

CLIMATE RISK AND VULNERABILITY

A HANDBOOK FOR SOUTHERN AFRICA

Second Edition

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CHAPTER 3: SOCIO-ECONOMIC IMPACTS OF EXTREME WEATHER EVENTS IN SOUTHERN AFRICA

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Southern Africa is susceptible to extreme weather events – particularly floods, droughts, fires and large storms, which have cost an estimated USD 10 billion in damages between 1980 and 2015 (based on data from EM-DAT). Integrating climate change adaptation and disaster risk reduction through a risk-management approach is important to help reduce future losses from climate extremes.

3.1. Introduction

Southern Africa is susceptible to extreme weather events with the most common being floods, large storms, droughts and wildfires (Figure 3.1 and Box 3.1). Climate events account for the largest percentage (67%) of natural disaster deaths. In the past four decades (1980-2015), the southern African development community experienced 491 recorded climate-disasters⁹ (meteorological, hydrological, and climatological) that

resulted in 110 978 deaths, left 2.47 million people homeless and affected an estimated 140 million people¹⁰ (EM-DAT CRED, 2016). In South Africa, extreme weather-related events have cost the insurance industry over R1 billion in claims in the 2013/2014 financial year (Uys, 2014).

The region's exposure to weather-related events, particularly floods, droughts, wildfires and storm surges (Figure 3.2), is likely to increase into the 21st century.

9 Climatological refers to droughts and wildfires, hydrological to floods and landslides, and meteorological to extreme temperatures and storms.

10 People requiring immediate assistance during a period of emergency, i.e. requiring basic survival needs such as food, water, shelter, sanitation and immediate medical assistance (EM-DAT CRED 2016).

As indicated in the previous chapter, climate change is projected to increase the frequency and magnitude of extreme weather events, which, without reductions in vulnerability, will increase the risk of disasters (Vincent et al., 2008).

The expected increase in weather-related disasters poses significant challenges for disaster risk management in southern Africa and is expected to negatively impact infrastructure and the transport, agriculture, health, tourism and insurance sectors, among others. The increased exposure combined with an increasing population, poor land-use practices, and an increasing number of people living in exposed areas are likely to augment the current levels of disaster risk.

This chapter presents:

- A recent analysis of the past disasters in SADC based on data from the Centre for Research on the Epidemiology of Disasters (CRED)/Emergency Events Database (EM-DAT); and
- The potential long-term impacts of changes in extreme weather over southern Africa.

The chapter focuses on the four main categories of weather-related disasters: floods, droughts, fires and storm surges. In view of projected increases in frequency and severity, these four types of events are considered key areas of interest and are priority areas for enabling adaptation and building resilience to future events.

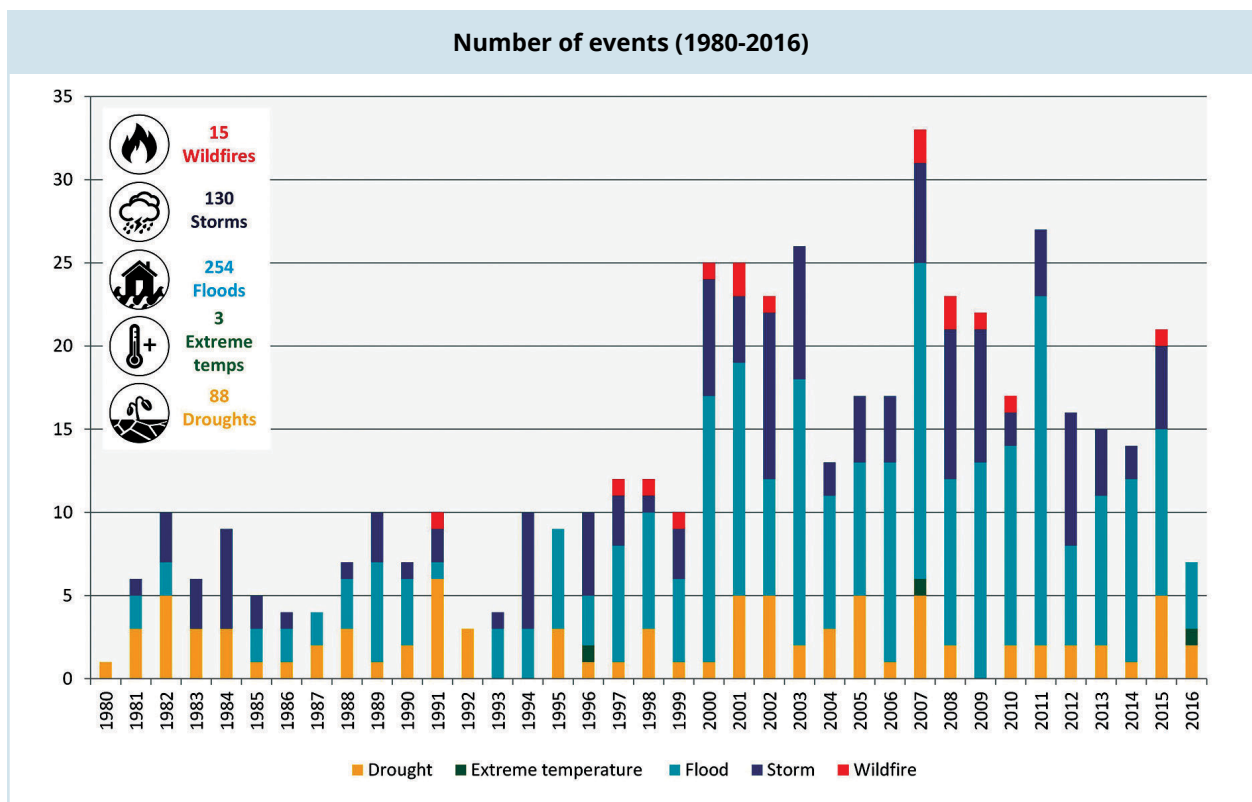
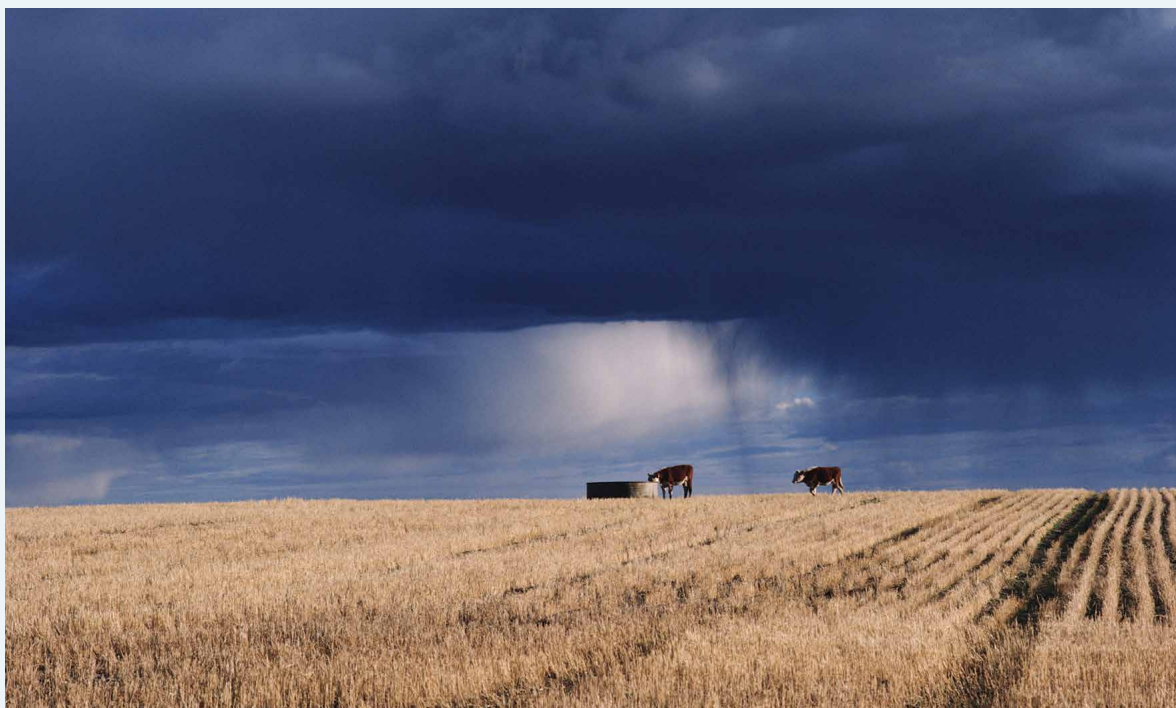


