CAPE TOWN
SOUTH AFRICA

2020 Exploring Urban Resilience Pathways

UR NET Urban Resilience research Network

International Master City Resilience Design and Management

UIC barcelona

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About the report and the collection

Exploring Urban Resilience Pathways

This report is part of a collection wishing to provide a global overview about different cities' experience in resilience, and how this is evolving. The series is titled "Exploring Urban Resilience Pathways" and each report is prepared by one student of the Int. Msc. City Resilience Design and Management (URNet-UIC Barcelona) during the first semester, as a learning outcome of the acquired analytical skills - to find, understand, organize and communicate different perspectives, approaches and models of urban resilience implementation in a determined city.

The aim of each report is thus offering an easy-to-read overview, about how adaptive capacities have been evolving in a selected city, as set of mechanisms to respond through governance, plans, projects or communities-led initiatives to overlapping shocks and stresses within its recent history. Nowadays current City Resilience Strategies – launched and supported by the Rockefeller 100RC program – are included within these analyses, representing the ultimate trend of understanding and implementing city resilience.

What is interesting to learn from this series of reports, is that each of them critically discusses how cities managed adaptive responses to different treats in the past, and how the concept of resilience entered city agenda, discourses and plans, making explicit what (and if) resilience brought to city policies and practices. Thus, the relationship between past and present adaptive capacities, between resilience and sustainability, and between city resilience and community resilience are critically discussed.

Although the scope of these reports is ambitious, and the analysis leading to each report results complex, the presentation has been designed in order to be easy to read and accessible to the general public. Each report of this collection maintains a standard structure, facilitating the reading and the reports and cities comparison.

Hope this initiative contributes to spread the understanding about how resilience is framed and implemented in many cities across the globe.

CAPE TOWN SOUTH AFRICA
2020 Exploring Urban Resilience Pathways

SUMMARY

The city of Cape Town is located in the Western Cape Province and is the legislative capital of South Africa, being the oldest urban settlement, and the third largest city of the country. The city has faced several environmental and societal challenges through its history which has been defining its structure and socio-economic features. From the apartheid system through a 3 years drought, this city has learnt to develop its resilience in terms of adaption and mitigation through different plans, strategies, policies and projects during the 21st century.

In May 2016, Cape Town was selected by 100 Resilient Cities (100RC), pioneered by the Rockefeller Foundation, to join a global network of 100 cities wishing to enhance their "abilities to adapt, survive and thrive, no matter what acute shocks or chronic stresses they may experience" (100RC). Cape Town was admitted to the program because of its vulnerability to climate change and social inequalities. A large number of Capetonians still live with the legacy of apartheid on a daily basis through chronic stresses such as high unemployment, poverty, crime and lack of availability of affordable housing.

Cape Town's experience in resilience became globally known in the light of the recent drought which hit the city, threatening it with a potential "Day 0" in which the metropolis would have run out of water. The current city resilience strategy relies on a broad approach requiring individuals, communities, institutions, and all spheres of government to play a variety of resilience-building roles. However, it is useful to explore and review through this report the most relevant past and present plans and strategies dealing with resilience, to understand the shift in their focus, approaches and city challenges.

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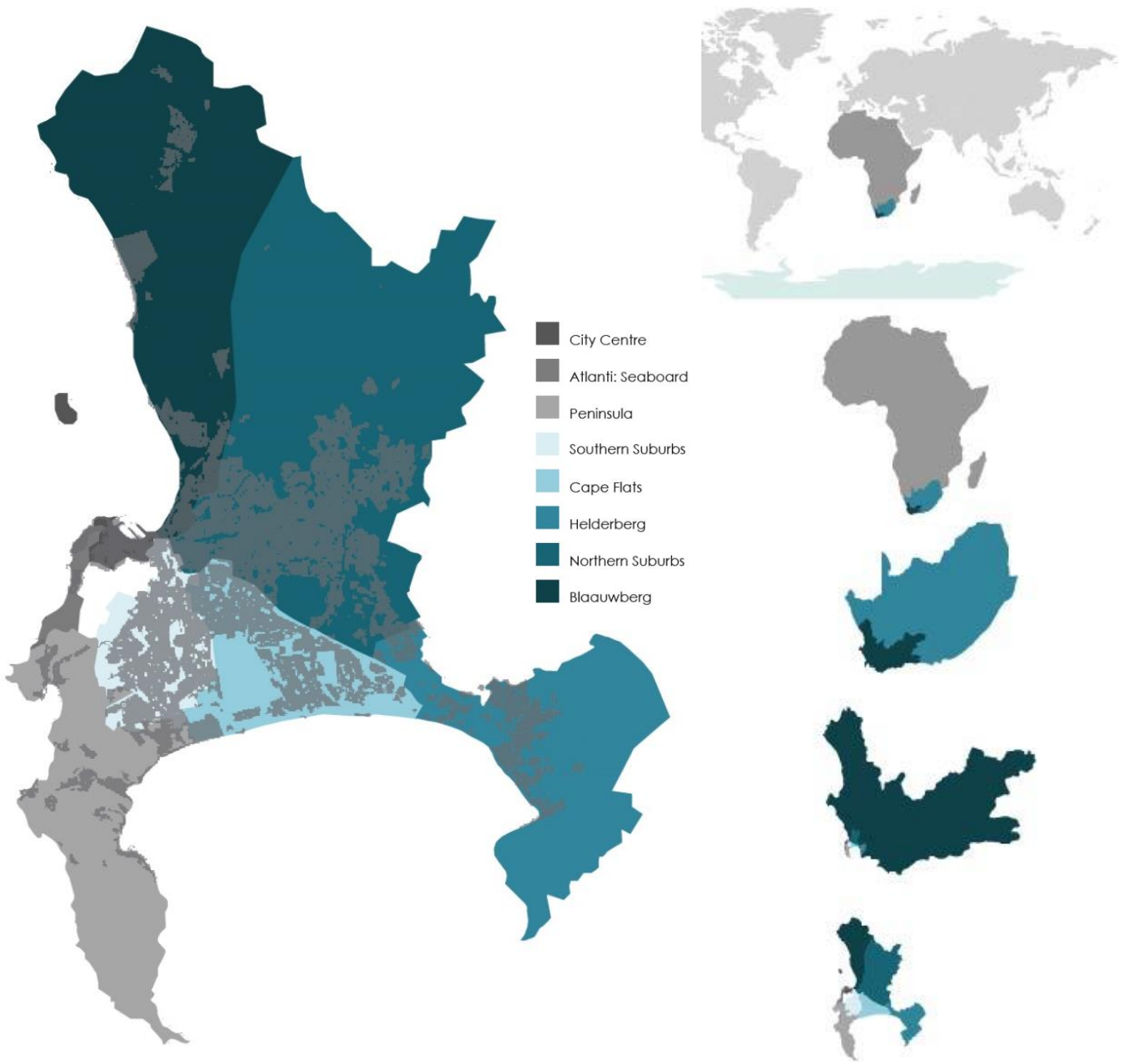
CAPE TOWN Introduction about the city

The city of Cape Town is located in the Western Cape Province and is the legislative capital of South Africa. Cape Town is South Africa's oldest urban settlement (founded in 1652 by the Dutch East India Company), and the third largest city of the country (after Johannesburg and Durban).



Profile of Cape Town

City size **2 456 sq.km.**

Population **4 322,031**

Gender
Male **2 129 594 (49%)**
Female **2 192 438 (51%)**

Languages
Afrikaans **32%**
isiXhosa **31%**
Enalish **31%**
Other **02%**

Informality
14% of capetonians are living in informal housing

No. Of households **1 264 894**
No. Of households living in poverty **20%**

Median household income **R8 000**

Unemployment **21%**

Access to basic service delivery
(% of households with access to basic services)
Water **98.4%**
Refuse removal **78.7%**
Electricity **90.1%**
Sanitation **92.8%**
Housing **77.5%**

Largest 3 sectors:
- Wholesale and retail trade, catering and accommodation **17.8%**
- Finance, insurance, real estate and business services **16.6%**
- Agriculture, forestry and fishing **14.1%**

HISTORICAL AND SPATIAL CONTEXT OF CAPE TOWN

Apartheid system and its urban consequences

Apartheid urban planning and the racially divisive policies of the country's past have negatively affected the spatial form, social fabric and structure of the economy, and resulted in urban management inefficiencies and expensive operating costs. As a result, the poorer population largely resides further away from economic and employment hubs, with uneven access to basic services as well as affordable housing, health, education, transport, social, cultural and recreational facilities (Resilient Cape Town: Preliminary Resilience Assessment, 2018)

The apartheid system was born in 1948, when the Afrikaaner National Party came to power in South Africa. It consisted in introducing a barrage of legislation to preserve white supremacy, where all South Africans citizens were officially classified according to skin colour, history and language by the 1950 'Population Registration Act (Spinks, 2001).

Apartheid system projected racial discrimination onto three levels of spatial structure: **'Grand'** Apartheid partitioned national space to create ten 'homelands' for the Black population, leaving 87% of national land for whites, coloureds and Asians; **'Petty' Apartheid** segregated public spaces and facilities between whites and non-whites; **'Urban' Apartheid** established race-based residential segregation(Spinks, 2001).

Apartheid did not just segregate races, but entrenched inequality; of housing form, geographical location, environmental landscape, and distribution of facilities. It also manipulated urban spaces to legitimise inequality, but ultimately produced a violently divided society rather than peaceful separation. The level of urban segregation was almost total, and Cape Town was and still is South Africa's most segregated metropolis.

Post-apartheid city

INEQUALITY

Despite significant political progress, with two democratic elections and a progressive constitution, Apartheid's socio-spatial structure remains dominant; as a consequence, the spaces given for apartheid settlements (townships) are areas with more risks and vulnerabilities in the city (Cape Flats). As a legacy of the former apartheid system, Cape Town is now known for being an unequal and growing city, which main challenge is overcome its inequity.

Mix of Formal and Informal Housing, Khayelitsha
Source: The Urban Food System of Cape Town, South Africa, 2017

INFORMALITY

There are at least 204 informal settlements in Cape Town that have been established in response to rapid inward migration and urbanization. These informal settlements accommodate approximately 145 000 households (Proactive re-blocking of informal settlements policy, 2013).

