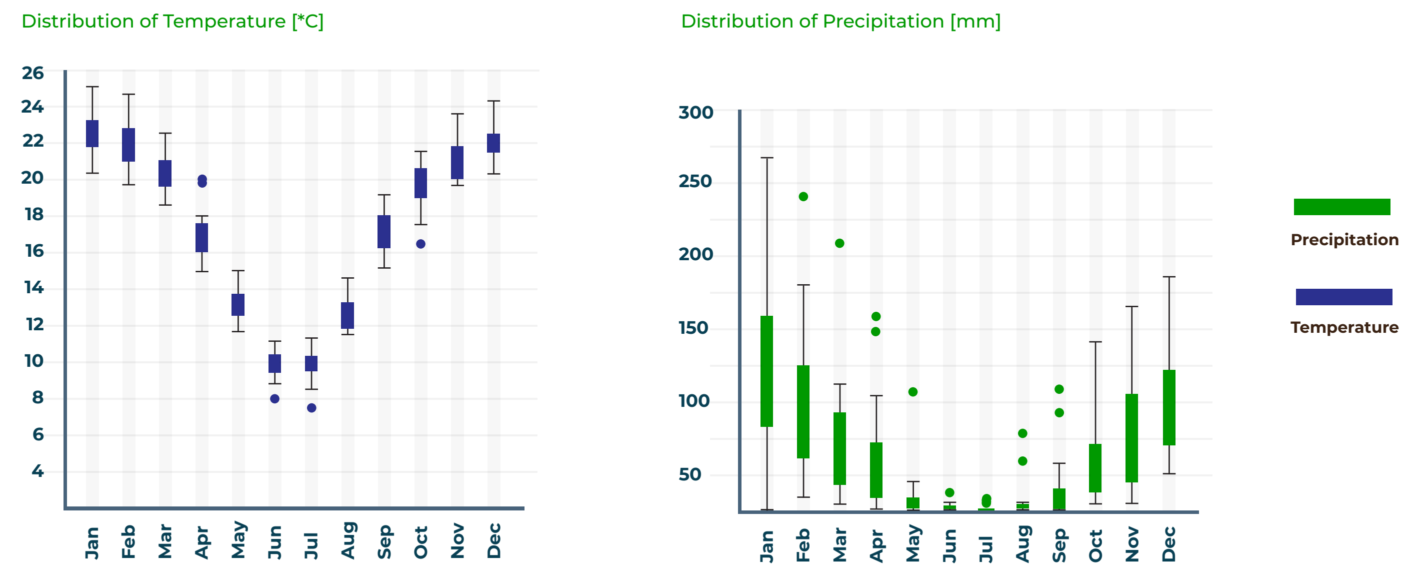
COUNTRY OVERVIEW

South Africa is a water-scarce country and one of the 30 driest countries in the world. The country has also experienced a growing frequency of droughts, in part triggered by El Niño Southern Oscillation (ENSO). Since 1990, 12 of those years were defined as drier years compared to only seven years in the previous 20 years. Over the past two years, several provinces were forced to set strict water restrictions (up to 50l per capita per day in the Day Zero case of Cape Town) – including curbs on irrigation – as dam levels dropped to below 20%. This had a direct effect on agriculture and food production, as well as ripple effects across the country. The impact of drought on food prices was severe with staple food items such as maize increasing. This affected mostly poor households, who spend relatively large portions of their income on food – sometimes as much as 34% of their total income. Also, lower agricultural production has affected food supplies. This, in turn, could increase food prices and food insecurity and push up the country's import bill.

Fig 1. Long-term rainfall and temperature anomaly over South Africa (26.73S, 27.07E), 1970-1999



Vulnerability and Impact Assessment – Medium

Monitoring and Early Warning Systems – Medium

Mitigation, Preparedness and Response – Medium

Low | Medium | High

The Integrated Drought Risk Management Framework highlights a three-pillar approach centered around interconnected, multi-disciplinary, multi-institutional activities. These are 1) Monitoring and early warning systems; 2) Vulnerability and impact assessment; 3) Mitigation, preparedness and response.

This country's Drought Resilience Profile contains drought information based on these three pillars. South Africa's vulnerability and impact assessment capacity is categorized as medium. Despite the many vulnerability and impact assessments that have been conducted in several sectors by different institutions, few integrate biophysical and socio-economic and historical dimensions, and also do not sufficiently interrogate the administrative role of institutional and other governance systems. South Africa's monitoring and early warning systems capacity is also categorized as medium. While several drought early warning systems are used, South Africa is constrained by limited coordination between institutions providing early warning system (EWS) services, limited context-specific EWS dissemination to next users and limited social indicators to form part of a holistic early warning system. Similarly, South Africa's capacity in Pillar 3, mitigation, preparedness and response, is categorized as medium, due in large part to the need for improved coordination between different tiers of government, and the financial 'bailout' mentality, with little follow-through on proactive rather than reactive drought responses.

