



TIPS AND
TRICKS

**POST DROUGHT
AND EMERGENCY
INTERVENTIONS**

Obtainable from:
Water Research Commission
Private Bag X03
Gezina
0031

Disclaimer

The Water Research Commission (WRC) has approved this booklet for publication. Approval does not signify that the contents necessarily reflect the views and policies of the WRC, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

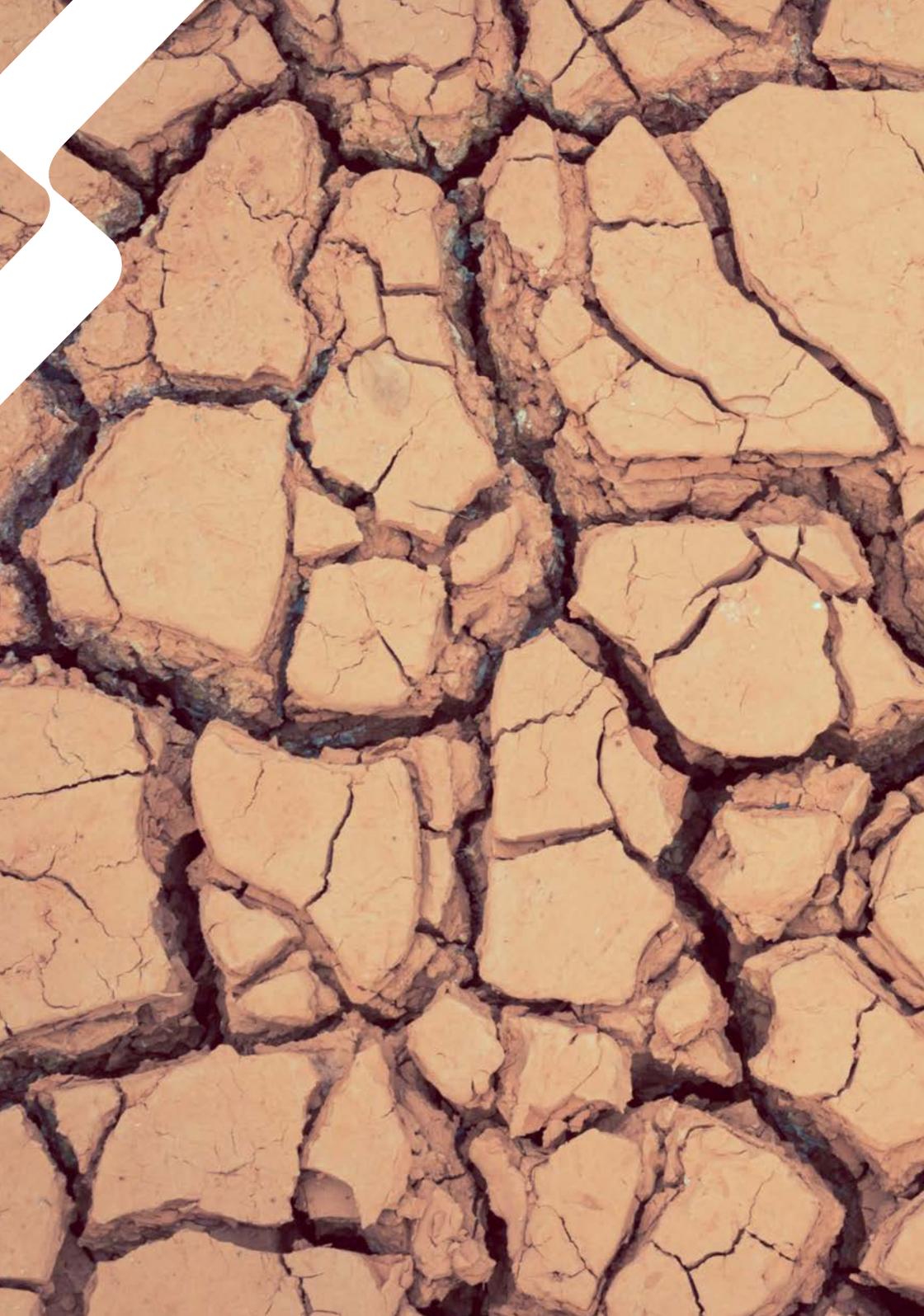
Production editor: Lani van Vuuren
Design and layout: Anja van der Merwe
Printed in the Republic of South Africa
© Water Research Commission

This booklet provides a summary of the report,
K. Pietersen, Post-drought and emergency
interventions: Towards higher water security
(WRC report no. 3005/1/23)



CONTENTS

Glossary	05
Introduction.....	07
Drought resilience tips and tricks.....	10
Other useful guides.....	19





