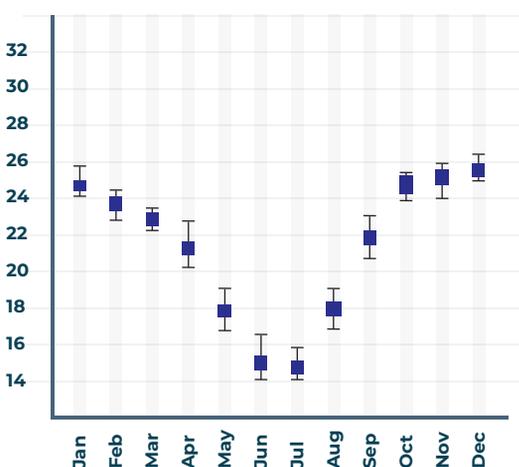


COUNTRY OVERVIEW

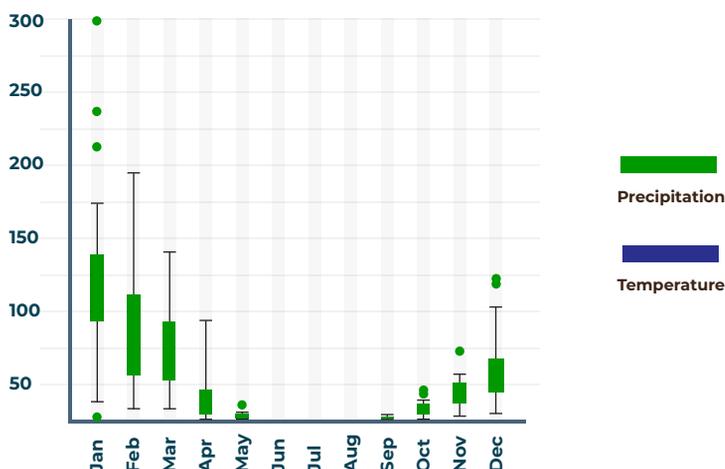
Namibia, home to approximately 2.5 million (2018) people and situated between the Namib and Kalahari deserts, has an arid climate. Similar to other southern African countries, temperature observations indicate that Namibia has experienced a considerable increase in temperature over recent years. In addition, a combination of poor, sporadic rainfall and low soil moisture has led to very low agriculture production and extreme water shortages. In light of this, the City of Windhoek has been a world leader in innovative water reuse, much of it for human consumption. The most recent 2018/19 drought, regarded as the worst drought in 90 years, resulted in a widespread food shortage for one-third of the population who depended on drought relief (8.6% of whom were from rural areas), with roughly 60,000 livestock deaths, cereal production reduced by up to 80%, and increased scarcity of grazing for livestock and wildlife in all 13 regions of the country. The drought was also declared a national emergency.

Fig 1. Long-term rainfall and temperature anomaly over Namibia (19.777S, 18.097E) Years: 1990-2019

Distribution of Temperature [°C]



Distribution of Precipitation [mm]



Vulnerability and Impact Assessment

Medium

Monitoring and Early Warning Systems

Medium

Mitigation, Preparedness and Response

Medium

Low
 Medium
 High

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

This country's Drought Resilience Profile contains drought information based on these three pillars. This profile provides an overview of Namibia's drought resilience capacity in the three pillars. Namibia's vulnerability and impact assessment capacity is categorized as medium. Despite its functional institutional arrangements to assess the impact of drought, as well as the support from institutions such as the FAO and WFP on vulnerability and impact assessments, a lack of consistent information, awareness and sufficient networks of communication provide gaps in coordination and information exchange. Namibia's monitoring and early warning systems capacity is also categorized as medium. While a drought early warning system is in place, it has a strong focus on food-security related vulnerability mapping and less so on hydrological impacts. It is also hampered by inadequate institutional coordination and information sharing. Similarly, Namibia's capacity in Pillar 3, mitigation, preparedness and response, is categorized as medium, due in large part to the need for an updated national drought policy (the current policy was developed in 1997), and one that integrates all sectors and impacts.