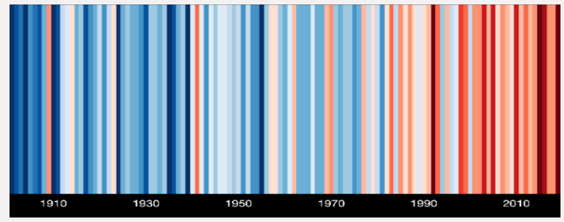
WORLD BANK GROUP | CIWA | IWMI International Water Management Institute | NDMC

Drought: Historical and Future

Historical climate

- As illustrated in the #ShowYourStripes 'warming stripe' graphic for South Africa in Fig. 2, the stripes turn from mainly blue to mainly red in more recent years, illustrating the rise in average temperature since 1901.
- Drought frequency is erratic. There were three droughts in the 1980s, two in the 1990s, one in the 2000s, and three in the 2010s (Table 1).
- Average annual temperature is 17.5°C (1901-2016).
- Extreme cold days and nights decreased by 3.7°C and 6 days/nights per decade from 1961 to 2000.
- Warming trends are seen in the western interior, western and southern coastal regions and less in central interior.
- Mean annual precipitation is 469.9mm (1901-2016).
- Increased rainfall variability has been experienced with lower variability in the winter rainfall zones of the west.

Fig 2. Temperature change in South Africa, 1901-2019



Source: Berkley Earth/#ShowYourStripes

Future climate

- Average annual temperature is expected to increase by 2°C (1.4°C to 2.9°C) from 2040 to 2059.
- By the middle of the century, the coast is likely to warm by about 1 to 2°C and the interior by about 2 to 3°C.
- All modelling approaches project warming trends through the end of this century, but most approaches project the possibility of both drying and wetting trends in almost all parts of South Africa. Overall, there is far greater certainty in temperature than in rainfall projections.

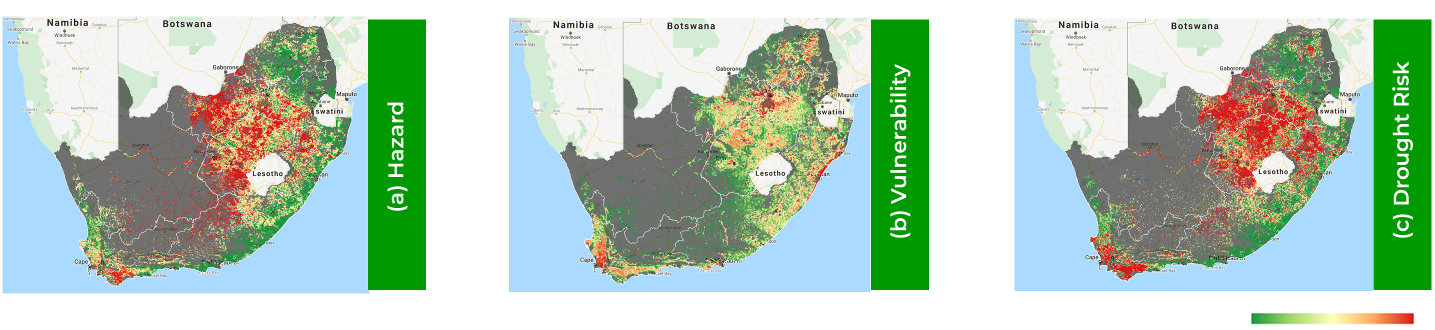
Table 1. Major droughts in South Africa (Source: EM-DAT.2020

Year	Location	Affected Population
1980-81	Natal and countrywide	No data*
1986	Lebowa, Venda	850,000
1988	Former homelands i.e. northern and eastern parts of the country (Transkei, Bophuthatswana, Ciskei, Venda, Gazankulu, KaNgwane, KwaNdebele, KwaZulu, Lebowa and QwaQwa)	1,320,000
1990	Transvaal, Natal, Cape Province, former homelands (Transkei, Bophuthatswana, Ciskei, Venda, Gazankulu, KaNgwane, KwaNdebele, KwaZulu, Lebowa, and QwaQwa)	No data*
1995	Northern provinces (Northern Cape, North West, Limpopo)	300,000
2004	KwaZulu-Natal, Cape, Mpumalanga, North West, Free State, Limpopo	15,000,000
2015-16	Free state, Limpopo, Mpumalanga, North-West, Western Cape, KwaZulu-Natal	2,700,000
2017	Western Cape, Northern Cape	No data*
2018-19	North West, Free State	750,000

* No data provided from source

Vulnerability and Impact Assessment

Fig 3a-c. Drought hazard, vulnerability and drought risk maps for South Africa



Vulnerability and Impact Assessment

The maps (Fig 3a-c) depict: (a) Drought hazard areas, (b) Areas of vulnerability and (c) Drought risk.

Drought risk is defined by characterizing hazard and exposure to vulnerability and the lack of adaptive capacity, using multisource information from satellite-derived drought indices and socio-economic conditions. In terms of components, hazard is defined through meteorological and agricultural drought i.e. Integrated Drought Severity Index (IDSI); and exposure and vulnerability expressed through population density, human modification index, water risk and irrigated systems.

Agricultural production (agricultural practices i.e. irrigated area, food production as provided on HarvestChoice) was used to define levels of vulnerability which were finally combined with all three components to define levels of drought risk at the country level, referred to as the National Drought Risk Index (NDRI). The drought risk profile is therefore based on the probabilistic estimation of hazard and vulnerability to assess the drought risk in the exposed areas. The NDRI estimates that 42% of the agricultural areas in the central regions of Free State, Gauteng, Mpumalanga and North West are among the drought-prone areas in South Africa, with Cape Town and surrounding areas being a drought-prone pocket in the south. The result of the hazard assessment – just like the risk assessment – displays an east-west gradient. Communal farmers and communal land in the former homelands are more vulnerable than commercial farmers and land in the west. The vulnerability in the central and eastern municipalities is as a result of extensive soil erosion, but also limited access to information and infrastructure as well as low income levels and high unemployment. The dependency on agriculture in combination with limited alternative on-farm income further aggravates the vulnerability. Thus, communal farmers are more vulnerable to drought because almost all their livelihood income depends on farming. In the western municipalities low soil fertility, lack of access to surface water for irrigation and high stock theft rates are contributors to the high and moderate vulnerabilities (Jordaan, 2017).