GLOSSARY

- Disaster risk management** Integrated multisectoral and multidisciplinary, administrative organisational and operational planning processes and capacities aimed at lessening the impacts of natural hazards and related environmental, technological and biological factors.
- Disaster risk reduction** Implies all the elements that are necessary to reduce vulnerabilities and disaster risks throughout a society. It includes the core risk reduction principles of prevention, mitigation and preparedness.
- Drought** Drought is a prolonged dry period in the natural climate cycle. It is a slow-onset disaster characterised by the lack of precipitation, resulting in a water shortage. Drought can have a serious impact on health, agriculture, economies, energy and the environment.
- Drought contingency planning** A strategy or combination of strategies for monitoring the progression of a drought and preparing a response to potential water supply shortages resulting from severe droughts or other water supply emergencies.
- Drought resilience** The ability to respond to immediate water supply threats, withstand drought impacts and recover quickly.





INTRODUCTION

Drought is a common occurrence in South Africa, with the last major drought recorded in 2015 – 2019.

Drought can be divided into six categories, namely meteorological, agricultural, hydrological, and socio-economic, as well as ecological and anthropogenic droughts.

Despite the frequency of droughts, the responses are mostly reactive dealing with drought in an emergency mode rather than it being a normal, recurrent feature. This reactive approach is unsound from the perspective of vulnerability reduction since the recipients of this assistance are not expected to change behaviours or resource management practices as a condition of the assistance.

This situation is exacerbated by poorly operated and maintained water supply infrastructure, resulting in socio-political and economic impacts. Further, complex and seemingly bureaucratic hurdles limiting action are shown to be cumbersome factors that impede and continue to frustrate effective drought response in the country.

Table 1. Common terminology and definitions related to drought

Terminology	Definition
Drought	Natural but temporary imbalance of water availability caused by the lack of precipitation (e.g. rain) and high temperatures
Meteorological drought	Occurrence of reduced precipitation (e.g. <70%) compared to the long-term average for a particular region
Agricultural drought	Prolonged insufficiency of available water e.g. soil moisture, during the growth stages of crops, which often results in a reduction in yield
Hydrological drought	Persistently abnormally low water volumes in streams, reservoirs and aquifers
Anthropogenic drought	Water shortage caused and modified by human processes
Ecological drought	Drought impacting on ecosystems and the 'Natural Capital' they provide to human communities in terms of ecosystem services, e.g. quality regulation, waste treatment, erosion prevention and recreation
Socio-economic drought	Water demand exceeding the available supply causing damage to population, economy and society

The Disaster Management Act (Act no 57 of 2002) is the primary legislation dealing with drought conditions in South Africa. The Act is supported by policies and strategies such as the National Disaster Management Framework of 2005 and the Drought Management Plan of 2005. The policies and legislation also put forward the institutional framework for disaster risk management. This includes the establishment of the National Disaster Management Centre and the Provincial Disaster Management Centres as well as the Municipal Disaster Management Centre (MDMC).

Each metropolitan and district municipality must have a disaster management centre in their area of authority to ensure the implementation of the local disaster management policy and that the goals and priorities of provincial and national disaster management is attainable. Following consultations with local municipalities, a MDMC should be established which is operated jointly by the district and local municipalities.





DROUGHT RESILIENCE TIPS AND TRICKS

Any municipality under water stress needs a long-term strategy for drought resilience interventions that considers long-term conditions and plans for permanent solutions. Such interventions should include stakeholder engagement, functioning institutions and diversity of water sources and cooperation between local, regional and national levels of government.



To become drought resilient, municipalities must:

- **Take action to protect human health and the environment, while maintaining a minimum level of service for customers during drought**
- **Manage decreases in water supply, increases in water demand and changes in water quality**
- **Plan for future changes in weather and climate patterns that can reduce water supply**

ENSURING STAKEHOLDER ENGAGEMENT

Designing drought resilience interventions requires effective and meaningful stakeholder engagement. This is a crucial prerequisite to building trust, ownership and acceptability. One of the key weaknesses in responding to, or planning for, wicked problems such as drought is to oversimplify the problem as only meteorological, as well as to adopt a technical focus with limited technical skills to act.