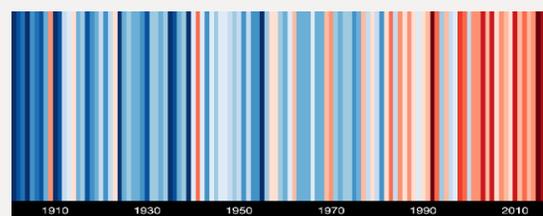
This document is meant to provide a brief overview of drought risk issues. The key resources at the end of the document provide more in-depth country and sectoral analysis. The contents of this report do not necessarily reflect the views of World Bank, NDMC, CIWA or IWMI.



Historical climate

- As illustrated in the #ShowYourStripes 'warming stripe' graphic (Fig 2.) for Namibia, the stripes turn from mainly blue to mainly red in more recent years, illustrating the rise in average temperature since 1901.
- Drought frequency is increasing. There was one drought in the 1980s, three in the 1990s, two in the 2000s, and three in the 2010s (Table 1).
- Mean annual temperature is 20.2°C (1901-2016) (World Bank, 2021).
- Average annual precipitation is 277.6mm (1901-2016) (World Bank, 2021).

Fig 2. Temperature change in Namibia, 1901-2019



Source: Berkley Earth/#ShowYourStripes

Future climate

- Mean annual temperature is expected to increase by 2.1°C (1.50°C to 2.97°C) in 2040-2059 (RCP 8.5, Ensemble) (World Bank, 2021).
- Using historical conditions (trends from 1951-2000), the probability of occurrence of severe effective precipitation deficiency (precipitation – evapotranspiration) is likely to increase in the future (2050-2100 climate). It is also likely that a larger share of Namibia will experience frequent droughts (UNDRR and CIMA, 2018).
- Annual precipitation is likely to decrease by 40.9mm in 2040-2059 (RCP 8.5, Ensemble) (World Bank, 2021).
- In the future climate, 91% of the population (amounting to on average 3 million people if population growth is accounted for) are likely to be affected by drought (UNDRR and CIMA, 2018).

Table 1. Major droughts in Namibia (Source: EM-DAT, 2020)

Year	Location	Affected Population
1981	Kavango, Ovambo regions (North)	No data*
1990	No data*	250,000
1995	No data*	163,200
1998	Otjovonatje, Otjorute, Okapundja, Otjekwa, Okaurukwa locations (Ruacana district, Omusati province)	25,000
2001	Otjozondjupa, Oshikoto, Oshana, Omusati, Ohangwena, Kunene, Kavango, Caprivi provinces (North)	No data*
2002	Kavango, Ohangwena, Oshikoto, Kunene provinces	345,000
2013	Erongo, Hardap, Karas, Kunene provinces (South and Western part of the country)	780,000
2015	Hardap, Kavango East, Khomas, Kunene, Ohangewna, Omusati, Omaheke, Zambezi	580,000
2019	No data*	289,644

* No data provided from source

Vulnerability and Impact Assessment



Fig 3a-c. Drought hazard, vulnerability and risk maps for Namibia



While drought vulnerability, risk and impact assessments related to droughts have been conducted in Namibia, they mostly pertain to food security and agricultural impacts, with insufficient focus on water security impacts except in terms of groundwater where groundwater vulnerability maps are produced.

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

Drought risk is defined by characterising hazard and exposure to vulnerability and the lack of adaptive capacity, using multisource information from satellite-derived drought indices and socio-economic conditions. In terms of components, hazard is defined through meteorological and agricultural drought i.e. Integrated Drought Severity Index (IDS); and exposure and vulnerability expressed through population density, the human modification index, water risk and irrigated systems. Agricultural production (agricultural practices i.e. irrigated area, food production as provided on HarvestChoice) is used to define levels of vulnerability which were finally combined with all three components to define levels of drought risk at the country level, referred to as the National Drought Risk Index (NDRI). This drought risk profile is therefore based on the probabilistic estimation of hazard and vulnerability to assess the drought risk in the exposed areas. Using this method, the NDRI estimates 37% of the agricultural areas in the northern regions of Oshana, Oshikoto, Omusati, Hardap and Kavango are amongst the most drought prone areas in Namibia (Maps generated by IWMI).

Vulnerability and Impact Assessment



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Droughts have adverse on effects population and GDP

The percentage of GDP potentially affected (produced in areas hit by droughts) is on average about 41%, equivalent to 4 billion USD per year (UNDRR and CIMA, 2018). Under future climate and socio-economic conditions, it is likely that 90% of the GDP will be affected (almost 10 billion USD).

