Drought Risk Management and Mitigation Strategy (DRIMMS)

2022 – 2032

VOLUME 3

DROUGHT RISK MANAGEMENT AND MITIGATION STRATEGY AND RECOMMENDED IMPLEMENTING ARRANGEMENTS

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Volume 2: Drought Vulnerability Assessment Report

Volume 3: Drought Risk Management and Mitigation Strategy and Recommended Implementing Arrangements

Executive Summary Document

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Abbreviations

ACAT	Africa Cooperative Action Trust
ACDRM	African Centre for Disaster Risk Management
ACRITEX	Agriculture, Technical and Extension Service
ADRA	Adventist Development and Relief Agency
ASMET	Advancement for Small and Micro Enterprises Development in Tanzania
AU	African Union
CBO	Community-Based Organisation
COMESA	Common Market for Eastern and Southern Africa
CRC	Conservation resource centre
DDMA	Department of Disaster Management Affairs
DENR	Department of Environment and Natural Resources
DMD	Disaster Management Department
DMMU	Disaster Management and Mitigation Unit
DRR	Disaster Risk Reduction
DWRM	Department of Water Resources Development
ECOT	Eswatini College of Technology
ECZ	Environmental Council of Zambia
EEC	Eswatini Electricity Company
EM-DAT	Emergency Events Database
ESWADE	Eswatini Water and Agricultural Development Enterprise
FANR	Food, Agriculture and Natural Resources Sector
FAO	Food and Agricultural Organization of the United Nations
GIS	Geographic Information System
GWP-SA	Global Water Partnership-Southern Africa
IFAD	International Fund for Agricultural Development
IGO	International governmental organisation
IPCC	Inter-Governmental Panel on Climate Change
IUCN	International Union for Conservation of Nature
IUCN	International Union for Conservation of Nature
IWMI	International Water Management Institute
LDN	Land Degradation Neutrality

MAE	Ministry of State Administration
MS	Member States
MT	Metric Ton
NAMBOARD	National Agricultural Marketing Board
NCCDM	National Committee on Disaster Management
NDMA	National Disaster Management Agency
NDMO	National Disaster Management Office
NEWU	National Early Warning System
NGO	Non-Governmental Organisation
NMC	National Maize Corporation
RCP	Representative Concentration Pathway
REC	Regional Economic Committee
REWU	Regional Early Warning System
RISDP	Regional Indicative Strategic Development Plan
SADC	Southern African Development Community
SLM	Sustainable Land Management
SSA	Sub-Saharan Africa
TWLAT	Tanzania Women Land Access Trust
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNEP	United Nations Environmental Programme
UNESCO	United Nations Economic and Social Council
UNESWA	University of Eswatini
UNICEF	United Nations International Children's Emergency Fund
WB	World Bank
WFP	World Food Programme
WMO	World Meteorological Organization
ZimVAC	Zimbabwe Vulnerability Assessment
ZINWA	Zimbabwe National Water Authority
ZMD	Zambia Meteorological Department

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Executive Summary

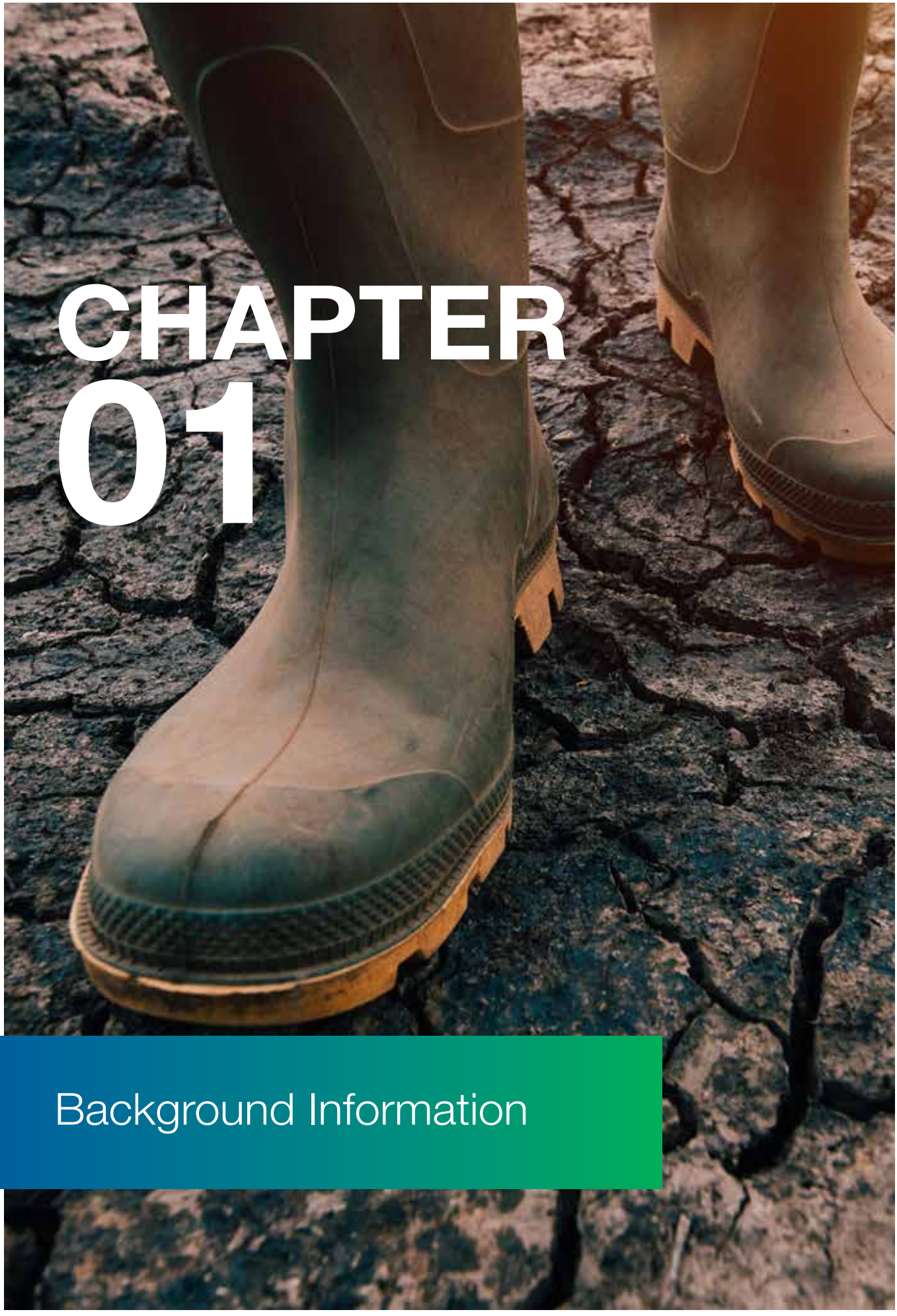
The incidence and intensity of droughts is expected to increase in Southern Africa over the coming years. The Southern African Development Community (SADC) region is known to be highly sensitive to droughts due to its dependence on rain-fed agriculture, the impacts of which can range from reduced water supplies to crop and livestock production, food insecurity and conflicts among competing water users. The negative impacts will be exacerbated by other hazards such as floods, advancing desertification and land degradation, as well as the region's well-documented diminishing economic productivity, persistent food insecurity, extreme poverty and chronic vulnerability, which affect the majority of communities due to overreliance on agriculture for livelihoods.

In order to mitigate these trends, the region has developed the SADC Drought Risk Management and Mitigation Strategy (DRIMMS), which is a 10-year road map to achieve region-wide drought resilience. The objective of the strategy is to enhance the capacity of the SADC countries to effectively prepare for and manage drought impacts. This will be achieved through a harmonised approached at regional level, using relevant tools in the UNCCD toolbox, to assess vulnerability to drought, strengthen institutions that deal with drought, and develop mitigation mechanisms.

A questionnaire was prepared and used to collect information and data from the key stakeholders in the different countries. This was followed up by online engagements with them. Relevant literature was sourced from the internet, the UNCCD national focal points and other sources. The drought vulnerability assessment for the SADC used the IPCC framework and other relevant sources to assess the distribution of drought hazard and social and biophysical vulnerability to those hazards to identify drought vulnerability and risk hotspots.

The findings show that SADC countries are experiencing increasing trends in terms of drought severity, albeit with differing rates of change. The number of reported drought events in the region has been increasing consistently over the past century and most countries in the region are severely affected by drought, with the exception of the three small island states of Comoros, Mauritius and Seychelles. Opportunely, all SADC states have disaster management policies and institutions in place, but there are gaps in how drought is addressed, which include a lack of institutional capacity and use of early warning systems (EWS). Further, the policy framework analysis revealed that the countries were often ill equipped to handle the financial aspects of disaster risk reduction (DRR) policy implementation.

To respond to the drought challenges in the region, DRIMMS is aptly anchored on three key pillars: (1) Drought monitoring and early warning (2) Drought impact, vulnerability and risk assessment, and (3) Implementing measures to limit impacts of drought and better respond to drought. It has seven strategic focal areas and nine strategic objectives. At a regional level, the SADC Secretariat is responsible for coordinating and harmonising implementation of the strategy, as well as resources mobilisation on behalf of SADC member states. The Secretariat is also responsible for advocacy, creating awareness, communication and information sharing. Implementation of the DRIMMS requires substantial financial resources, which should be acquired through various mechanisms that build on existing systems, such as those that support action on climate change, strategic programming, capitalisation and partnership management.



CHAPTER 01

Background Information

1.1 Introduction

With a population of 350 million, the 16-member Southern African Development Community (SADC) is an inter-governmental organisation pursuing regional development and political security among its members (Figure 1). Being a developing region, member states have limited industrialisation, with the bigger portion of the national population living in rural communities. About 70% of the region's population depend on agriculture for food and income, making people's livelihoods reliant on rainfall. It is a region characterised by a high youth population, rising unemployment and growing inflation. The region's climate ranges from arid to sub-humid, with heavy rains normally following long dry periods.

The region is highly vulnerable to weather extremes, poverty and social inequalities, among other factors. Droughts are common, with flooding increasingly becoming frequent, especially in coastal areas. This affects water availability and the integrity of ecosystems, livelihoods and food security. The 2019 cyclones Idai and Kenneth led to agricultural losses of at least US$141 million in Mozambique alone, killing over a thousand people. Further, poverty is a major concern in many member states. For example, in Mozambique, Zambia and Zimbabwe, between 21% and 62% live below the poverty line. The region is experiencing high unemployment levels among the youth, which stood at 25.1% on average in 2017, with South Africa (57.4%), Eswatini (54.8%), and Namibia (45.5%) recording the highest figures among SADC member states. Social inequalities, notably based on gender, exacerbate vulnerability across the region, constraining access to information, resources and decision-making power. The ratio of male to female youth unemployment was highest in Mauritius (1.30) and Tanzania (1.22)

The SADC Regional Indicative Strategic Development Plan (RISDP) of 2020 expresses the regional development agenda. The document illustrates a comprehensive framework for the implementation of SADC's regional integration agenda for the next 10 years by idenitfying, in an incremental approach, concrete steps and milestones to be achieved on the road to SADC's Vision 2050, which envisions read; "a peaceful, inclusive, competitive, middle-to-high-income industrialised region where all citizens enjoy sustainable economic well-being, justice, and freedom". The plan also emphasises the need for cooperation in adopting an effective disaster preparedness and management mechanism by implementing programmes and projects aimed at early detection, early warning and mitigation of disaster effects. While SADC has not developed a protocol on disaster risk reduction or management, several existing SADC protocols are relevant to addressing the multidisciplinary nature of drought disaster risk.

FIGURE 1: MAP SHOWING SADC MEMBER STATES.

1.2 Background

Droughts are common in the arid and semi-arid regions of the SADC region, and heavy rains following periods of drought can cause severe flooding. In the region, wet and dry seasons are influenced by three primary wind systems: the Sub-Tropical Eastern Continental Moist Maritime System (characterised by regular cyclones); the South-easterly Wind System, which brings rainfall from the Indian Ocean; and the Inter-tropical Convergence Zone. However, the El Niño Southern Oscillation phenomenon has also been found to affect climate fluctuations, specifically rainfall amounts.

The increase in climate variability and extremes continues to play a significant role in the declining trend in per capita food production growth. The Intergovernmental Panel on Climate Change (IPCC) has predicted that droughts in Southern Africa will increase in severity and frequency over the coming years and evidence has shown that the occurrence of drought is intensifying both in frequency and severity in Southern Africa, inflicting serious economic and social losses and worsening the vulnerabilities of the region (Tirado et al., 2015; Urama and Ozor, 2010). Due to an overreliance on agriculture for livelihoods, these impacts will be exacerbated by other hazards such as flooding, desertification and land degradation, as well as declining economic productivity, persistent food insecurity, extreme poverty and chronic vulnerability. The SADC

region is known to be highly sensitive to droughts due to its dependence on rain-fed agriculture, the impacts of which can range from reduced water supplies and crop and livestock production to food insecurity and conflicts among competing water users (Adejuwon and Olaniyan 2019). Some crops show more climate resilience than others, but the majority of projected impacts of climate change on rain-fed agriculture are negative (Serdeczny et al. 2017).