Figure 3.1: Number of recorded climate-related events over southern Africa since 1980 (Source: EM-DAT CRED, 2016). ‘Wildfires’ refers to any uncontrolled and non-prescribed burning of plants in a natural setting; ‘storms’ to tropical, extra-tropical and convective storm events; ‘floods’ to riverine, flash and coastal flood events; ‘extreme temperature’ to both cold waves and heat waves; and ‘droughts’ to extended periods of unusually low precipitation that produce a shortage of water.



Box 3.1: Description of the four major categories of weather-related events included in this study

Type	Description
Flood	<p>Rapid-onset floods: These include flash floods, tidal surges, floods provoked by cyclones or accompanied by strong winds, high runoff from heavy rainfall, dam bursts and overtopping, canals and rivers bursting their banks. Typically, water rising to dangerous levels within 48 hours (Smith, 2009).</p>
	<p>Slow-onset floods: Prolonged rainfall causing low-lying areas to gradually become flooded over a period of days or weeks (Smith, 2009).</p>
Drought	<p>Meteorological drought: Less than 70% of normal rainfall is received (Bruwer, 1993).</p>
	<p>Agricultural drought: A reduction in water availability below the optimal level required by a crop during each different growth stage, resulting in impaired growth and reduced yields (Wilhite and Glantz, 1985).</p>
Wildfires	<p>The occurrence of fires is closely linked with high temperatures and dry spells, for example during berg wind conditions. Originally most fires were caused by lightning, but today more than 90% of fires are lit by people, either deliberately or accidentally (Forsyth et al., 2010).</p>
Storms	<p>The classification of storms includes severe thunderstorms, cyclones, tornados, convective storms, frontal systems and cut-off low events which often cause flash floods. For the purposes of this report, storm surges, hail storms and severe cold fronts (including some instances of snow) are included in the classification of storms. Storm surges are an irregular rise in sea level produced by a storm and characterised by heavy rains and high winds (Theron, 2011).</p>





Box 3.2: Sources of information on disasters and disaster losses

In keeping with commitments to monitor disaster occurrence and losses (as mandated in the Sendai Framework for Disaster Risk Reduction), there are a number of accessible databases:

Global Assessment Report Risk Data Platform (<http://risk.preventionweb.net>)

This interactive Risk Viewer provides the global risk data from the Global Assessment Reports, presented in an easily accessible manner. Risk and exposure indicators can be overlaid with hazard data from earthquakes, cyclones, surges, floods, tsunamis and volcanoes. Other country-specific data can also be downloaded, including future projections of return periods, etc.

DesInventar (<http://www.desinventar.net>)

DesInventar is a Disaster Management Information System for generating National Disaster Inventories and constructing databases that capture information on damage, loss and general effects of disasters. It is also used to store the data sets that are reported on in the Global Assessment Reports on Disaster Risk Reduction. With increased understanding of disaster trends and their impacts, better prevention, mitigation and preparedness measures can be planned to reduce the impact of disasters on the communities. It covers Mozambique and Madagascar in southern Africa.

EM-DAT: The International Disaster Database (<http://www.emdat.be>)

EM-DAT contains essential core data on the occurrence and effects of over 18,000 mass disasters in the world from 1900 to present. The database is compiled from various sources, including UN agencies, non-governmental organisations, insurance companies, research institutes and press agencies. Users can download data and create their own tables and figures by selecting from among the data sets.

PREVIEW Global Risk Data Platform (<http://preview.grid.unep.ch>)

The PREVIEW Global Risk Data Platform contains spatial data information on global risk from natural hazards. Users can visualise, download or extract data on past hazardous events, human and economical hazard exposure and risk from natural hazards. It covers tropical cyclones and related storm surges, drought, earthquakes, biomass fires, floods, landslides, tsunamis and volcanic eruptions.





Box 3.3: Early warning systems in southern Africa

Early warning of extreme events is crucial for developing and implementing various preparedness and response strategies and ultimately reducing the risk of death and damage. Early warning systems (EWS) in the region are a result of cooperation between international, regional and national organisations, and comprised the development of new systems and the improvement of current systems for preparedness and response (OCHA, 2015). Themes covered by the early warning systems in the regions include food production and security, multiple hazards, weather forecasting and humanitarian (OCHA, 2015; see figure below).

For EWS to be effective, they should address four key elements as defined by the United Nations International Strategy for Disaster Risk Reduction (UNISDR): (i) risk identification, (ii) monitoring and warning system, (iii) warning dissemination, and (iv) response actions (Seng & Stanley, 2012). EWS have evolved considerably over the last two decades and there are a number of systems in operation, covering the majority of natural hazards in southern Africa.

One example of a recent EWS is the Advanced Fire Information System (AFIS), which is a real-time satellite-based fire monitoring system for southern Africa. AFIS was developed in partnership with Eskom, the Council for Scientific and Industrial Research (CSIR) – Satellite Application Centre (SAC) to monitor fires across Africa in real time (Davies et al., 2008; Frost and Annegarn, 2007). Active fires are detected using remotely sensed satellite images from the Moderate Resolution Imaging Spectroradiometer (MODIS). The information from AFIS has been used by the South African Broadcasting Corporation (SABC), for example, to show fire maps as part of the weather bulletin, as well as by Fire Protection Associations (FPAs) and the officers of the Working on Fire programme in South Africa. A mobile application for both Google Android and Apple iOS platforms was launched in September 2013. Active fires are also immediately published on a web page.





Box 3.3: Early warning systems in southern Africa (continued)

Name	Host	Main Purpose	Link
Regional Specialized Meteorological Centre (RSMC) La Réunion	Météo-France	Multi-Hazard Early Warning System: Provides real-time weather advisories and is responsible for tracking tropical cyclones in the south-west Indian Ocean.	http://www.meteofrance.re/accueil
Climate Services Centre (CSC)	Southern African Development Community (SADC)	Weather Forecasting Early Warning: Provides operational, regional services for monitoring and predicting extremes in climate condition. The Centre develops and disseminates meteorological, environmental and hydrometeorological products, and hosts the Southern Africa Regional Climate Outlook Forums (SARCOF), which are designed to develop region-wide consensus on climate outlooks in the near future. The Real Time Extreme Weather and Climate Monitoring System (MONIS) is the key tool used to gather and visualize all meteorological data for analysis and early warning.	http://www.sadc.int/sadcsecretariat/services-centres/climate-services-centre/
Regional Integrated Multi-Hazard Early Warning System (RIMES) for Africa and Asia	RIMES Member States	Multi-Hazard Early Warning System: RIMES provides regional early warning services and builds capacity of its Member States in the end-to-end early warning of tsunami and hydro-meteorological hazards.	http://www.rimes.int/
Famine Early Warning Systems Network (FEWS-NET)	US Agency for International Development (USAID)	Food Security Warning System: Provides objective, evidence-based analysis related to food security and famine to help Government decision-makers and relief agencies plan for and respond to humanitarian crises.	http://www.fews.net/
Locust Watch	Food and Agriculture Organization (FAO)	Food Security Warning System: Provides timely information on the movement of locust swarms and the potential impacts these swarms may have on food security.	http://www.fao.org/ag/locusts/en/info/info/index.html