Water resources

In May 2019, the President of Namibia declared a national state of emergency. Similarly, the City of Windhoek declared a water crisis, coupled with strict water restrictions, as dam levels of the main supply dams north and north-west of the city ran critically low (City of Windhoek 2019).

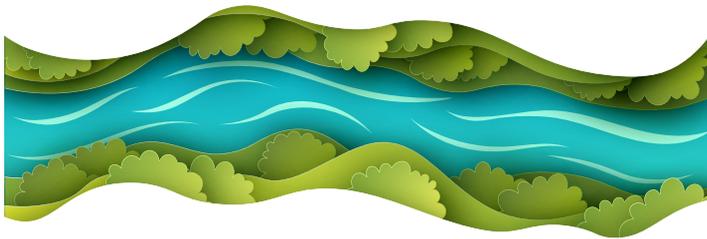
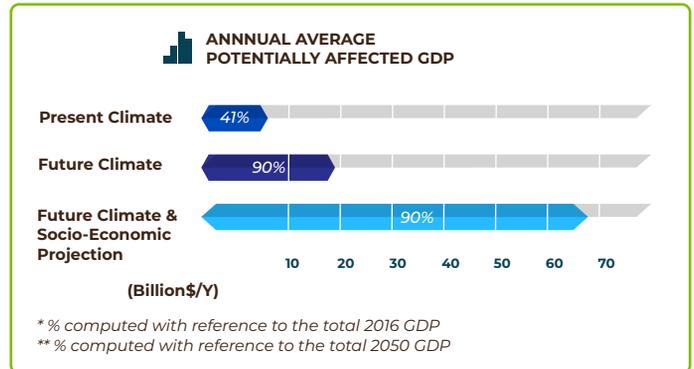


Fig 4. Percentage GDP affected by drought in Namibia



Source: UNDRR and CIMA, 2018

Droughts impact on livestock

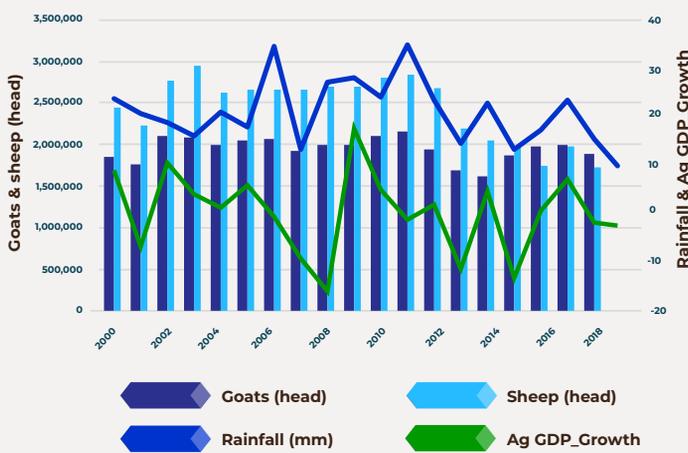
Severe water shortages in the 2018/19 drought resulted in a deterioration of livestock body conditions and an increase in deaths. According to the Ministry of Agriculture, over 60,000 livestock died in 2019. Roughly 90% of livestock is expected to be affected by droughts in the future. The affected livestock under current climate conditions is about 883,000 units (43%), while under future climate conditions, considering current livestock units, the projection is likely to increase to 1.8 million units (90% of the total) (UNDRR and CIMA, 2018).



*Livestock is a summation of all livestock animals using FAO factors.

Source: UNDRR and CIMA, 2018

Fig 5. Impact of drought on livestock production and Ag. GDP growth



Source: Own compilation from World Bank & FAO data 2020

Droughts drag macro-level agricultural growth

According to Namibia's Crop Prospects, Food Security and Drought Situation Report for March 2019, crop areas expected massive reductions in 2018/19. The country saw a substantial reduction in harvest of at least 53% of the 2017/18 harvest and over 42% below the average production for the past 10 years. This reduction is largely attributed to the general poor rainfall received during the 2018/2019 rainfall season and to some extent Fall Army worms reported in the regions (MAWF, 2019).