Informal settlements are at a greater risk from the effects of disasters. Some informal areas are built on dangerous sites such as unplanned landfills, wetlands or depressions which intensify the likelihood of disasters such as flooding. From a social point of view, these areas often overlap with high social vulnerability such as poverty, unemployment and high crime rates. The reality on the city of Cape Town is that the challenges of daily stresses and intermittent shocks are exponentially higher for individuals living in these settlements.

Inequality in services delivery

Formal housing **2/3 of city's water**

Informal settlements **4% of city's water** as a resource

1/3 of the city's residents (1.5 million people) can't afford to pay for water

180 000 household in informal settlements collect free water from public standpipes and some have to share community toilets

Source: Rebecca Davis, 12 August 2015

ECONOMIC CONTEXT OF CAPE TOWN

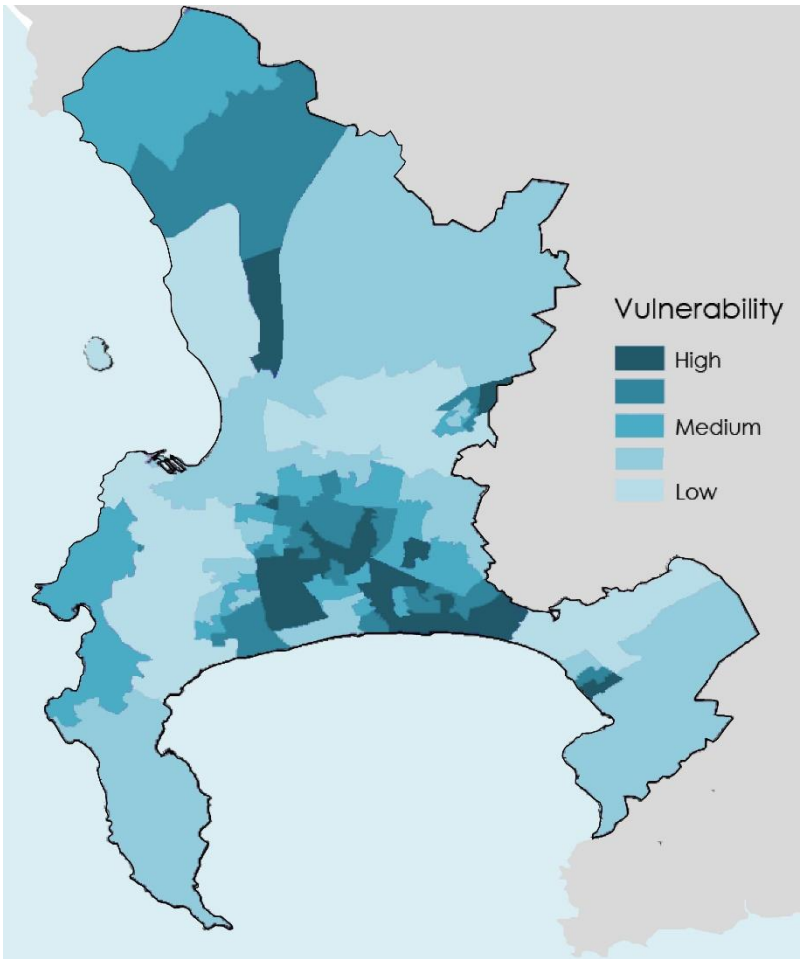
The Cape Town economy contributes 9,4% to the national employment figure and is the second-largest employer of all the South African metropolitan areas (Economic Performance Indicators for Cape Town, 2017). Industries that have grown quickly and have emerged as comparative advantages for Cape Town include information and communication technology, renewable energy, film and media, and tourism and business services, especially business-process outsourcing. Accompanying this shift is the continuing decline of employment opportunities for low- and semi-skilled workers in the city (Resilient Cape Town: Preliminary Resilience Assessment, 2018).

SOCIAL CONTEXT OF CAPE TOWN

Cape Town consists of a dynamic and multicultural society that provides a number of opportunities. Cape Town is however also a city with numerous societal stresses, many overlaid on each other, with strong spatial agglomeration. One of the most relevant is the migration. Cape Town is the second most populous city in South Africa and the 10th most

populous city in Africa. The rapid urbanization present in the last years is largely the result of inward migration of South Africans, particularly from the Eastern Cape, Gauteng and other parts of the Western Cape. A significant number of new migrants to Cape Town find residence in one of the city's many informal settlements.

For this reason, Cape Town's continued growth will intensify the range of environmental and social challenges it already faces.



Social Vulnerability Map
Adapted from: Apostos, Alex 2017, 'mapping social vulnerability in cape town'

Key social stresses that Cape Town is still grappling with can be linked to the country's historical roots, including the legacy of apartheid, as well as ongoing high levels of unemployment and poverty. These stresses include crime, substance abuse, gang activity and gender-based violence, with the youth and women being most at risk.

ENVIRONMENTAL CONTEXT OF CAPE TOWN

Cape Town has a unique natural environment surrounded by mountains and the sea. It possesses a range of natural and semi-natural open spaces as well as terrestrial and aquatic ecosystems that support a variety of plants and animals. Cape Town is a biodiversity hotspot of global significance; it is at the heart of the Cape Floristic Region (CFR) – the smallest of the world's six floral kingdoms – and is home to approximately 3 500 of the 9 600 plant species found in the CFR. The city of Cape Town is also home to significant heritage assets, both in terms of the built environment and cultural heritage, which give the city a unique sense of place (Environmental Strategy, 2017

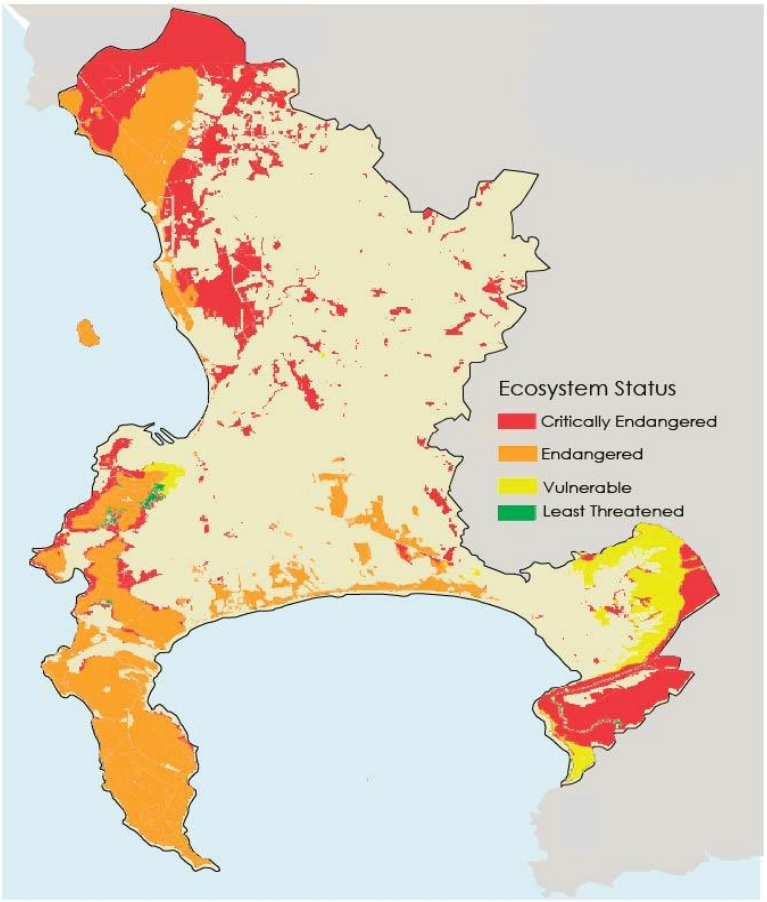
Cape Floral Region Protected Areas (South Africa)
Source: Western Cape Nature Conservation Board
whc.unesco.org/en/documents/114241

Cape Town is a unique example of a city where biodiversity must be conserved as part of the urban fabric, and be fully integrated into present and future spatial planning. However, the city is very vulnerable to the impact of climate change, notably to a likely increase in frequency and intensity of extreme weather events.

Climatic changes that Cape Town is facing include:

- A decrease in annual average rainfall and changed seasonality of rainfall
- An increase in mean annual temperature: higher maximum temperatures, more hot days, and more frequent and intense heat waves
- An increase in average wind and maximum wind strength
- An increase in both the intensity and frequency of storms: short, high-intensity rainfall events and increased size and duration of coastal storms.

Resilient Cape Town: Preliminary Resilience Assessment, 2018



Ecosystem Status Map
Source: city of Cape Town 2012 state of the environment report

DAY ZERO

The Western Cape region experienced 3 consecutive years of below average rainfall between 2015 and 2018, translated into a record-breaking drought which has been described as the worst in more than a century and which no one saw coming (Joubert, L; Ziervogel, G. June 2019). The potential for a major city to run out of water during this time was called 'Day Zero', which referred to the day when the average levels of stored water would reach 13.5%, leaving large sections of the city without reticulated water.

The City government began to develop a portfolio response to the drought, the City analyzed a wide variety of risks and proposed a comprehensive set of emergency, tactical and strategic actions, including interventions related to both water demand and supply. Meanwhile Capetonians, in households and businesses, were doing remarkable things to contribute to the drought response.

Beginning in late 2017 and continuing through 2018, the City government increased its investment in mechanisms to manage water pressure on a zone-by-zone basis using smart process controllers. This led to a reduction in water consumption by a further 50 mL a day by early 2018.

By partnering with other large users in the water system, the City received a considerable water transfer from a private agricultural association. This, along with the regular attainment of daily water consumption, as well as a few early rains, resulted in the prospect of Day Zero being called off for 2018. And soon thereafter it was removed as a possibility for 2019 as well.

Capetonians working together helped to avoid the arrival of Day Zero by showing strong resilience. During the whole of 2018, and into the early months of 2019, water-saving and efficiency behaviors endured, even as restrictions were gradually lessened.