Source: OCHA Regional Office for Southern Africa (ROSA)
http://reliefweb.int/sites/reliefweb.int/files/resources/Disaster_Response_and_Preparedness_in_Southern_Africa-A_Guide_to_International_Tools_and_Services_Available_to_Governments.pdf

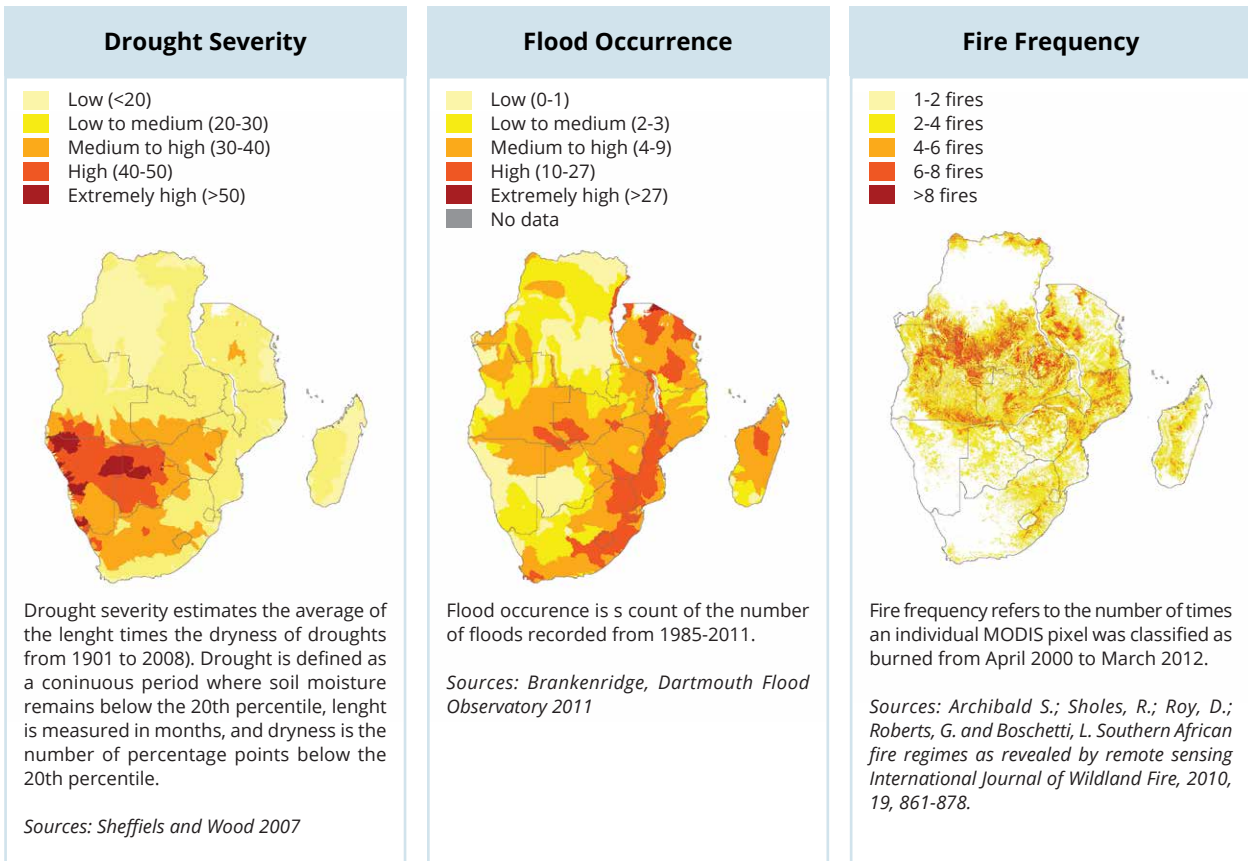


Figure 3.2: Distribution of droughts, floods and fires across southern Africa.

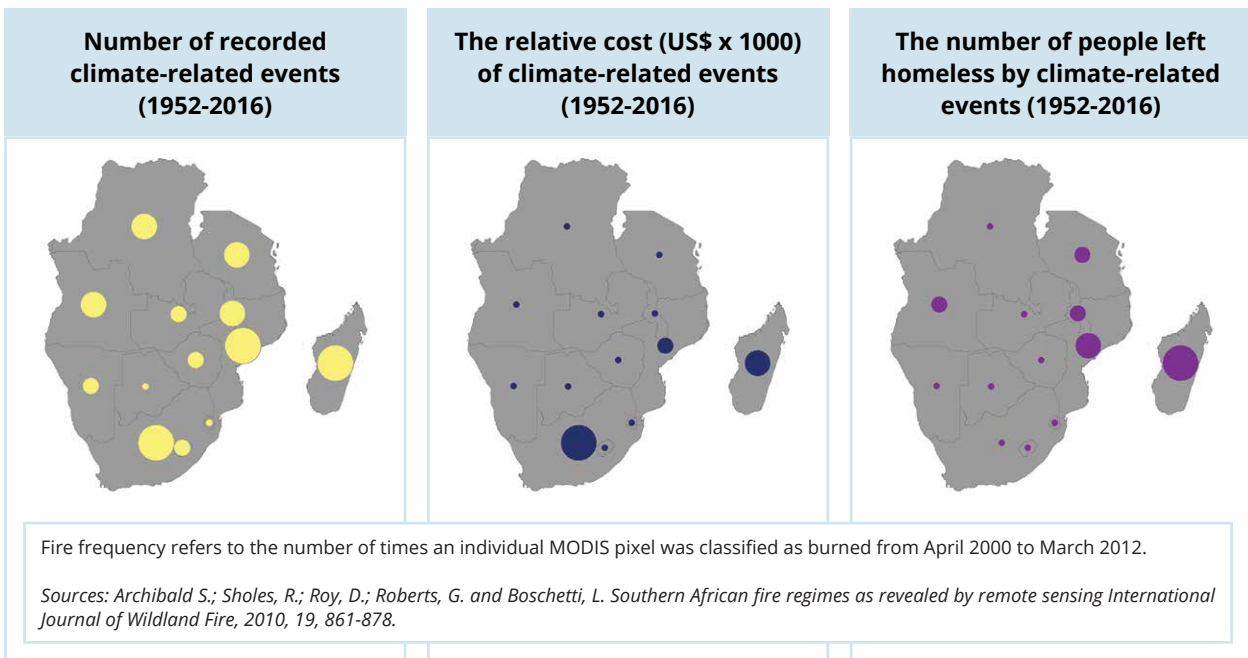


Figure 3.3: Summary of the climate-related events per country in southern Africa since 1980 (Source: EM-DAT CRED, 2016).

3.2. Impact of climate-related disasters in SADC

The impacts of extreme weather events are wide-ranging and affect multiple sectors. The impacts range from primary or direct effects, such as damage to infrastructure and death, to secondary or indirect effects, such as health issues and the loss of livelihoods (Easterling et al., 2000). There are also differences between countries in terms of impacts (Figure 3.3). Past impacts of climate-related events in SADC countries are a good indication of the types of hazards and their impacts that can be expected in the future.