Source: MAWF, 2019

Fig 6. National cereal production statistics and 2018/2019 preliminary forecast production



Vulnerability and Impact Assessment



Vulnerability and impact assessment capacity

In terms of Namibia's capacity in the vulnerability and impact assessment pillar, the Namibia Vulnerability Assessment Committee (NamVAC), hosted by the Directorate Disaster Risk Management (DDRM) in the Office of the Prime Minister (OPM) is the primary mechanism that conducts vulnerability assessments to identify vulnerable groups, the prevalence and degree of any given risk, and their causes using agreed indicators and assessment tools. As such, it provides the first stage of response planning when any disaster including drought has occurred.

NamVAC uses the Household Economy Approach (HEA) to conduct multi-hazard assessments. The reports generated by NamVAC are used by decision makers to improve the livelihood of disaster affected communities for short-, medium- and long-term planning. The information on risk and vulnerability to food insecurity assists government in decision making for interventions whenever there is risk of food insecurity affecting areas. The National Planning Commission through the Central Bureau of Statistics conducts household income surveys and poverty assessments information that is useful for decision-making and planning purposes and tracing vulnerability.

The Central Bureau of Statistics is responsible for archiving and disseminating all assessment and survey reports while individual institutions also maintain their own databases. Other environmental assessments and related research are conducted periodically that help to show environmental risks inherent in Namibia. Such assessments include assessments on water resources, land degradation, deforestation, biodiversity loss, climate change, natural disasters, and other economic assessments. The SADC Regional Vulnerability Assessment and Analysis (SADC-RVAA) has also supported vulnerability assessments in Namibia.

Despite these institutional arrangements, as well as the support from institutions such as the FAO and WFP on vulnerability and impact assessments, a lack of consistent information, awareness and sufficient networks of communication provide gaps in coordination and information exchange.

There appears to be a particular lack of understanding of solutions at a system scale, such as watershed management and fisheries management, for which an ecosystem-based approach could be taken (Cochrane et al., 2009; Turpie et al., 2010). In instances where there is information, the information is often not adequately shared between government departments (Dirkx et al., 2008). Likewise, there is a lack of capacity in boundary organisations that might translate the science and local knowledge into messages relevant for policy and practice and facilitate dialogue between different groups (MET, 2011).

A progressive step in terms of policy development is that the National Gender Policy (2010), which aims to reduce gender inequality to overcome poverty also acknowledges that climate change has a significant impact on the livelihoods of women and girl-children. It includes a provision to involve women in the development of climate change-related policies and programs (GRN, 2020). Gender-based violence, which is exacerbated by the stresses associated with the impacts of drought on livelihoods and well-being, is also a prominent issue evidenced by the National Plan of Action (GRN, 2012).



Monitoring and Early Warning Systems



Monitoring and early warning systems capacity

Table 3 represents a summarized traffic light checklist to illustrate the state of monitoring and early warning system capacity in Namibia. It summarises key aspects needed for a strong monitoring and EWS framework, most notably, whether there is an official definition of drought used in the country; whether drought indicators are used, and if so, which ones; whether there is a drought early warning system (DEWS) in place; and if so how functional it is; and whether the country makes use of seasonal forecasting. The 1997 Drought Policy aimed to provide an objective definition of drought.

In the past drought was defined according to the situation of agricultural or water resources, and tended to include conditions of normal aridity (Namibia, 1997). Scientific criteria for estimating the extent and severity of drought, and for defining what constitutes an extreme rainfall event, or 'disaster drought', in the Namibian context were developed.

As per the Drought Policy, a disaster drought refers to drought conditions so intense or protracted that they are beyond what can reasonably be dealt with in terms of normal risk management practices, and which justify state intervention, the occurrence of which would take place in particular area once every 14 years on average (ibid.). In terms of an official declaration of drought, the President takes action to announce a state of emergency for drought – the last instance being on 6 May 2019 - which then kicks in relief aid both from national and international funding sources.

Table 3. Summarized checklist of monitoring and EWS capacity

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

● Yes ● No ● Limited



Monitoring and Early Warning Systems

Drought early warning is a coordinated task by different institutions. The Ministry of Agriculture, Water and Forestry (MAWF) takes the largest share of early warning and drought monitoring activities. It houses the Early Warning and Food Information Unit (EWFIU), and conducts thrice yearly crop and household food security assessments at both the national and regional level. There is a bias towards agricultural-related monitoring in terms of expected food security (agricultural drought) and less emphasis on hydrological droughts. There is a need to enhance the national capacity in the area of early warning especially in the highly technical field of meteorology.