Droughts have adverse on effects population and GDP

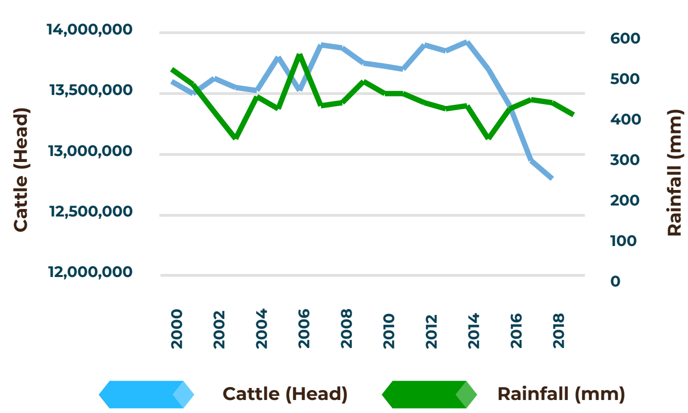
Drought has resulted in the reduction in yield of the maize crop, a reduction in agriculture's contribution to the gross domestic product (GDP), as well as negative impacts on food supply and employment opportunities. From 2015 to 2017 South Africa's economy grew by a mere 1.1% average per annum, with the agricultural sector growing at a rate of less than 0.5%. According to AFASA (2019), since January 2018, the agricultural sector shed 31, 000 jobs in provinces severely affected by the drought and lost approximately ZAR7 billion (turnover) due to drought. AgriSA (2019) reported that real agricultural output was 9.2% lower in the first half of 2019 than in the corresponding period of 2018, in part also due to the knock-on effects of earlier drought conditions in 2013, 2015 and 2016. Financial strain is increasing, carry-over debt is rising and many farmers are looking to alternative sources of income in urban areas. The 2017/18 Western Cape drought has had a big effect on total production, with export volumes down 25%, from the 5-year average of 2008/9-2012/13 to the 5-year average of 2013/14-2017/18. The Western Cape agricultural sector contributes roughly 22% to national agricultural GDP.

Droughts impact on livestock

In the livestock sector, several factors have combined to strain producer margins in 2019 such as rising feed prices resulting from the dry planting season as well as the foot and mouth disease (FMD) outbreak in 2019. With domestic consumer spending under pressure, the diversion of products that might otherwise have been exported into the domestic market caused prices to decline sharply despite constrained supply amid a cycle of herd rebuilding.

From the compilation (Fig 4.) showing livestock production and rainfall, it is evident that there is a relationship between cattle production and rainfall. When rainfall increases the number of cattle are expected to increase. Only a few cases show a negative relationship, however, that is expected as a shortage of rainfall may cause spikes in food prices after extreme events are expected and reduced productivity due to deteriorating vegetation (livestock highly depend on). In essence, drought reduces livestock numbers through higher mortality and culling due to the declining availability of grazing and feed. Where livestock product prices rise sharply in the years following drought due to reduced supply, this may cause some revival of livestock numbers in subsequent years.

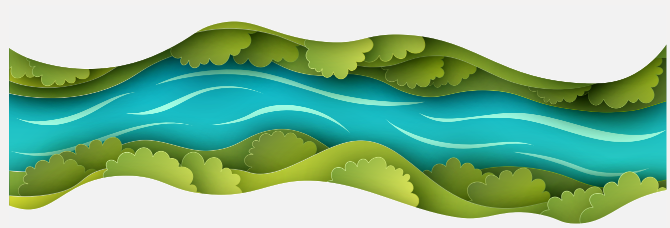
Fig 4. Livestock production and rainfall patterns in South Africa, 2000-2018



Source: Own compilation from World Bank & FAO **2020**

Water resources

At 490mm per year, South Africa's annual rainfall is half the world average (WWF, 2016). Despite that, the country has a reliable yield (i.e. supply from current infrastructure) of around 15 billion kl/year (at 98% assurance of supply – or 2% annual probability of supply failure), of which the majority is from surface water (68%) and return flows that support surface water (13%). This includes water received through inter-basin transfers from neighbouring countries such as Lesotho. National demand is projected to increase by 32% (to 17, 700 million m³) by 2030 due to population growth and industrial development.

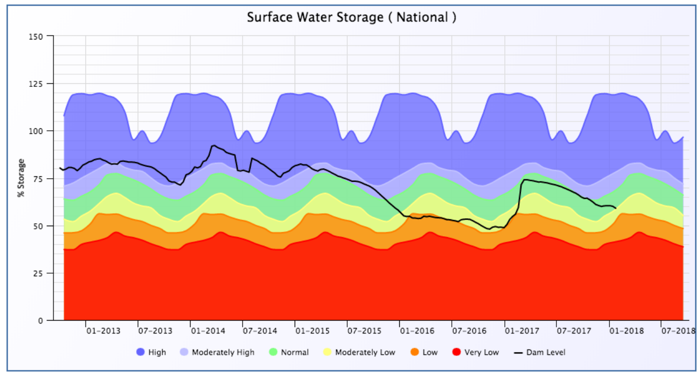


Water resources

Fig 5 shows surface water storage levels from 2013-2018. It illustrates the decline in dam levels starting in mid-2014 (solid black line). While there is seasonal variation, there is also a downward trend, with each peak and trough a bit lower than the last.