Along with desertification and land degradation, drought is a challenge of global dimensions. In Southern Africa, it has contributed to and aggravated economic, social and environmental problems such as:

- In the absence of rainfall for extended periods, access to water becomes a challenge, resulting in **water insecurity**. The inability to access water during a drought limits household and commercial activities and lowers economic productivity. The added pressure on water systems such as rivers, lakes, and even groundwater, may result in the depletion/ drying out of these systems (Habiba, et al., 2014). This also encourages **desertification** in certain regions.
- Drought reduces soil integrity and encourages vegetation loss, which leads to the land being more susceptible to soil erosion, land **degradation** and **habitat loss**. As vegetation cover and rainfall reach minimal levels, numerous plant and animal species struggle, causing massive **biodiversity loss** as ecosystems collapse.
- **Food insecurity** during drought is drastically increased, primarily by the limited access and/ or availability of water. Reduced soil nutrients present a challenge to farmers (commercial and subsistent alike) as crop growth is majorly delayed while livestock is susceptible to diseases and likely to die from hunger, due to limited grazing, and thirst due to limited to no access to water. Additionally, the nutritional value of the food is compromised, while the food prices become inflated.
- Drought reduces the overall health of the population as food insecurity can lead to **poor health** and malnutrition. The dry conditions result in lower air quality due to dust and wildfires/fumes that harm people; basic hygiene and sanitation may be reduced as there is a need to save water, increasing the number of people carrying communicable diseases. There is also an increase in stress, which may lead to increased mental illness as people lose their livelihoods (Vins, et al., 2015).
- In countries or sub-regions that are reliant on water to produce energy (hydropower-reliant), **energy production** capacity can be significantly reduced by drought as water levels in hydroelectric dams are reduced. The low water supply also impacts the functioning of power stations (regardless of the source) and may lead to closures of energy-generating facilities. Wildfires that are rife during drought also destroy energy infrastructure (power lines and stations) and the reduced biomass affects those that rely on wood as a source of energy.
- Stressed habitats/ecosystems due to drought lead to **reduced climate resilience** as the ecosystem services are limited. The environment, including people, becomes vulnerable to climate-induced disasters (i.e heatwaves, flash floods or uncontrollable wildfires) and are unable to adapt or maintain productivity and healthy ecological functions.
- Drought affects the urban water supply, which then limits further development in urban areas and **urbanisation** (Szalińska, et al., 2018). In some areas, urban sprawl may increase as people flock to cities, searching for water, food and opportunities. This places excess pressure on the systems.
- Water scarcity during drought often leads to an increase in the vulnerable gender(s) and groups, i.e women and children. Water collection points being scarce and further away from homesteads during drought adds another dimension to **gendered vulnerabilities**. There is also a high likelihood of an increase in the number of low-income women and female-headed households.

1.3 Purpose and Target of DRIMMS

The Vulnerability Assessment (Volume 2) demonstrates clearly that the SADC region is extremely vulnerable to drought events due to various factors, such as overreliance on rain-fed agriculture, poorly developed infrastructure and slow economic growth. The SADC Drought Risk Management and Mitigation Strategy (2022-2032) aims to strengthen and/or enhance the resilience of vulnerable communities and ecosystems while simultaneously targeting growth and sustainable development in the SADC region in response to recurrent droughts. As outlined in the SADC RISDP 2020–2030, the SADC SRAP (2015–2025) and several regional initiatives undertaken in response to collective decisions to end drought emergencies, most notably the Windhoek Declaration (2016), this initiative builds on the region's integrated development framework. This Declaration was adopted by African governments, development partners and other stakeholders in Windhoek, Namibia in August 2016.

Serving as a common framework for national and regional programmes to enhance drought resilience and build sustainability in the SADC region, the features of the strategy should be reflected in the national drought plans. The strategy by design recognises that drought-prone communities face common challenges and are often interconnected through shared natural resources and regional trade as well as trans-boundary, human and animal factors. Individual SADC Member States may have their own specificities and areas of emphasis. For example, droughts are a common feature in the arid and semi-arid countries of the region. The vulnerability and impact assessment capacity for member countries range from low to medium. The same applies to monitoring and early warning systems, and mitigation and preparedness response.

1.4 Vision

The vision for DRIMMS is a future that mitigates the effects of drought in Southern Africa and strives to achieve drought resilience at all levels in the 16 SADC member states, consistent with the UN 2030 Agenda for Sustainable Development and the SADC Regional Development Strategies.

1.5 Goal

The objective of the strategy is to build and/or enhance the resilience of vulnerable communities and ecosystems to the effects of recurrent droughts, while targeting simultaneous growth and sustainable development in the SADC Region.

Development of a drought risk management strategy for SADC, focusing on risk management and mitigation, using outputs from preceding activities, aimed at the following:

- To articulate activities to enhance resilience to drought events.
- Suggest approaches that promote a paradigm shift from reactive to proactive approaches.
- Identify activities to enable countries to achieve a long-term regional objective to develop technical and institutional capacity to manage droughts and other natural hazards in an effective, efficient and sustainable manner.
- Identify mechanisms to facilitate cooperation on data-sharing, including early warning and monitoring systems, vulnerability and impact mapping and evidence on drought risk mitigation measures in the countries affected.

1.6 Guiding Principles

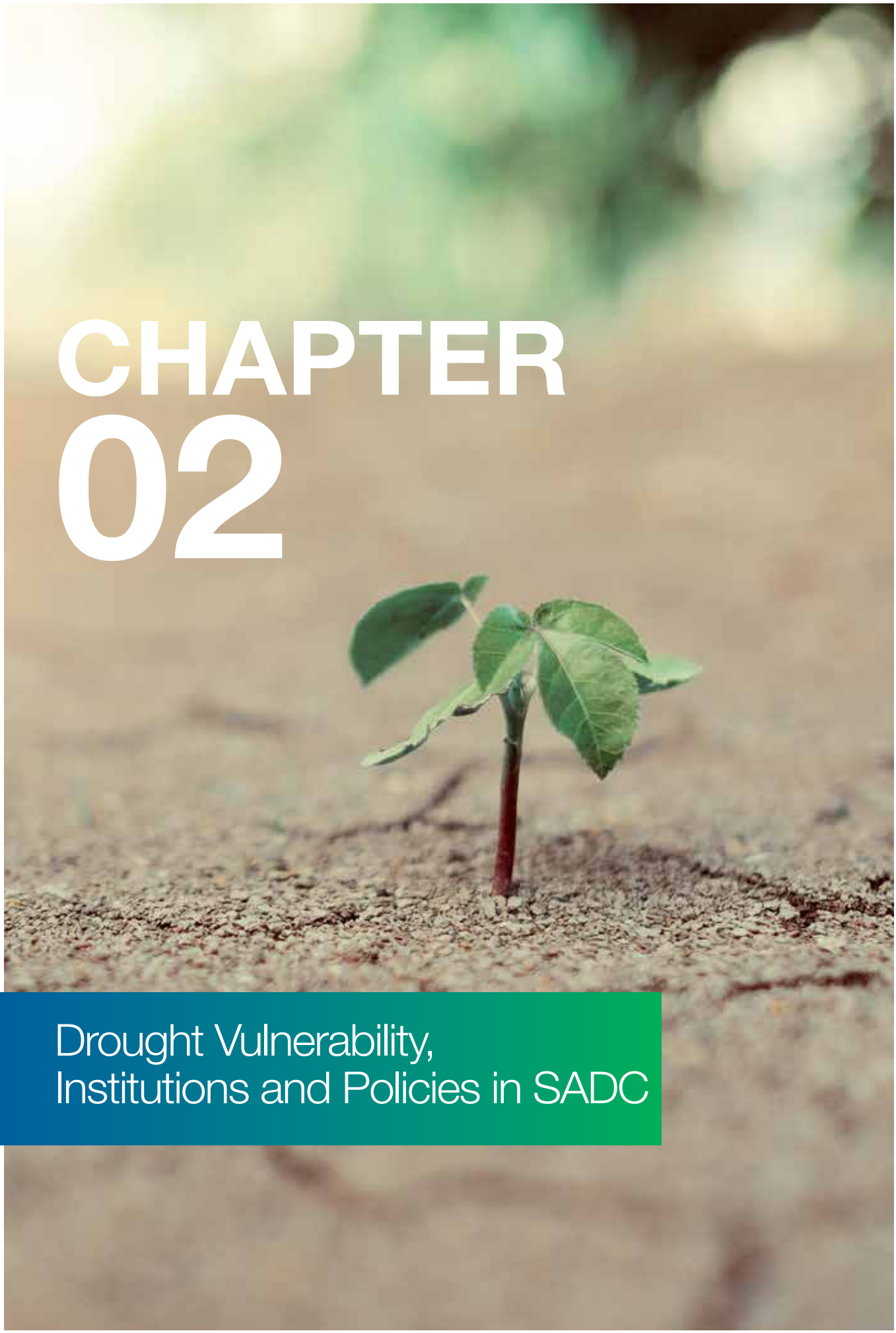
In preparing the DRIMMS, SADC embraced and employed high values and principles, including ownership, participation, inclusiveness and partnership with stakeholders. Thus, SADC member states, development partners and non-state actors have all contributed to the preparation and implementation of the strategy. At regional, level the SADC secretariat will be responsible for coordinating and harmonising the implementation of the strategy, as well as resources mobilisation on behalf of SADC member states. The secretariat will also be responsible for advocacy, awareness creation, communication and information sharing.

1.7 The Formulation Process

IUCN, together with the SADC Secretariat, engaged in a consultative and participatory process formulation. The strategy formulation is indicated in Figure 1 and highlights the linkage to the strategy and the development process. The execution of the regional project was launched at an online meeting held on 9 November. There were over 40 participants, comprising the UNCCD Secretariat, IUCN, the Government of Korea, SADC National Focal Points, IWMI, FAO, WB and SADC. IUCN introduced the project objectives and milestones. It was emphasised that the expected outcome was a regional framework/drought strategy for the SADC region and a draft proposal to further the initiative.

Before commencing with preparation plans, a list of key public and private stakeholders in each jurisdiction was prepared. These included relevant national and local agencies, the city council or town board, utilities and service providers, commercial enterprises, small business owners and public or private facilities such as schools and hospitals, local residents, etc. as applicable, and the national focal points were the main contacts for the countries.

A questionnaire was prepared and used to collect information and data from the key stakeholders in the different countries. This was followed up by online engagements with the stakeholders. Relevant literature was sourced from the internet, UNCCD national focal points and other sources, and reviewed. The drought vulnerability assessment for the SADC (see Volume 2) used the IPCC framework and other relevant sources to assess the distribution of drought hazard and social and biophysical vulnerability to those hazards to identify drought vulnerability and risk hotspots.



CHAPTER 02

Drought Vulnerability, Institutions and Policies in SADC

2.1 Vulnerability and Risk Assessment

SADC as a region has shown to be vulnerable to drought, with varying degrees among and within countries. higher national-level vulnerability found in northern and eastern countries, including the DRC, Tanzania, Mozambique and Madagascar. There is a greater degree of variability between districts with, for example, countries such as Madagascar and areas such as northern Mozambique and south-western Angola demonstrating higher vulnerability. South Africa exhibits lowest overall levels of vulnerability.

Use of various assessment methods all show increasing vulnerability to drought in SADC, especially from 2015 (Table 1), largely driven by characteristics of natural systems (for example, natural disasters that are becoming more frequent and intense). Irrigated drought index for the region showed a high level of vulnerability, the highest irrigated drought risk primarily due to the fact that the area under irrigation is high. On the contrary, countries such as Botswana and the DRC showed the lowest irrigated drought risk due to the smaller areas under irrigation. Rain-fed drought risk is higher in the arid and semi-arid southern part of the region, and low in the northern part of the region. The countries with low rain-fed drought risk include Angola and the DRC. Groundwater risk is also generally high, while surface water risk is widespread risk throughout the region. The risk hotspots are concentrated in Namibia, Botswana, southern-western Zimbabwe and the Northern Cape in South Africa.

Table 1: Occurrence and impacts of major recorded droughts in SADC countries from the 1900s (adapted from Bhaga et al., 2020).

COUNTRY	DROUGHT YEARS	NUMBER OF EVENTS	EXAMPLE OF DROUGHTS EFFECTS
Botswana	1981–1984; 1990; 2005; 2012–2013; 2014–2020	**5**	In 2015, some areas experienced decreased water pressure and water supply was cut off. In 2019, 40,000 cattle died and water scarcity led to a 70% drop in land cultivation.
Democratic Republic (DR) of Congo	1978; 1983; 2017–2020	**3**	The 2017 drought period affected hydroelectric power generation and left 13.1 million people severely food insecure.
Eswatini	1981; 1984; 1990; 2001; 2007; 2014–2020	**5**	In 2016, 80,000 cattle died and maize production dropped by 67% between 2015 and 2016; and in 2017, 308,059 people suffered from food insecurity.
Lesotho	1968; 1983; 1990; 2002; 2007; 2011; 2015–2020	**7**	In 2019, approximately 71,000 people suffered from food insecurity, and in 2020 approximately 500,000 people are threatened with hunger. It is estimated that more than 30% of the population will experience acute food insecurity.
Madagascar	1981; 1988; 2000–2002; 2005–2007; 2010–2012; 2015–2020	**6**	In 2016, 1.1 million Malagasy suffered from food insecurity due to crop failure, as agricultural production was 90–95% lower than usual. At the end of 2019, more than 2.6 million Malagasy were affected by drought.
Malawi	1987; 1991–1992; 2001–2002; 2005–2007; 2012; 2016–2017	**6**	In 2016, maize production decreased by 12%, leading to food shortages. In 2017, 6.5 million Malawians were food insecure due to poor agricultural seasons.
Mauritius	1999; 2011–2013	**2**	The agricultural sector lost $160 million in 1999 due to crop failure and in 2011, only 15–20% of the harvest was viable.
Mozambique	1991–1992; 2001–2003; 2005–2007; 2016–2019	**4**	In 2010, 81% of Mozambicans relied on agriculture for food and employment, therefore increasing unemployment rates and food shortages, and by 2019, more than 60,000 Mozambicans were affected and in some areas 60% of crops were lost.