While monitoring and early warning system efforts focus largely at the national level based on expected weather conditions relative to food security and possible warnings for intended crop planting and farming, the system is cross-sectoral and once in a drought situation most of the effort is at regional level through a variety of government and non-government agencies.

In terms of seasonal forecasting capacity, the meteorological service provides weather forecasts as well as seasonal rainfall

outlooks. It monitors and reports on the performance and progression of rainfall and other weather patterns. However, limited information is available in terms of seasonal forecasts and early warnings, as well as climate scenarios and information on adaptation options (Giorgis, 2011; MET, 2011). Without this information, it is hard for farmers and regional and national authorities to adjust their decisions. Moreover, the early warning and seasonal forecasting information that is available is not linked to actions.

There are no thresholds in drought intensity/extent that are used as triggers for activities. Although information sharing protocols are in place, information is shared among institutions largely on a bilateral basis (i.e. the Meteorological Service to DDRM; the Meteorological Service to MAWF etc.).

The operational coordination among technical services such as meteorological and hydrological services and line ministries is largely inadequate with regards to early warnings. Namibia's monitoring and DEWS could benefit from broader stakeholder participation and improved coordination backed up with a strategy and action plan for drought mitigation.

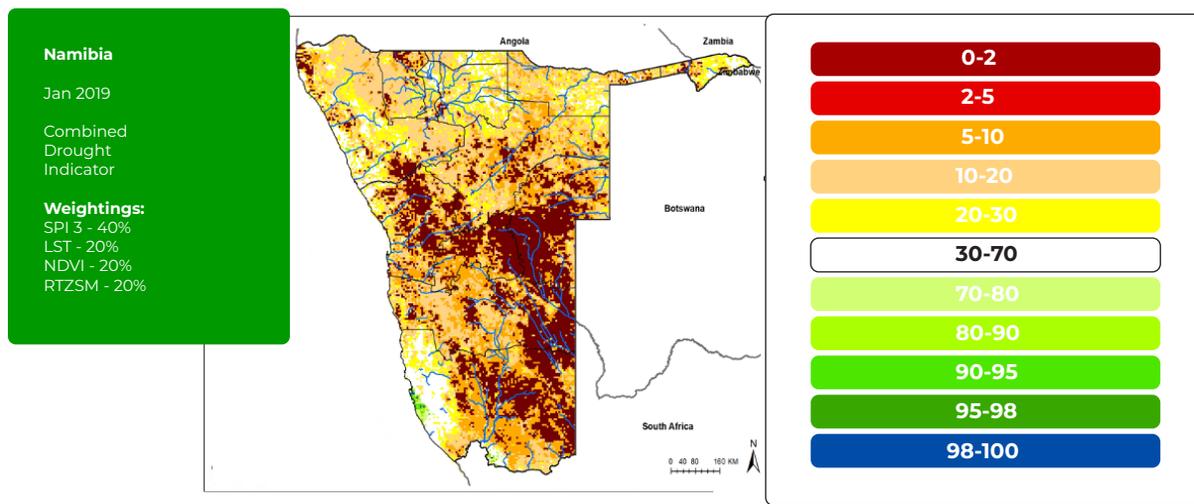
The Combined Drought Indicator (CDI)

Using a Combined Drought Indicator (CDI) approach, the National Drought Mitigation Center (NDMC) at the University of Nebraska, in partnership with the World Bank, has developed a Drought Monitor that represents a consolidation of indices and indicators into one comprehensive drought map. The CDI map for Namibia was created using a weighted combination of four indicators of drought: precipitation, vegetation stress, land-surface temperature and soil moisture.

January 2019 was selected to depict the severity of the recent 2018/19 drought. January, being the peak of the rainy season when more rain is expected, provides an assessment of the drought's magnitude (duration and intensity), spatial extent, probability of occurrence and impacts. The January 2019 CDI map shows the vast majority of the country impacted by some degree of drought. The concentration was in the mid- and south-east.

Without an effective drought monitoring and EWS to deliver timely information for early action, such as the CDI, effective impact assessment procedures, proactive risk management measures, preparedness plans aimed at increasing the coping capacity, and effective emergency response programmes directed at reducing the impacts of drought, the country will continue to respond to drought in a reactive, crisis management mode.