In addition, the Cape Town water crisis was a period of severe water shortage in the Western Cape region that received much media attention globally. While dam water levels had been declining since 2015, the Cape Town water crisis peaked during mid-2017 to mid-2018 when water levels dropped between 15 and 30% of total dam capacity. In 2017, Day Zero was launched, the term denoting Level 7 water restrictions, when municipal water supplies would be switched off and residents would have to queue for their daily ration of water. The City of Cape Town implemented significant water restrictions in a bid to curb water usage, and succeeded in reducing its daily water usage by more than half to around 500 million liters (130,000,000 US gal) per day in March 2018. The fall in water usage led the City to postpone its estimate for Day Zero, and strong rains starting in June 2018 led to dam levels recovering.

Fig 5. Surface water storage levels in South Africa, 2013-2018

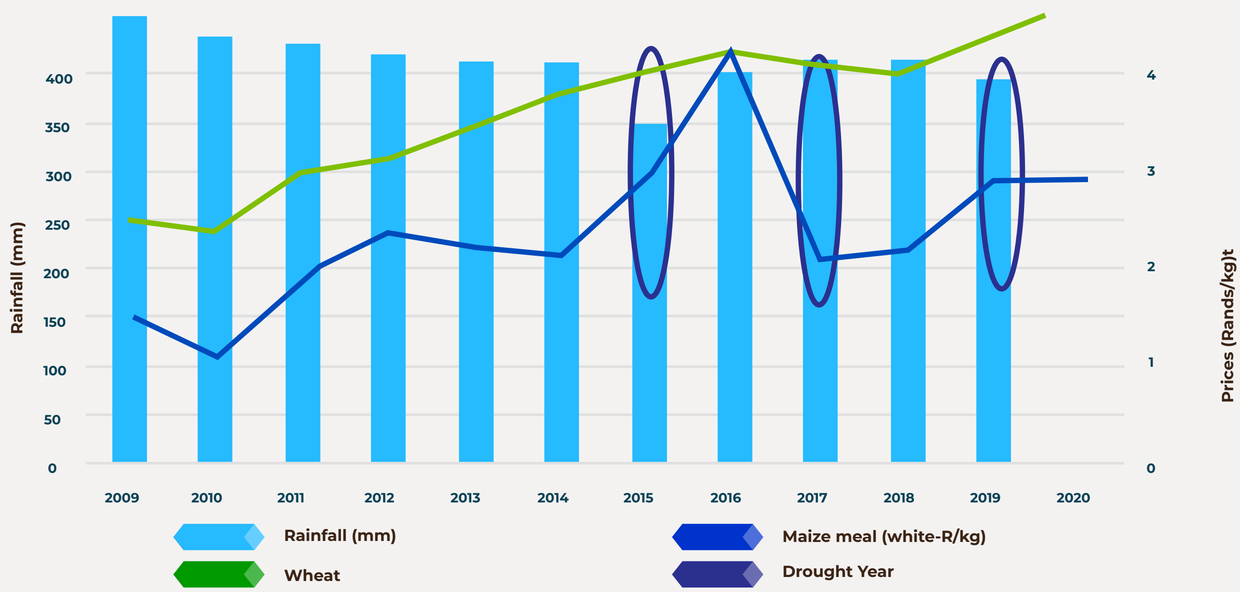


Source: DWS **2018**

In September 2018, with dam levels close to 70%, the city began easing water restrictions, indicating that the worst of the water crisis was over. Good rains in 2020 effectively broke the drought and resulting water shortage when dam levels reached 95%.

Droughts have an impact on commodity prices

Fig 6. Commodity prices and rainfall patterns, 2010-2020



Source: Own compilation from FAOSTAT & CHIRPS **2020**

The 2015/16 drought (drought years marked in ovals) resulted in a significant decline in the harvest (Baudoin, Vogel, Nortje & Naik, 2017), which led to an increase in food prices as a result of a deficit in the market. This is depicted in Fig 6, where the country experienced a sharp increase in prices of maize meal in 2016 (2016 received the highest prices over the years of the analysis). This is understandable for the spike in prices for maize meal, as maize is a staple crop for South Africa, and reduced supply of maize can lead to food insecurity for the country. Price increases affected mostly poorer households which spend relatively large portions of their income on food – as much as 3

Vulnerability and impact assessment capacity

While a host of vulnerability and impact assessments have been conducted in several sectors by government, research institutes, the private sector and non-governmental organisations, few provide detailed assessments of drought and drought responses that encompass both biophysical and socio-economic and historical dimensions of drought (Vogel & Olivier, 2019), particularly in terms of assessing the administrative role of institutional and other governance systems (Baudoin et al. 2017).

By analysing past responses to drought, at various governance scales, some of the lessons learned in responses to drought can be derived. As early as 1923, drought was seen as one of the major constraints faced by South African farmers.

Vulnerability and Impact Assessment

Vulnerability and impact assessment capacity

Early reports (e.g. the benchmark Union of South Africa, 1923 Report) resulted in an overall assessment that drew attention to the role of the interlinked issues of poor planning and institutional design, and deteriorating soil and vegetation status that heightens drought impacts and vulnerability to drought (Union of South Africa 1923 in Vogel et al., 2010). Despite such very early recognition of the multiple stresses and factors influencing vulnerability to drought, past drought management and the policy response in South Africa, as with the wider SADC region, has remained strongly orientated toward a "reactive relief response" strategy as opposed to a longer-term, more proactive drought policy (ibid.)