The people of Cape Town have responded to the possibility of what has come to be known as "Day Zero" by curtailing water consumption by more than 50% compared to pre-drought consumptions levels.

Resilience lessons learned from the drought: A whole city responds

In 2014 Cape Town was well known worldwide for its water management. But by the end of 2015 with Day Zero, this changed. Water demand and availability, economic development, planning (decision-making), social inequity, political tensions, bureaucratic management challenges, infrastructure failures and delays, all this in collision with a climate shock were the root cause of the 3-years drought. This drought showed how politically and economically unstable a city can became.

With the crisis contained, the entire experience has served as a strong wake-up call for the extremity of drought events that are expected to become more frequent in the years ahead, particularly under conditions of climate change. One of the most relevant learnt lessons from the drought is the importance of planning for future scenario in short but mostly in long term, based on understanding that the water resource will be scarcer in the future. Also, the need for a stronger governance link between city departments and with national government (better data, knowledge and communication, and understand how the wider water system works).

The Crisis is averted for now; however, a similar shock could be striking during the next years. For this reason, the city and citizens need to adapt much faster to climate change, to strengthen their capacity and manage water much better. Also, citizen needs to work in harmony with the government in order to create more resilient and long term solutions.

AREA 1: STRENGTHEN GOVERNANCE

LESSON 1: Build systems and relationships of Mutual Accountability for effective water management between spheres of government

LESSON 2: Strengthen horizontal/transversal management between municipal departments and entities

LESSON 3: Invest in partnerships beyond the city

AREA 2: DATA, EXPERTISE AND COMMUNICATION

LESSON 4: Understand the local water system

LESSON 5: Share information about the water situation to build public trust

LESSON 6: External input is important

AREA 3: TAKE A SYSTEMS APPROACH

LESSON 7: Actively manage and integrate diverse part of the water system

LESSON 8: Create a robust networked system of water supply

LESSON 9: Recognize the limitations of the current financial model for water.

AREA 4: BUILD ADAPTIVE CAPACITY

LESSON 10: Strengthen leadership and the capacity to enable flexible, adaptive decision-making

LESSON 11: Integrate Climate Change into water planning

LESSON 12: Develop a water sensitive city vision

12 Lessons from the Cape Town drought.
Source: Adapted from Unpacking the Cape Town drought: lessons learned by Gina Ziervogel

City Past Adaptive Pathway

"Before Resilience"

Cape Town is situated within a unique and diverse natural environment, that offers significant benefits in terms of the ecosystem goods and services it provides. However, Cape Town, as with many urban areas globally, faces a number of environmental challenges, mostly characteristic of cities in developing countries. As a rapidly growing city that hosts critically endangered biodiversity of global importance, the need to conserve biodiversity is a key challenge. Cape Town additionally faces a number of socio-economic challenges. The city struggles with high levels of unemployment, poverty, inequality, crime, and social injustice.

Cape Town Challenges
Action Plan 2011

High carbon footprint (compared to similar cities)

Poor energy security

Rapid urbanization and associated energy poverty

Urban sprawl

Vulnerability to the impacts of climate change

HISTORY OF CLIMATE CHANGE STRATEGIES AND POLICIES IN THE CITY

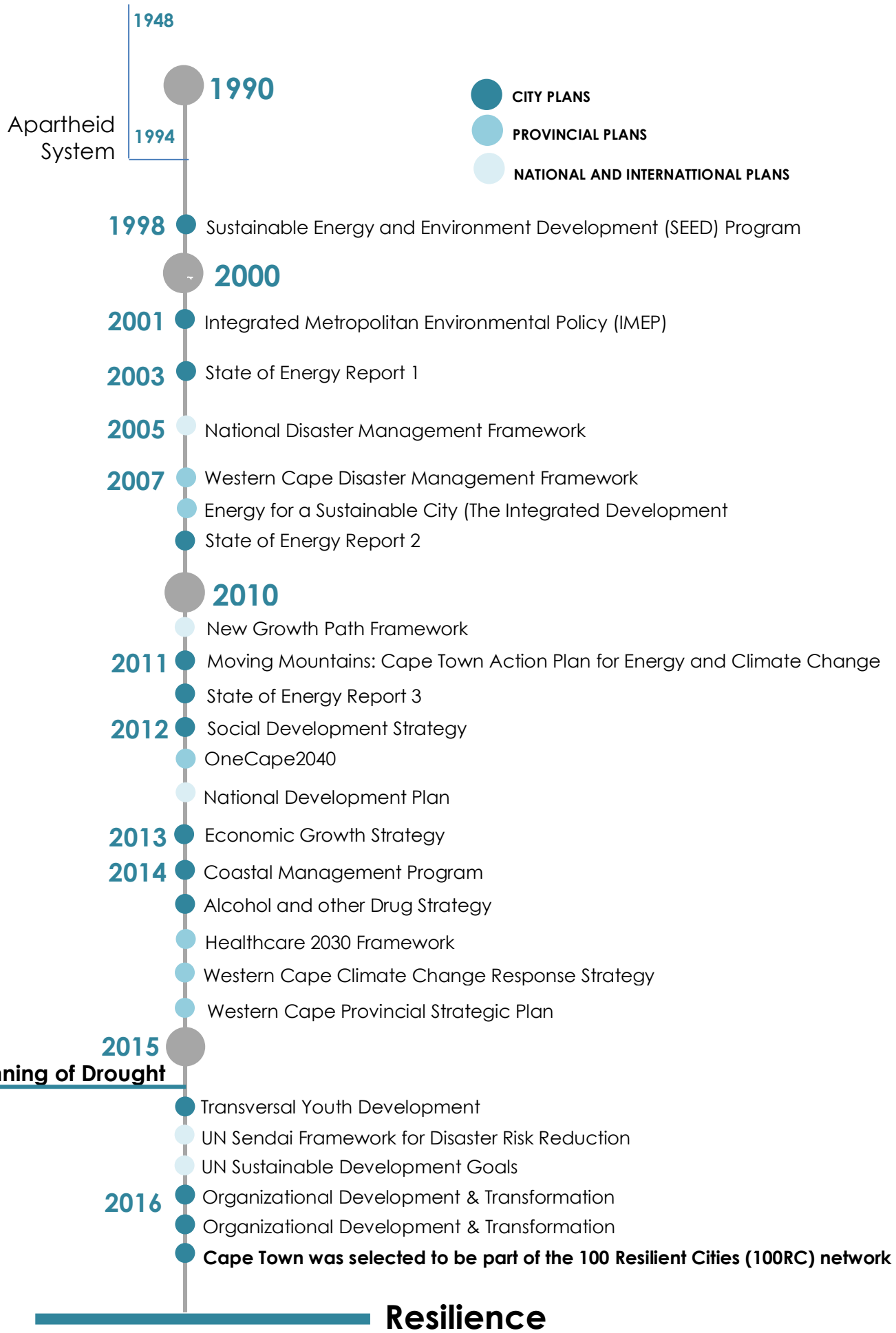
The first policy developed based on environmental challenges in Cape Town was the Integrated Metropolitan Environmental Policy (IMEP), adopted by Council in 2001 and was later accompanied by a set of implementation strategies. One of these was a draft Energy and Climate Change Strategy, which was developed in 2003. Elements of this strategy were included in the Spatial Development Framework, the City Development Strategy and the Integrated Development Plan (IDP). The Energy and Climate Change Strategy was based on key foundational programs and projects in the City and run through partnerships around the Sustainable Energy, Environment and Development Program (SEED).

The Energy and Climate Action Plan (ECAP), which was adopted by Council in 2010, was based on energy futures modelling and developed to promote the implementation of the IMEP Energy and Climate Change Strategy which was primarily focused on mitigation. To cover the adaptation action gap, in November 2006, the City's Mayoral Committee endorsed a set of principles outlined in the report "Framework for Adaptation to Climate Change in the City of Cape Town", which formed the precursor and basis for all subsequent climate change adaptation related work in Cape Town. In parallel, the City undertook a comprehensive Disaster Risk Assessment, which identified climate as high on the list of hazards. The assessment leads to the development of 23 hazard plans, one of which was a 2012 climate change and coastal process hazards disaster risk management plan. This plan covers sea level rise, storm surge, coastal erosion, sand dune migration,

saline intrusion of aquifers, changes in rainfall pattern, changes in aquifer recharge, drought, heat waves, UV radiation exposure, cold spells, tsunamis, harmful marine algal blooms (red tide) and stranding of whales and other animals.

The City was involved at high level in the 17th Conference of the Parties to the United Nations Framework Convention on Climate Change (COP 17) hosted in Durban in December 2011, and ran a visible and active campaign during the build up to the event (Climate Smart Cape Town). During this time the Cape Town Climate Change Coalition was launched, providing a communications and collaboration platform for Cape Town-based organizations and institutions involved in or impacted by climate change. Thirty government, academic, civil society and corporate entities signed the coalition charter at the time and the coalition has continued to meet around important climate change issues of relevance to Cape Town.

Given the international evolution of climate change plans - initially focusing on mitigation and then from the mid-2000s increasingly including adaptation to climate change - it is not unusual for cities internationally to have initially developed mitigation based climate change plans without considering or including climate change adaptation. Through time, the city recognizes that is important a balanced approach including both adaptation and mitigation in the make of plans and strategies.