Fig 7. Combined Drought Indicator for Namibia, January 2019



Mitigation, Preparedness and Response



Drought policy framework

In terms of mitigation, preparedness and response to droughts, Namibia has an institutional framework in place, information and communication systems, response mechanisms and public education and training programmes. Drought preparedness and response are also multi-sectoral and interdisciplinary in Namibia and involve a number of government and non-governmental agencies.



Mitigation, Preparedness and Response

Drought policy framework

Namibia's drought response policies include: Namibia's Policy to Combat Desertification, 1994; Food Security and Nutrition Policy for Namibia, 1995 (FSNP); National Agricultural Policy, 1995 (NAP); First National Development Plan of 1995 (NDP1); National Drought Policy and Strategy, 1997; National Disaster Risk Management Policy, 2008; Disaster Risk Management Act, 2012, No.228; Draft Comprehensive Agricultural Policy Framework (2012-2032); National Climate Change Strategy and Action Plan 2013-2020.

The 1997 National Drought Policy and Strategy (currently under review) is the main document used to guide the National Drought and Climate Change Strategy and Action Plan 2013-2020, and facilitates the building of adaptive capacity to increase resilience and to enhance mitigation prospects. Namibia's Drought Policy is concerned with developing an efficient, equitable and sustainable approach to drought management. The policy aims to shift responsibility for managing drought risk from government to the farmer, with financial assistance and food security interventions only being considered in the event of an extreme or "disaster" drought being declared. The thrust of the policy is a move away from regular financial assistance to large numbers of private-tenure and communal-tenure farmers to measures that support the on-farm management of risk. This is a reasonable expectation for farmers to manage if a strong insurance framework exists and if good forecasting mechanisms are in place.

The government's involvement with drought has similarly moved beyond a reactive focus on emergency drought programmes to a broader, longer-term perspective, but has also hampered the declaration of drought in extreme cases (e.g. the delay in the drought declaration in 2019).

Institutions and coordination

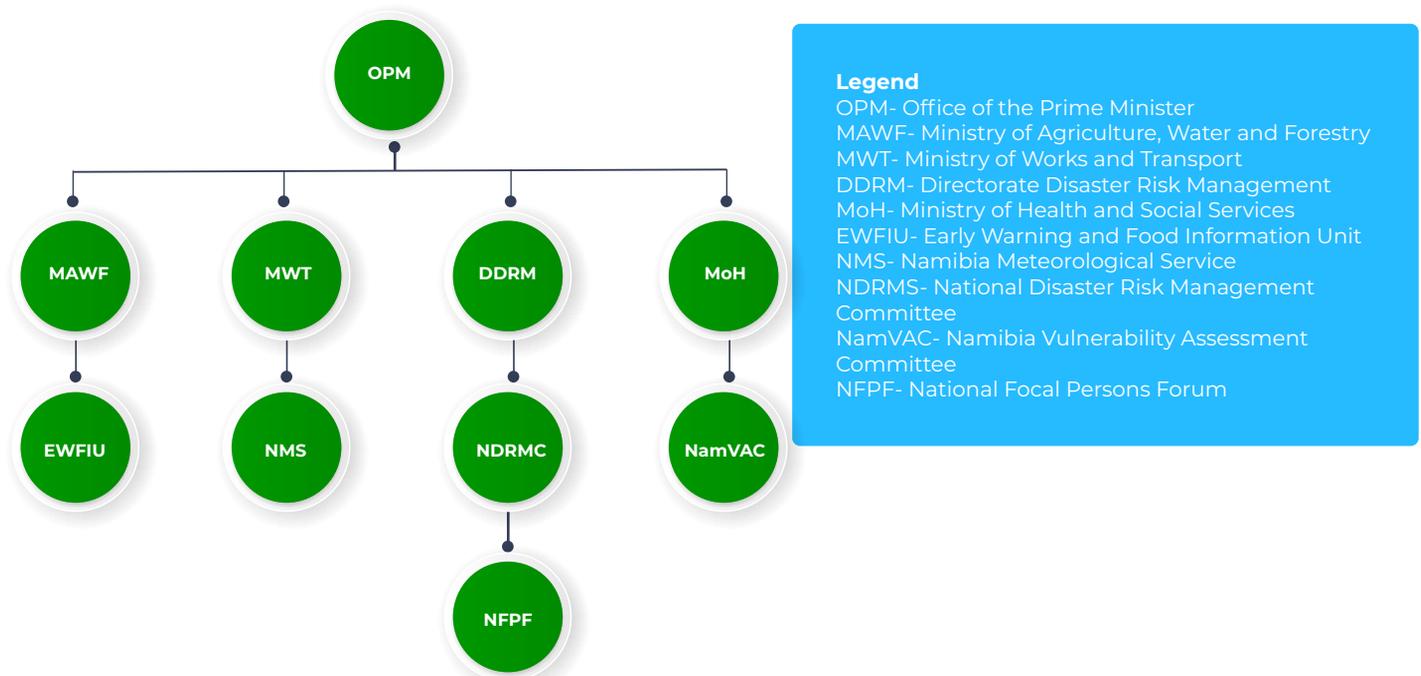
Several government departments and ministries contribute to drought management in Namibia. The Office of the Prime Minister (OPM) coordinates all drought preparedness and response and gets inputs from: Office of the President, Ministry of Agriculture, Water and Forestry (MAWF); Ministry of Health and Social Services (MoH); Ministry of Education, Arts and Culture; Ministry of Environment, Forestry and Tourism; Ministry of Poverty Eradication and Social Welfare (MPESW); NamWater; Regional Councils; Local Authorities and Namibia Meteorological Services.