Namibia	1981; 1990; 1995; 1998; 2001; 2002; 2013; 2015–2020	**8**	In 2013, there were 463,581 people that suffered from food insecurity, and in 2019 The Agricultural Bank of Namibia's employment opportunities from the agricultural sector decreased from 34% in 2012 to 23%.
Seychelles	1998–1999; 2010–2011	**2**	The 1998 drought led to bleaching of 90% coral reefs.
South Africa	1964; 1986; 1988; 1990; 1995; 2004; 2015–2019	**7**	The worst drought experienced in 30 years occurred in 2015, and in 2018 approximately 3.7 million South Africans were affected by drought, leading to cut-offs of water supply in certain areas and to nationwide water restrictions.
Tanzania	1996; 1999–2002; 2004–2006; 2011; 2016–2019	**10**	In 2011, Tanzanians were affected by water and food shortages, and in 2017 the agriculture sector suffered a loss of approximately $200 million, causing food prices to increase by 12%.
Zambia	1981; 1983; 1990–1995; 1999–2002; 2004–2005; 2015–2020	**6**	Drought in 1981 led to disruption in maize production, which led to severe famine. In 2019, 1.3 million people needed food aid as maize production dropped from 2.4 million tons to 2 million tons and there was a disruption in hydropower generation.
Zimbabwe	1981–1983; 1986–1987; 1991–1992; 2010–2011; 2015–2020	**5**	In 2019, 2.3 million Zimbabweans needed food aid, and maize production dropped by more than 70% compared to 2017/18. The death of livestock affected 2.2 million people in cities and 5.5 million people in rural villages.

A study by Quin et al (2020) points to the fact that medium-high climate risk (high vulnerability, medium-high climate hazard) is widespread across Angola, the DRC, Tanzania, Mozambique and Madagascar. Figure 2 below represents the combined vulnerability index at national and district level as estimated by Quinn et al (2020).

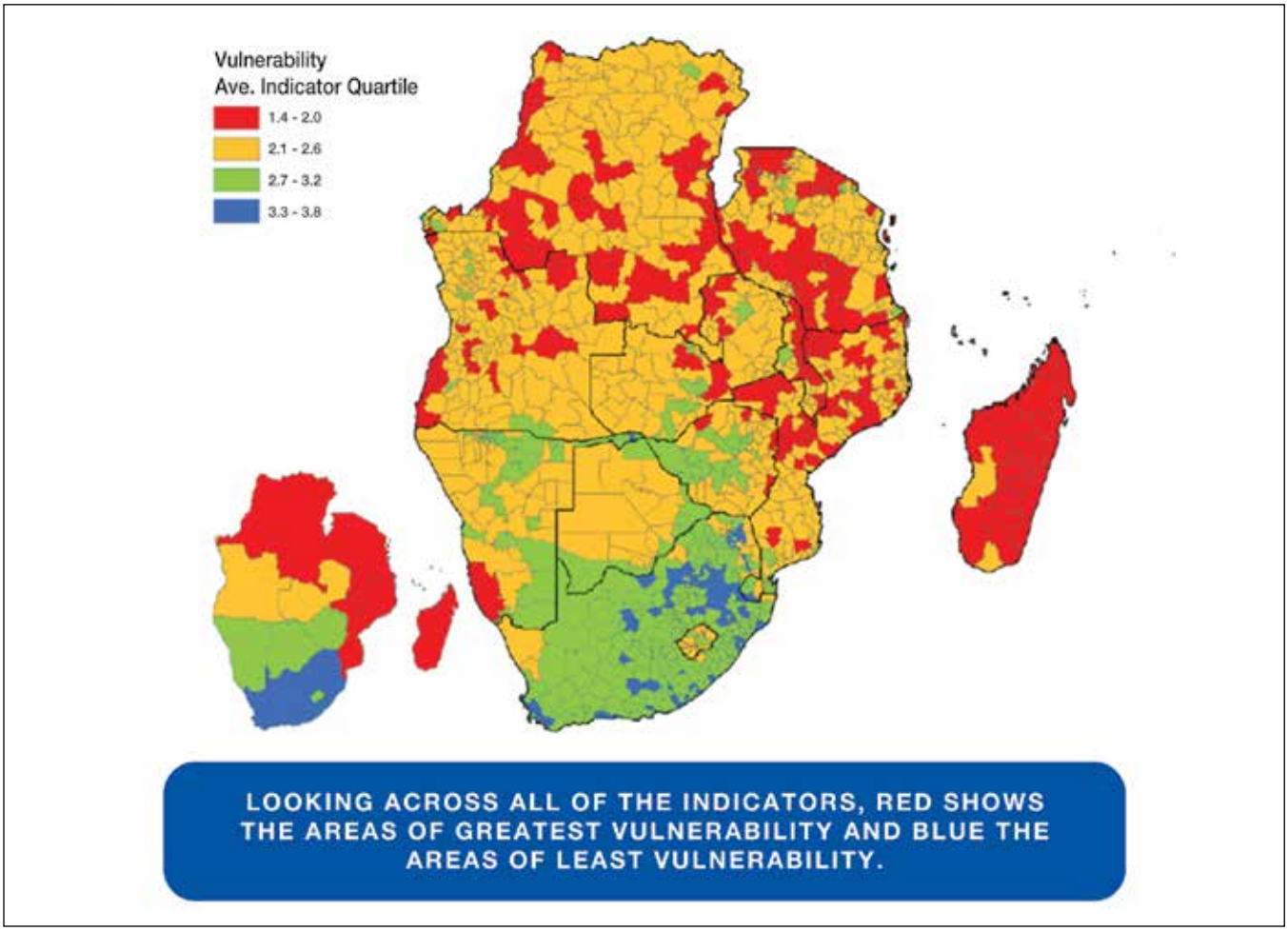


FIGURE 2: DROUGHT VULNERABILITY STATUS OF DISTRICTS AND COUNTRIES ACROSS THE SADC REGION (FROM QUINN ET AL, 2020). QUARTILES REPRESENT THE COMBINED (10 INDICATORS) RELATIVE VULNERABILITY LEVELS, WHEREBY QUARTILE 1 (RED) = MORE VULNERABLE, QUARTILE 4 (BLUE) = LESS VULNERABLE.

The observed increase in vulnerability among the SADC countries is attributed to inadequate and poor development (and development planning) (Annex 1), poor governance and corruption, and the inability to address poverty, inequalities and poor economic performance, among other things.

2.2 Vulnerable Groups

Drought predominantly affects the most vulnerable groups, including female-headed households whose income is derived mostly from agriculture (Ngcamu and Chari 2020). This is further compounded by low levels of education and literacy and poor health among women, exacerbated by HIV and AIDS, which is widespread in the SADC region. Furthermore, 20th- and 21st-century environmental changes have directly affected vulnerable groups, including children, people living with disabilities, ethnic minorities and the aged.

Most of the rural poor in sub-Saharan Africa depend for their survival on subsistence agriculture, which is sensitive to changes in weather patterns. The agriculture sector is the one that is mostly affected by the adverse effects of climate change, with the highest number of rural inhabitants prone to chronic hunger and malnutrition. The magnitude of poverty limits the ability of those affected to adapt to climate variability and natural disasters (Lobell et al. 2008). Consequently, rural households and communities in sub-Saharan Africa are often cited as having battled with socio-economic challenges due to climate change and variability.

Within the agriculture sector, subsistence farmers are likely to be more vulnerable to drought because of their predominant involvement in rain-fed agriculture and their greater concentration in less favourable climatic regions. As a consequence, they are likely to face much greater relative loss of assets. For similar reasons, pastoralists with limited numbers of livestock may be more badly affected than large-scale commercial cattle farmers (Benson and Clay, 1998). Muchenje et al., 2008 indicate that livestock production is still a challenge in developing countries due to poor management practices, high prevalence of pests and diseases, and the poor state of the grazing land and overgrazing. Therefore, rises in temperature lead to increases in the spatial distribution and intensity of existing pests and diseases, which in turn affect livestock productivity and may cause the death of livestock in some extreme instances.

Acknowledging the gender dimensions of drought, it is important to employ a gender-responsive approach to drought management to identify how disasters affect men, women, boys and girls differently. This is in line with the UNCCD Gender Policy, which states that, “Parties will seek to increase and strengthen the participation and leadership of women at all levels in decision-making and local implementation of the UNCCD, including in drought management and sand and dust storms and land degradation neutrality interventions, and aim to reach gender parity by 2030.” Mainstreaming gender in environmental issues, including drought, should be a priority for the region and party states as required by Article 12 of the SADC Protocol on Gender and Development (2008).

Based on the vulnerability assessment, it is recommended that:

01 In the short term: provide immediate relief to meet the needs of vulnerable people in the region requiring food and non-food assistance, and provide targeted support packages to the assessed vulnerable people to assist recovery and build resilience. It is estimated that about 27.1 million needed such assistance after the 2018 drought. DRIMMS can be used as a framework to make sure that countries put in place social protection systems that can respond to shocks caused by the climate crisis and ensure they are gender-responsive.

02 In the medium to long term, promote and scale up appropriate technologies, including climate-smart agricultural practices; scale up provision of primary health care services, including nutrition, water and sanitation, in line with approved regional food and nutrition security strategy; take measures to promote water conservation techniques, efficient use, reuse and recycling of water and where possible, encourage and advocate for rainwater harvesting.

03 Ensure the participation of civil society in initiatives to promote food security and drought resilience to integrate cross-cutting issues such as gender, environment climate change and disaster reduction into policies, plans and programmes. Institutionalisation of gender-responsive drought risk assessments, implementation of gender-responsive early warning systems and using gender-responsive indicators to monitor the gender mainstreaming progress. Also, affirm gender consideration and participation of the youth in all drought-related issues.

04 Manage the drought risks, not the crisis. National governments should recognise their primary responsibility to meet drought risk reduction and provide political leadership. All decision makers and drought risk managers need to review their approach to drought risk management. Drought monitoring and early warning specialists need to develop a common approach to drought management triggers so that early action can be used by both humanitarian and development actors. This includes enhancing early warning systems, building community capacity and institutions for preparedness, and investing in ecosystem-based approaches to reduce drought and drought impacts.

05 There is a need for an evidence base (reports, publications, data etc.) to be created relating to hazard exposure, vulnerability and adaptive capacity.

06 Limitations in drought governance appear to be hindering effective drought risk responses in most of the member countries. More detailed research into how institutions learn over time is required to better understand the nuances of leadership and accountability in the system.

07 Create a SADC consortium/initiative that brings government bodies, research institutes, the UN and international organisations, the private sector, civil society and donor organisations together to deal with assessing the economics of drought preparedness.

Annex 2 illustrates some specific activities to enhance drought resilience, for each country.

2.3 Institutional framework for Drought Management in SADC

The SADC institutions that deal with drought-related issues include the SADC Food, Agriculture and Natural Resources Sector (FANR) and the SADC Climate Change Service Centre. FANR is responsible for the coordination of the food security programme of SADC. A major component of this programme is the SADC Food Security and Development Hub, a regional resource facility meant to act as a catalyst for rural development in member countries through capacity building and resource mobilisation at the local and regional levels. Other FANR programmes and projects are the Regional FANR Coordination and Cooperation Programme and the Regional Information System for Food Security. The main programmes under the Regional Information System for Food Security are: the Regional Early Warning System, Regional Remote Sensing Component of the Regional Early

Warning System, Regional Agricultural Potential Information System, Regional Food Security and Nutrition Information System, Regional Environmental Information System, Regional Food Security Database Project, Famine Early Warning System (FEWS) and Risk Mapping for Vulnerable Groups.

The SADC Climate Service Centre was established in 1990 as a drought monitoring centre and charged with the responsibility of monitoring climate extremes, especially drought, focusing on their intensity, geographical extent, duration and impact on various sectors. It was established to give early warnings for the formulation of appropriate strategies to combat the adverse effects of climate extremes. It falls within the Infrastructure and Services Directorate. It provides operational and regional services for monitoring and predicting extremes in climate conditions. It develops and disseminates meteorological, environmental and hydro-meteorological products that contribute to improved disaster risk management in the region. The Centre is supported by the World Meteorological Organisation (WMO), United Nations Development Programme (UNDP), World Bank, the United States Agency for International Development (USAID) and other international organisations. SADC established a Disaster Risk Reduction Unit that is responsible for coordinating regional preparedness and response programmes for transboundary hazards and disasters.

The SADC Regional Platform for Disaster Risk Reduction was inaugurated in 2011. SADC works with other regional disaster risk management partners and international cooperating partners. These include the Global Facility for Disaster Reduction and Recovery (GFDRR), United Nations Office for Disaster Risk Reduction, UNDP Crisis Prevention & Recovery, Swedish Civil Contingencies Agency, and the UN Office for the Coordination of Humanitarian Affairs (SADC, 2021).

All SADC states have a disaster management structure that undertakes national activities. Each country is represented by a national focal point at the UNCCD. The national focal points come from key ministries that deal with drought-related issues. Most of them come from ministries or departments responsible for the environment. All the countries have departments responsible for meteorological and weather services (Annex 3). They provide early warnings in the event of eminent hydrological disasters. The meteorological departments are members of the World Meteorological Organisation (WMO, 2021). The WMO provides weather, climate and water-related services to the national meteorology departments, which synthesise the information and customise it for local application. The national departments of meteorology liaise with the SADC Climate Service Centre on monitoring climate extremes.

In most of the SADC countries, drought risk assessment is the responsibility of disaster risk management agencies (Table 2). For example, in Zambia, it is the responsibility of the Zambia Disaster Management and Mitigation Unit (DMMU), which forms part of the Office of the Vice President (Government of Zambia, 2010). In Namibia, it is the responsibility of the Directorate of Disaster Risk Management (DDRM), an office under the prime minister (the Republic of Namibia, 2012). The DDRM is responsible for implementing decisions of the National Disaster Risk Management Committee (NDRMC). The NDRMC comprises of permanent secretaries from all key ministries, organisations and partners. The institutions responsible for disaster management, including drought, were established by Acts of Parliament in most of the countries. For example, the National Disaster Management Centre of South Africa was established by

the Disaster Management Act No. 57 of 2002. It also established the Intergovernmental Committee on Disaster Management and the National Disaster Management Advisory Forum (Republic of South Africa, 2002). The forum is inclusive of representatives from other role players in disaster management. In the case of Lesotho, the Disaster Management Authority was established by the Disaster Management Act No. 2 of 1997. Similar to South Africa, the Act established the National Disaster Relief Task Force, which comprises representatives from key players in disaster management (Government of Lesotho, 1997). The Act further established district and village disaster management teams. A similar structure can be observed in Botswana (Botswana Government, 2009), Malawi (Government of Malawi, 2015) and Eswatini (Government of Swaziland, 2006).