1948
1990
Apartheid System
1994
CITY PLANS
PROVINCIAL PLANS
NATIONAL AND INTERNATTIONAL PLANS
1998 Sustainable Energy and Environment Development (SEED) Program
2000
2001 Integrated Metropolitan Environmental Policy (IMEP)
2003 State of Energy Report 1
2005 National Disaster Management Framework
2007 Western Cape Disaster Management Framework
Energy for a Sustainable City (The Integrated Development
State of Energy Report 2
2010
New Growth Path Framework
2011 Moving Mountains: Cape Town Action Plan for Energy and Climate Change
State of Energy Report 3
2012 Social Development Strategy
OneCape2040
National Development Plan
2013 Economic Growth Strategy
2014 Coastal Management Program
Alcohol and other Drug Strategy
Healthcare 2030 Framework
Western Cape Climate Change Response Strategy
Western Cape Provincial Strategic Plan
2015
Beginning of Drought
Transversal Youth Development
UN Sendai Framework for Disaster Risk Reduction
UN Sustainable Development Goals
2016 Organizational Development & Transformation
Organizational Development & Transformation
Cape Town was selected to be part of the 100 Resilient Cities (100RC) network
Resilience

RESILIENCE In Cape Town

Cape Town's Resilience Story

With an **unemployment** rate above its historical average, born disproportionately by the city's youth, Cape Town has clear resilience priorities. Unemployment is a key driver of poverty, and continues to exacerbate existing **socio-economic inequality**, as well as substance abuse and **crime**. Unemployment also undermines the tax and income base of the government and increases the cost of basic and social services, forcing the government to do more with fewer resources.

Climate change is furthermore a major stress and Cape Town is particularly vulnerable to its impacts, which are expected to become more frequent and intense. The city, as well as the surrounding provincial region, confronted a **severe drought**, a shock event, with recent annual rainfall levels being among the lowest in recorded history.

Cape Town is increasingly characterized by **informality**, with over 200 informal settlements having been established in the city. The challenges of daily stresses and intermittent shocks are exponentially higher for individuals living in these settlements. Informal settlements are characterized by a lack of formal tenure, insufficient public space and facilities, inadequate access to municipal services, poor access ways, and non-compliance with planning and building regulations

100 Resilient Cities website.

Resilience

2017

- Travel Demand Management
- Electricity Generation and Distribution Plan
- Air Quality Management Plan
- Water Services Development Plan
- Integrated Waste Management
- Integrated Development Plan
- Environmental Strategy
- Water Resilience Plan
- Cape Town Integrated Development Plan (IDP) 2017-2022
- Climate Change Policy

2018

- Municipal Spatial Development
- Comprehensive Integrated Transport Plan
- Built Environment Performance
- Cape Metro District Health Plan

2019

- Water Strategy
- National Climate Adaptation Strategy

Cape Town's Resilience Challenge:

Tackling **unemployment** and **improving the resilience of informal settlements** are top priorities for South Africa's legislative capital.

100 Resilient Cities website.

Cape Town Challenges Resilience Strategy 2019

Shocks

Shocks are sudden sharp events that threaten a city

- Infrastructure failure
- Gale-force winds
- Civil unrest
- Financial/economic crises
- Cyber-attack
- Fire
- Power outage
- Rainfall flooding
- Drought
- Heat wave

Stresses

Stresses weaken the fabric of a city on a day-to-day or cyclical basis

- Climate change
- Informal settlements
- Substance abuse
- Crime and violence
- Lack of social cohesion
- Traffic congestion
- Food insecurity
- Poverty and inequality
- Trauma
- Insecure municipal finances
- Rapid urbanization
- Unemployment

"A resilient Cape Town is a compassionate, connected, and capable city, where Capetonians collaborate across households, communities and institutions, to build collective responses to the current and future social, environmental and economic challenges" (Resilience Strategy, 2019)

Urban Resilience nowadays in Cape Town

The effects of climate change in Cape Town are exacerbated by the present physical and socioeconomic vulnerabilities. As a result, the city recognizes the importance of responding to the challenges of the 21st century through resilience building efforts.

Resilience is defined by the Rockefeller Foundation as "the capacity of individuals, communities, institutions, businesses and systems in a city to survive, adapt and thrive no matter what kind of chronic stresses and acute shocks they experience". Urban resilience refers to the ability of an urban system-and all its constituent socio-ecological and socio-technical networks across temporal and spatial scales-to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity (Meerow, 2015). Following this definitions, urban resilience incorporates the need to manage the multiple risks and challenges in a city that arise from global environmental and social problems and that affect everyone, particularly the poor and most vulnerable in a society.

In Cape Town resilience first appeared following the selection of the 100 cities in the 100RC network. Right after, the city appointed a Chief Resilience Officer (CRO) for Cape Town with the endorsement of the City Council. Then, the CRO began to establish a Department of Resilience, located within the City's Directorate of Corporate Services.

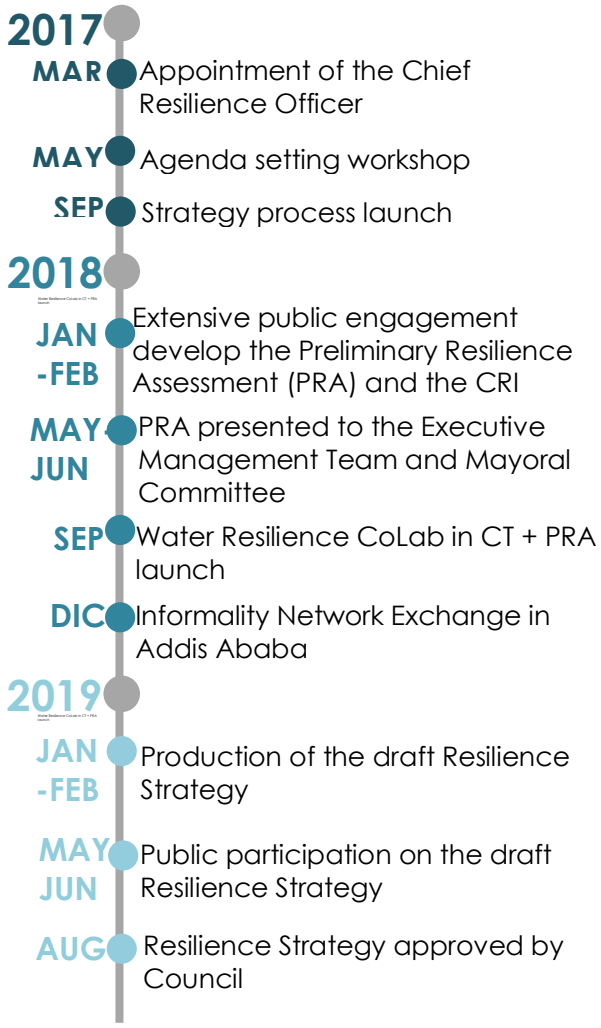
In order to measure the resilience of Cape Town, the different stakeholders involved in the process of creating a Resilience Strategy, used the CRI as main tool. However, they established that some of the most important aspects of the city were no covered by the CRI, (e.g. informality). Similarly, while disaster-related questions were overly proportioned, other important themes like food and education were under proportioned (Croese, S; Green, C; Morgan, G. 2020).

In addition, the prioritization of resilience at a high level within the City of Cape Town is evident in its Environmental Strategy, Climate Change Policy and its Integrated Development Plan (IDP) 2017–2022. All of them list resilience as guiding principles, goal or mission. Therefore, the City is committed to build resilience in order to address urban challenges that leave households vulnerable to social, environmental, and economic shocks.

1. RESILIENCE STRATEGY

Cape Town took a bottom-up approach to the development of its resilience strategy, meaning that a range of stakeholders, citizens, and subject experts across Cape Town were consulted to seek their input on resilience factors in Cape Town.

This strategy is developed in 5 pillars, 20 goals, and 75 actions. Each of these actions is aligned with the relevant CRF drivers that it aims to improve, with the relevant SDG goals and targets, and with other actions in the strategy that it works alongside. Likewise, each goal is described and measured through a series of characteristics such as: resilience value, quality of resilience (robust, resourceful, flexible, inclusive, integrated and redundant), shocks and stresses, SDGs, status, timescale and the number of aligned actions



STRATEGY PILLARS

Cape Town's resilience challenge is to build "a resilient Cape Town that is a compassionate, connected, and capable city, where Capetonians collaborate across households, communities, and institutions to build collective responses to the current and future social, environmental, and economic challenges". Based on this, the actions of the strategy are specifically concerned with building the capacity that is required to plan for and to manage shocks and stresses. Moreover, each action in the resilience strategy aligns with multiple other actions, showing not only interconnections but also transversally. While there may be a lead for each action, all actions require multiple government departments or collaborations across government areas and with external actors. Also, the strategy shows its alignment with other plans and strategies at local, provincial and national and international levels.

Based on the gaps found in the CRI tool, several actions in the resilience strategy intend to impact positively on building resilience in informal settlements and the informal economy.

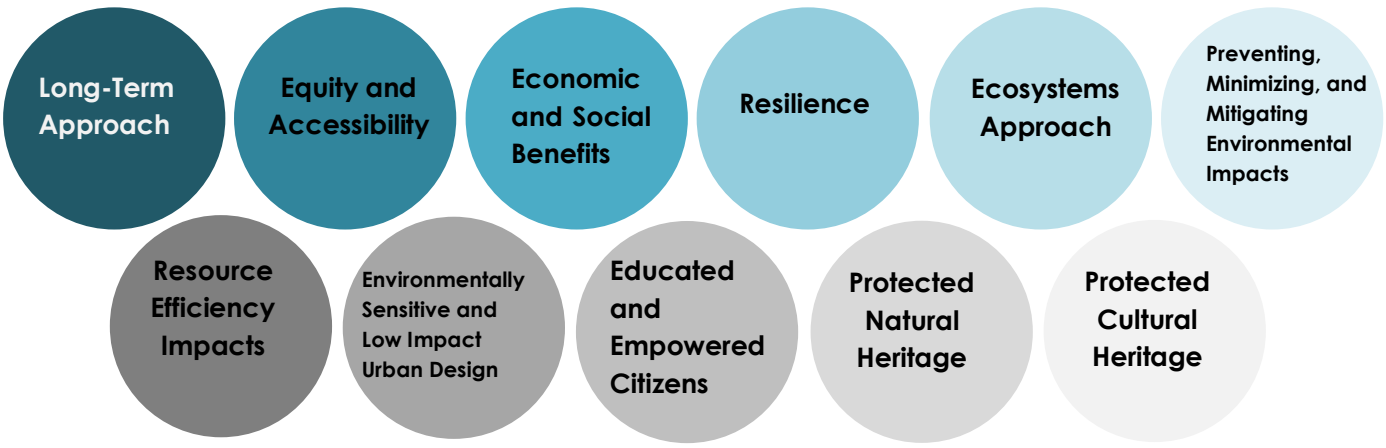
In terms of community resilience aspects, the city of Cape Town is exploring possibilities for monitoring at the community level through action 4.2.1, which is a flagship action dedicated to developing neighborhoods resilience assessments with the aim of building greater awareness at a community level of shocks and vulnerabilities, more prepared communities for shock events, and the production of standardized data for guiding and monitoring the effectiveness of interventions, projects and plans (Croese, S; Green, C; Morgan, G. 2020).