Reliable statistics on the scope and prevalence of hazard events are difficult to compile owing to the lack of reporting and the lack of consistency in reporting structure, especially on costs of disasters. Conservative indication can, however, be produced based on international databases such as the Emergency Events Database (EM-DAT) of the Office of Foreign Disaster Assistance/Centre for Research on the Epidemiology of Disasters (OFDA/CRED) International Disaster Database (www.emdat.be). These record disasters where ten or more people are reported killed, 100 or more people need to be evacuated, provided with humanitarian assistance or otherwise affected, or the State declares an emergency or calls for international assistance.

Figure 3.3 shows the number of recorded climate disasters per country, highlighting the impacts on Mozambique, Madagascar, Malawi and Tanzania in particular (refer to Table S.1 for data per country). Although South Africa has the highest number of recorded climatological events, it accounts for a small percentage of deaths. This can be attributed to lower levels of social vulnerability and more adaptation and disaster risk management strategies compared with its SADC counterparts.







Figure 3.4 provides a summary of the cost for each of the four major categories of extreme weather events in southern Africa – droughts, floods, fires and storms – over time. The number of people affected and the number of people displaced by each of the major categories are shown in Figure 3.5 and Figure 3.6 respectively. While floods (riverine, flash and coastal) have tended to be the most frequent type of climate disaster (Figure 3.1), droughts have resulted in the highest economic cost of damages and have affected a larger proportion of the region's population. Between 1980 and 2015 an estimated 107 million people (37% of the SADC population¹¹) have been affected by drought, whereas floods have affected an estimated 21 million people (7.6% of the SADC population). This can be attributed to the nature of droughts, which are slow-onset disasters and affect more than just the people in the immediate locality. Despite these numbers, the SREX report states that drought events in southern Africa are under-reported compared with other regions (Field, 2012).

The four categories of disasters have resulted in approximately US\$10 billion in economic damages, with costs associated with droughts and floods amounting to approximately US\$3.4 billion and US\$3.3 billion respectively (based on data from EM-DAT). These damage and recovery/rehabilitation costs reflect the reactive costs of disasters and highlight the need for more investment in proactive measures and disaster risk reduction to mitigate the impacts of disasters.

Storms (including tropical cyclones) have been responsible for displacing the vast majority of people; an estimated 1.7 million people have been left homeless between 1980 and 2016. Flooding events have left an estimated 780 000 people homeless since 1980. Table 3.1 summarises the relative impacts of different climate-related events between 1980 and 2015.

11 Population of SADC countries is estimated at 277 million (Source: SADC Statistics Yearbook 2011 <http://www.sadc.int/information-services/sadc-statistics/sadc-statiyearbook/>).

Table 3.1: Summary of impacts of climate-related events on southern Africa between 1980 and 2015 (Source: EM-DAT CRED, 2016)

Most frequent	Most costly	Affect the most people	Displace the most people	Cause the most deaths	Injure the most people
					
Floods	Droughts	Droughts	Storms	Droughts	Storms

Floods have tended to be the most frequent type of climate-related disaster, while droughts have resulted in the highest economic cost of damages and have affected a larger proportion of the region's population. Storms have been responsible for displacing the vast majority of people.

This conceals the diversity of the hazard landscape in southern Africa, which experiences a far broader range of localised hazards (Pharoah et al., 2013). Examples include:

- The tornado in October 2011 in Duduza, Gauteng, South Africa resulted in the death of one child, the injury of 160 people, and left hundreds homeless (Extreme Planet, 2012).
- The hail event on 28 November 2013 in Gauteng resulted in a loss in the insurance industry estimated at R 1.4 billion due to claims in the motor and property sectors (PwC, 2014).
- Slow-onset flood events which occur regularly in informal settlements. These settlements are often located in low-lying, flood-prone areas. Houses are regularly flooded or destroyed leaving families displaced, and resultant stagnant water has led to outbreaks of cholera, for example in Keko Machungwa informal settlement in Dar es Salaam (Sakijege et al., 2012).

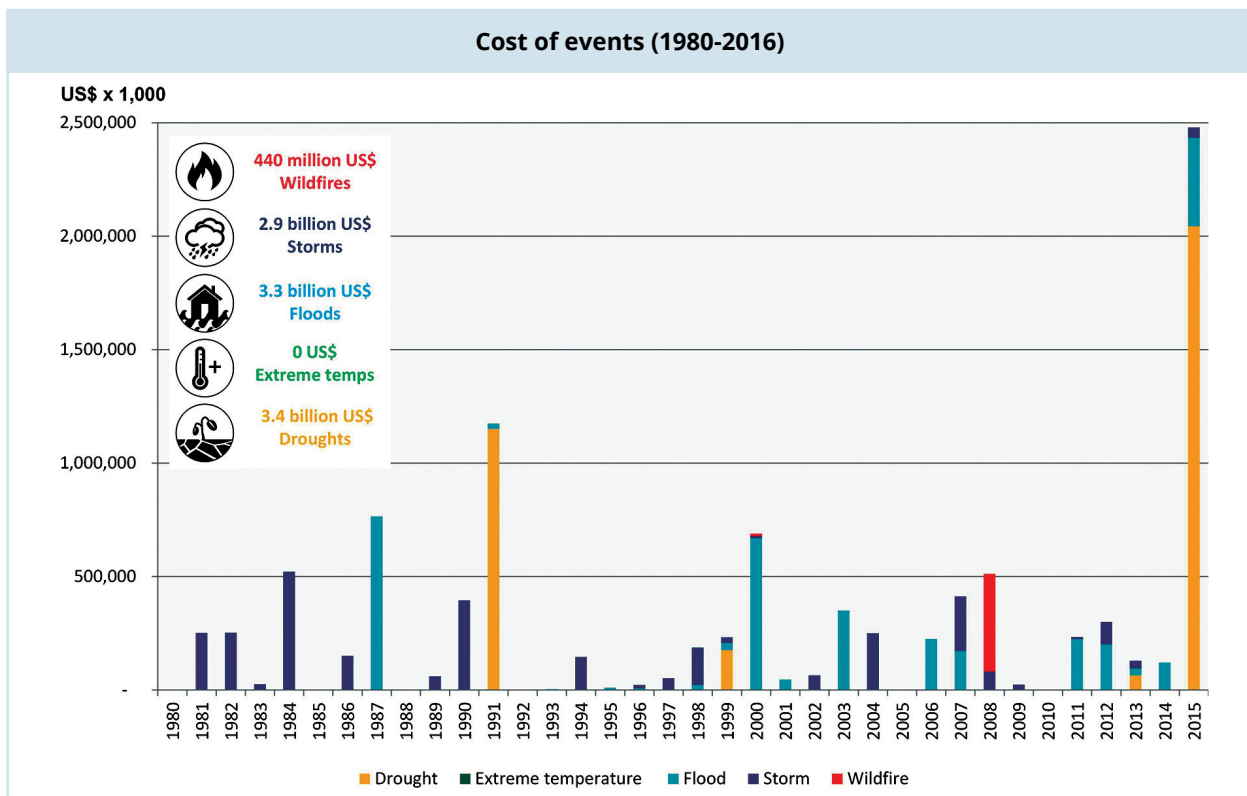


Figure 3.4: The relative cost (US\$ x 1 000) of the major categories of climate-related events – wildfires, storms, floods, extreme temperature, and droughts – in southern Africa since 1980 (Source: EM-DAT CRED, 2016).

