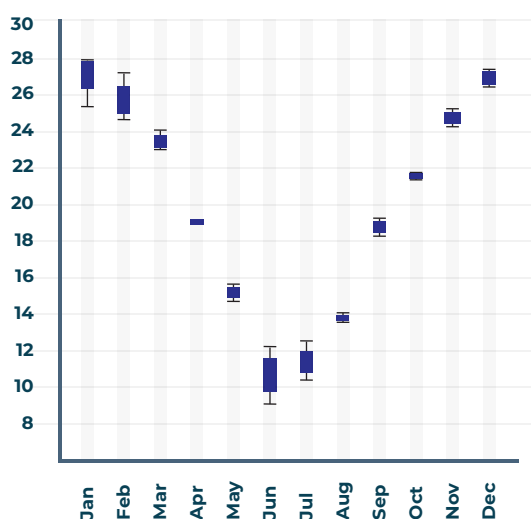


## COUNTRY OVERVIEW

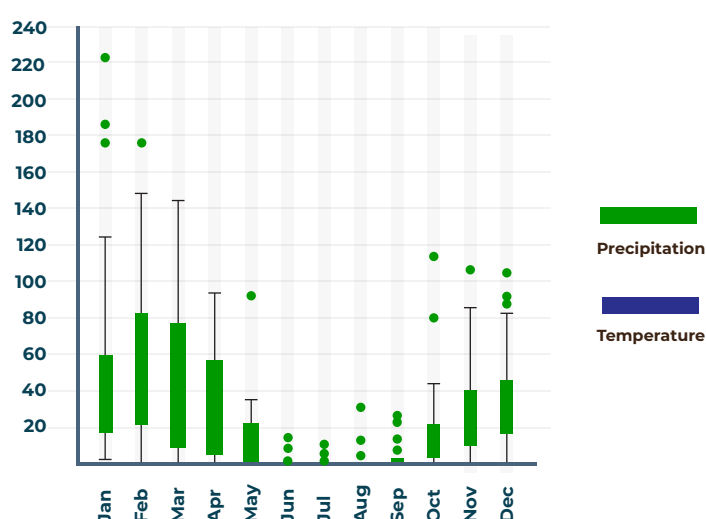
Botswana is one of the world's most drought-prone countries, with multiple, multi-year droughts recorded since the 1950s. Drought adversely affects fragile food and agricultural production, disrupts water supply in urban centres and seriously impairs the rural economy and socio-cultural structures. As a result, the country faces serious chronic food insecurity with over 10% of its population facing food insecurity and nutrition problems. About 70% of rural households derive part of their livelihoods from agriculture; and crop production is mainly based on rain-fed farming. Ragelands resources, which cover more than 60% of the country and are the basis for the cattle industry, are the most affected by drought. The recent 2018/19 drought resulted in the failure of two thirds of the crops planted in the previous season, while Ngamiland, a rich beef producing region, recorded nearly 40,000 cattle deaths.

Fig 1. Long-term rainfall and temperature anomaly over Botswana (26 .05S,22.45E) Years: 1967-1996

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 Botswana's drought resilience capacity under the international three pillars of drought risk management. Botswana's vulnerability and impact assessment capacity is categorized as medium. Despite its functional institutional arrangements, a lack of clarity of roles between responsible institutions and a traditional approach to vulnerability assessments focused on biophysical impacts on ecosystems, lead to gaps in coordination, information exchange and a less-than-holistic assessment of vulnerabilities. Botswana's monitoring and early warning systems capacity is categorized as medium due to an organized drought monitoring system, however, information flow between different levels of government, as well as the roles and responsibilities of all agencies and ministries could be more clearly defined.

Botswana's capacity in Pillar 3, mitigation, preparedness and response, is categorized as medium, due in large part to the need for a dedicated national drought policy, and one that integrates all sectors and impacts. Finally, the traditional, reactive approach to drought management in Botswana has undermined the adaptive capacity of vulnerable communities. Shifting toward a more proactive, integrated and multi-sectoral drought management paradigm will help to build the resilience of vulnerable groups. Botswana can further benefit from a people-centred approach including effective governance and institutional arrangements, involvement of local communities and consideration of gender perspectives and cultural diversity.

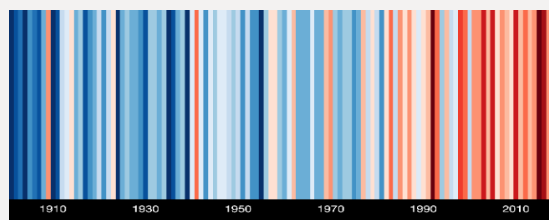


This document is meant to provide a brief overview of drought risk issues. The key resources at the end of the document provide more in-depth country and sectoral analysis. The contents of this report do not necessarily reflect the views of World Bank, NDMC, CIWA or IWMI.