In addition, is relevant to mention that the strategy structure is also based on the previous three-years-drought. Each pillar is aligned with the drought impacts multiplied by stresses, the successful actions by capetonians and government to prepare for and defeat day zero and the lessons learnt from the drought relevant to most shocks events.

2. ENVIRONMENTAL STRATEGY

The Environmental Strategy vision is to "enhance, protect and manage Cape Town's natural and cultural resources for long term prosperity, in a way that optimizes economic opportunities and promotes access and social wellbeing".

PRINCIPLES



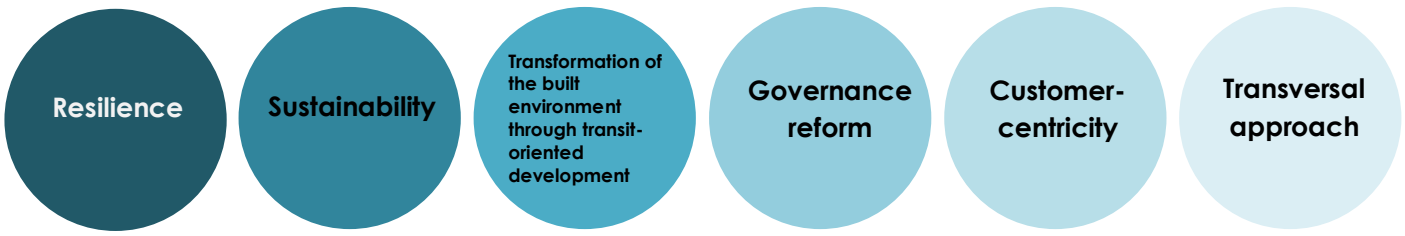
The environmental strategy will approach resilience by taking decisions, implementing service delivery, operating, as well as planning for the future, the City will ensure a focus on resilience, enabling the city to withstand and mitigate the negative impacts of environmental hazards, proactively reduce Cape Town's vulnerability, and protect the city's economy.

The City will strive to implement the Environmental Strategy through the formation of partnerships and transversal management approaches, where shared responsibility and collaborative decision making between line departments is at the core of implementation.

3. INTEGRATED DEVELOPMENT PLAN (IDP) 2017-2022

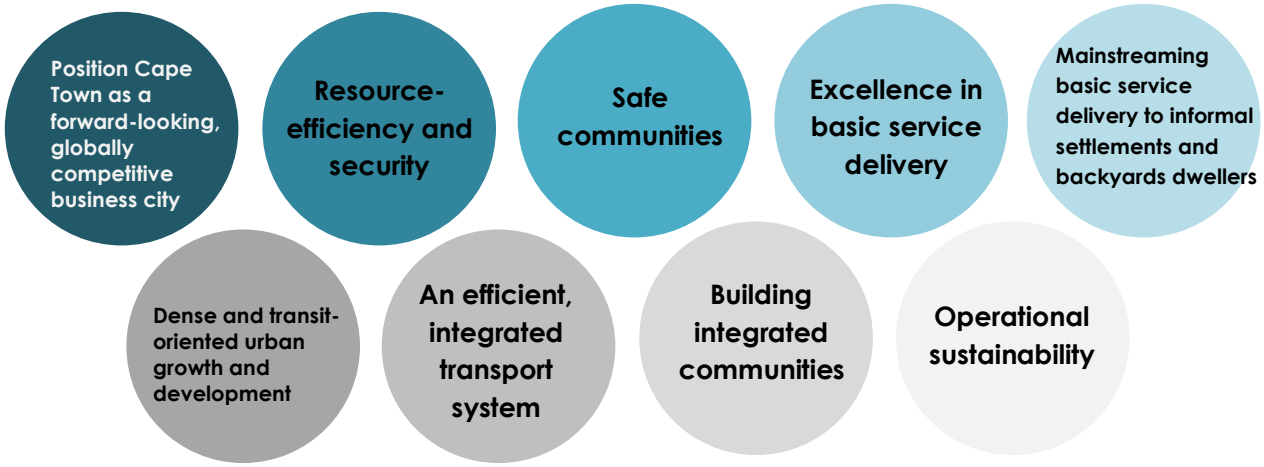
The IDP is a strategic planning instrument which guides and informs all planning and decisions in the municipality. The City's IDP has six guiding principles of which 'resilience' is one. As noted in the IDP, 'the City views urban resilience as a core factor in achieving its strategic objectives of building a safe, caring, opportunity, inclusive and well-run city. Therefore, the City is committed to building resilience to urban challenges that leave households vulnerable to social, environmental and economic shocks.'61 The other guiding principles include 'sustainability', 'transformation of the built environment through transit-orientated development', 'governance reform', 'customer-centricity' and a 'transversal approach'. These guiding principles are expected to be incorporated not only into the implementation of the programs and projects identified in the IDP, but also into all the operations of the City. This will ensure that resilience is considered in the conceptualization, planning and implementation of all projects in the City. The IDP must, according to legislation, incorporate key operational and developmental strategies that the City will be focusing on implementing over the five-year term.

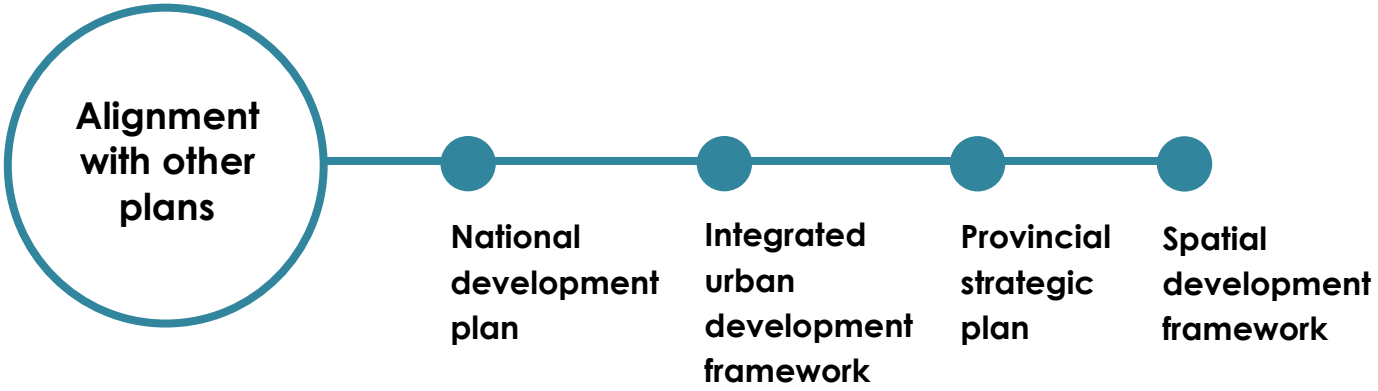
PRINCIPLES



Based on the principles, the IDP developed 5 main **FOCUS AREAS** for the city

Moreover, the IDP established **9 PRIORITIES** which are the start for the implementation phase.





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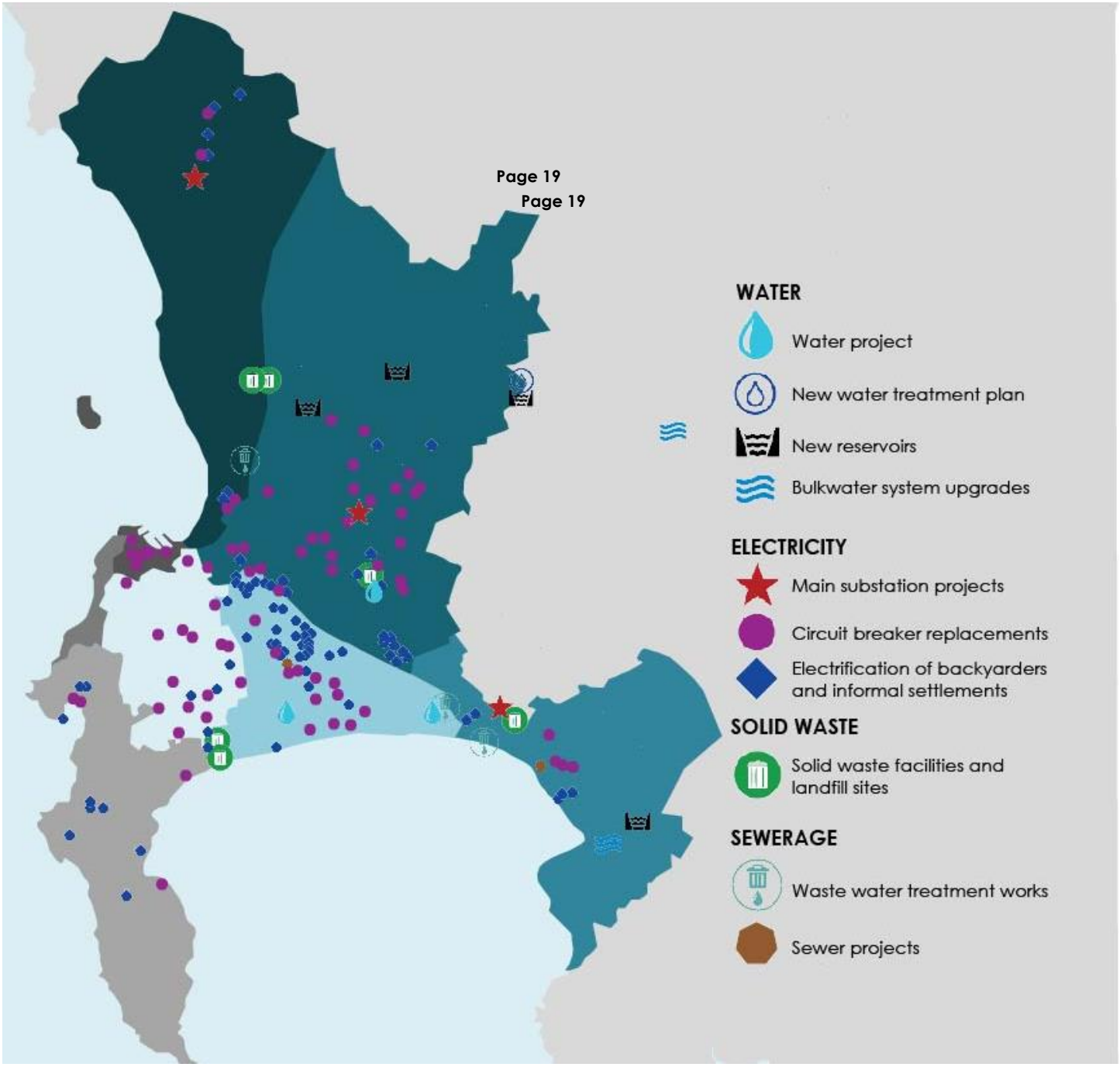