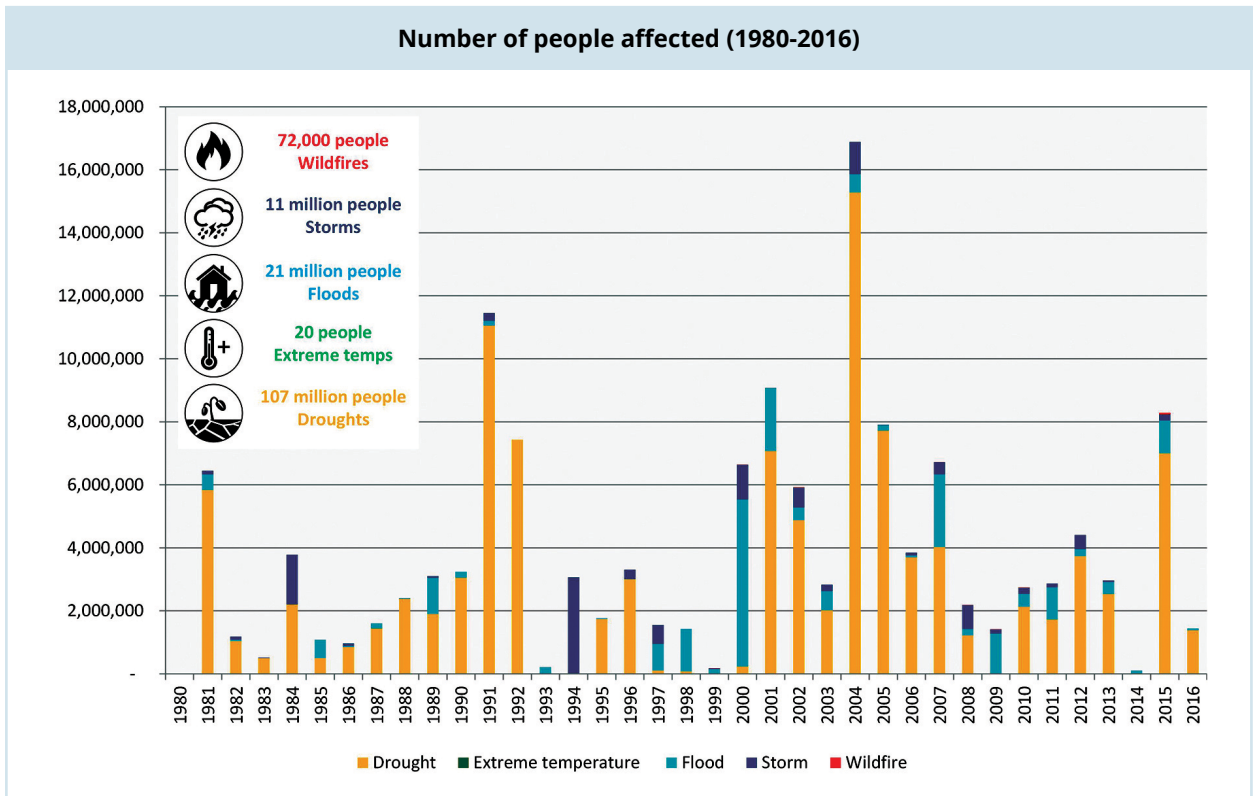


Figure 3.5: The number of people affected by each of the major categories of climate-related events – wildfires, storms, floods, extreme temperature, and droughts – in southern Africa since 1980 (Source: EM-DAT CRED, 2016).

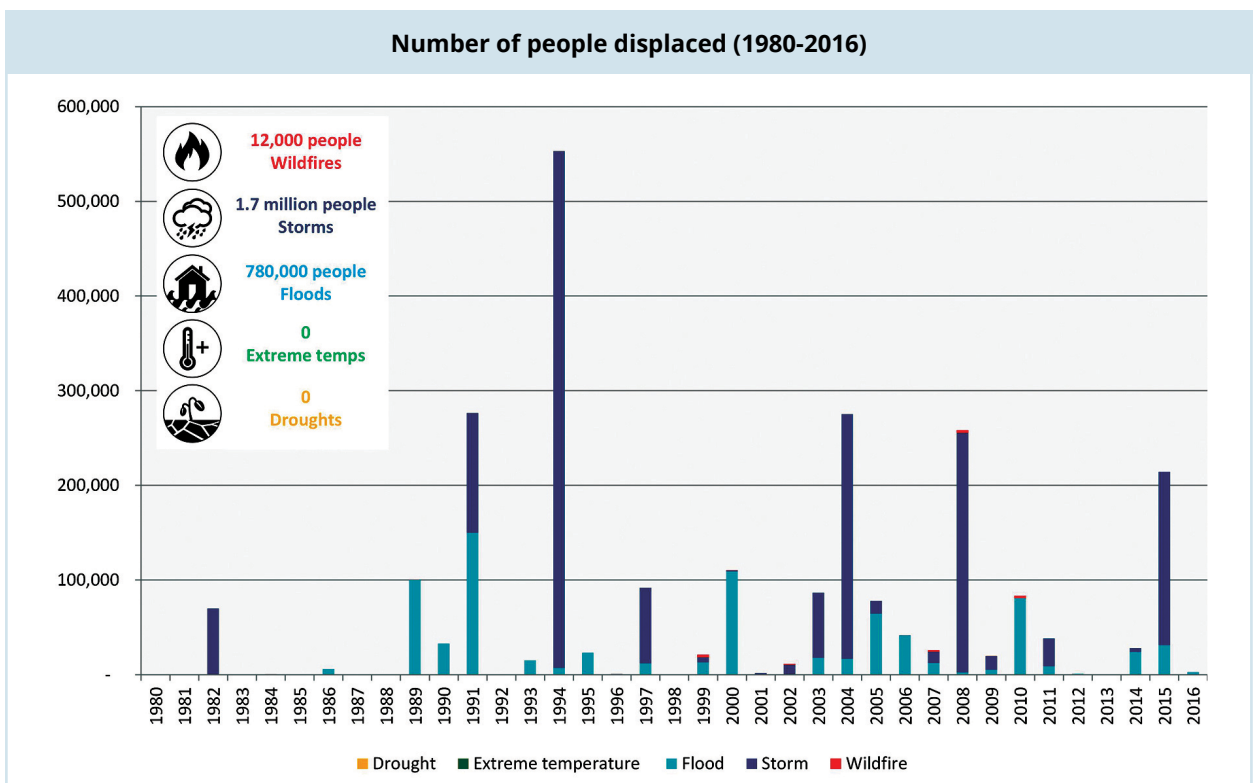


Figure 3.6: The number of people left homeless by each of the major categories of climate-related events – wildfires, storms, floods, extreme temperature, and droughts – in southern Africa since 1980 (Source: EM-DAT CRED, 2016).

Floods

Floods in southern Africa result from:

- tropical cyclones that bring widespread flooding to Mozambique and north-eastern South Africa (Figure 3.2);
- cut-off lows that cause flooding along the Cape south coast and Eastern Cape;
- thunderstorms that result in flash-flooding across the Highveld of South Africa; and
- heavy rains that cause flooding in Angola and Namibia.

Recurrent floods have a detrimental impact most noticeably in communities with less developed infrastructure and health services where floods often result in loss of life, damage to property and infrastructure as well as the spread of diseases such as malaria, diarrhoea, and cholera. Flood events are often exacerbated by dam and infrastructure failures related to inadequate design and maintenance, poor land-use planning, land degradation, deforestation and a lack of early-warning systems (Mulugeta et al., 2007). Some of the worst flood events in the region are described in Box 3.4.



