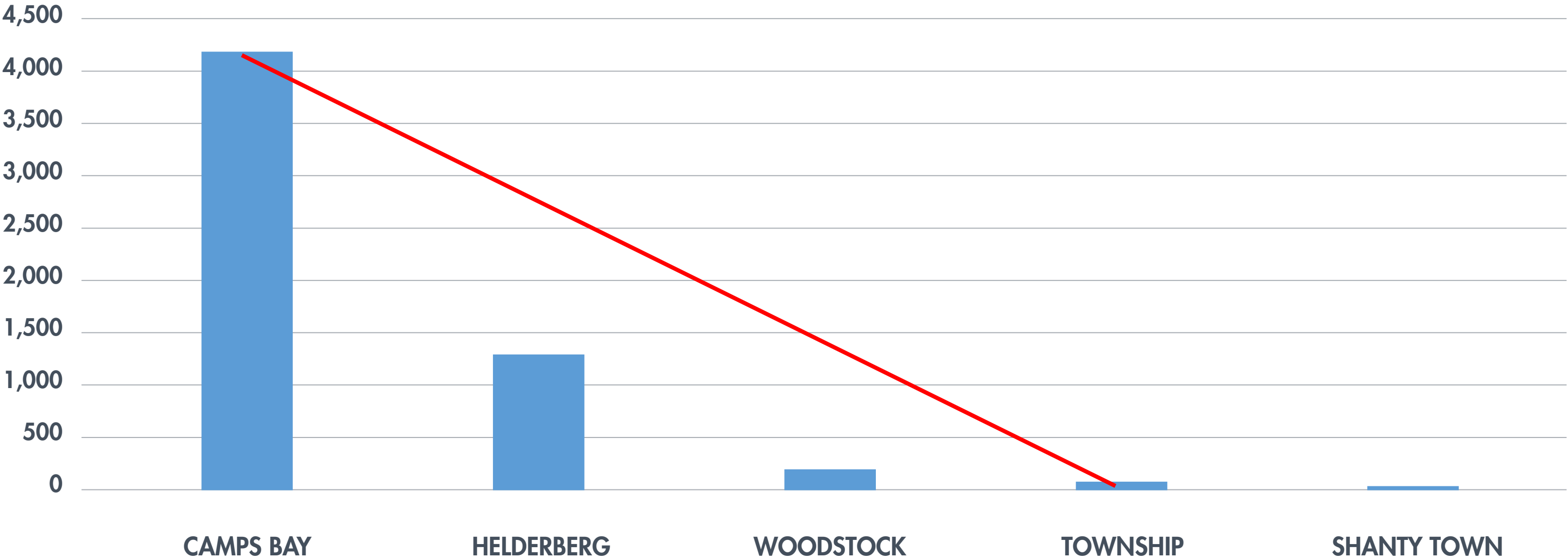


# UNIFORM WATER RESTRICTIONS





# PROPORTIONAL WATER TARIFFS INCREASE





# RANDOM INSTALLATION OF WATER METERING DEVICES

Water Meters Devices  
cut the water use to  
350 liters/household/day

Mostly installed in houses with  
high water consumption and/  
or in households unable to pay  
their water fees.

This measure was uniformly  
applied to houses which varies  
from 1 person to 20 persons  
per household.





# FROM ALTERNATIVE WATER SOURCES TO WATER SYSTEMS OFF-THE-GRID





# UNEVEN EXPERIENCES OF DROUGHT ACROSS THE CITY

## FACTORS AFFECTING EXPERIENCE

Elite and upper middle class households were able to pay for increased tariffs, had easy access to alternative sources, and many went off the grid.

Lower middle class and townships dwellers could not always access to alternative sources, they were not able to pay for higher tariff nor to buy alternative sources. Often their households are more numerous.

Informal dwellers did not change their conditions (40 litres / households / day).