The Namibia Meteorological Service (NMS) provides weather forecasts as well as seasonal rainfall outlook and the Ministry of Health is responsible for nutritional surveillance related to drought. In terms of coordination with disaster risk management functions, the Directorate Disaster Risk Management (DDRM) is mandated with the coordination of disaster risk management in terms of Cabinet Resolution 15.02.94/006. The DDRM forms part of, and functions within, the Office of the Prime Minister.

Through the DDRM, the National Disaster Risk Management Committee (NDRMC) serves as the national multi-stakeholder platform that is assigned the responsibility for disaster risk management in Namibia. In order to facilitate improved stakeholder participation, the NDRMC could establish a National Focal Persons Forum (NFPF) to provide a mechanism for all the relevant role players to consult one another and coordinate their disaster risk management planning and operations.

In essence, Namibia's capacity in drought mitigation, preparedness and response is comparatively stronger than several of its SADC counterparts. It has a dedicated policy (albeit in need of review) and an integrated institutional framework (albeit not a dedicated institutional authority dealing with drought). Some farmer groups have criticized the Drought Policy for not adequately addressing climate change, restocking after a severe drought and the establishment of a drought fund to mitigate the impact of droughts. This highlights the continued tension between the policy shift from regular financial assistance by government to on-farm management of risk.

Fig 8 . Namibia's drought institutional framework





Recent drought resilience efforts and recommendations

For several decades, Namibia has developed drought relief response plans for each major drought. During the 2018/19 drought, the government endorsed drought relief interventions valued at N\$442,700,000 to assist affected food insecure households and drought affected farmers in all regions. The approved interventions have been decentralized and targeted to specific groups and affected areas and included: food assistance for needy and drought affected; distribution of water tankers; rehabilitation/installation of boreholes; livestock marketing incentives in the drought-affected areas; transport subsidy to and from grazing areas, and transport for fodder to the drought affected farmers especially in communal areas; support for lease of grazing for the drought affected; subsidies for crop farmers and fodder/lick; etc.

Given that drought is a regular phenomenon in Namibia, its response strategies have tried to shift to more proactive interventions that have focused on building community resilience. For example, Namibia has also developed drought response plans at the city-level. Aside from its globally recognized water reuse achievements, the City of Windhoek (CoW) has developed a Drought Response Plan that outlines guidelines the city will use to manage water supply and use during drought situations. The guidelines are designed to maintain the health, safety and economic vitality of the community to avoid adverse impacts to the quality of life for the community; and to consider individual customer needs. NamWater has a two-season window within which it issues an early warning for an impending drought that the CoW uses to introduce restrictions and/or forced savings. At the moment this is almost every third year as the demand for water has far outstripped the surface water resources. In urban context, Windhoek's reuse and Swakopmund's desalination initiatives are worth noting.