Table 2: Key institutions responsible for Drought Risk Assessment and Drought Risk Mitigation.

COUNTRY	KEY INSTITUTIONS
Angola	The Department of Civil Protection is responsible for drought issues in the country. The department is under the National Civil Protection Service of the Ministry of Interior.
Botswana	The National Disaster Management Office is responsible for hazard identification, and vulnerability and risk assessment. The Office is under the president. The National Committee on Disaster Management is the principal policy formulation and coordinating body in the country.
Comoros	The General Directorate of Civil Protection is responsible for disaster management issues in the country. Comoros is prone to tropical cyclones. The wind, rain and storm surge associated with tropical cyclones contribute to losses in the country.
Democratic Republic (DR) of Congo	The Directeur National de la Protection Civile is responsible for drought issues in the country. The Directorate falls under the Ministry of Interior and Security.
Eswatini	The National Disaster Management Agency is mandated to lead, coordinate and manage disaster risk management functions in Eswatini. It does that through development and implementation of Disaster Risk Reduction/Management programmes and activities. The agency developed into being a parastatal, from being a department under the Deputy Prime Minister's Office. However, a National Disaster Management Department is still existing under the Deputy Prime Minister's Office, with complement of staff.
Lesotho	The Disaster Management Authority is responsible for planning, coordinating and monitoring disaster management and post-disaster recovery. It is responsible for warning the public of an approaching disaster and predict its effects on the country. The Lesotho Vulnerability Assessment Committee of the Authority prepared assessment reports for imminent disasters and for post disaster events.
Madagascar	The National Office of Risk and Disaster Management is responsible for drought issues in Madagascar. It is the operational arm of the National Council for Risk and Disaster Management.
Malawi	The Department of Disaster Management Affairs (DOSMA) is responsible for coordinating the implementation of disaster risk management programmes. It oversees disaster prevention, mitigation, preparedness, response and recovery.
Mozambique	The National Institute for Disaster Management is responsible for drought issues in Mozambique. It operates under the Ministry of State Administration and is mandated to coordinate emergencies, promote disaster prevention through population and government mobilisation, protect human lives, ensure multi-sectoral coordination in disaster emergency, coordinate early warning systems, carry out public awareness and re-utilise arid and semiarid zones.
Mauritius	The Central Cyclone and National Disasters Committee is responsible for drought issues. It is under the Prime Minister's Office.
Namibia	The Directorate of Disaster Risk Management is in the Office of the Prime Minister and is responsible for implementing the decisions of the National Disaster Risk Management Committee, which is a multi-institutions and multi-organisational committee.
Seychelles	The Department of Risk and Disaster Management is responsible for drought issues in Seychelles. The department is under the office of the President. It is responsible for disaster risk reduction and response.
South Africa	The National Disaster Management Centre is responsible for implementing disaster management in South Africa. It falls under the Ministry of Cooperative Governance and Traditional Affairs.
Tanzania	The Disaster Management Department is responsible for the coordination of disaster management activities in Tanzania. It is responsible for ensuring that appropriate response systems, procedures and resources are in place to assist those affected.
Zambia	The Disaster Management and Mitigation Unit, a statutory government agency charged with the responsibility of the country's disaster management objectives. It forms part of the Office of the Vice President.
Zimbabwe	The Department of Civil Protection is charged with the coordination and management of disasters and hazards in Zimbabwe. The Zimbabwe Vulnerability Assessment Committee (ZimVAC) is responsible for drought risk assessment in the country.

This study's analysis reveals that despite the existence of drought institutions in each country, the following challenges exist:

01 While there are several initiatives on drought early warning systems in the SADC region, these countries lack user-friendly and reliable early warning systems including seasonal meteorological and hydrological forecasts and adequate drought vulnerability assessment, and they have limited networking and data-sharing practices.

02 There is an inadequate observational station network due to a lack of instruments, trained personnel, telecommunications systems, and data processing and information dissemination facilities, and this is a major drawback. The infrastructure and facilities have continued to deteriorate, leading to great difficulties in providing weather and climate services to meet national and regional needs.

03 There are insufficient coordinating mechanisms for early warning systems (EWS). Data is fragmented, with little synergy and collaboration across sectors. Cross-sectoral coordination is also hampered by inconsistent planning. While all countries have some disaster risk reduction (DRR) institutions, not all of them have national drought management plans.

04 There is evidence that institutional capacity for EWS is weak. One of the limiting factors is the non-adoption of uniform drought indicators and corresponding thresholds to trigger coordinated action when drought occurs.

05 There is a need to expand and strengthen dissemination and communication mechanisms at the community and municipal level to implement early warnings, paying special attention to working with people in the community viewed as trusted authorities.

2.4 The Drought Management Policy Framework

Since the adoption of the Hyogo Framework for Action in 2005, significant progress has been achieved in reducing disaster risk at local, national, hemisphere/regional and global level by countries and other relevant stakeholders, leading to a decrease in mortality and economic losses in the case of some hazards. The international community has recognised that reducing disaster risk is a cost-effective investment in preventing future losses. International mechanisms for strategic advice, coordination and partnership development for disaster risk reduction, such as the Global Platform for Disaster Risk Reduction and the hemisphere/regional platforms for disaster risk reduction, as well as other relevant international and regional forums for cooperation, have been instrumental in the development of policies and strategies and the advancement of knowledge and mutual learning. Overall, the Hyogo Framework for Action was an important instrument for raising public and institutional awareness, generating political commitment and focusing on and catalysing actions by a wide range of stakeholders at all levels. Drought policy challenges in the region.

The existing global and international drought-related instruments include the UN Agreements on droughts and related issues, multilateral trade agreements, international organizations' programmes and market-related instruments. SADC drought-related protocols include the Protocol on Transport, Communications and Meteorology, Protocol on Politics, Defence and Security Cooperation, Protocol for Health

and protocols on environment drought-related policies, including the SADC regional agricultural and water policies. The SADC strategies related to drought are the Drought Resilient and Preparedness Africa (DRAPA), the Regional Indicative Strategic Development Plan, and the Regional Biodiversity Strategy and Action Plan (SRAP). Through the support of the UNCCD Drought Initiative, all the SADC countries have some instruments related to drought management. The national drought plan for Zimbabwe was finalised in 2017 (Government of Zimbabwe, 2017). On the other hand, the National Drought Plan for Zambia was finalised in 2018 (Government of Zambia, 2018). Namibia has a specific national drought preparedness Act that aims at improving national drought preparedness, mitigation, and response efforts.

The UNCCD resource depository shows that, out of the 16 SADC countries, a total of 14 countries have prepared documentation on voluntary Land degradation neutrality (LDN) targets and submitted them to the UNCCD. SADC countries have and are still developing national plans to increase resilience and improve preparedness for drought risk. Eswatini recently finalised its national drought plan.

The drought policy challenges in the region include a lack of capacity to handle aspects of policy implementation, and policies that are not able to be implemented. Assessment of the policy framework reveals there is a need to work towards holistic disaster management, of which both disaster reduction and response are essential components so that drought can be managed adequately. The following challenges/ gaps were identified:

01 Many countries lack national drought management plans and policies, and this makes actions disjointed and piecemeal.

02 A lack of coordination between the national (country-specific) and sub-regional strategies.

03 Inadequate organisational structures to delegate responsibilities for effective implementation of disaster risk reduction (DRR) projects and programmes.

04 There is an absence of established links between disaster management, emergency response and rehabilitation programmes at the national level.

05 The existing drought policies do not address gaps for on-the-ground drought actions, as they do not create ‘drought-ready communities’.

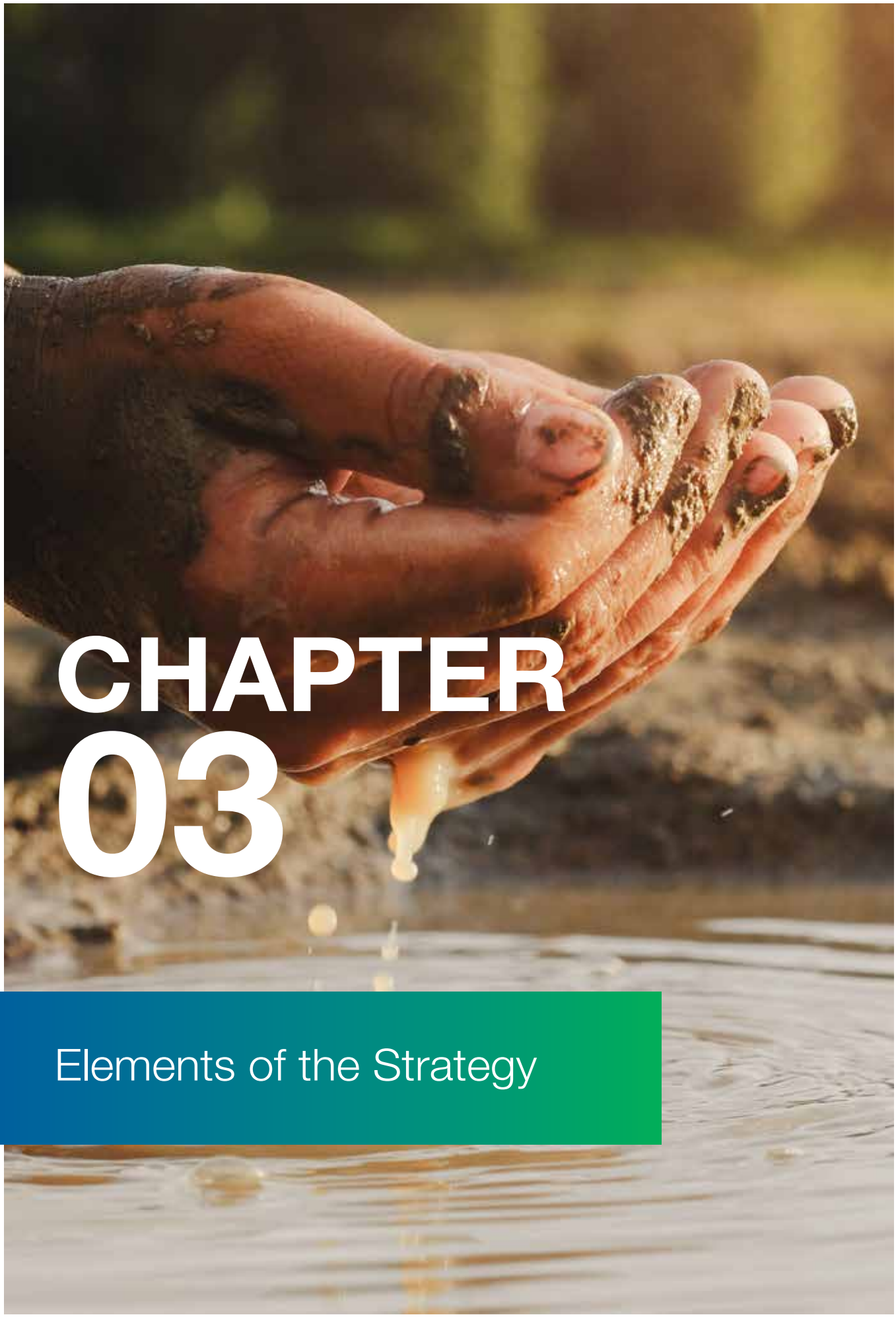
06 There is weak gender integration into policies and programmes.

07 There is inappropriate integration between the DRR programmes and the rehabilitation programmes required as post-disaster reactive measures.

08 Lack of participation of disaster-affected communities and stakeholders during the DRR policy formulation and implementation processes.

09 The inappropriate involvement of community members during the design of DRR programmes leaves a gap in the effective implementation of these strategies. This gap is widened by the lack of needs analysis surveys conducted by policymakers (a country-specific requirement).

10 There is a need to work towards holistic disaster management, of which both disaster reduction and response are essential components so that drought can be managed adequately.



CHAPTER 03

Elements of the Strategy

3.1 Introduction

DRIMMS (2022–2032) was developed following the Integrated Drought Risk Management Framework and has seven strategic focus areas, based on the UNCCD's core pillars of drought monitoring, early warning and prediction, risk and impact assessment, mitigation and response. The strategy will guide and inform the process of implementing the drought resilience initiative at the local, national and regional levels, united and harmonised under the overall coordination and leadership of the SADC Secretariat. The implementation of DRIMMS in cross-border areas accentuates its appeal as an effective framework for interstate cooperation to pioneer the concept of ecological zone development and to power regional integration.

The DRIMMS strategy underscores the importance of effective monitoring and evaluation of the implementation of the drought strategy. The identified seven strategic focus areas highlight and prioritise the region's food security and other development challenges in relation to the objective of achieving drought resilience. Its design attempts to assist SADC to build the resilience of communities to environmental and socio-economic shocks by addressing drought impact while investing in sustainable development and optimising the productivity of the region's resources.

The DRIMMS is based on three key pillars:

01 Drought monitoring and early warning,

02 Drought impact, vulnerability and risk assessment, and

03 Implementing measures to limit impacts of drought and better respond to drought.

It has seven strategic focus areas and nine strategic objectives. Annex 4 has a detailed illustration of these pillars and focus areas.

3.2 Pillar 1: Drought Monitoring and Early Warning

At both the national and regional level, drought monitoring and early warning systems should be improved by using advanced models and tools suitable for effective forecasting, ensuring timely and reliable data is available to inform decisions and policy reforms. This pillar consists of effective drought forecasting and monitoring, reliable drought early warning and effective regional coordination of drought management. Table 3 illustrates the recommended strategic interventions and expected outputs.

Table 3: Strategic Focus areas for drought monitoring and early warning.