IDP Projects and estimated location
Adapted from: Integrated Development Plan 2017-2022

The implementation plan into the IDP is develop based also on the 5 pillars named above and 11 priorities which are transformed into 11 objectives, resulting in the following structure: 1 Pillar – 1.1Objective – 1.1.a Program – 1.1.a.1 Project

4. CLIMATE CHANGE POLICY (2017)

The City's response to climate change is focus both on preparing for change at the local level to reduce risks and build adaptive capacity to projected climate change impacts, and contributing to global efforts to reduce GHG emissions.

The focus of the policy is to design and use the key levers and mechanisms that the City holds to actively drive, influence and enable change. These levers include, amongst others, strategic planning, development approvals, pricing (tariffs and rates) and by-law development and enforcement. Through this policy, The City is working extensively to prepare for change at the local level to reduce risks and build adaptive capacity, to contribute to global efforts to reduce GHG emissions and to build a more resource efficient and resilient Cape Town. The solutions to address climate change through this policy need to be cross-cutting, holistic and must consider those most affected. Anticipating, reducing, responding to and coping with identified impacts necessitate an integrated approach across the City.

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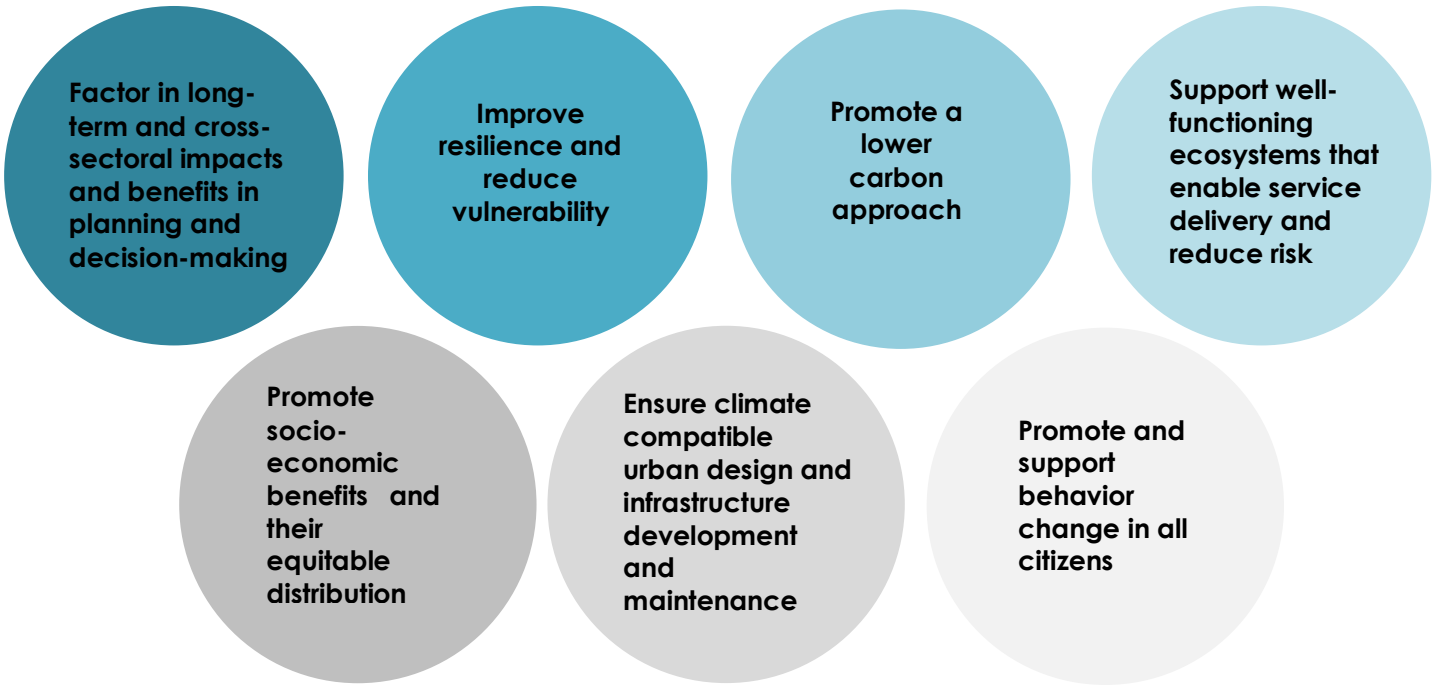
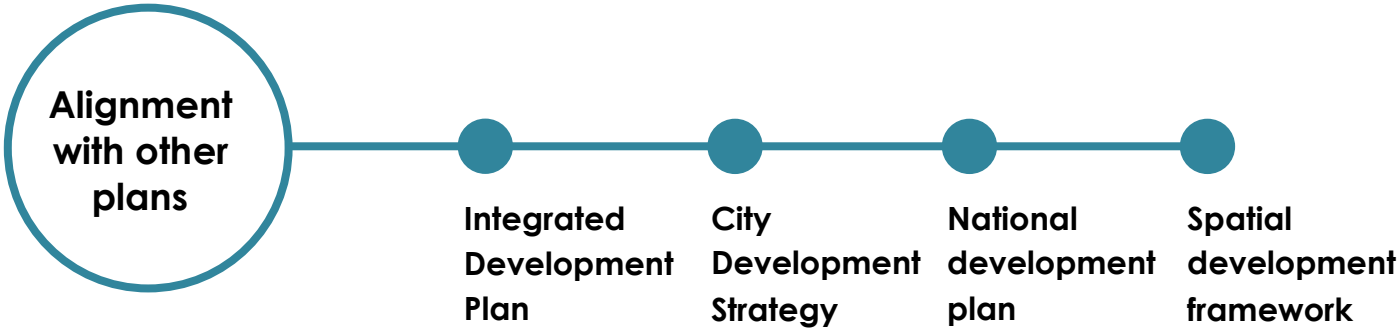


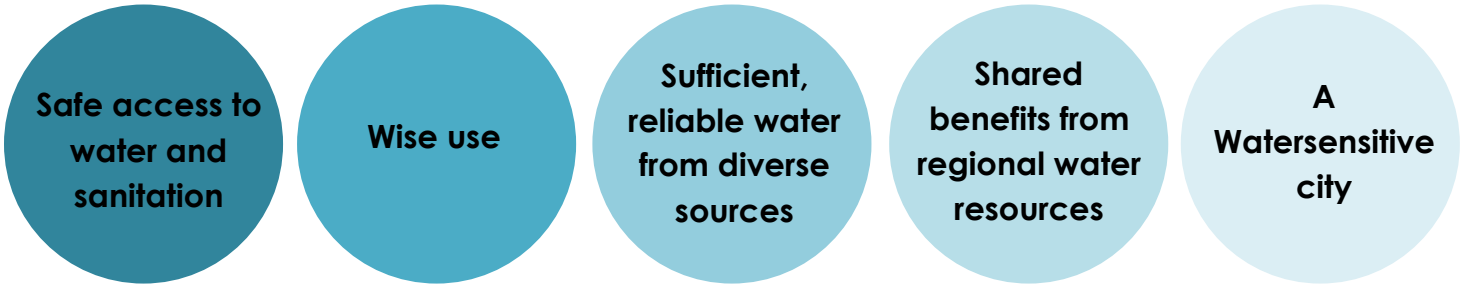


5. WATER STRATEGY OF 2019

This strategy was developed in the context of the severe three-year drought that Cape Town experienced from 2015 to 2017. Cape Town managed to get through it and avoid Day Zero by successfully reducing water use by more than 40%, which was a remarkable achievement. The lessons learnt in the process, what works well and what needs to be improved, have informed this strategy.

The strategy provides a roadmap towards a future in which there will be sufficient water for all, and Cape Town will be more resilient to climate and other shocks. With a long-term vision, it takes into account the important yet complex relationships between water, people, the economy and the environment.