For Namibia to continue to improve its preparedness and enhance local capacity to adequately respond to future drought periods, strategies may wish to consider focusing on measures that are more long-term. These may include: extending the use of desalinated water; using solar power pumping mechanisms as the country has long hours of sunshine and over 1,500km of coastline; the use of rainwater harvesting systems; the use of untapped groundwater; the use of hydroponic gardens for human consumption and hydroponic fodder production for animals; investing in drought-tolerant livestock species; supplying more drought-tolerant seeds for crops, legumes and vegetables to communities and conservation agriculture (Shikangalah, 2020). Other recommendations to the government since the drought of 1992/93 include working on drought preparedness and management, infrastructure development, pastoral development, alternative livelihood systems and on policies and management (Shikangalah, 2020).

It is further recommended that Namibia updates its drought policy and strategy to reflect some of the capacity and coordination challenges evident in the three pillars, starting with the operationalisation of a drought monitor that tracks and categorises drought severity according to its historical context and is linked to triggers in drought plans (potentially building from the CDI shown in Fig. 7). The revised policy could also emphasize the importance of forming a Drought Task Team or some other institutional authority, with a dedicated focus on drought management, over and above the broader disaster-relevant focus of the DDRM and clearly outline the role of the task team to ensure that all policy initiatives are implemented.

The revised policy could also incorporate longer-term strategies that ensure sustainable water supply including solar panel installation for pumping water and water harvesting. There is also an urgent need for the enactment of a legally binding regulatory framework for water that ensures the implementation and enforcement of the Water Resource Management Act of 2013. Sector-specific policy, as in the case of agriculture, can also benefit from a more targeted emphasis on drought, e.g. drought-resistant fodder crops.

Recent drought resilience efforts by the international community

Table 4. Selected projects focused on drought, or some aspect of it, in Namibia

World Bank

Integrated Land and Water Management in support of Namibia's NDC Partnership Plan The World Bank mobilized funding from the Nationally Determined Commitments (NDC) Support Facility to support Namibia with a Technical Assistance (TA) programme to strengthen sustainable management of natural resources, particularly of land, forests and water, through integrated landscape and watershed management (ILWM). This is expected to increase resilience to climate change and to mitigate GHG emissions. Aside from activities around forestry and land use, particularly land and forest restoration and sustainable management, and Climate-Smart Agriculture, the Bank has also supported an assessment of the hydrometeorological services designed to support Namibia in enhancing monitoring water resources and water security.
Budget (USD): 450K
Time Period: 2019-2021

Collection, Analysis and Dissemination of Household Survey Data in Namibia
Budget (USD): 500K
Time Period: 2017-2019

UN Country Team

Activities included: technical expertise in dealing with emergencies, particularly in the area of planning and coordination of assistance; reallocating existing funding and mobilising resources to provide humanitarian response in the areas of food and livelihood support, nutrition, water, sanitation and hygiene (WASH), health, and protection services for the most vulnerable people. **Budget (USD): Unknown**
Time Period: 2019

WFP

Activities included: strengthening the management of the national emergency relief safety net programmes to effectively meet the food and nutrition needs of vulnerable people throughout the year; government assessment and analysis capacity for improved policy and programme formulation. **Budget (USD): 884,654**
Time Period: 2019-2020

Episcopal Relief & Development

Activities included: food supplies and other support to 1,060 vulnerable families in the Ohangwena and Omusati regions; two communities, Eembindi and Enghandja received a four to five km pipeline; support for community and home gardens; poultry farming training and the rehabilitation of wells and dams for water sources in six villages. **Budget (USD): Unknown**
Time Period: 2019

References and data sources

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9. Shikangalah, R. N. (2020). The 2019 drought in Namibia: An overview. *Journal of Namibian Studies*, 27 (2020): 37 – 58
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11. World Bank (2021). Namibia. World Bank Climate Change Knowledge Portal. <https://climateknowledgeportal.worldbank.org/country/namibia/climate-data-historical>

Data Sources:

Climate Data: CHIRPS

Drought Risk: International Water Management Institute (IWMI)

CDI: National Drought Mitigation Center at the University of Nebraska-Lincoln

Population Data: WorldPop

Livestock, GDP: FAO, World Bank

About the Southern Africa Drought Resilience Initiative (SADRI)

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