## Historical climate

- As illustrated in the #ShowYourStripes 'warming stripe' graphic for Botswana in Fig. 2, the stripes turn from mainly blue to mainly red in more recent years, illustrating the rise in average temperature since 1901.
- Drought frequency is increasing. There was one drought in the 1980s, one in the 1990s, and two in the 2010s (Table 1).
- An analysis of climate data from 1970 to 2015 shows an average temperature rise of around 1.5 °C. Trends for precipitation are not as clear as those for air temperatures and they vary in time and space (UNDRR and CIMA, 2018).
- Average annual temperature is 21.6°C (1901-2016) and the mean annual rainfall is 396.2mm (1901-2016) (World Bank, 2020).

Fig 2. Temperature change in Botswana, 1901 - 2019



Source: Berkley Earth/#ShowYourStripes

## Future climate

- With respect to historical conditions (1951-2000 climate), the probability of occurrence of severe effective precipitation deficiency (precipitation – evapotranspiration) could increase by 45% in the future (2050-2100 climate). It is likely that a larger share of Botswana may also experience frequent droughts (UNDRR and CIMA, 2018).
- In the present climate, on average about 845,000 people (37% of the total 2016 population) are annually affected by droughts. Under future climate conditions, this number is expected to increase to 78% (on average 2.1 million people if population growth is accounted for) (UNDRR and CIMA, 2018).
- In high emission scenarios (RCP8.5) for the period 2050-2074, projections show a temperature increase of between 2°C and 4.5°C and an increase of between about 3.5°C and 6°C for the period 2071-2095.
- Future changes in precipitation are more uncertain but models predict a decrease in precipitation for both periods and for all different emission scenarios of up to 25% (UNDRR and CIMA, 2018).

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

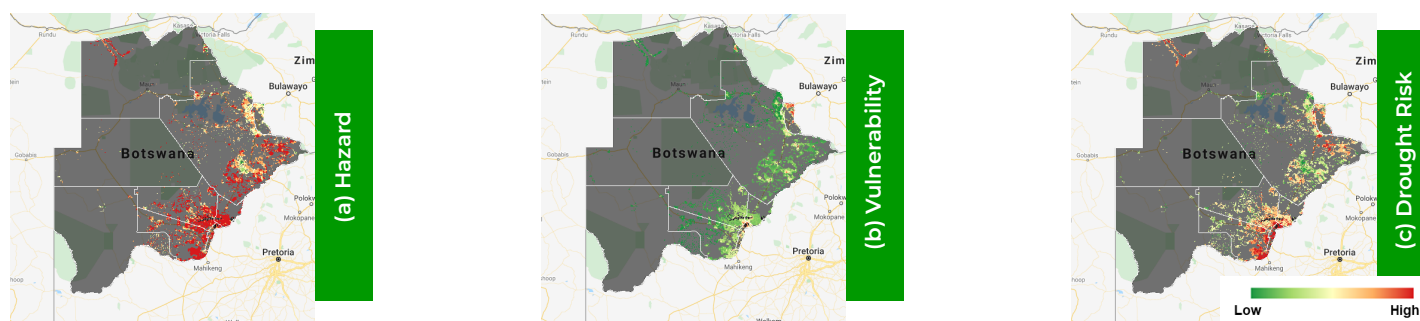
| Year    | Location                  | Affected Population |
|---------|---------------------------|---------------------|
| 1981    | Nationwide                | 1,037,300           |
| 1990-91 | No data*                  | 100,000             |
| 2015-16 | Nationwide                | No data             |
| 2018-19 | Botswana's Okavango Delta | 38,000              |

\* No data provided from source

## Vulnerability and Impact Assessment



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



Botswana has a high probability of experiencing severe drought, and exposure to the risk of drought is therefore also significant (Davies, et al., 2017). However, the impacts of drought are not uniform across all sectors or socio-economic groups. In Botswana, like in other semi-arid regions of southern Africa, vulnerability to drought is a function of the existing environmental and climatic conditions coupled with governance, socio-economic, health, education, culture and human demography issues (Spear et al, 2015).

The above maps (Fig 3a-c) depict drought hazard areas (a), areas of vulnerability (b) and drought risk (c). 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 (IDSI); and exposure and vulnerability expressed through population density, human modification index, water risk and irrigated systems.