STRATEGIC FOCUS AREA (SFA)	STRATEGIC OBJECTIVES (SOs)	STRATEGIC INTERVENTIONS	EXPECTED OUTPUTS
SFA 1: Effective drought forecasting and monitoring	**SO 1:** Enhanced and reliable collection of meteorological data	1. Align and monitor key indicators and indices of precipitation, temperatures, soil moisture, vegetation conditions, streamflow, snowpack and ground water. 2. Improve collection and sharing of drought information. 3. Align applied and adaptive research with development priorities of the resilience agenda.	1. Availability of up-to-date climate information to inform decision making throughout the drought cycle. 2. Improved capacity for monitoring drought triggers at the onset of drought and management of responses throughout the drought cycle. 3. Up-to-date and relevant information to share within the region (disaggregated and analysed on gender issues).
	SO 2: Enhanced drought monitoring and forecasting	1. Support the establishment of explicit national drought management plans in countries that do not have any. 2. Develop reliable seasonal forecasts and appropriate decision-support tools for impacted sectors. 3. Assess potential drought damage or loss. 4. Improve national and regional drought forecast by using advanced models and tools suitable to specific place, and weather parameters. 5. Reassess the regional early warning system to be improved and strengthened in terms of its methodology and focus areas.	1. Improved drought risk decision-making and coordination of national and regional efforts responding to drought situations in the region.
SFA 2: Reliable drought early warning	**SO 3:** Disseminate effective, credible and reliable warning messages to enable timely drought preparedness and response	1. Packaging and dissemination of regional and national early warning information in refined manner. 2. Provide timely and effective information to facilitate action to avoid or reduce the risk of droughts and prepare for effective response. Local knowledge and experiences, including traditional knowledge of farmers and pastoralists should be incorporated into the early warning systems. 3. Educate vulnerable members of society on drought response mechanisms.	1. Availability of early warning information across different levels. 2. Availability of timely and reliable data to inform drought decisions and policy reforms. 3. Improved capacity of women, youth and other vulnerable groups on drought responses.
SFA 3: Effective regional coordination of drought management	**SO 4:** Enhanced regional coordination of drought management	1. Establish SADC regional coordination mechanism, connected to national drought management mechanisms, to strengthen responses and responsiveness, build capacities, coordinate actions, mobilise resources, and enhance adherence to agreed principles. 2. Include gender responsiveness in all drought resilience, adaptation and management actions. 3. Improve infrastructure: Countries need to build infrastructure (like the National Situation Room and Regional Disaster Early Warning Centre), to facilitate a more synchronised effort for developing and dissemination of early warning messages (such as evacuation in the face of potential floods/fires/hail storms) and, for transmitting those messages to communities at risk. 4. Establish regional and national institutions that deal exclusively with drought management for improved coordination; enhance monitoring and early warning capabilities, water shortage impact assessments, and preparedness, response, and recovery programmes.	1. Increased capacity of SADC Secretariat and Member States to coordinate drought actions 2. Adequate awareness among community members (including women, boys and girls) on how to react to warnings 3. Up-to-date infrastructure for drought forecasting and communication 4. A network of drought institutions

3.3 Pillar 2: Drought impact, vulnerability and risk assessment

In order to achieve better vulnerability and risk assessment, governments should focus on assessing risks at all levels, identifying and analysing different forms of vulnerability, assessing the severity of droughts and estimating the expected damage. The vulnerability assessment features in the SADC region should especially consider assessing the coping capacity of communities that are prone to drought, and identify reasonable mitigation measures to address risks with state sectors, population groups, and ecosystems. This pillar focuses on drought impact assessment, vulnerability and risk assessment. Table 4 illustrates the interventions and expected outputs.

Table 4: Strategic Focus areas for drought impact, vulnerability and risk assessment.

STRATEGIC FOCUS AREA (SFA)	STRATEGIC OBJECTIVES (SO's)	STRATEGIC INTERVENTIONS	EXPECTED OUTPUTS
SFA 4: Drought impact assessment	**SO 5:** Enhanced drought impact assessment	1. Evaluate drought impacts and communicate recovery priorities (post-disaster needs assessment), with attention to vulnerable sectors such as agriculture, water and health. 2. Create centralised database system for the region that will capture and possibly quantify all disaster incidences into financial values so as to establish trends, and compare the impact of the hazards over the years. 3. Map drought hotspots and focus resources to manage drought risks in the drought-prone areas. 4. Assess vulnerability of economic sectors, especially those that deal with extracting from the natural systems, including rain-fed agriculture, livestock, environment, energy, tourism and health sectors.	Enhanced adaptive capacity and resilience of communities.

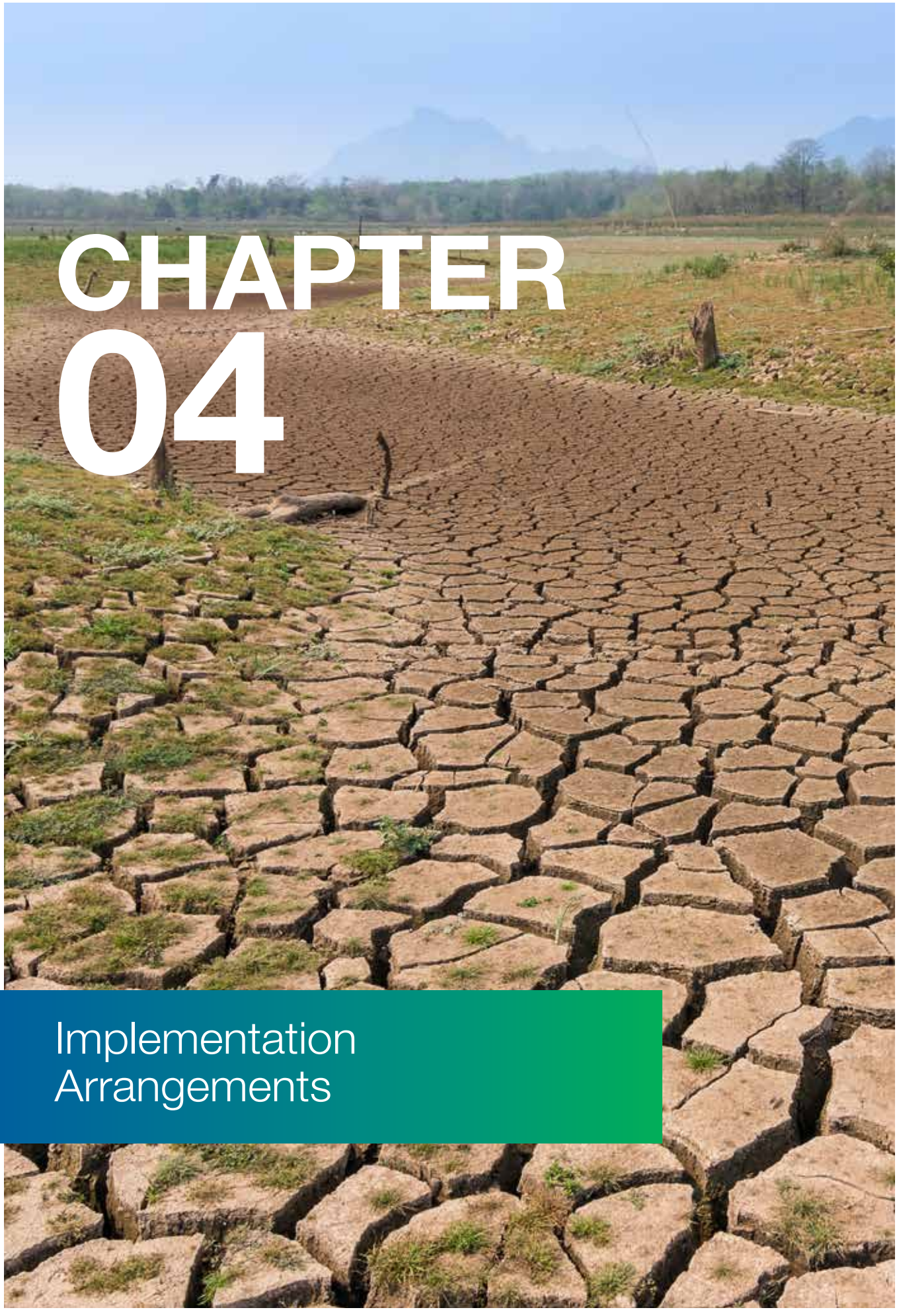
SFA 5: Drought vulnerability and risk assessment	**SO 6:** Enhanced drought vulnerability and risk assessment	1. Conduct drought vulnerability and risk mapping at national and community level. 2. Conduct detailed periodic drought vulnerability and risk assessments and draw up a drought risk atlas to inform sectoral risk mitigation. 3. Evaluate factors that enhance coping strategies and resilience, and identify solutions for building drought resilience. 4. Do assessments of impacts of drought on households and the region's productive sectors such as rain-fed and irrigated agriculture, livestock and environment, energy, and health sectors. 5. Establish solid national risk observatories in the countries to continuously collect and analyse data from relevant agencies, coordinate and/or disseminate early warnings, and serve as a communications hub.	Data and information on vulnerabilities and their drivers. Data and information on drought hazard, exposure and vulnerability, including the influence of climate change. Knowledge base for development of strategies for building resilience. Database of drought hazard, exposure and vulnerability as well as drought impacts across spatial and temporal scales and sectors. Improved, forecast-based drought financing and drought preparedness.

3.4 Pillar 3: Implement measures to limit impacts of drought and better respond to drought

To mitigate drought risk, some pertinent measures required include improving water supply infrastructure, investing in land restoration to improve soil moisture, and enhancing the farmers' resilience capacity to drought impacts, including crop insurance. Local communities will need assistance with social protection and improving access to markets. Improving water conservation and sustainable utilisation is critical, especially protection of water sources against contamination and expanding water storage for local users. This pillar focuses on strategic interventions, as illustrated in Table 5:

Table 5: Strategic Focus areas for drought intervention measures

STRATEGIC FOCUS AREA (SFA)	STRATEGIC OBJECTIVES (SOs)	STRATEGIC INTERVENTIONS	EXPECTED OUTPUTS
SFA 6: Drought risk reduction	**SO 7:** Priority measures implemented to limit adverse impacts of drought	1. Enhance water supply by increasing storage capacity, locating new potential water resources, small-scale water collection/harvesting, water treatment and re-use of wastewater. 2. Establish agricultural water management that will include irrigation expansion (where possible), water loss reduction, shifting to less water-demanding crops, soil water conservation practices. 3. Invest in social protection, cash-transfer programmes and improving access to markets and rural services, which can create alternative non-farm employment that could reduce the impacts of droughts. 4. Establish permanent disaster relief funds: Countries should establish a permanent disaster relief fund as an eventuality against drought and other natural disasters. 5. Increase long-term water use efficiency and drought resilience.	Adequate and sustainable water resources infrastructure developed in the region. Improved water management infrastructure and knowledge. Reduced drought impacts and more resilient societies. Improved financial and technical assistance to drought-affected areas and sectors. Improved water demand management and reduced water consumption.
	SO 8: Priority measures implemented to reduce drought exposure and vulnerability	1. Implement priority measures, including land and ecosystem restoration, to reduce drought exposure and vulnerability using ecosystem-based approaches (e.g. nature-based solutions). 2. Water demand management through reducing use and losses, and reviewing water allocations. 3. Municipalities to enhance water harvesting and dam construction measures. 4. Environmental (including biodiversity) management for minimising degradation of natural resource base. 5. Rangeland and pasture improvement.	Enhanced water availability and resilience to drought whilst protecting ecosystem services and livelihoods. Enhanced water conservation and efficient water use to make better use of water supplies, and mitigation against waste or misuse of water resources. Enhance the availability of water, reduction of water scarcity and drought risk. Enhanced drought resilience and reduced drought exposure.
SFA 7: Drought response	**SO 9:** Drought response mechanism established	1. Establish drought response mechanisms, capacities and plans for assistance or intervention during or immediately after drought, including resource mobilisation. 2. Develop drought mitigation infrastructure in cities and other populated areas. 3. Coordinate water shortage contingency planning and implementation. 4. Address water shortages in vulnerable communities and ecosystems.	Enhanced humanitarian assistance and enhanced response capacity in Member States to meet needs of impacted and vulnerable groups. Enhanced availability of water during drought events. Drought contingency planning improved at national and sub-national level. Reduced impacts of drought on water shortage and reduced water scarcity.



CHAPTER 04

Implementation Arrangements

4.1 Introduction

The means of implementation used are critical to the effective operationalisation of the DRIMMS. In order for the SADC Secretariat and Member States to be active throughout the drought cycle, by carrying out the strategic activities identified under the three pillars, concerted efforts are required in the area of institutional arrangements and governance, capacity development, communication, advocacy and awareness, and resource mobilisation.

At regional level, the SADC Secretariat will be responsible for coordination and harmonisation of the implementation of the strategy, as well as resources mobilisation on behalf of SADC Member States. The Secretariat will also be responsible for advocacy, awareness creation, communication and information sharing. It will be responsible for the leadership and oversight role in the implementation of regional activities. The relevant institutions responsible for disaster risk management in Member States will be responsible for implementation coordination at their respective States. They will work in conjunction with the relevant public-sector and private-sector bodies, and civil society.

4.2 Institutional Arrangements and Governance

Implementation of the strategy will require close coordination of relevant stakeholders at all levels, including international, regional, national and local. Coordination of the implementation of the strategy is a function of the SADC Secretariat as guided by the Member States. It is important to strengthen the current capacity and institutional arrangement for the effective implementation and coordination of the strategy at both Secretariat and Member State level. To achieve this, the following actions need to be implemented:

- Establish and strengthen the national drought coordinating structures, which are established under the National Drought Plan in each Member State, including drought committees.
- Provide resources and expertise to train relevant entities on drought contingency planning, at all levels.
- Establish linkages between the SADC Disaster Management Unit and the SADC Cross-Sectorial Technical Working Group on Climate Change to mainstream drought and improve drought coordination at SADC Secretariat level.
- Work closely with national and regional centres of excellence in the water, agriculture, climate and health sectors, to establish partnerships on drought-related issues.