A new era of a more proactive, disaster risk management approach in South Africa began to emerge in the late 1990s (Makaya et al., 2020). In 1992, during which time a severe drought gripped the country, a multi-stakeholder National Consultative Forum on Drought was established that began to investigate drought impacts in several parts of the country (Vogel et al., 2010). These links between development and drought risk reduction have, in principle, remained a focus in government, although not fully implemented. The Disaster Management Act (Government of South Africa, 2002), for example endorses "proactive" approaches in which efforts are made to couple drought risk reduction with effective early warning, and effective water governance etc. (Van Zyl, 2008). However, evidence of implementation of these proactive drought management principles is patchy. The effectiveness of the interrelations between water and drought management institutions and structures, particularly coordination between the local level and/or the district level and the national government level needs to be interrogated, particularly from a vulnerability and impact assessment perspective. Critical to this, is to understand what these assessments mean for local communities. South Africa may wish to consider streamlining its coordination mechanisms in this regard.

There are several institutions that conduct vulnerability and impact assessments, there are many, including but not limited to, the Agricultural Research Council (ARC), which monitors climate and vegetation response and provides near-real-time products, such as maps and bulletins; the South African National Space Agency (SANSA) which provides information on the state of vegetation; and the Department of Water and Sanitation (DWS), which monitors dam and groundwater levels. Given the complexity of the institutional arrangements, what may be beneficial in this regard is the creation of a central repository of all drought vulnerability and impact assessment data, and a process of review of how these could potentially support short-, medium- and long-term planning and decision-making.

Finally, it is important to acknowledge the role of science in framing drought responses. The shape and type of financial relief schemes, predicated largely on biophysical measures of drought impact (e.g., soil status) have continued to be used as the guide shaping drought relief and the award of subsidies. Such approaches have arguably sustained and entrenched a relief-based mentality.

Monitoring and Early Warning Systems

Monitoring and early warning systems capacity

Table 2 represents a summarized traffic light checklist to illustrate the state of monitoring and early warning system capacity in South Africa. It summarises key aspects needed for a strong monitoring and early warning systems framework, most notably, whether there is an official definition of drought used in the country; whether drought indicators are used, and if so, which ones; whether there is a drought early warning system (DEWS) in place; and if so, how functional it is and whether the country makes use of seasonal forecasting.

Table 2. Summarized checklist of monitoring and EWS capacity

Official definition of drought	Yes
Drought indicators used	Yes
Existence of a DEWS	Limited
Capacity to tailor EWS messages to end-user needs	Limited
Effective communication of early warnings with built-in feedback mechanisms	Limited
Use of most salient communication channels to reach women/youth/disenfranchised communities	Yes
Use of community relays, extensions services, local media to communicate EWS and reach at risk communities promptly	Limited
Seasonal forecasting	Yes

Yes No Limited

*In terms of the definition of drought used, different sectors define it differently: meteorological, agricultural, hydrological, socio-economic, ecological and anthropogenic drought, but SAWS defines it in meteorological terms i.e. when an area experiences below average rainfall for an extended period of time (where "normal" rainfall is calculated over a 30 year period.

The South Africa Weather Service (SAWS), a public entity under the Department of Environment, Forestry and Fisheries (DEFF), is the legally mandated institution, as per the Weather Service Act (South Africa, 2001), responsible for weather and climate forecasting and the issuing of severe weather related alerts in South Africa. Traditionally, drought early warning systems have primarily comprised of biophysical indicators of the recent meteorological conditions. Several such EWS products are available, and more are in development for different sectors and different weather elements.

EWS examples being used include the SAWS weather events warning system and the South African Flash Flood Guidance System (SAFFG). The information and warnings from these systems are made available on websites and are distributed to provincial, district and local municipalities via SMS and email, for them to incorporate into their own EWSs or to take action. SAWS also adopted the Multi Hazard EWS (MHEWS) which makes use of multiple monitoring systems, meteorological, hydrological and climate information to prepare and respond to the multiple weather-related hazards. The SAWS severe weather system also covers potentially damaging weather events (e.g. heavy rain, heat waves and cold weather) that are common in the country. Alerts are issued by SAWS and are used by disaster management centres in preparation and readiness for emergency actions such as evacuation in the face of the hazard. The alerts are also issued directly to the public through the media, internet and cellphone service providers (CSIR, 2014). Other EWSs include Decile rainfall, the Water Satisfaction Index, the NOAA Normalized Difference Vegetation Index (NDVI), and other crop- and rangeland-based models. In addition, the Agricultural Drought Management Plan was drafted in 2005 and seeks to reduce the impacts of droughts by providing information management, monitoring and evaluating systems for the early warning of droughts (Government of South Africa, 2005). Another example of a DEWS is the Umlindi system developed by the Agricultural Research Council (ARC) which provides information on drought conditions based on the interpretation of satellite and climate data. This information is translated and packaged by the Department of Agriculture, Land Reform and Rural Development into monthly newsletters. The information is also used for crop estimation by the National Crop Estimate Committee (NCEC) and is also disseminated through the provincial departments, the National Agro-meteorological Committee (NAC) and subsequently to the farming community. A research partnership between ARC, CSIR and the University of Pretoria also developed a suite of tailored forecasts for livestock.