GEOGRAPHICAL  
LOCATION



LEVEL OF  
WATER CONSUMPTION



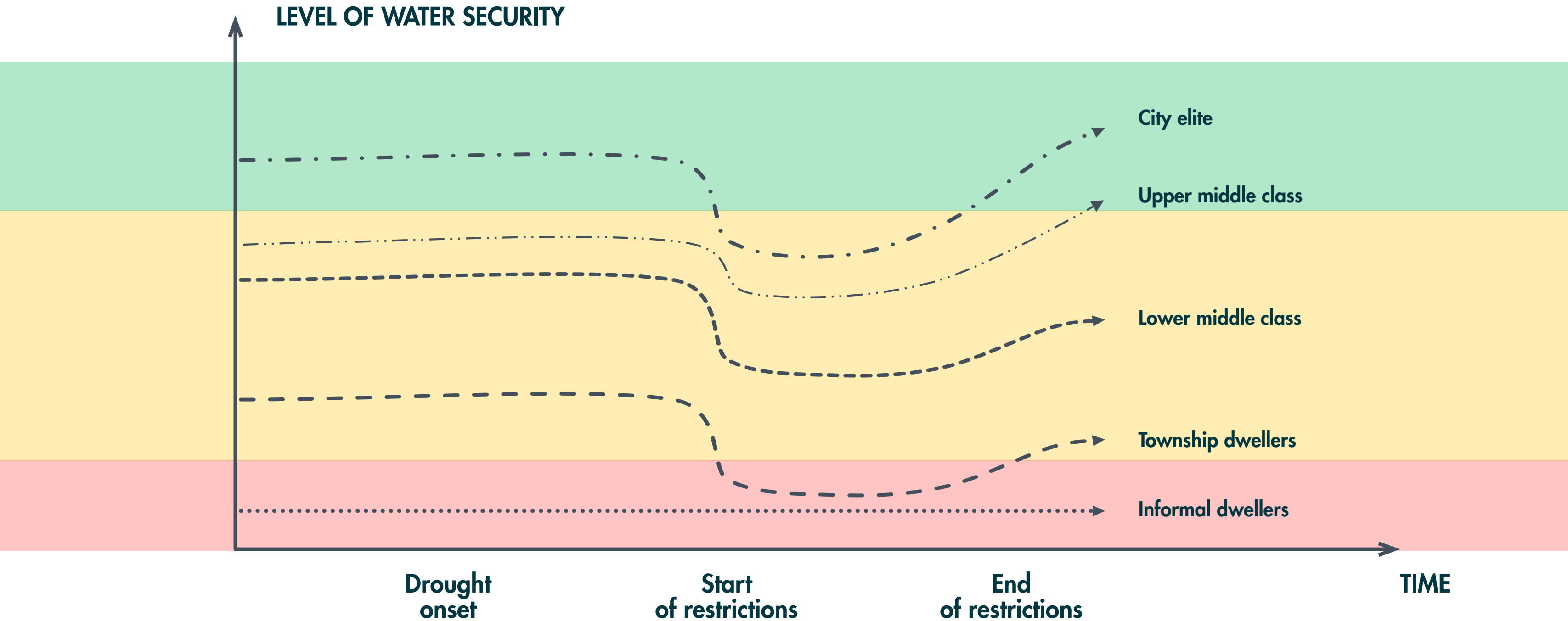
SOCIO-ECONOMIC  
LEVEL



COMPOSITION OF  
THE HOUSEHOLD



# CAPETONIANS' RESILIENCE TRAJECTORIES





WHITE

COLORED

## **DON'T BLAME THE RAIN**

**Rather than producing it, the 2015-17 drought accelerated a pre-existing water crisis and exacerbated the level of water insecurity of every Capetonian.**

**Capetonians water insecurity is a manifestation of the spatial and economic segregation which has shaped Cape Town since colonial times, in addition to the physical water shortage.**

**This socio-economic legacy determines the unequal recovery trajectories across Cape Town's metropolitan area.**

**Retracing the political legacy of Cape Town metropolitan area, we can firstly explain the different experiences of drought across the city, secondly we can address the different resilience trajectories of varying urban areas.**



## CONCLUSION

This critical understanding can play an important role in addressing water insecurity in a more equal and efficient manner. It suggests to both sociohydrologists and policy makers to understand and address the socio-political factors that produce unequal levels of water insecurity.

With this wider recognition, water supply expansion, efficient water use or IWRM policies are no longer sufficient to address water insecurity. Instead, the latter should be addressed by developing a more just political and economic system.



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