4.3 Capacity Development

For the region to effectively respond to the challenges of drought, there is an urgent need to build and strengthen capacities on drought issues at various levels. This calls for actions that will promote and strengthen the capacity of the SADC Secretariat as well as Member States to implement drought programmes, including:

- Empowering relevant capacity-building institutions and regional networks and

facilitating sharing of experiences, information and best practices.

- Enhancing networks for disseminating drought information to ensure effective communication before, during and after drought events.
- Facilitating the development of tools, methods and technologies in support of drought mitigation, including enhancing the capacity of national and regional early warning institutions.
- Supporting and strengthening participatory and integrated approaches in mainstreaming of drought into planning and decision-making processes, including training on risk-informed decision-making.
- Effectively accessing and harnessing international drought, water and land management capacity-building programmes and initiatives. .

4.4 Communication, Advocacy and Awareness

In 2019, SADC crafted a communication strategy focused on drought, land degradation and desertification. The overall goal of the strategy is to link all stakeholders to enable effective understanding of the key issues on drought, land degradation and desertification. This communication strategy will be used to facilitate information sharing and the enhanced collaboration and dissemination of critical drought information, and to attract further support and allow for a feedback on the effectiveness of the strategy. This strategy will be used together with the communication plan to consider the role of relevant institutions and stakeholders. For this to be achieved, the following actions need to be undertaken:

- Enhance the utilisation of the communication strategy for the SADC SRAP.
- Enhance the utilisation of the SADC climate change regional media network.
- Establish and strengthen local media networks and systems at national level in the SADC Member States.
- Maximise the advocacy of drought issues through different communication channels, including online social media systems.
- Produce promotional materials for drought awareness.
- Integrate drought on curricula, along with climate change and sustainable development at all levels of learning.
- Enhance capacity of climate scientists, researchers, science communicators, media specialists and relevant professionals on packaging and disseminating appropriate weather information, especially for early warning.
- Document and share best practices on drought responses in SADC countries.

4.5 Resources Mobilization

The SADC DRIMMS requires considerable investment, which should be financed through mechanisms that build on existing systems, such as those that support action on climate change, strategic programming, capitalisation, partnership management, project approval, policy assurance, financial control and performance measurement. In this regard, the SADC region needs to take direct and urgent

responsibility for mobilising resources for drought management to implement the cross-sectoral programmes identified in this strategy. To that end the strategy will be used to promote resource mobilisation capacity at Secretariat and Member States level, and to lobby SADC Member States governments to maximise drought resources through wide-scale domestic financing approaches.

Financing mechanisms should include the following:

- Domestic financing including Direct Member States budgetary allocations and private sector-based financing
- Direct bilateral funding and development partners-based mechanisms between Member States and specific development partner countries and/or organisations
- Multilateral funding mechanisms, especially the UNCCD LDN Fund, UNFCCC Green Climate Fund, Global Environment Facility, World Bank and other sources of international finance and resources. Opportunities that offer developing countries opportunities to transition to low-emission and climate-resilient development pathways
- Exploit opportunities that are identified under the SADC Green Economy Strategy, such as international market-based instruments, including emissions trading systems
- Support regional institutions, such as the Development Bank of Southern Africa, to maintain their status as accreditation entities of the Green Climate Fund, Global Environment Facility and the Adaptation Fund..

4.6 Monitoring and Evaluation

A result-based monitoring and evaluation framework has been developed and finalised as part of the strategic documents that are endorsed by the drought stakeholders in Southern Africa, to allow for measuring the success of strategy implementation as well as to draw lessons (see Annex 7). A systematic process of collecting and analysing data to measure the project's performance will be adopted. Baseline data collected in partnership with stakeholders will be used to assess performance through analysis and comparison of indicators over time. The monitoring will provide a mechanism for the early indication of progress or lack of progress. A programme evaluation will be undertaken to assess the extent to which the programme has achieved its defined impact objectives. The programme will be evaluated based on the project logical framework.

There will be a mid-term review to assess the programme's progress in attaining set objectives at its mid-point. This will provide an opportunity to review strategies and outputs. At the end of the 10-year programming cycles of the strategic plan, and end-of-term evaluation will be conducted so that the expected impact can be measured. Periodic progress reports will consist of findings, conclusions, recommendations and lessons learnt from programme implementation experiences. The feedback will be used to improve performance and to inform relevant policy formulation and decision-making. Project implementation progress will be reported at least every six months. In terms of reporting on the implementation of the strategy, the SADC Secretariat will compile reports biannually based on the outcomes of the Monitoring and Evaluation Framework, with inputs from Member States and present periodical reports to the UNCCD.

4.7 Risks and Assumptions

Assumptions:

01 That heads of state in the region are committed to supporting the strategy.

02 There is goodwill and commitment on the part of international and regional development partners and donors' agencies to leverage resource requirements for the implementation of the strategy.

03 SADC Member States will allocate substantial funds for investment in the countries to enhance disaster resilience in the region.

Risks:

01 Donor funds may not be available because of economic meltdown due to the Covid-19 pandemic

02 Political, legal and bureaucratic issues in the Member States make it difficult to implement strategy at country and regional levels.

03 Member States may not be able to move fast to close the identified policy gaps, which is required to address drought challenges more comprehensively.

The DRIMMS is aimed at building and/or enhancing the resilience of vulnerable communities and ecosystems to the effects of recurrent droughts in Southern Africa. It is based on three key pillars: (1) Drought monitoring and early warning, (2) Drought impact, vulnerability and risk assessment, and (3) Implementing measures to limit impacts of drought and better respond to drought.

It promotes specific actions, including resource mobilisation to raise financial resources for the strategy implementation from different sources, including national and international, through various mechanisms; capacity development to enhance the regions' ability to coordinate and collaborate on drought actions at Secretariat and country levels; institutional arrangements and governance that place the SADC Secretariat at the centre of primary coordination for the implementation of the strategy and delineate roles of member countries, key institutions and partners; communication, advocacy and awareness of drought issues in the region to stimulate public awareness; monitoring and evaluation framework to allow for measuring the success of strategy implementation as well as to draw lessons. The implementation of the strategy will need vigorous resource mobilisation both at the national and regional levels.

At the regional level, the SADC Secretariat will be responsible for coordination and harmonisation of the implementation of the strategy, as well as resource mobilisation on behalf of SADC Member States. The Secretariat will also be responsible for advocacy, awareness creation, communication and information sharing. It will be responsible for the leadership and oversight roles in the implementation of regional activities. The relevant institutions responsible for disaster risk management in the Member States will be responsible for implementation coordination in their respective states. They will work in conjunction with the relevant public sector, private sector and civil society. The implementation of the strategy will require strengthening institutional arrangements and governance in the SADC Member States. There will be a need to empower relevant institutions and enhance networks for disseminating drought information. The DRIMMS should be financed through mechanisms that build on existing systems, such as those that support action on climate change, strategic programming, capitalisation, partnership management, project approval, policy assurance, financial control and performance measurement.

Bibliography

Adejuwon, J O, and Olaniyan, SB. 2019. 'Drought Occurrence in the Sub-Humid Eco-Climatic Zone of Nigeria'. Theoretical and Applied Climatology 137 (3): 1625–36. https://doi.org/10.1007/s00704-018-2670-7.

African Union Commission. 2020. 'Bi-Ennial Report on the Programme of Action for the Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 in Africa: 2015-2018'. Addis Ababa.

AghaKouchak, A, Mirchi, A, Madani, K, Di Baldassarre, G, Nazemi, A, Alborzi, A, Anjileli, H, Azarderakhsh, M, Chiang, F, Hassanzadeh, E, Huning, LS, Mallakpour, I, Martinez, A, Mazdiyasni, O, Moftakhari, H, Norouzi, H, Sadegh, M, Sadeqi, D, Van Loon, AF & Wanders, N 2021, 'Anthropogenic Drought: Definition, Challenges, and Opportunities', Reviews of Geophysics, vol. 59, no. 2, e2019RG000683, pp. 1-23. https://doi.org/10.1029/2019RG000683

Babatunde, A J., Makhanya, Petja,B., Abatan, A and Oguntunde, P. 2019. 'Future Projection of Droughts over Major River Basins in Southern Africa at Specific Global Warming Levels'. Theoretical and Applied Climatology 137 (3): 1785–99. https://doi.org/10.1007/s00704-018-2693-0.

Bhaga, T D., Dube, T., Shekede, M, and Shoko, C. 2020. 'Impacts of Climate Variability and Drought on Surface Water Resources in Sub-Saharan Africa Using Remote Sensing: A Review'. Remote Sensing . https://doi.org/10.3390/rs12244184.

Birkmann J., Cardona, O., Carreno, M., Barbat, A., Pelling, M., Schneiderbauer, S., Kienberger, S., Keiler, M., Alexander, D., Zeil, M and Welle, T. 2013. Framing vulnerability, risk and societal responses: the MOVE framework. Nat. Hazards, 67 193–211. https://doi.org/10.1007/s11069-013-0558-5

Blauhut, Veit., Hagenlocher, M and Naumann, G. 2019. 'Drought Risk Analysis-State of the Art and Future Challenges Drought Risk Analysis – State of the Art and Future Challenges'. Geophysical Research Abstracts 21 (February): 3–4.

Carrão, H, Gustavo N, and Paulo B. 2016. 'Mapping Global Patterns of Drought Risk: An Empirical Framework Based on Sub-National Estimates of Hazard, Exposure and Vulnerability'. Global Environmental Change 39: 108–24. https://doi.org/10.1016/j.gloenvcha.2016.04.012.

Davis-Reddy, CL, and Vincent, K. 2017. Climate Risk and Vulnerability: A Handbook for Southern Africa. 2nd ed. Council of Scientific and Industrial Research. https://www.csir.co.za/sites/default/files/Documents/SADC Handbook_Second Edition_full report.pdf.

Department of Environment Forestry and Fisheries. 2020. 'National Climate Risk and Vulnerability (CRV) Assessment Framework'. Pretoria.

Fritzsche, K., Schneiderbauer, S., Bubeck, P., Kienberger, S., Buth, M., Zebisch, M and Kahlenborn.W 2014. 'The Vulnerability Sourcebook: Concept and Guidelines for Standardised Vulnerability Assessments'. Bonn.

Funk, Chris, Pete Peterson, Martin Landsfeld, Diego Pedreros, James Verdin, Shraddhanand Shukla, Gregory Husak, et al. 2015. 'The Climate Hazards Infrared Precipitation with Stations - A New Environmental Record for Monitoring Ex-

tremes'. Scientific Data 2 (December): 150066. https://doi.org/10.1038/sdata.2015.66.

Ghebrezgabher, M G., Yang, T and Yang, X. 2016. 'Long-Term Trend of Climate Change and Drought Assessment in the Horn of Africa'. Edited by Hiroyuki Hashiguchi. Advances in Meteorology 2016: 8057641. https://doi.org/10.1155/2016/8057641.

Gibbs, W. J. and Maher, J. V. 1967. Rainfall Deciles as Drought Indicators, Bureau of Meteorology Bull. 48, Commonwealth of Australia, Melbourne, Australia.

Government of Botswana, 2009. National Disaster Risk Management Plan. National Disaster Management Office. Office of the President. Gaborone, Botswana.

Government of Lesotho, 1997. Disaster Management Act No. 2 of 1997. Government of Lesotho. Maseru, Lesotho.

Government of Malawi (2015). National Disaster Management Policy. Ministry of Economic Planning and Development. Lilongwe, Malawi.

Government of Swaziland, 2006. Disaster Management Act of 2006. Ministry of Justice and Constitutional Affairs. Mbabane, Eswatini.

Government of Zambia, 2010. Disaster Management Act no. 13 of 2010. Government of Zambia

Government of Zimbabwe (Undated). National drought plan for Zimbabwe. https://knowledge.unccd.int/sites/default/files/country_profile_documents/1%2520FINAL_NDP_Zimbabwe.pdf

Hagenlocher M, Renaud FG, Haas S, Sebesvari Z. 2018. Vulnerability and risk of deltaic social ecological systems exposed to multiple hazards. Sci. Total Environ. 631–632, 71–80.

Hagenlocher, M., Renaud, F., Haas, S and Sebesvari, Z. 2018. 'Vulnerability and Risk of Deltaic Social-Ecological Systems Exposed to Multiple Hazards'. Science of The Total Environment 631–632: 71–80. https://doi.org/https://doi.org/10.1016/j.scitotenv.2018.03.013.

Hagenlocher M., Meza, I., Anderson, C., Min, A., Renaud, F., Walz,Y., Siebert, S and Zita Sebesvari. 2019a. 'Drought Vulnerability and Risk Assessments: State of the Art, Persistent Gaps, and Research Agenda'. Environmental Research Letters 14 (8): 83002. https://doi.org/10.1088/1748-9326/ab225d.

Intergovernmental Panel on Climate Change. 2012. Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation. Edited by C.B. Field, V. Barros, T.F. Stocker, D. Qin, D.J. Dokken, K.L. Ebi, M.D. Mastrandrea, et al. Cambridge: Cambridge University Press. https://www.ipcc.ch/site/assets/uploads/2018/03/SREX_Full_Report-1.pdf.

Intergovernmental Panel on Climate Change. 2014. 'Climate Change, Adaptation, and Vulnerability'. Organization & Environment. https://doi.org/http://ipccwg2.gov/AR5/images/uploads/IPCC_WG2AR5_SPM_Approved.pdf.

Intergovernmental Panel on Climate Change. 2014. Climate Change 2014: Impacts, Adaptation, and Vulnerability. Part A: Global and Sectoral Aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. Edited by C.B. Field, V.R. Barros, D.J. Dokken, K.J. Mach, M.D. Mastrandrea, T.E. Bilir, M. Chatterjee, et al. Cambridge: Cambridge University Press.