Despite the myriad EWSs and products available, the current legislation and institutional arrangements do not acknowledge independent early warning information producers such as local farmers, and that access to early warning information does not always reach the people who need it despite the warning being issued. As further responsibility is placed on farmers to plan for and survive droughts with minimum intervention from the state, greater emphasis on locally relevant early warning systems is required. EWSs that are locally based and focused on the systems used by farmers are now required. For example, although maize is the staple crop, many commercial farmers are planting higher-value crops that are generally more vulnerable to drought in locations where there is insufficient water availability and water infrastructure to ensure resilience to drought. For small-scale farmers and rural communities, many other social and economic factors interact. Thus a more comprehensive suite of indicators is needed (CSIR, 2014; Monnik 2000).

The increasing frequency of drought in the region has placed pressure on institutions to improve early warning systems that are informed by biophysical science inputs, including a focus on improved climate forecasts (e.g. seasonal climate forecasts) and estimating crop production. However, less emphasis has been placed on enhancing EWSs that include the social dimensions driving vulnerability to drought (e.g. the breakdown of social networks, health indicators, that is, data that can be obtained through clinics, etc.).

The status of several EWSs is shown in Table 3. Several of the systems remain dormant until a need arises, due to the limited resources available to keep systems running when the demand is low.

Table 3. Drought monitoring and EWS used in South Africa

SAWS weather events warning system	Routine
South African Flash Flood Guidance System (SAFFG)	Routine
Multi Hazard EWS (MHEWS)	Routine
Decile rainfall	On demand
Water Satisfaction Index (WSI)	On demand
NOAA NDVI	Routine
ZA Model	On demand
PUTU Veld Production model	On demand
Long-lead forecasts	Routine
Free State Agriculture Outlook	Routine
Umlindi system	Routine

Routine (green) On demand (red)

Further, the packaging of early warning information could be improved, and translated into local languages, while the reliability of issuing early warning information could be strengthened. Moreover, despite its relatively strong technical capacity, and numerous studies conducted on drought impacts, South Africa could benefit from a more coordinated approach to monitoring and early warnings; involving national institutions and between them and the provincial and municipal levels. There is currently insufficient communication and collaboration between organizations that provide climate services and EWSs. And indeed, intergovernmental coordination, especially between national and local government, arguably poses some of the greatest risks to the coherence of drought monitoring systems. Competitive groups exist in the country for providing these services and the legal framework, and do not provide the means for local or international informal systems to feed into the framework (CSIR, 2014).

Monitoring and Early Warning Systems

Information sharing between institutions therefore needs to be strengthened. Furthermore, the modelling, monitoring and predicting capacities at institutions across the country, and the role of scientific inputs, have the potential to contribute to advances in EWSs but this is often limited by the translation of information into disaster risk reduction strategies (ibid.).

The implementation and uptake of early warning information remains slow. Provincial offices of Department of Agriculture, Land Reform and Rural Development (DALRRD) remain incapacitated and constrained because of the lack of structure and defined roles of individuals (NDMC, 2011). Similarly, dissemination of warnings to all levels of society remains a challenge and requires support and participation with the local disaster management structures and the media (SAWS, 2010). Some of these challenges require a longer-term focus, while some may be doable in the short-term, with a low resource realignment or refined focus.

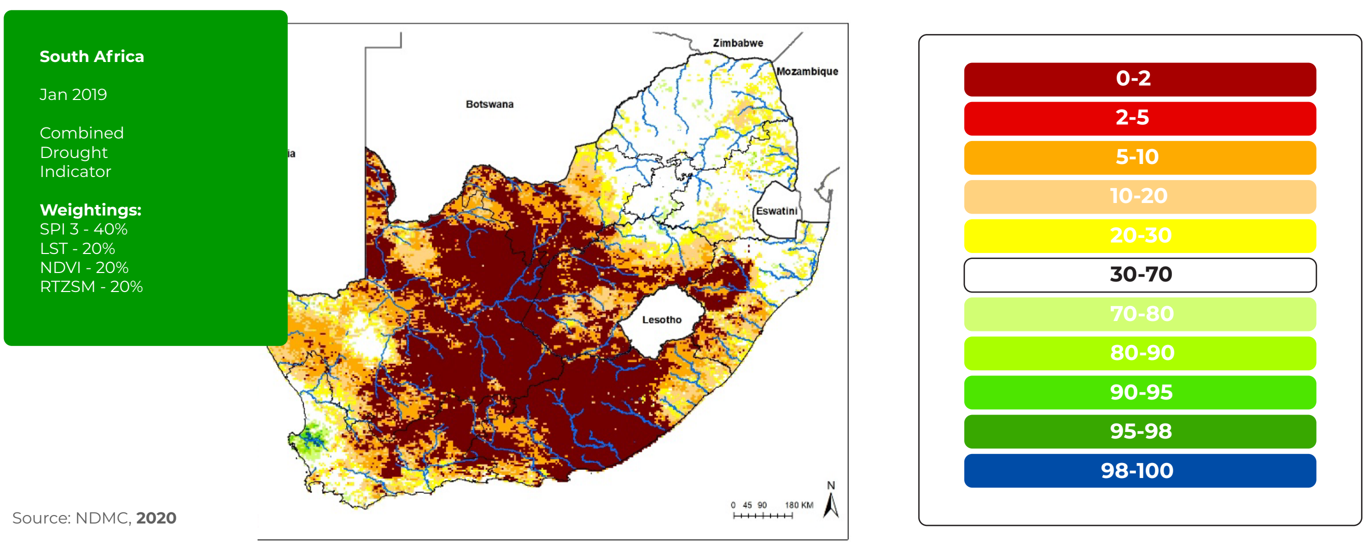
In summary, the main constraints to future development, access and communication of DEWS include:
- Lack of a completed drought policy framework,
- Lack of coordination between institutions that provide some type of drought early warning,
- Limited context-specific EWS dissemination to next users such as farmers, extension officers and communities
- Lack of vulnerability databases, and
- Lack of social indicators to form part of a holistic early warning system (Monnik, 2000).