PRINCIPLES

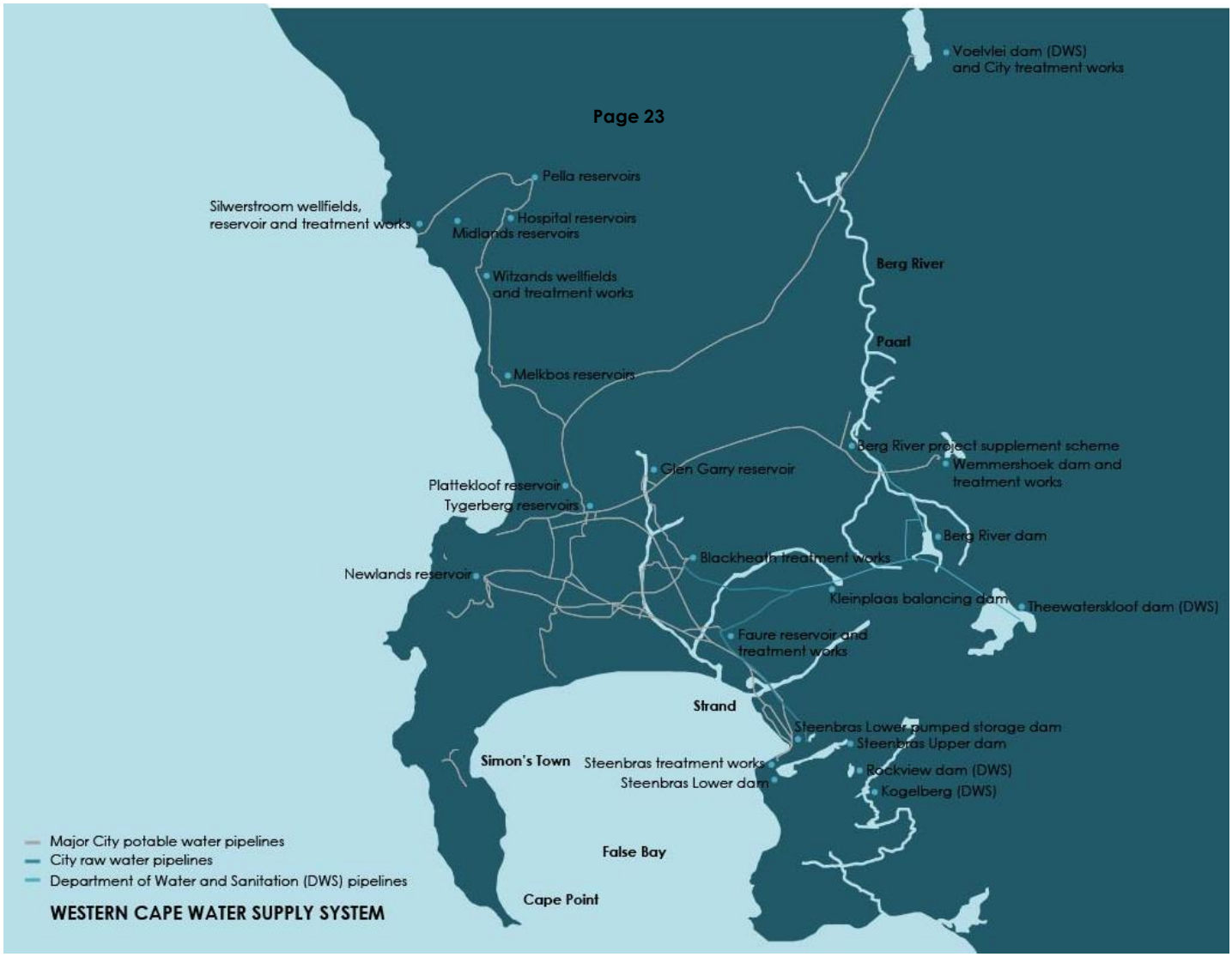


The fulfilment of these five commitments will result in citizens' needs being met, support being given for improved living conditions and protection of the environment, and will ultimately enable and support a growing economy. The steps necessary to translate the strategy into

action are set out in the last section of the document and include the strengthening of institutions, financial resourcing and building trust.

Building resilience through partnering and collaboration

Successfully translating the City's commitments in this strategy into meaningful outcomes requires a whole-of-government and whole-of-society approach. The City recognizes that collaborative relationships need to be built and maintained at many different levels of the Cape Town water system, including between: Citizens and the City; Customers and Cape Town Water; Citizens and political leaders; Officials and politicians; Different City departments; Different spheres of government; Business and the City; The City and the scientific community; and The City and other users of the WCWSS.



The geographic extent of the Western Cape water supply system
Adapted from: Cape Town's Water Strategy: Our shared water future

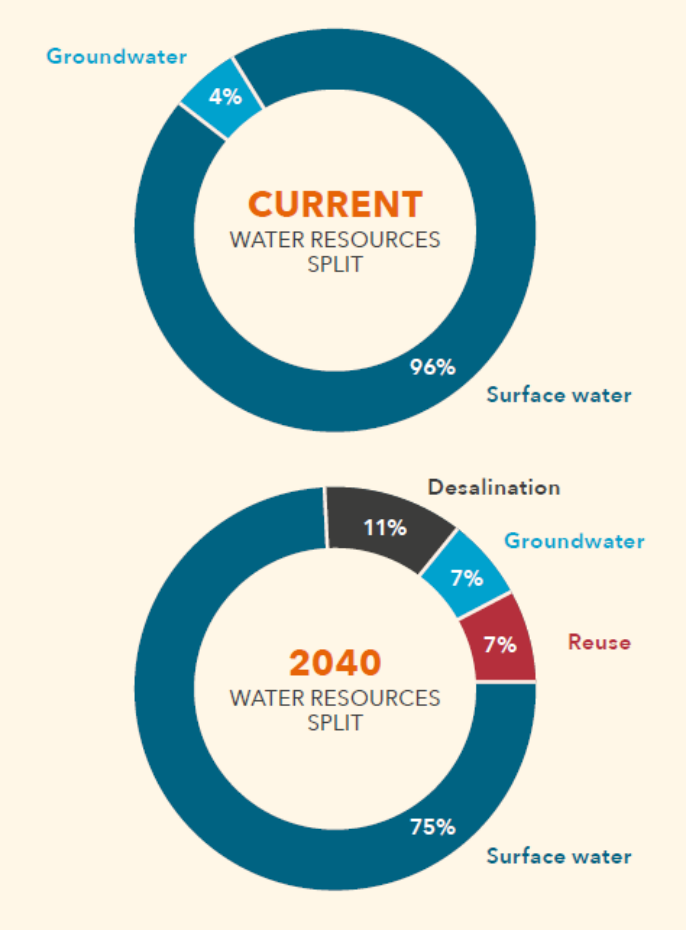
Implementation

A **Cape Town Water transition plan** will be developed and implemented to transform Cape Town Water into a modern, fit-for-purpose water services provider, which will lead key elements of the implementation of this strategy.

The **Water Services Development Plan** will incorporate the augmentation plan and all formal planning-related aspects of the water and sanitation business.

The **Collaborative Resilience Action Plan** will create a multi-stakeholder platform to coordinate efforts and improve governance and decision making during any crisis.

The platform will provide monitoring to support the City during strategy implementation. The whole of- society approach of this initiative is based on the fundamental principles of sustainability and resilience, reinstates the critical importance and value of partnerships, communication and cooperation, and speaks directly to the United Nations sustainable development goals as well.



How Cape Town's water supply system will change
Cape Town's Water Strategy: Our shared water future

DISCUSSION – the evolution of resilience, approaches and trade-offs

In this section we are going to discuss the main insights about how resilience has been adopted in Cape Town, which are the approaches, contributions and trade-offs (negative and positive implications of the choices).

In order to simplify the reading of the discussion, it has been divided in 3 main topics, exploring the resilience effects across scales, the relationship between resilience and social justice, and finally how resilience changed the planning and management paradigm in the city.

Resilience across scales: the issue of multiscale governance

Most of the resilience building efforts respects to the drought were developed by and at the city level, even if a watershed regional scale issue. Although cooperation between city level departments and between provincial and national departments is critical for navigating a crisis like this, the already problematic relationship between local and national governments became a real issue and obstacle to many possible solutions during the drought.

Furthermore, water needs from different sectors and different neighborhoods contributed to make the spatial aspects of managing resilience a real political (and ethical) challenge. How much water should be used for a city center, how much for the agricultural areas, or big industries, or how much for tourism? How to manage this delicate trade-offs between saving the economy while people suffering from the lack of water, or closing some enterprises for have more water for households (i.e. while households were forced to follow strong restriction measures in order to save water, Coca-Cola and other industrial users were given a free pass for using water). Thus the resilience of Coca-Cola was prioritized over reducing water stresses in other nearby contexts. This raises the issue of responsibility: who is building resilience (of what, to what, for whom)?

For example, ground water (which could have been available in Cape Town) is national government competency for regulation, while Cape Town Government could only manage surface water. This lack of coordination among government levels, contributed to the rise of a second resilience trade-off, which was not about scales, but about groups and thus regarding social justice.

Resilience and Justice: whom resilience?

The impossibility for the local government to manage local groundwater induced a lack of control over many citizens that during the emergency started to dig wells and boreholes, to get their own private fresh water resource. We saw an out of control rising number of private wells during the drought, dig to alleviate the pressures of the harsh water restrictions.

Many middle and high-income households were able to buy their way out of the crisis by installing bulk water containers and grey-water systems, or sink boreholes, which protected them from the uncertainty of the municipal grid collapsing. As a result, people used the

water illegally (it's not known how many boreholes has been made because people who owned the boreholes were not obligated to registered them so there is no formal control). On the other hand, another issue related is the quality of the groundwater water. People who owned boreholes, spent a lot of money trying to clean the water coming from it, however, there were several health issues related. Nevertheless, this is not a solution for everyone in the city, only for high-income households.

As a result, few privileged Capetonians could get their own "private source of resilience", while – through the "tragedy of the common" lens – most of the population was exposed to the drought and saw groundwater level availability, a potential solution to drought, decreasing under their eye.

Some recently published paper pointed out how persistent drought still exists elsewhere in the region, in small town rural communities where there's a lack of water infrastructure, lack of access to dam water supplies and depleting aquifers. Cape Town similarly delivers reliable water to a greater proportion of its residents than the national average, but in informal settlements and peri-urban townships the situation can still be very dire. One example is Khayelitsha, where service delivery protests have increased over the past two decades. Addressing inequality is partly a matter of finding new technical solutions for piping water into informal settlements, but more broadly the situation is a result of political priorities which have historically often catered to the interests of rural, commercial, white farmers (Enqvist, J; Ziovergel, G, 2019). Addressing water resilience could have been not a local issue, in Cape Town, but a regional, or national issue, since many informal settlement live constantly in a "Day Zero" reality.

Indeed, the informal sector has only 4% of the water resource. Thousands of people need to collect water from standpipes outside of their homes every day and share community toilets. Thus how the current water resilience strategy contributed to building resilience to these so much already "adapted" (to live with no water in homes) communities? Is resilience helping the most vulnerable, being these the ones having developed no skills in coping with crises, while neglecting the ones (poorer) that live within many coping mechanisms because of their challenging lives?