Box 3.4: Examples of the worst recorded floods in southern Africa

1987

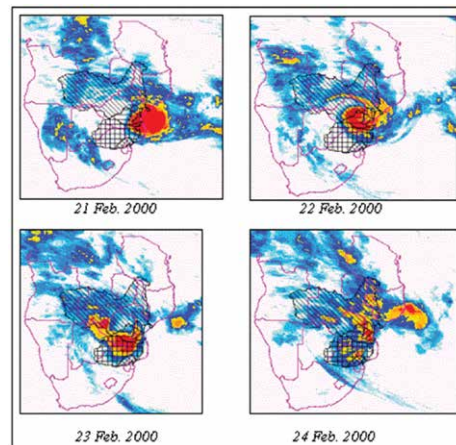
In 1987 the flooding in KwaZulu-Natal, South Africa and Lesotho caused severe damage to thousands of kilometres of roads, with 14 bridges being washed away and all entrance routes to Durban being closed. Approximately 68 000 people were left homeless and 388 people were killed (Grobler, 2003).

1991

Flash floods in southern Malawi resulted in damage to houses, agricultural crops, and infrastructure. The floods and consequent landslides resulted in 500 deaths and thousands of people displaced (ReliefWeb, 1991).

2000

Cyclone Eline resulted in severe flooding in South Africa, Mozambique, Zimbabwe and Botswana with the worst affected being Mozambique. High winds, torrential rains and high river flows caused economic losses and damage to infrastructure, livelihoods and agricultural crops. In Mozambique 700 people were reported dead and the GDP growth rate decreased from 10% to 2% (Mulugeta et al., 2007; ReliefWeb, 2000).



Picture: Satellite image showing the path of Cyclone Eline in relation to the major catchments (ReliefWeb, 2000).

2009

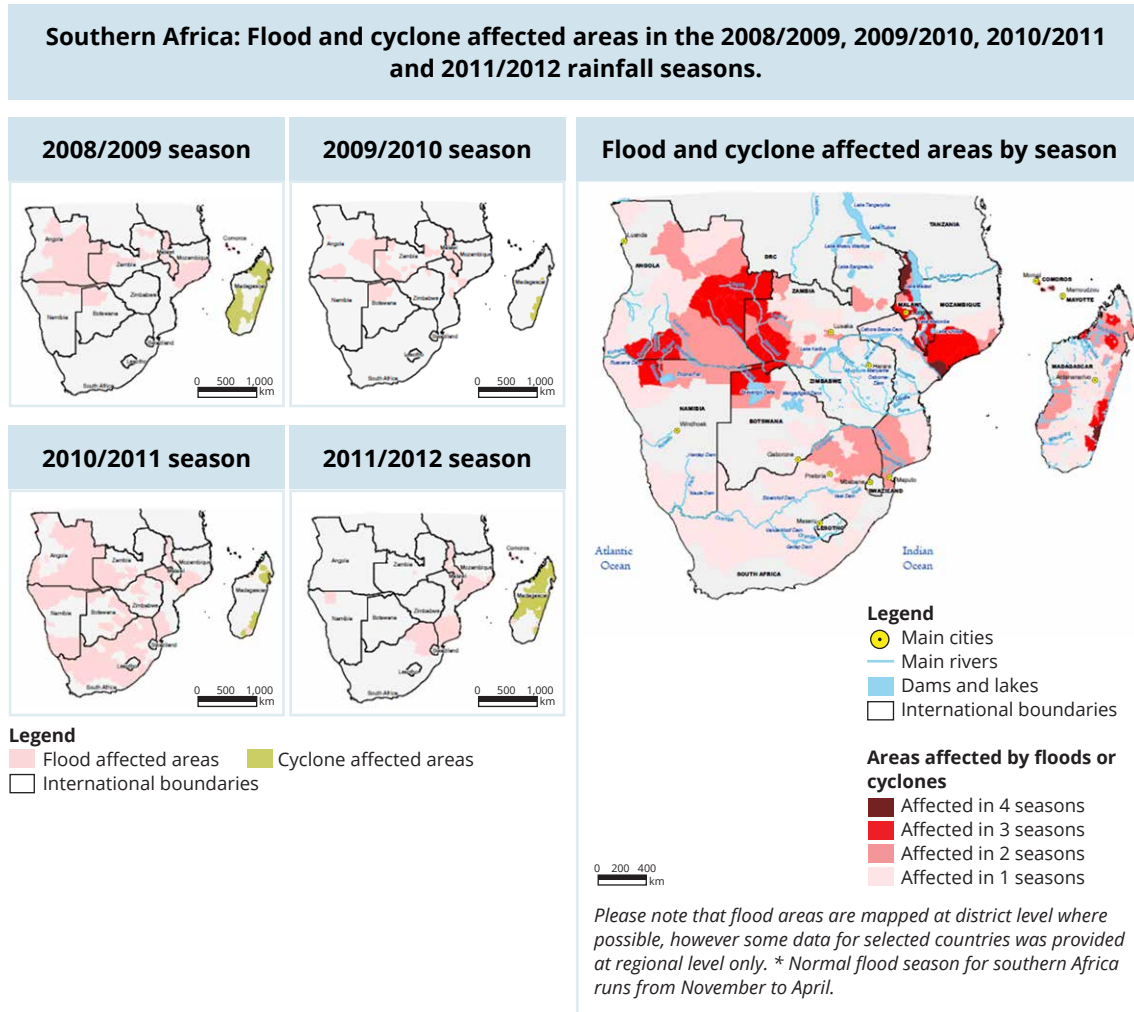
In March 2009, heavy rains caused widespread flooding in Angola and Namibia, affecting 120 000 people in Angola; leaving approximately 30 000 people isolated after roads and bridges were washed away; and leaving families homeless after 4 720 houses were destroyed. In Namibia 130 000 people were at risk. Hectares of crops were submerged and small livestock was lost. The cholera outbreak after the flood affected 143 people and killed seven people (IFRC, 2009). All countries in the region suffered major flooding events during the same period, resulting in huge losses (Mail and Guardian, 2009).



Box 3.4: Examples of the worst recorded floods in southern Africa (continued)

2008-2012

The map below highlights countries in southern Africa affected by cyclones (green) and floods (pink colour) between 2008 and 2012. The largest map in the right panel highlights countries that were affected by flooding or cyclones in each season¹², ranging from one season to four seasons.



Source: <http://reliefweb.int/map/angola/southern-africa-flood-and-cyclone-affected-areas-20082009-20092010-20102011-and-20112012>

12 A normal season is from November to April.

Droughts

Large areas of southern Africa are susceptible to dry conditions and experience frequent droughts (Figure 3.2) (Masih et al., 2014). Severe droughts (such as those of 1982-1983, 1991-1992, 1997-1998 and 2014-2015) have been linked to the El Niño-Southern Oscillation (ENSO) phenomenon (Rojas et al., 2014; Rouault and Richard, 2005; WFP, 2016). The standardized precipitation index (SPI) – which is used to predict short-term drought – is shown in Figure 3.7 for the years 1992, 2014-2015 and 2015-2016 (McKee et al., 1993). Droughts are often exacerbated by land degradation, poor water conservation practices as well as political instability

and poor economic growth. Droughts are often accompanied by high temperatures and an increase in high fire danger days. Southern African economies are dependent on rain-fed agriculture, and hence more prone to agricultural droughts. Droughts often result in decreased agricultural productivity owing to lower crop yields and loss of livestock and ultimately an increase in national and household food insecurity and rise in food prices. Droughts have additional consequences for hydropower energy generation (Lesolle, 2012). In 1992, for example, a drought in Zambia resulted in a 35% reduction in hydropower generation compared with the previous year (Beilfuss, 2012).