Agricultural production (agricultural practices i.e. irrigated area, food production as provided on HarvestChoice) was used to define levels of vulnerability which were finally combined with all three components to define levels of drought risk at the country level, referred to as the National Drought Risk Index (NDRI). The drought risk profile is therefore based on the probabilistic estimation of hazard and vulnerability to assess the drought risk in the exposed areas. Among the drought prone areas in Botswana, the NDRI estimates 40% of the agricultural areas in the regions of North-East, North-West, South-East, Southern, Kweneng and Kgatleng (maps generated by IWMI).



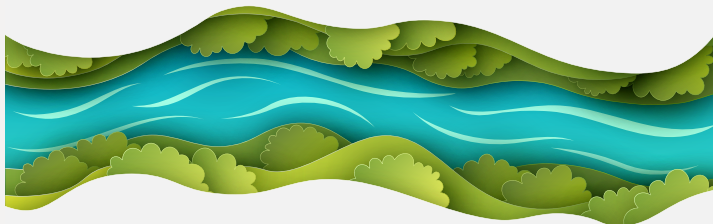
## Droughts have adverse on effects population and GDP

The effects of drought on the average annual percentage of GDP (i.e. the economic value produced in areas hit by droughts) is about 38% of the total GDP, which is equivalent to 5.8 billion USD of GDP per year (CIMA, 2019). Under future climate conditions, this may rise to 80% of the GDP (12 billion USD), which could amount to 68 billion USD if socio-economic projections are accounted for.

Under the present climate, approximately 37% (or 845 000) of the 2016 population is also likely to be affected by drought annually, whereas, in future under a changing climate, the affected people are more likely to increase to 78% (on average 2.1 million people if population growth is accounted for) (ibid).

## Water resources

Groundwater is the main source of water supply in Botswana, and is constrained by high salinity, low rates of replenishment due to low rainfall and the deep lying nature of aquifers (Rural Development Council, 2019).



Drought also causes a decrease in annual dam yields and an increase in average unmet water needs. According to Statistics Botswana, dam levels were low in 2016, and then assumed an upward trend from 2017-2019, with a slight dip between 2018-2019. In 2019, the Rural Development Council (2019) reported that the 2018/19 storage level was relatively fair and all dams, except Bokaa dam, had more than twelve months of supply without rainfall. Most notable is the Gaborone dam which saw an increase from an annual average level of 13% in 2016 to 63% in 2019. Despite this, the most recent drought saw the capital city instituting water restrictions.

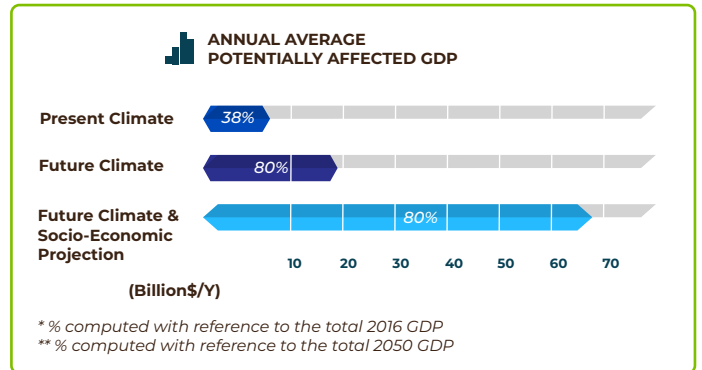
## Droughts drag macro-level agricultural growth

Rainfall and agriculture production are intricately linked in Botswana.

Drought-related moisture deficiency is largely triggered by high temperatures and low rainfall leading to low crop yields. High rainfall correlates with good agricultural production (e.g. 2008, 2009, 2018). Poor rainfall correlates with poor agricultural production (e.g. 2002, 2005 and 2012).

The annual yields for sorghum, maize and millet fluctuated between 2010-2017. A comparative analysis between the national crop yields and the cereal requirement reveal that the yields do not meet the country's cereal demand. This has led to the country's overdependence on imports. Low average yields have far-reaching implications on the livelihoods and food security of many households in Botswana, particularly smallholders. (Statistics Botswana, 2020).