IUCN, 2022. Restoring Ecosystems to Reduce Drought Risk and Increase Reilience. https://www.iucn.org/theme/ecosystem-management/our-work/global-drylands-initiative/gdi-projects/restoring-ecosystems-reduce-drought-risk-and-increase-resilience

Kasperson, RE., Renn, O., Slovic, P., Brown,H., Emel,J., Goble,R., Kasperson, J and Ratick. S. 1988. 'The Social Amplification of Risk: A Conceptual Framework'. Risk Analy-

sis 8 (2): 177–87. https://doi.org/https://doi.org/10.1111/j.1539-6924.1988.tb01168.x.

Lobell, DB, Burke, M., Tebaldi, C., Mastrandrea, M., Falcon, W and Naylor, R. 2008. 'Prioritizing Climate Change Adaptation Needs for Food Security in 2030'. Science 319 (5863): 607 LP – 610. https://doi.org/10.1126/science.1152339.

Mann, HB. 1945. 'Nonparametric Tests Against Trend'. Econometrica 13 (3): 245–59. https://doi.org/10.2307/1907187.

Marin-Ferrer, M, Vernaccini, L and Poljansek, K. 2017. 'Index for Risk Management INFORM Concept and Methodology Report - Version 2017'. Ispra. https://doi.org/10.2760/094023.

Martin, R., Linstädter, A., Frank, K and Müller, B. 2016. 'Livelihood Security in Face of Drought – Assessing the Vulnerability of Pastoral Households'. Environmental Modelling & Software 75: 414–23. https://doi.org/https://doi.org/10.1016/j.envsoft.2014.10.012.

Masih, I., Maskey,S., Mussá, F and Trambauer. P. 2014. 'A Review of Droughts on the African Continent: A Geospatial and Long-Term Perspective'. Hydrol. Earth Syst. Sci. 18 (9): 3635–49. https://doi.org/10.5194/hess-18-3635-2014.

McKee, T.B., Doesken, N.J. and Kleist, J. (1993) The Relationship of Drought Frequency and Duration to Time Scales. 8th Conference on Applied Climatology, Anaheim, 17-22 January 1993, 179-184.

Meza, I., Siebert, S., Döll, P., Kusche, J., Herbert, C., Eyshi Rezaei, E., Nouri, H., Gerdener, H., Popat, E., Frischen, J., Naumann, G., Vogt, J. V., Walz, Y., Sebesvari, Z., and Hagenlocher, M.: Global-scale drought risk assessment for agricultural systems, Nat. Hazards Earth Syst. Sci., 20, 695–712, https://doi.org/10.5194/nhess-20-695-2020.

Miralles, D., Holmes, T., de Jeu, R., Gash, J., Meesters, A and Dolman, H. 2010. 'Global Land-Surface Evaporation Estimated from Satellite-Based Observations'. Hydrology and Earth System Sciences Discussions 7 (October). https://doi.org/10.5194/hessd-7-8479-2010.

Mishra, Ashok K, and Vijay P Singh. 2010. 'A Review of Drought Concepts'. Journal of Hydrology 391 (1): 202–16. DOI:10.5194/hessd-7-8479-2010 .

Ngcamu, B S, and Felix C. 2020. 'Drought Influences on Food Insecurity in Africa: A Systematic Literature Review'. International Journal of Environmental Research and Public Health . https://doi.org/10.3390/ijerph17165897.

Nilsson, M., Griggs, D and Visbeck, M. 2016. 'Policy: Map the Interactions between Sustainable Development Goals'. Nature 534 (7607): 320–22. https://doi.org/10.1038/534320a.

O'Brien, K., Quinlan, T and Ziervogel, G. 2009. 'Vulnerability Interventions in the Context of Multiple Stressors: Lessons from the Southern Africa Vulnerability Initiative (SAVI)'. Environmental Science & Policy 12 (1): 23–32. https://doi.org/https://doi.org/10.1016/j.envsci.2008.10.008.

OECD. 2008. Handbook on Constructing Composite Indicators: Methodology and UserGuide, available at: https://www.oecd.org/std/42495745.pdf (last access: 19 September 2020).

Oguntunde, PG., Abiodun,B and Lischeid, G. 2017. 'Impacts of Climate Change on Hydro-Meteorological Drought over the Volta Basin, West Africa'. Global and Planetary Change 155: 121–32. https://doi.org/10.1016/j.gloplacha.2017.07.003.

Omolola, O M., Masinde, M Botai, J and Botai, C. 2020. 'Bibliometric Analysis of Methods and Tools for Drought Monitoring and Prediction in Africa'. Sustainability . https://doi.org/10.3390/su12166516.

Palmer, W. C.: 1968. Keeping track of crop mois-

ture conditions, nationwide: the new crop moisture index, Weatherwise, 21, 156–161.

Peng, J, S Dadson, F Hirpa, E Dyer, T Lees, D G Miralles, S M Vicente-Serrano, and C Funk. 2020. 'A Pan-African High-Resolution Drought Index Dataset'. Earth Syst. Sci. Data 12 (1): 753–69. https://doi.org/10.5194/essd-12-753-2020.

Polong, F., Chen, H., Sun, S., and Ongoma, V. 2019. 'Temporal and Spatial Evolution of the Standard Precipitation Evapotranspiration Index (SPEI) in the Tana River Basin, Kenya'. Theoretical and Applied Climatology 138 (1): 777–92. https://doi.org/10.1007/s00704-019-02858-0.

Preston, B L., Yuen, E., and Westaway, R . 2011. 'Putting Vulnerability to Climate Change on the Map: A Review of Approaches, Benefits, and Risks'. Sustainability Science 6 (2): 177–202. https://doi.org/10.1007/s11625-011-0129-1.

Pyšek, P., Jarošík, V., Hulme, P., Kühn, I., Wild, J., Arianoutsou, M., Bacher,S., Chiron, F., Didziulis, V., Essl, F., Genovesi, P., Gherardi, F., Hejda, M., Kark, S., Lamdon, P., Desprez-Loustau, M., Nentwig, W., Pergl, J., Poboljsaj, K., Rabitsh, Roques, A., Roy, D., Shirley, S., Solaz, W., Vila, M and Winter, M. 2010. 'Disentangling the Role of Environmental and Human Pressures on Biological Invasions across Europe'. Proceedings of the National Academy of Sciences of the United States of America 107 (27): 12157–62. https://doi.org/10.1073/pnas.1002314107.

Quinn, C., Carrie, R., Chapman, S., Jennings, S., Jensen, P., Smith, H and Whitfield S. 2020. 'Rapid Climate Risk Assessment for the SADC Region. SADC Futures: Developing Foresight Capacity for Climate Resilient Agricultural Development Knowledge Series.' CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS). Wageningen. www.ccafs.cgiar.org.

Republic of Namibia, 2012. Disaster Risk Management Act 10 of 2012. Republic of Namibia

Republic of South Africa, 2002. Disaster Management Act No. 57 of 2002. Department of Cooperative Governance. Pretoria, South Africa.

Republic of South Africa, 2002. Disaster Management Act No. 57 of 2002. Department of Cooperative Governance. Pretoria, South Africa.

Resilient Agricultural Development Knowledge Series. CCAFS Report. Wageningen, the Netherlands: CGIAR Research Program on Climate

SADC, 2021. Risk Disaster Management; https://www.sadc.int/themes/disaster-risk-management/.

SADC, 2011. SADC Regional Groundwater Drought Vulnerability Mapping. Southern African Development Community, Gaborone.

Sridhar, V., Hubbard K.G., You, J, and Hunt E.D. 2008. Development of the Soil Moisture Index to Quantify Agricultural Drought and Its "User Friendliness" in Severity-Area-Duration Assessment. Journal of Hydrometeorology, Vol 9, pg. 660-675. DOI: 10.1175/2007JHM892.1

Sebesvari, Z., Renaud, F., Haas, S., Tessler, Z., Hagenlocher, M., Kloos, J., Szabo, S., Tejedor, A and Kuenzer, C. 2016. 'A Review of Vulnerability Indicators for Deltaic Social-Ecological Systems'. Sustainability Science 11 (4): 575–90. https://doi.org/10.1007/s11625-016-0366-4.

Seungjong,B., Lee, S., Yoo, S and Kim, T. 2018. 'Analysis of Drought Intensity and Trends Using the Modified SPEI in South Korea from 1981 to 2010'. Water . https://doi.org/10.3390/w10030327.

de Sherbinin, A., Bukvic, A., Rohat, G., Gall, M., McCusker, B., Preston, B., Apotsos, A., Fish, C., Kienberger, S., Muhonda, P., Wilhelmi, O., Macharia, d., Shubert, w., Sliuzas, R., Tomaszewski, B and Zhang, S. 2019. 'Climate Vulnerability Mapping: A Systematic Review and Future

Prospects'. WIREs Climate Change 10 (5): e600. https://doi.org/10.1002/wcc.600.

Sutcliffe, Chloe, Andrew J Dougill, and Claire H Quinn. 2016. 'Evidence and Perceptions of Rainfall Change in Malawi: Do Maize Cultivar Choices Enhance Climate Change Adaptation in Sub-Saharan Africa?' Regional Environmental Change 16 (4): 1215–24. https://doi.org/10.1007/s10113-015-0842-x.

Thornton, P., Jones, P., Owiyo, T., Kruska, R., Herrero, M., Orindi, V., Bhadwal, S., Kristjan, P., Notenbaert, A., Bekele, N and Omolo, A. 2008. 'Climate Change and Poverty in Africa: Mapping Hotspots of Vulnerability.' African Journal of Agricultural and Resource Economics 2: 24–44.

Tirado M, Hunnes D, Cohen M and Lartey A 2015. Climate change and nutrition in Africa. J. Hunger Environ. Nutr. 10 (1) 22–46. https://doi.org/10.1080/19320248.2014.908447.

Turner B L et al. 2003. A framework for vulnerability analysis in sustainability science PNAS 100 8074–9.

Ujeneza, E and Abiodun, B. 2015. 'Drought Regimes in Southern Africa and How Well GCMs Simulate Them'. Climate Dynamics 44 (5): 1595–1609. https://doi.org/10.1007/s00382-014-2325-z.

United Nations Office for Disaster Risk Reduction. 2019. 'The Global Risk Assessment Framework Concept Note'. Geneva.

Van Loon,A., Stahl, K., Baldassarre, G., Clark, J., Rangecroft,S., Wanders, N., Gleeson, T., Albert, I., Van Dijk, J., Tallaksen, L., Hannaford, J., Uijlenhoet, R., Teuling, A., Hannah, D., Sheffield, J., Svoboda, J., Verbeiren, B., Wagener, T and Van Lanen, H. 2016. 'Drought in a Human-Modified World: Reframing Drought Definitions, Understanding, and Analysis Approaches'. Hydrol. Earth Syst. Sci. 20 (9): 3631–50. https://doi.org/10.5194/hess-20-3631-2016.

Van Niekerk, D. 2021. 'Anticipatory Governance in SADC: Reducing Disaster Risk After COVID-19'. Johannesburg. https://www.kas.de/documents/261596/0/Anticipatory+Governance+in+SADC+Reducing+Disaster+Risk+After+COVID-19.pdf/0e354268-e0a8-0fd7-9ca1-20a5240600fb?version=1.0&t=1620829653409.

Vicente-Serrano, S M., Beguería, S and López-Moreno, J. 2010. 'A Multiscalar Drought Index Sensitive to Global Warming: The Standardized Precipitation Evapotranspiration Index'. Journal of Climate 23 (7): 1696–1718. https://doi.org/10.1175/2009JCLI2909.1.

Villholth, K G., Tøttrup, C., Stendel, M and Maherry, A. 2013. 'Integrated Mapping of Groundwater Drought Risk in the Southern African Development Community (SADC) Region'. Hydrogeology Journal 21 (4): 863–85. https://doi.org/10.1007/s10040-013-0968-1.

World Bank (1998). The Impact of Drought on Sub–Saharan African Economies.

World Bank, 2019. Seychelles National Integrated Emergency Management Plan. Department of Risk and Disaster Management. Victoria, Seychelles.

World Meteorological Organization (WMO) and Global Water Partnership (GWP) (2014) National Drought Management Policy Guidelines: A Template for Action (D.A. Wilhite). Integrated Drought Management Programme (IDMP) Tools and Guidelines Series 1. WMO, Geneva, Switzerland and GWP, Stockholm, Sweden.

World Food Programme. 2018. 'Integrated SADC, 2021. Risk Disaster Management' https://www.sadc.int/themes/disaster-risk-management/ Context Analysis (ICA) Guidance Manual'. Rome.

WMO, 2021. World Meteorological Organisation Members. https://public.wmo.int/en/about-us/members.

World Food Programme, 2019. 'Integrated Context Analysis (ICA) Technical Paper - Eswatini'. Mbabane. https://geonode.wfp.org/documents/10739/download.

World Bank, 2020. World Bank Climate Change Knowledge Portal https://climateknowledgeportal.worldbank.org/.

World Bank, CIWA & IWMI (2021). Drought Resilience Profile for Southern Africa. https://www.ciwaprogram.org/fr/resources/type-of-resource/country-profiles/.

Zargar, A., Sadiq, R., Naser, B and Khan, K. 2011. 'A Review of Drought Indices'. Environmental Reviews 19 (NA): 333–49. https://doi.org/10.1139/a11-013.

Annex 1: Drought Resilience and Checklist of Monitoring and Early Warning Systems Capacity for individual countries.