A clear policy framework would provide the foundation on which further systems development and integration between institutions could occur.

Combined Drought Indicator (CDI)

Using a Combined Drought Indicator (CDI) approach, the National Drought Mitigation Center (NDMC) from the University of Nebraska, in partnership with the World Bank, has developed a Drought Monitor that represents a consolidation of indices and indicators into one comprehensive drought map. The CDI map for South Africa was created using a weighted combination of four indicators of drought - precipitation, vegetation stress, land-surface temperature and soil moisture. January 2019 was selected to depict the severity of the recent 2018/19 drought. The January CDI, being the peak of the rainy season for much of South Africa, provides an assessment of the drought's magnitude (duration and intensity), spatial extent, probability of occurrence and impacts. The CDI map shows the areas of the country impacted by some degree of drought, with the concentration predominantly in the interior.

Fig 7. Combined drought indicator for South Africa, January 2019



Source: NDMC, **2020**

Mitigation, Preparedness and Response

Drought policy framework

South Africa's long history of drought management is largely embedded within its disaster management and agricultural policy frameworks. These include the Constitution, the Conservation of Agricultural Resources Act (No. 43 of 1983), the White Paper on Agriculture (1995), the White Paper on Disaster Management (1999), the Strategic Plan for the Department of Agriculture, the Disaster Management Act (DMA) (No. 57 of 2002), the Drought Management Plan (2005) and the National Disaster Risk Management Framework (2005).

Drought policy continues to evolve, particularly with the dynamic political environment in South Africa. The White Paper on Agriculture began the change to improving the way droughts are managed in the country as the focus shifted from relief to prevention and mitigation. In 2002, an agricultural risk insurance bill was developed that sought to supplement agricultural producers' incomes for those most susceptible to crop and livestock losses from natural disasters, including drought.

Drought policy framework

However, a challenge remains for the South African government to maintain a balance between encouraging a risk management approach for large agricultural enterprises and providing a safety net for the resource-limited sectors of the population (Williams, 2016). Generally, despite some evidence of a paradigm shift from emergency response to more holistic drought risk management and disaster risk reduction approaches, the focus across various governance levels remains rooted in technical and financial relief solutions (Vogel et al., 2010).

One example of a more proactive approach to drought management in South Africa is the Agricultural Drought Management Plan (ADMP) based on the DMA. This plan has four key performance areas, namely integrated institutional capacity, disaster risk assessment, disaster risk reduction and response and recovery, and is seen to enhance proactive drought risk management, information management and communication, education, training, public awareness and research, as well as funding arrangements (Van Zyl, 2016).

At the city level, drought policy development and implementation has been used to inform key mitigation efforts. The City of Cape Town's Water Strategy, released in 2019 is one such example. The strategy emphasized 1) water security and drought mitigation through a participatory approach, together with 2) developing and extracting diverse water resources; 3) diversified infrastructure that makes optimal use of stormwater and urban waterways, flood control, aquifer recharge and water reuse; and 4) basing these measures on sound ecological principles (CoCT, 2019).

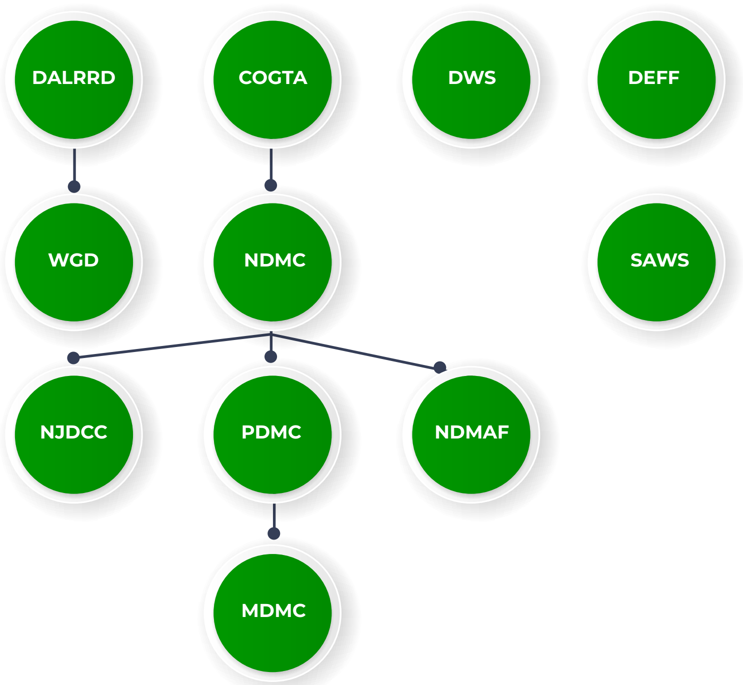
Institutions and coordination

In terms of the institutional structure, the Government of South Africa has established the National Disaster Management Center (NDMC), which acts under the auspices of the Department of Cooperative Governance and Tradition Affairs (COGTA). The NDMC along with the Department of Agriculture chairing the Inter-departmental Working Group on Drought (WGD) are the principal functional units for drought management (DMP, 2005). The NDMC is responsible for guiding and developing frameworks for disaster risk management policy, facilitating and monitoring their implementation and facilitating multidisciplinary disaster risk management activities.