Benefits of stakeholder engagement:

- More informed and transparent decision-making
- Conflict prevention because of consensus seeking and transparency in decision-making
- Trigger local stakeholder initiatives to implement demand and supply measures and reduce the cost of regulation



For effective stakeholder engagement municipalities need to follow these principles:

- Stakeholder engagement is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process
- Stakeholder engagement includes the promise that the participants' contribution will influence the decision
- stakeholder engagement promotes sustainable decisions by recognising and communicating the needs and interests of all participants, including decision-makers
- Stakeholder engagement seeks out and facilitates the involvement of those potentially affected by or interested in a decision
- Stakeholder engagement seeks input from participants in designing how they participate
- Stakeholder engagement provides participants with the information they need to participate meaningfully
- Stakeholder engagement communicates to participants how their input affected the decision

FUNCTIONING INSTITUTIONS

Implementing resilience interventions requires functioning institutions to reduce drought impacts. Management of droughts in South Africa is facilitated by several enablers, although impacted upon by several barriers.



Enablers and barriers to successful drought management

Community-level enablers	Community-level barriers
Community leadership structures	Lack of knowledge about management of drought
Available extension services	Lack of skilled human capital within the communities
Constituted farming communities	Financial constraints
Water use pressure groups	
Municipal-level enablers	Municipal-level barriers
Disaster management committees	Bureaucracy (red tape)
Available drought management	Financial management (incl. misappropriation of funds)
Information	Limited information
Water management institutions	Limited communication

The Department of Water and Sanitation is required to provide support or assistance to municipalities in drought matters. This includes regulating water abstraction considering the sustainable use of the resource. The assistance to local municipalities is best undertaken through local level water management institutions such as water use associations. Catchment management agencies can support municipalities at a regional level, becoming anchor institutions.



Keys to management success of water institutions:

- **Leadership** must respond to both internal organisational and broader external community imperatives. Leadership refers both to individuals who can be effective champions for improvement, and to teams that provide resilient, day-to-day management continuity and direction.
- A **Strategic business plan** provides a framework for decision-making by assessing current conditions and conducting strengths, weaknesses, opportunities and threats (SWOT) analysis; characterising a continuum of possible and likely future conditions; assessing underlying causes and effects of future conditions; and establishing vision, objectives, strategies, and underlying organisational values.

- **Knowledge management** spans standard operating procedures, human resource management, and business systems and operating systems data integration and utilisation to support dependable operations and continual improvement.
- **Measurement** is critical to management improvement efforts and is the backbone of successful continual improvement management and strategic business planning.
- **Continual improvement** plays a central role in effective local-level governance and is critical to making progress on drought resilience interventions.

HORIZONTAL AND VERTICAL COOPERATION

Multiple organisations and stakeholders play a part in drought resilience in local municipalities. This includes formal and informal institutions. Integration – both vertical (within the sector) and horizontal (across different established sectors) – is fundamental to balanced (local-level) governance and policymaking.

Example indicators of local drought risk governance

Inclusion and participation	Local capacity	Accountability and transparency
<ul style="list-style-type: none"> • Participation by all • Gender equality • Consideration of especially vulnerable groups • Partnership to foster knowledge co-generation 	<ul style="list-style-type: none"> • Policies are in place to protect vulnerable groups from disasters and climate change • Local knowledge, skills and resources are considered • There is a plan to turn policies into practices • There is adequate budget for drought risk reduction 	<ul style="list-style-type: none"> • Measure progress in implementing drought risk reduction policies • Involve communities and civil society in monitoring • Information gathering takes place • Updated information about drought risks and prevention

ECOLOGICAL AND CRITICAL BUILT INFRASTRUCTURE

Investing in water-related ecological infrastructure, with built infrastructure, will deliver more clean water from our land. Any attempt to transition to water sensitive cities will need to consider both formal and informal settlements.

The priority pathways and key actions for urban water resilience are set out below.

Plan for water

- Mainstream information on water, climate and health risks in urban and regional planning
- Recognise hydrologically linked regions, often larger than urban boundaries, to account for water resilience priorities based on ecosystems, rural-urban landscapes, and regional networks
- Incentivise development in less hazard-prone areas and / or areas with regulations and planning that support water-sensitive development
- Offer planning, policy and regulatory incentives for floodplain restoration and watershed protection, including preservation of green spaces within and around cities
- Increase capacity to implement regulatory frameworks and incentives, such as building permits, limits on groundwater extraction, and ecosystem protection
- Draw on nature-based solutions to proactively address water challenges and support communities
- Ensure the rights of the most marginalised groups are protected in existing and proposed schemes

Prioritise the most vulnerable

- Collect and use data disaggregated by social groups and spatial areas, on local climate and environmental risks, and on urbanisation patterns to identify the most vulnerable areas
- Integrate local knowledge and community participation in decision-making around improve water access and water resilience
- Support strategic and cost-effective policies that strengthen water resilience for the most socially vulnerable
- Support community-led and or government-led upgrading of informal settlements and water insecure areas
- Support the integration of small-scale, decentralised and / or informal water and sanitation providers
- Strengthen the role of public institutions to ensure the safety and affordability of innovative, off-the-grid water and sanitation solutions