COUNTRY	THREE PILLARS OF IDRMF			CHECKLIST OF MONITORING AND EARLY WARNING SYSTEMS CAPACITY FOR INDIVIDUAL COUNTRIES							
	Vulnerability and Impact Assessment	Monitoring and Early Warning Systems	Mitigation and Preparedness Response	Official definition of drought	Drought indicators used	Existence of DEWS	Capacity to tailor EWS messages to end-user needs	Effective communication of EWs with built in feedback mechanisms	Use of most salient communication to reach women/ youth	Use of community relays, extension services al local media to communicate EWS promptly	Seasonal forecasting
Angola	Low	Low	Low	Yes	No	No	No	No	No	No	Limited
Botswana	Medium	Medium	Medium	Yes	Yes	Limited	Limited	No	Limited	Limited	Yes
Comoros	Medium	Low	Medium	No	Limited	No	No	No	Yes	Yes	Limited
Congo, DRC	Low	Low	Low	Limited	No	Limited	No	No	No	No	Limited
Eswatini	Medium	Medium	Medium	Yes	Yes	Limited	Limited	Limited	Limited	Limited	Yes
Lesotho	Medium	Low	Medium	Limited	Yes	No	Limited	Limited	Limited	Limited	Limited
Madagascar	Low	Low	Medium	Yes	Yes	Limited	Limited	Limited	Limited	Limited	Limited
Malawi	Medium	Medium	Medium	Yes	Yes	Yes	Limited	Limited	Yes	Limited	Yes
Mauritius	Low	Low	Medium	Limited	Yes	Yes	Yes	Limited	Limited	Limited	Limited
Mozambique	Medium	Medium	Medium	Yes	Yes	Yes	Limited	Limited	Limited	Limited	No
Namibia	Medium	Medium	Medium	Yes	Yes	Limited	Limited	Limited	Limited	Limited	Yes
Seychelles	Low	Medium	Medium	Yes	Yes	Yes	Limited	Limited	Yes	Limited	Yes
South Africa	Medium	Medium	Medium	Yes	Yes	Limited	Limited	Limited	Yes	Limited	Yes
Tanzania	Medium	Medium	Medium	Yes	Limited	Limited	Limited	No	Limited	Limited	Yes
Zambia	Low	Medium	Medium	Yes	Limited	Limited	Limited	Limited	Limited	Limited	Limited
Zimbabwe	Medium	Medium	Medium	Yes	Yes	Limited	Limited	No	Limited	Limited	Limited

Annex 2: Some specific activities to improve drought resilience.

COUNTRY	SPECIFIC ACTIVITIES TO IMPROVE DROUGHT RESILIENCE
Angola	• Strengthen capacity and coordination with government, local authorities, and across all sectors • Strengthen capacity of line ministries and local authorities with necessary information systems, including measures to facilitate monitoring
Botswana	• Improve coordination at national and subnational levels • Embed drought management in the country's policy frame and mainstream into management plans across sectors
Comoros	• Establish institutions with strong coordination. • Create an enabling environment for drought monitoring and forecasting • Review recovery plan for boosting agriculture during crises, such as having a strategy for irrigation, and water harvesting
Congo, DRC	• Develop legislation that directly deal with drought • Establish a dedicated institutional framework to coordinate drought response • Strengthen humanitarian response system • Improve coordination among relevant stakeholders for better flow of information
Eswatini	• Partner with organisations that would provide drought risk insurance • Establish National fund to support drought risk insurance • Revive the Early Warning System for SADC that was housed in Zimbabwe to provide enough information for farming operations • Develop new and alternative water resources and outreach to encourage water conservation practices
Lesotho	• Improve on consistent information, awareness and communication • Develop a strong, integrated and well-coordinated EWS
Madagascar	• Develop a dedicated integrated drought strategy and plan to guide proactive planning and decision-making, • Develop drought preparedness and response plan that prioritises loner-term resilience building in communities most affected by drought • Implement more agriculture value chain programs to boost domestic production, strengthening coordination between different entities for better functionality in management in the management of drought
Malawi	• Integrate MVAC Information Systems at national and community level • Integrate MVAC process into the national early warning systems • Integrate indigenous knowledge available within local communities into existing scientific grounded ESW • Strengthen capacity of department officials across all responsible departments, most notably in the translation of climate information in a user-friendly to next-user
Mauritius	• Develop effective drought risk management institutions/committees/task forces with defined, shared responsibilities • Improve social, economic and environmental data collection to support planning
Mozambique	• Consolidate disaster related data spread across various institutions and several databases into GeoNode • Improve network of observation and data management stations and systems in order to support decision-making, strengthen relevant ministries (e.g. Agriculture, Environment) and local institutions to improve agencies
Namibia	• Strengthen information awareness and networks of communication • Strengthen sharing of information between government departments • Strengthen drought preparedness and management, infrastructure development, and alternative livelihoods
Seychelles	• Strengthen long-term early warning mechanism by improving data availability for forecasting and developing proper indicators for drought • Broaden institutional engagement for national preparedness and response coordination mechanism to bring in more non-state actors i.e. civil society organisations and private sector players
South Africa	• Improve coordination between institutions that provide some type of drought early warning • Improve context-specific EWS dissemination to next users such as farmers, extension offices and communities • Develop vulnerability databases • Develop and use social indicators to form part of a holistic early warning system
Tanzania	• Establish formal central system for drought data across the country • Consolidate the available risk knowledge to support preparedness and warning activities • Improve dissemination of risk knowledge

	• Improve meteorological and hydrological observation status to adequately and accurately monitor current state of climate and hydrology
Zambia	• Develop drought plan or drought policy to strategically facilitate drought management • Introduce financial instruments such as weather-based insurance to cover climate-related risks • Improve mitigation effort national level
Zimbabwe	• Develop robust Early warning system for regional; national and local level Develop efficient national and local level drought management mechanism Improve national and local level monitoring of drought impacts to both ecosystem and human wellbeing • Improve water efficiency technology transfer, at national and subnational levels • Establishment of the drought induced land degradation restoration fund

Annex 3: List of UNCCD National Focal Points' Ministries / Departments.

COUNTRY	MINISTRY / DEPARTMENT
Angola	Ministry of Environment
Botswana	Ministry of Environment, Natural Resources Conservation and Tourism
Comoros	Ministère de la Production, de l'Environnement,de l'Energie et de l'Artisanat
Congo, DRC	Ministère de l'Environnement, Conservation dela Nature et Tourisme
Eswatini	Ministry of Agriculture
Lesotho	Ministry of Tourism, Environment and Culture
Madagascar	Ministère de l'Environnement, de l'Ecologie, de la Mer et des Forêts
Malawi	Ministry of Forestry and Natural Resources
Mauritius	Ministry of Agro Industry and Food Security
Mozambique	Ministry for Coordination of Environmental Affairs
Namibia	Ministry of Environment, Forestry and Tourism
Seychelles	Ministry of Environment, Energy and Climate Change
South Africa	Department of Environmental Affairs
Tanzania	Vice President's Office
Zambia	Ministry of Lands, Natural Resources and Environmental Protection
Zimbabwe	Ministry of Environment, Climate, Tourism and Hospitality Industry

Annex 4: Pillars, Strategic Focus Areas and Strategic Objectives and Strategic Interventions.

STRATEGIC OBJECTIVES (SOs)	STRATEGIC INTERVENTIONS	EXPECTED OUTPUTS	TIMEFRAME	RESPONSIBILITY
SO 1: Enhanced and reliable collection of meteorological data	1. Align and monitor key indicators and indices of precipitation, temperatures, soil moisture, vegetation conditions, streamflow, snowpack and ground water. 2. Improve collection and sharing of drought information. Align Applied and Adaptive Research with Development 3. Priorities of the Resilience Agenda.	Availability of up-to-date climate information to inform decision making throughout the drought cycle.	Short - Long Term	REWU, NEWU, MS
		Improved capacity for monitoring drought triggers at he on-set of drought and management of responses throughout the drought cycle.	Short Term	REWU, NEWU, MS
		Up-to-date and relevant information to share within the region (disaggregated and analysed on gender issues).	Long Term	SADC Secretariat, MS, REWU, NEWU
SO 2: Enhanced drought monitoring and forecasting	1. Develop reliable seasonal forecasts. 2. Develop appropriate decision-support tools for impacted sectors. 3. Assess potential drought damage or loss. 4. Improve national and regional drought forecast by using advanced models and tools suitable to specific place, and weather parameters. 5. Re-assess the Regional Early Warning System to be improved and strengthened in terms of its methodology and focus areas.	Improved drought risk decision-making and coordination of national and regional efforts responding to drought situations in the region.	Short - Medium Term	SADC Secretariat, MS, REWU, NEWU, Partners, Donors
SO 3: Disseminate effective, credible and reliable warning messages to enable timely drought preparedness and response	1. Packaging and dissemination of regional and national early warning information in refined manner. 2. Provide timely and effective information to facilitate action to avoid or reduce the risk of droughts and prepare for effective response Local knowledge and experiences, including traditional knowledge of farmers and pastoralists should be incorporated into the early warning systems. 3. Educate vulnerable members of society on drought response echanisms	Availability of early warning information across different levels.	Short - Medium Term	REWU, NEWU, FANR, MS, Regional Early Warning (ORGAN)
		Availability of timely and reliable data to inform drought decisions and policy reforms.	Short Term	REWU, NEWU, FANR, MS, Regional Early Warning (ORGAN)
		Improved capacity of women, youth and other vulnerable groups on drought responses.	Short - Medium Term	REWU, NEWU, FANR, MS, Regional Early Warning (ORGAN)
SO 4: Enhanced regional coordination of drought management	1. Establish SADC regional coordination mechanism, connected to national drought management mechanisms, to strengthen responses and responsiveness, build capacities, coordinate actions, mobilize resources, and to enhance adherence to agreed principles. 2. Include gender responsiveness in all drought resilience, adaptation and management actions.	Increased capacity of SADC Secretariat and MS to coordinate drought actions.	Medium Term	REWU, NEWA
		Adequate awareness among community members (incl. women, boys and girls) on how to react to warnings.	Short - Medium Term	MS, SADC Secretariat

	3. Improve infrastructure: The countries need to build infrastructure (like the National Situation Room and Regional Disaster Early Warning Centre), to facilitate a more synchronized efforts for developing and dissemination of early warning messages (such as evacuation in the face of potential floods/fires/hail storms) and, for transmitting those messages to communities at risk. 4. Establish regional and national institutions that deal exclusively with drought management for improved coordination; enhancing monitoring and early warning capabilities; water shortage impact assessments; and preparedness, response, and recovery programs.	Up-to-date infrastructure for drought forecasting and communication. A network of drought institutions.	Medium Term Long Term	REWU, NEWU SADC DRR Unit, MS
SO 5: Enhanced drought impact assessment	1. Evaluate drought impacts and communicate recovery priorities (post disaster needs assessment), with attention to vulnerable sectors such as agriculture, water and health. 2. Create centralised database system for the region that will capture and possibly quantify all disaster incidences into financial values so as to establish trends, and compare the impact of the hazards over the years. 3. Map drought hot-spots, and focus resources to manage drought risks in the drought prone areas. 4. Assess vulnerability of economic sectors especially those that deal with extracting from the natural systems, including rain-fed agriculture, livestock, environment, energy, tourism and health sectors.	Enhanced adaptive capacity and resilience of communities.		SADC FANR SADC DRR, MS, IWMI REWU, NEWU MS, SADC Secretariat MS, SADC Secretariat CARDESSA
SO 6: Enhanced drought vulnerability & risk assessment	1. Conduct drought vulnerability and risk mapping at national and community level. 2. Conduct detailed periodic drought vulnerability and risk assessments and a drought risk atlas to inform sectoral risk mitigation. 3. Evaluate factors that enhance coping strategies and resilience, and identify solutions for building drought resilience. 4. Assessments of impacts of drought on households and the region's productive sectors such as rain-fed and irrigated agriculture, livestock and environment, energy, and health sectors. 5. Establish solid national risk observatories in the countries which would continuously collect and analyse data from relevant agencies, coordinate and/or disseminate early warnings, and serve as a communications hub.	Data and information on vulnerabilities and their drivers. Data and information on drought hazard, exposure and vulnerability including the influence of climate change. Knowledgebase for development of strategies for building resilience. Database of drought hazard, exposure and vulnerability as well as drought impacts across spatial and temporal scales and sectors. Improved forecast-based drought financing and drought preparedness.	Short Term	Member States

SO 7: Priority measures implemented to limit adverse impacts of drought	1. Enhance water supply by increasing storage capacity, locating new potential water resources, small scale water collection/harvesting, water treatment and re-use of wastewater. 2. Establish agricultural water management that will include irrigation expansion (where possible), water loss reduction, shifting to less water-demanding crops, soil water conservation practices. 3. Invest in social protection, cash-transfer programs, improving access to markets and rural services which can create alternative non-farm employment that could reduce the impacts of droughts. 4. Establish permanent disaster relief fund: Countries should establish a permanent disaster relief fund as an eventuality against drought and other natural disasters. 5. Increase long-term water use efficiency and drought resilience.	Adequate and sustainable water resources infrastructure developed in the region. Improved water management infrastructure and knowledge. Reduced drought impacts and more resilient societies. Improved financial and technical assistance to drought-affected areas and sectors. Improved water demand management and reduced water consumption.	Short Term	Member States
SO 8: Priority measures implemented to reduce drought exposure and vulnerability	1. Implement priority measures including land and ecosystem restoration to reduce drought exposure and vulnerability using ecosystem-based approaches (e.g. Nature based Solutions). 2. Water demand management through reducing use, losses, and reviewing water allocations. 3. Municipalities to enhance water harvesting and dam construction measures. 4. Environmental (including biodiversity) management for minimisation of degradation of natural resource base. 5. Rangeland and Pasture Management.	Enhanced water availability and resilience to drought whilst protecting ecosystem services and livelihoods. Enhanced water conservation and efficient water use to make better use of water supplies, and mitigation against waste or misuse of water resources. Enhance the availability of water and reduction of water scarcity and drought risk. Enhanced drought resilience and reduced drought exposure.	Short Term	Member States
SO 9: Increase investments in drought response and impact mitigation	1. Establish drought response mechanisms, capacities and plans for assistance or intervention during or immediately after drought, including resource mobilisation. 2. Develop drought mitigation infrastructure in cities and other populated areas. 3. Coordinate water shortage contingency planning and implementation. 4. Addressing water shortages in vulnerable communities and ecosystems.	Enhanced humanitarian assistance and enhanced response capacity in member states to meet needs of impacted and vulnerable groups. Enhanced availability of water during drought events. Drought contingency planning improved at national and sub national level. Reduced impacts of drought on water shortage and reduced water scarcity.	Medium Term	Member States

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