Drought management is coordinated at the national government level and executed through government departments or structures at the provincial and municipal levels. Provinces and municipalities have their own drought management plans and disaster management centres (PDMC and MDMC) responsible for the implementation of disaster risk management policy and legislation and the integration and co ordination of municipal disaster risk management activities and priorities (Luker & Rodina, 2017). A significant gap appears to be co ordination of the widespread but localised efforts by the government civil society, and private sector, particularly in identifying and responding to the areas and people most in need.

In addition, the National Joint Drought Coordinating Committee (NJDCC) convened by the National Disaster Management Center was established as the technical platform for cooperative governance and for coordination and management of droughts by a wide range of stakeholders. Similarly, the National Disaster Management Advisory Forum (NDMAF) provides a mechanism for relevant role players to consult one another and to co ordinate their activities with regard to disaster risk management issues. However, such mechanisms require suitable financial support and human capital, as well as appropriate institutional architecture, if they are to be successfully rolled out. A significant gap, already noted by several experts, appears to be coordination of the widespread but localised efforts by the government, civil society and private sector, particularly in identifying and responding to the areas and people most in need.

Fig 8. South Africa's drought institutional framework



Legend
DALRRD- Department of Agriculture, Land Reform and Rural Development
COGTA- Department of Cooperative Governance and Tradition Affairs
DWS- Department of Water and Sanitation
DEFF- Department of Environment, Forestry and Fisheries
WGD- Working Group on Drought
NDMC- National Disaster Management Center
SAWS- South Africa Weather Service
NJDCC- National Joint Drought Coordinating Committee
PDMC-Provincial Drought Management Center
NDMAF- National Disaster Management Advisory Forum
MDMC- Municipality Drought Management Center

Recent drought resilience efforts and recommendations

Overall, while there is improved awareness of and preparedness for droughts by both government and communities in several measures such as the disaster management plans, the implementation of drought mitigation programmes is still not well coordinated. The distribution of financial and material resources for mitigating the impacts of droughts within and among national- and local-level institutions needs further improvement (Maya et al., 2020). Education, training, research, public awareness and communication on drought management require more attention and may be reinforced long before a drought occurs in a proactive way (DMP, 2005). Despite calls for better risk management approaches at all levels, the failure to fully understand, integrate and learn from past efforts may undermine current and future drought response. State-led drought risk reduction, which remains focused on reactionary drought relief, with little follow-through on proactive drought responses, only exacerbates the vulnerability of communities to future drought impacts (Van Zyl, 2016).

During the 2018/19 drought, the South African government announced a provisional allocation of ZAR6 billion for drought relief and to augment public infrastructure investment. Priorities included how to avoid job losses by increasing the personnel intake in the Working for Water programme and short-term assistance, including disaster relief grants for provinces and municipalities worth ZAR501.2 million in 2018/19. In 2019/20, drought relief by the DWS was estimated at ZAR 2.7 billion including existing projects listed for implementation.

South Africa's approach to drought relief makes drought declaration a measure of last resort. It requires that local and provincial contingency plans be exhausted before conditional funding is released by Treasury. This approach is appropriate given the extensive powers conferred to the executive in times of a declared disaster. The addition of a time limit to the declaration and its consequences usefully constrains the use of emergency executive power. However, administrative processes tend to stall much-needed drought relief, and there may be a need to develop special emergency procedures relating to severe drought conditions. Even more important is a focus on proactively addressing the potential for drought at municipal and provincial levels – particularly given the frequency with which drought occurs in South Africa, which climate change is likely to make worse.

Recent drought resilience efforts by the international community

Table 4. Selected drought projects implemented by international organisations during the most recent droughts in South Africa

Gift of the Givers	World Bank	USAID
Drought relief in Eastern, Northern and Western Cape, Free State and KwaZulu-Natal: drilling 330 boreholes, delivery of 625 truckloads of fodder, delivery and distribution of 250 truckloads of bottled water, deployment of 200 JoJo tanks, daily delivery of water through water tankers and the distribution of food parcels to farm workers and farmers, nutritionally enriched food to schools and pre-schools etc.	The World Bank provided technical assistance to the City of Cape Town, through analyzes on general water security risks and mitigation options, as well as the need and framework for an augmentation strategy that would draw on diverse approaches, including desalination options, and costing and technical advice on the specific desalination projects that the city was planning)	Resilient Waters Program
Budget (USD): 14.6M Time Period: 2017-2018	Budget (USD): 250K Time Period: 2017-19	Budget (USD): 14,8K Time Period: 2018-2023

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Data Sources:
Climate Data: CHIRPS
Drought Risk: International Water Management Institute (IWMI)
CDI: National Drought Mitigation Center at the University of Nebraska-Lincoln
Population Data: WorldPop
Livestock, GDP: FAO, World Bank

About the Southern Africa Drought Resilience Initiative (SADRI)

SADRI is a World Bank initiative supported by the Cooperation in International Waters in Africa Program (CIWA) that integrates across the energy-water-food-environment nexus to help lay the foundations for making southern african countries more resilient to the multi-sectoral impacts of drought. Its main objectives are to generate tools and dialogue for enhancing partnerships and capacity across Member States and to inform future national and regional investments in drought-related activities