Great change at scale

- Incentivise collaboration across jurisdictions and agencies to jointly consider a mix of green and grey infrastructure and create cost-saving synergies
- Support cross-departmental coordination, resource support, and capacity development, including identifying strategic opportunities to advance multiple outcomes among sectors that impact and are impacted by water, e.g. roads
- Prioritise multistakeholder engagement processes that align agendas and build consensus, trust and relationships crucial for building resilience
- Strengthen partnerships at the regional level to effectively manage the watershed region
- Support and recognise leadership at the community level to cocreate partnerships and knowledge grounded in the everyday realities of water challenges
- Build capacity to plan, implement and operationalise resilience in long-term strategies, business plans and investments
- Build leadership capacity for reflective learning and experimentation
- Build capacity with soft skills, such as contract negotiations and partnership building with community groups

Get finance right

- Develop financing mechanisms to improve own-source revenue streams, such as land value capture
- Create a shared vision with partners organisations, donors, the private sector, and the largest water consumers to increase investments in equitable water-sensitive design
- Develop mechanisms and incentives to align water-sensitive priorities and investments across sectors
- Establish dedicated funding pathways to channel external resources to water resources conservation and nature-based solutions
- Revise economic valuation method to account for long-term economic benefits, avoided costs and livelihood gains from urban water resilience actions
- Implement measures to capture value from building water resilience in the medium to long term. Increase transparency and equity criteria in investment allocations



Vulnerable communities, such as those living in informal settlements, need to be supported.

IMPROVE SYSTEM EFFICIENCY

Implementing measures to conserve water and reduce losses within reticulation systems are critical to drought preparedness:

- Reducing pressure throughout all or part of the distribution system, while maintaining necessary pressure for 'high priority' users, such as hospitals and firefighters.
- Limiting main flushing as much as possible, while still meeting all regulatory requirements
- Exploring beneficial uses for flushed water, such as irrigation, construction, fire-fighting storage or other non-drinking water uses
- Recirculating backwash water to the head of the treatment plant
- Aggressively finding and repairing leaks



Regular maintenance and curbing water losses is essential to achieving water security.

DIVERSIFICATION OF WATER RESOURCES

To achieve water security requires diversifying water sources to include water reuse, stormwater capture, recycled wastewater, groundwater and so on. This requires the following:

Construct new infrastructure: Diversifying sources helps to reduce the risk that water supply will fall below water demand. Examples includes using a varying mix of surface- and groundwater, employing desalination when the need arises, and establishing water trading with other utilities in times of water shortages or service disruption.

Build infrastructure: Increasing the amount of groundwater storage available promotes recharge when surface water flows are more than demand, thus increasing climate resilience for seasonal or extended periods of drought and taking advantage of seasonal variations in surface water runoff. Depending on whether natural or artificial aquifer recharge is employed, the required infrastructure may include percolation basins and injection wells.

Increase water storage capacity: Increased drought can reduce the safe yield of reservoirs. To reduce this risk, increases in available storage can be made. Methods for accomplishing this may include raising a dam, practicing aquifer storage and recovery, removing accumulated sediment in reservoirs, or lowering water intake elevation.

Practice conjunctive use: Conjunctive use involves the coordinated, optimal use of both surface- and groundwater, both intra- and inter-annually. Aquifer storage and recovery is a form of conjunctive use. For example, a local municipality may store some fraction of surface water flows in aquifers during wet years and withdraw this water during dry years when the river flow is low. Depending on whether natural or artificial aquifer recharge is employed, the required infrastructure may include percolation basins and injection wells.



The diversification of water sources, such as the use of surface- and groundwater, can enhance drought resilience.



OTHER USEFUL GUIDES

- Cap-Net, Drought risk reduction in integrated water resources management – Training manual, https://catalogue.unccd.int/560_drought-risk-reduction-in-integrated-water-resource-management.pdf
- CISA, Drought and infrastructure – A planning Guide, https://www.cisa.gov/sites/default/files/publications/Drought_and_Infrastructure_A_Planning_Guide_508c.pdf
- G. Ziervogel, Unpacking the Cape Town drought: Lessons learned, https://www.africancentreforcities.net/wp-content/uploads/2019/02/Ziervogel-2019-Lessons-from-Cape-Town-Drought_A.pdf
- U. Jack & P. de Souza, Water safety and security – Emergency response plans (WRC report no. TT 656/16), <https://wrcwebsite.azurewebsites.net/wp-content/uploads/mdocs/TT%20656-16.pdf>



WATER
RESEARCH
COMMISSION