As shown in the result section, the city took into account with the resilience strategies, the most vulnerable people (the informal sector). However, beyond the documents stating this, not implementation has been seen so far, in order to enhance water services for them. The City of Cape Town aims to provide one water tap for every 25 families within a 200m radius and one toilet for every five families, which would comply with the Emergency Housing Program, but this has proved to be insufficient. Usually, several households have to share a toilet located outside their dwelling. For example, Endlovini, in Khayelitsha, is home to an estimated 20 000 people who share 380 communal toilets (about 53 people per toilet). In some settlements where communities invaded the land, toilets and communal taps are located on the outskirts of the settlement because the land is still privately owned (for instance, Marikana Informal Settlement). In such cases the City of Cape Town argues that it cannot build infrastructure on such land until the legal issues of the illegal occupations have

been resolved (Hara, Ncube, & Sibanda, 2020). Residents of informal settlements say the drought has made no difference to the problems they already have with access to water. Many households share the same standpipe; there are problems with water pressure; and periods when the pipe stops functioning altogether. (Bratton, 2017).

Urban poor are a priority in the 5 commitments of the water strategy 2019. But no measure could be implemented radically for several factors. Since the end of apartheid, South Africa has failed to close the service delivery gap in townships and informal settlements across the country. Moreover, the government and water supply utility perceive more and more risky to supply water to certain areas. A recent inventory showed that the main barriers to the implementation of proper sanitation systems are unsuitability of the location of many settlements (more than 40% of the sites are located on private land, wetlands and flooding prone areas), high settlement densities (55%), the nonpermanent status of the informal settlements and the distance to existing sewerage networks. (Mels, D et al, 2008)

On the other hand, tensions across high-medium-low classes are emerging when some families from low-class communities started to worry that they'd now have to compete with middle-class Capetonians who might drive into their neighborhoods to fill up their water containers.

The Contributions of resilience to Governance: from engineering- responsive mechanisms to innovation for transition.

Resilience is not only about trade-offs and complexity. Looking to all the innovation in the planning and governances of the city and water, the drought was functional to induce a paradigm shift in Cape Town approach to urban challenges. As illustrated along the report analysis of the plans, resilience contributed to bring focus which is not only on responding to shocks (Engineering resilience approach) but start thinking about how to be prepare for future crisis. This means, to start thinking and enhancing generic resilience (or better said those capacities which confer to the system the resilience to effectively manage a shock or increasing stress). Several projects are aimed at increasing fresh water availability and increasing managing skills about water governance – reaching a more sustainable water use.

Cape Town is now a living lab for developing urban adaptions and new plans for addressing different shocks and stresses. Some of the proposals might be considered for be scaled up or exported in other developing countries contexts (For example all the projects related with the transformation of Cape Town to a Water sensitive city, see Water Strategy 2019, page 24).

After having discarded desalination as the Holy Grail of (technology-driven) water resilience, and in the light of the uncertain climatic future, Cape Town is entering a post-emergency phase of innovation, of experimentation and learning. In addition, Cape Town was the first city in the world to have been selected to deploy the City Water Resilience Framework created by Arup and 100 Resilience Cities program. The city of Cape Town has leaded this

new alliance by providing a comprehensive assessment of water management in the city through the creation of its Water Resilience Profile.

The city of Cape Town has already achieved a great deal as can be seen in the plans and strategies describes in this report (Environmental strategy, Integrated Development Plan, Climate Change Policy, Resilience Strategy, Water strategy). It is demonstrated that city has shown has the capacity to test, learn and going through cycles of innovation shaping a more sustainable urban future.

CONCLUSION

This report describes the evolution of the city of Cape Town towards resilience through the analysis of the most relevant plans and strategies with a focus on urban resilience, developed in the last years.

Before the mainstream of resilience in the city, the focus was orientated towards mitigation strategies addressing challenges related with climate change and migration. However, from mid-2000s, there is a shift on the focus towards the inclusion of adaptation measures as well. Therefore, new plans are developed under the idea of balancing adaptation and mitigation with the inclusion of citizens in most of the process.

Cape Town is a city that has faced many challenges through its history. From socio-economic, such as apartheid system, through climate and environmental related, such as Day Zero. Nevertheless, the city and its inhabitants have shown strong resilience and adaptive capacities responding to such shocks and stresses. With Day Zero specifically, the city has demonstrated its necessary willingness to adapt, leaving the city well placed to achieve much more and move towards being a resilient city

Cape Town's continued growth will intensify the range of challenges it already faces. From high levels of unemployment, substance abuse and crime to environmental degradation and climate change effects on the city. Simultaneously, Cape Town needs to overcome its inequity, which is a legacy of the former apartheid system and one the bigger challenges faced by the city. Hence Cape Town will require a major focus on physical and economic infrastructure as well as human capital development to manage these challenges. For this reason, Cape Town's resilience relies on a broader approach that requires individuals, communities, institutions, and all spheres of government, including the City of Cape Town, to play a variety of resilience-building roles.

Resilience timeline of Cape Town: Physical, economic, social shocks and stresses that Cape Town has experienced.

2000 years ago	1488	1652	1657	1697	1713	1798
The southern and south-western Cape regions are inhabited by the Khoikhoi people	The Portuguese explorer Bartolomeu Dias cir-cumnavigates the Cape, naming it 'Cabo de Boa Esperança' or the Cape of Good Hope	Jan van Riebeeck, arrives in Table Bay and establishes a refreshment station for the Dutch East India Company	First instance of the introduction of the official policy of territorial segregation in South Africa relating to the movements of the Khoikhoi people	First hospital instituted at the Cape by Simon van der Stel.	An outbreak of smallpox results in the death of a large portion of both the settler and Khoikhoi populations.	A fire devastates large areas of Cape Town.

1809	1814	1838	1863	1885	1890s	1895	1901
A large earthquake hits Cape Town, estimated to have measured 6.5 on the Richter scale	Cape Town formally becomes part of the British Empire after the Battle of Waterloo	The apprenticeship of slaves, formally emancipated in 1834, ends. This marks the factual end of slavery in the Cape.	Railways connecting Cape Town to the winelands are built	The Parliament buildings are completed at the Cape	Water, drainage and sewerage infrastructure is installed in Cape Town	First municipal electricity supply for lighting is established	An outbreak of bubonic plague hits Cape Town.

1910	1918	1923	1935	1936	1948	1950	1950
The Union of South Africa is formed	The University of Cape Town is established	The Urban Areas Act is passed, forcing Africans to live in designated locations	The reclamation of 480 acres of land on Cape Town's foreshore begins	The Table Bay power station is built	The National Party wins the general elections and commences institutionalized racial segregation under apartheid.	The National Party wins the general elections and commences institutionalized racial segregation under apartheid.	The Group Areas Act is passed by Parliament, mandating that certain geographical areas are declared for exclusive occupation by specific race groups.

1960	1960	1960	1964	1966	1967
Phillip Kgosana leads a Pan Africanist Congress march of between 30 000 and 50 000 protestors from Langa and Nyanga to police headquarters in Caledon Square, where protestors offer themselves up for arrest for not carrying passes.	The government bans the African National Congress and the Pan Africanist Congress.	The University of the Western Cape is established as a university for coloured people only	Nelson Mandela is imprisoned on Robben Island in Table Bay, beginning his 27-year incarceration as a political prisoner.	District Six is declared a 'White' area under the Group Areas Act of 1950, with removals starting in 1968. About 30 000 people living in the specific group area were affected.	The world's first human heart transplant is successfully performed at Groote Schuur Hospital in Cape Town

1969	1976	1982	1983	1984	1986
A 6.3 magnitude earthquake, the most destructive in South African history, occurs in Tulbagh, north-east of Cape Town	There is a significant increase in civil protests against apartheid. In September 200,000 coloured workers stay away from work in a protest action.	The Koeberg nuclear power station, still under construction, is bombed by Umkhonto we Sizwe, setting back construction by 18 months	Plans for the building of Khayelitsha are announced, one of the apartheid government's final attempts to enforce the Group Areas Act.	Unit 1 of the Koeberg nuclear power station is synchronised with the grid. It becomes the first, and remains the only nuclear power station in Africa.	The 'Gugulethu Seven', a group of anti-apartheid activists, are shot and killed by members of the then South African Police Force

1989	1990	1994	1998	2000	2000
On 13 September, 30 000 Capetonians from all communities marched in support of peace and the end of apartheid. The march was conducted in defiance of the State of Emergency	On Sunday 11 February, after 27 years in prison, Nelson Mandela is released from Victor Verster prison. On the same day he addressed a mass rally from the balcony of the Cape Town City Hall	The first democratic elections are held in South Africa. Nelson Mandela becomes president of the Republic of South Africa	A terrorist attack occurs at the Planet Hollywood restaurant in the Waterfront	In January, two wildfires burn more than 8 000 hectares of the Cape Peninsula, destroying houses and property	The City of Cape Town metropolitan municipality is formed by a merger of Cape Town/Central, Tygerberg, South Peninsula, Blaauwberg, Oostenberg, and Helderberg municipalities

2005	2006	2008	2013	2014	2015	2015	2015	2017	2018
Several incidents lead to shut downs of the Koeberg nuclear power station, leading to black-outs across the Cape	The Koeberg nuclear power stations shuts down again	Xenophobic attacks spread throughout South Africa, including Cape Town	Load-shedding takes place across the country, with rolling black-outs being experienced in Cape Town	Wildfires across the Cape Peninsula burn 6 900 hectares of land	On 3 March the temperature in Cape Town reaches 42.4 degrees, the hottest day recorded in a century	Beginning of the 3 years drought, the most severe in the region in over 100 years	A fire in the Imizamo Yethu informal settlement in Hout Bay destroys 4 500 homes and displaces 15 000 people	There is listeriosis outbreak across South Africa, resulting in at least 29 deaths in the Western Cape	End of Drought

Source: multiple sources, but mostly from SA history online, http://www.sahistory.org.za/topic/cape-town-timeline-1300-1997 and Preliminary Resilience Assessment of Cape Town

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