Box 3.5: Examples of the worst recorded droughts in southern Africa

1992

The 1992 drought resulted in approximately 70% of crops failing and 11.4 million tonnes of cereal having to be imported (FAO, n.d). Large areas of southern Africa received 20-70% of normal rainfall totals, with the dry conditions amplified by excessively high temperatures. The countries most affected were Zambia, Malawi, Mozambique and South Africa.

- Zimbabwe experienced a decline in agricultural production of 45%, manufacturing output of 9.3%, and GDP of 11% (FAO, n.d).
- In Mozambique, the impacts of the drought were exacerbated by the civil war and more than 1.3 million people were affected by food insecurity. The World Food Programme (WFP) provided an estimated US\$200 million in food aid relief (FAO, n.d).
- In South Africa, the loss of GDP during the 1992 drought was approximately 1.8 percent, representing US\$ 500 million (Pretorius and Smal, 1992). Crop failure resulted in farm labour lay-offs, increased farm debt and farm closures, and caused knock-on effects for households that depended on the agricultural sector. It has been estimated that 50 000 jobs were lost in the agricultural sector, with a further 20 000 in related sectors, affecting about 250 000 people (Mniki, 2009).

2015

South Africa has recently experienced the worst drought since 1930, with total rainfall in 2015 of 403 mm, the lowest annual amount on record (de Jager, 2016). Temperatures over this period were of the hottest recorded over the last 10 years. The 2015 drought was the result of a strong El Niño event (WFP, 2016). The agricultural sectors that have been most severely affected are maize, wheat and sugarcane along with beef and sheep production. The majority of maize (83%), wheat (53%) and sugarcane (73%) are produced under dryland conditions, making them especially vulnerable to periods of drought (AgriSA, 2016). The Free State, KwaZulu-Natal, Limpopo, Mpumalanga, Northern Cape and North-West provinces were declared drought disaster areas. Other regions in SADC (Lesotho, Swaziland, Zambia and Zimbabwe) also experienced reductions in crop yields and an associated increase in maize prices (WFP, 2016). The overall cereal deficit for the region stands at 7.90 million tonnes for the 2015-16 marketing year as compared to 3.9 million in 2014/15 (WFP, 2016).

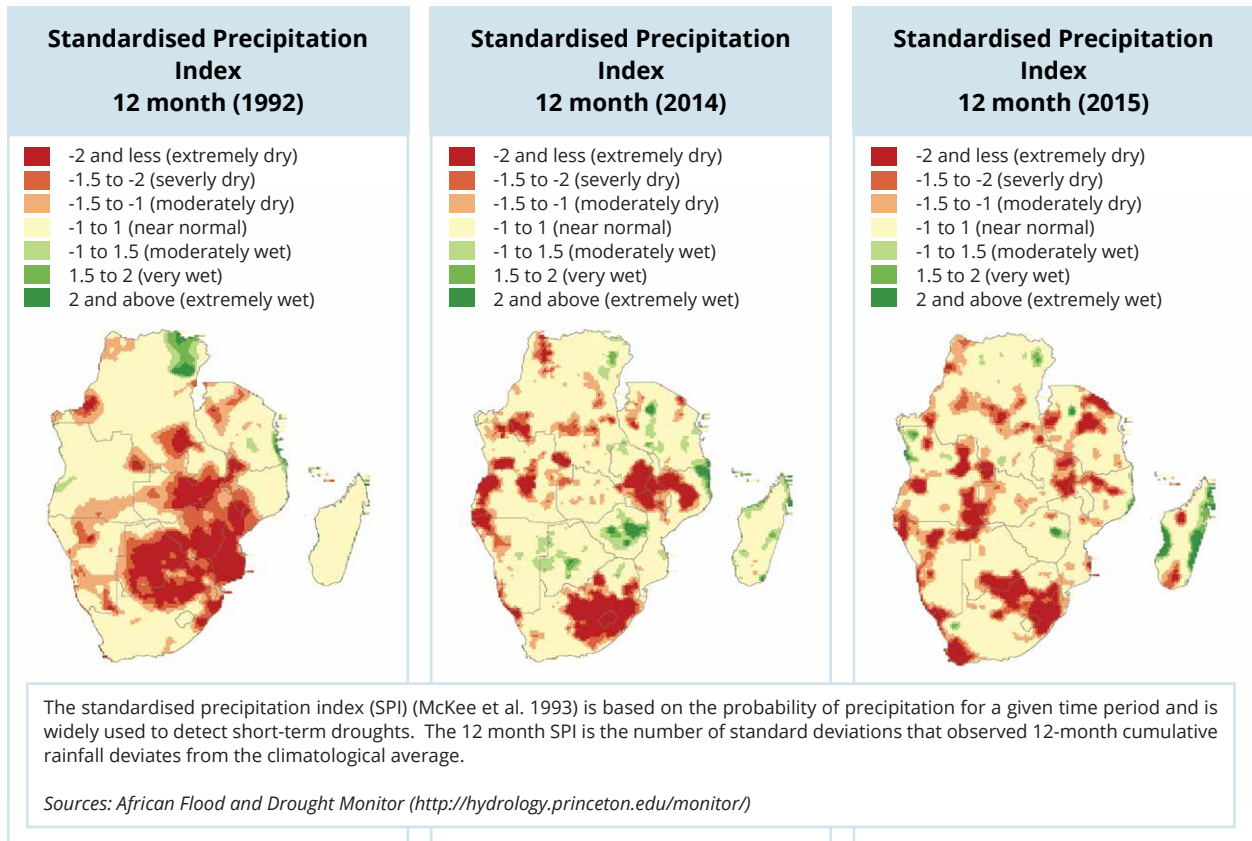


Figure 3.7: The standardized precipitation index (SPI) for 1992, 2014-2015 and 2015-2016. SPI is based on the probability of precipitation for a given time period and is widely used to detect short-term droughts. The 12-month SPI, shown here, is the number of standard deviations that observed 12-month cumulative rainfall deviates from the climatological average (Source: African Flood and Drought Monitor accessed at <http://hydrology.princeton.edu/monitor/>).



Storm surges

The south-eastern coastline of southern Africa, comprising South Africa, Mozambique, Tanzania, Madagascar as well as small island states such as Mauritius, is regularly affected by cyclones and other significant weather events that result in an increase in sea level and large wave events along the coast (storm surges) (Mather and Stretch, 2012). Storm surges cause

severe damage to settlements and infrastructure such as sea walls, railway lines, harbours and coastal properties. Madagascar, Mozambique and the east coast of South Africa (to a lesser extent) have been the worst affected by storm surges (Field, 2012). On the south-western coastline, Luanda in Angola is on the list of the top 20 most vulnerable cities in the world to coastal storms and sea-level rise.



Box 3.6: Examples of the worst recorded storms in southern Africa

1994

Madagascar was affected by five cyclones during the 1993-1994 season, with the worst being Cyclone Geralda, category 5, which followed Cyclone Daisy. More than 90% of the port city of Toamasina was destroyed (Longshore, 2010) and damage was estimated at US\$10 million.

2004

Cyclone Gafilo, category 5, was the most intense tropical cyclone worldwide in 2004. It is estimated that approximately 773 000 people were affected (ReliefWeb, 2004).

2008

In 2008 a storm surge along the western and southern coasts of South Africa resulted in damage to coastal property and infrastructure that was estimated at R1 billion (Smith, 2013). The storm surge was caused by the combination of a mid-latitude cyclone (cold front) and secondary low pressure (Theron, 2011).



Wildfires

Fires are a frequent occurrence in southern Africa (Figure 3.2) due to a strong dry season, lasting for up to five months, combined with rapid rates of fuel accumulation. The dominant fire season is July, August and September (Archibald et al., 2010). While climatic controls (such as wind and temperature) are important in determining the size and intensity of fire, human activities (such as land

clearing, inadequate land management and increased spread of invasive alien plants) have a substantial effect on fires and are a strong controlling factor on fire regimes in southern Africa (Archibald et al., 2010). The two worst recorded cases of wildfires are described in Box 3.7.



Box 3.7: Examples of the worst recorded fires in southern Africa

2008

The KwaZulu-Natal and Mpumalanga provinces in South Africa experienced fires that resulted in significant loss of revenue, estimated at US\$440 million (Figure 3.4). As much as 61 700 hectares of plantation forest were burnt, equating to 2.9% and 9.5% of the total area of plantations in these two provinces, respectively. Forestry SA estimated the value of standing timber burnt to be R1.33 billion (2007 prices) and that 40% of this was unsalvageable (Forsyth et al., 2010).

2015

An estimated 57 000 people were affected by fires in Cape Town, South Africa in March 2015 (EM-DAT CRED, 2016). High temperatures of 42 °C combined with windy, dry conditions fuelled a fire that burnt approximately 4 000 hectares of vegetation (SAinfo, 2015). Fires are critical for maintaining the Fynbos ecosystem and occur every 15 years (Mucina and Rutherford, 2006). The close proximity of some developments to Table Mountain National Park resulted in a number of homes being evacuated during the fire and five being damaged by the fire (Swingler, 2015).

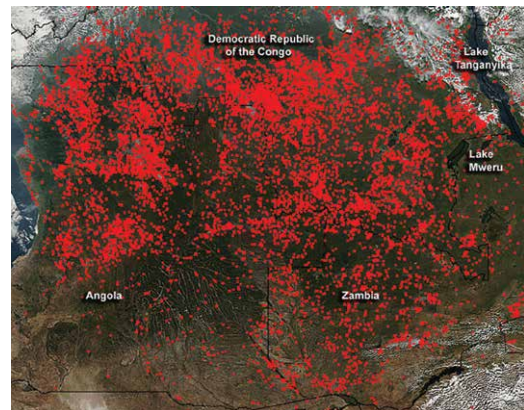


(Pictures: Timm Hoffman)

2016

Widespread burning was observed over the southern region of the Democratic Republic of Congo, Zambia and Angola in June 2016. The main fire season in these regions occurs from June to July and the fires in this image are attributed to agricultural burning practices.

Image taken on June 3, 2016 from the Suomi NPP satellite's Visible Infrared Imaging Radiometer Suite (VIIRS) instrument showing actively burning areas in red (Source: www.nasa.gov).



3.3. Impacts of changes in climate extremes

The socio-economic impacts of recent extreme climate events, as highlighted in Section 3.2, reveal southern Africa's significant vulnerability and exposure (see Part II of the handbook for detailed definitions) to changes in climate disasters. The expected increase in climate-related disasters due to climate change is expected to have a negative impact on food production and access to water, infrastructure, settlements, and human well-being (Stocker et al., 2013). While some sectors with closer links to climate such as tourism and agriculture are particularly at risk, the majority of sectors are exposed, either directly or indirectly, to the effects of extreme weather events. The severity of these impacts will depend on the exposure and vulnerability of communities to the climate hazard.

More frequent and intense events, combined with a growing and urbanising population and increasing value in urban and built infrastructure, imply greater exposure to such events. High exposure and vulnerability levels will transform even small-scale (slow-onset) events into disasters for some affected communities. Recurrent small or medium-scale events affecting the same communities may have cumulative effects which lead to serious erosion of the development base and livelihood options, thus increasing vulnerability (Field, 2012). The poor, in particular, will be most vulnerable because of their limited access to livelihood opportunities,

infrastructure, information, technology and assets. In addition, they are often forced, through economic circumstances, to inhabit areas that are susceptible to natural disasters. This vulnerability is exacerbated by inadequate planning and insurance cover for disaster losses.

Given the increasing economic costs of extreme events, there is a great need for proactive investment in disaster risk management (DRM) activities to deal with disasters (refer to Chapter 15 for approaches to linking DRM with climate change adaptation). Currently DRM receives only a small proportion of global development assistance, and the amount allocated to proactive risk reduction, as opposed to response, is still small (Figure 3.10). Quantifying the cost effectiveness of DRM, including investments in effective climate information systems and early warning systems, remains a challenge – not only to southern Africa – owing to limited data and robust information on costs such as recovery and rehabilitation (Moench et al., 2007). Moreover, the full costs of extreme events in southern Africa are likely to be underestimated because of the lack of comprehensive studies on damage, adaptation, and residual costs (Field, 2012). Despite this, there is a large body of evidence that suggests that investment in prevention is more cost-effective than spending on relief (Hallegatte, 2012; Rogers and Tsirkunov, 2011).

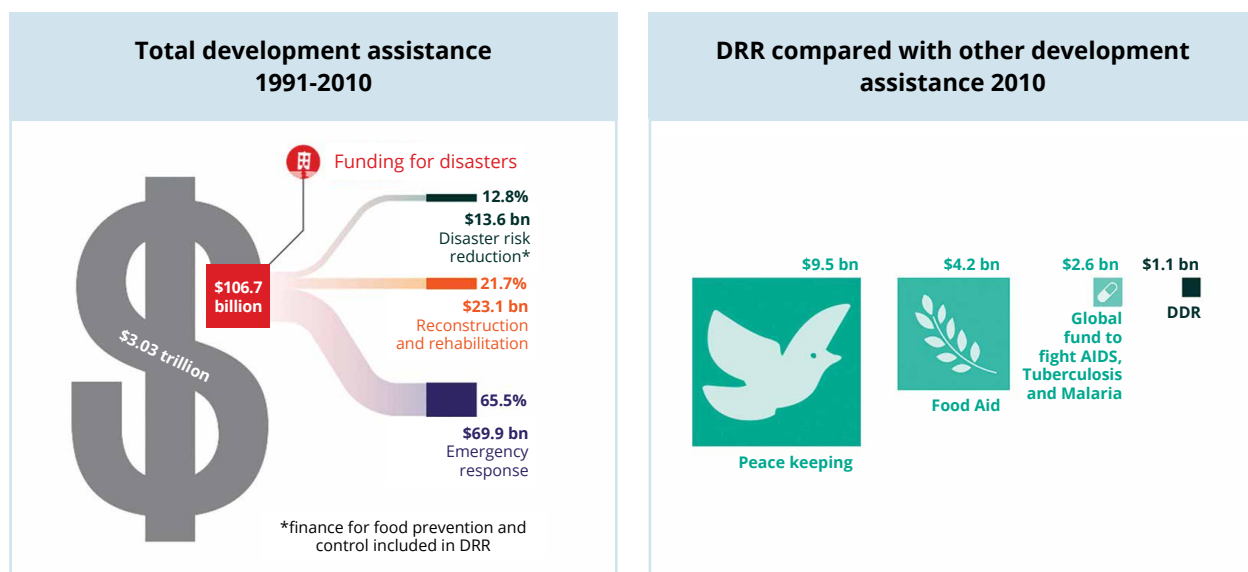


Figure 3.4: The relative cost (US\$ x 1 000) of the major categories of climate-related events – wildfires, storms, floods, extreme temperature, and droughts – in southern Africa since 1980 (Source: EM-DAT CRED, 2016).