Fig 4. Percentage GDP affected by drought in Botswana



Source: UNDRR and CIMA, 2018

## Droughts impact on livestock

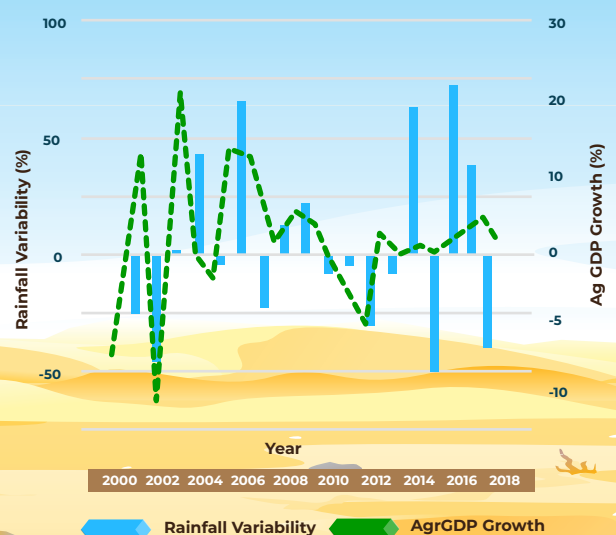
Under current climate conditions, approximately 40% of the total livestock in Botswana is likely to be affected by drought, and in the future the number of livestock affected by drought is projected to double (CIMA, 2019). Currently, the central district of Botswana is prone to a higher number of livestock affected by drought, whereas under future climate conditions, Ngamiland, Kweneng, and the southern districts are likely to suffer higher numbers of livestock affected by drought (CIMA, 2018). Increased livestock mortality and culling due to a combination of heat stress, reduced availability of drinking water, grazing and feed, increased distances to water for livestock, as well as greater spread of diseases all contribute to this.

Fig 5. Annual average number of potentially affected livestock in Botswana



Source: UNDRR and CIMA, 2018

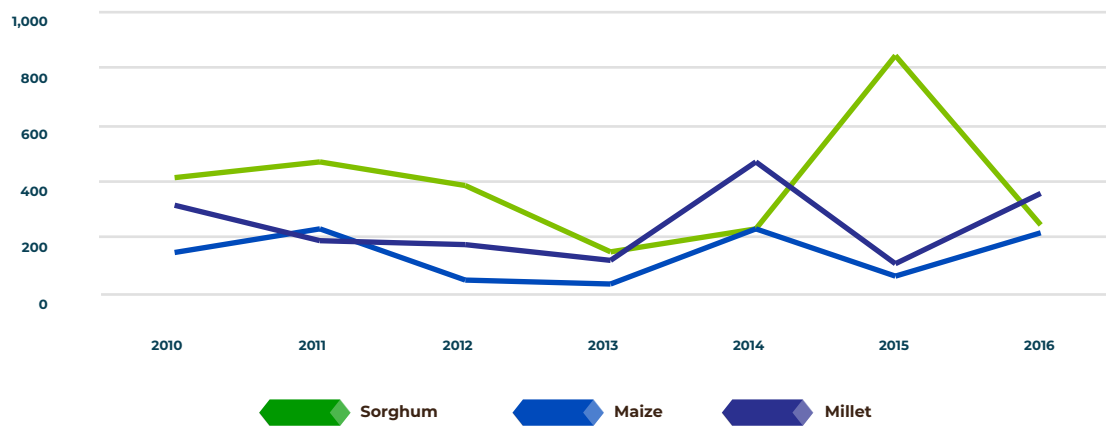
Fig 6. Relationship between rainfall variability and Ag GDP growth





## Droughts have an impact on commodity prices

Fig 7. Yield per hectare planted (kg/ha) by cereal crop, 2010-2017



Source: Agricultural Statistics Unit, Statistics Botswana 2020

## Vulnerability and impact assessment capacity

The Government of Botswana recognises the importance of conducting vulnerability and risk assessments, as is evident by its inclusion as one of three pillars in the National Strategic Framework for Drought Risk Management.

In terms of the institutional framework coordinating vulnerability and impact assessments, the Botswana Vulnerability Assessment Committee (BVAC) was formed in 2008 as part of the regional effort to respond to the food security crisis that faced SADC countries at the time. Since then, the BVAC has been undertaking annual Drought and Household Food Security assessments with the intention of informing decision-making for drought interventions.

A key function of the Drought and Household Food Security Outlook relates to assessing the current levels of human vulnerability and stressors and the possible effects of their interaction with the observed impacts of drought. This includes, but is not limited to, the nutritional status of under-five year olds, current and emerging trends in the number and distribution of destitute persons, as well as a review of implementation of the feeding and intensive labour works (Ipelegeng) programme. Based on conclusions arising from the above, the assessment team determines the need for continuation of government interventions, including the form, nature and scope of the interventions.

In terms of the reporting structure, BVAC currently sits under the Office of the President (OP). In the past, the BVAC was under the Rural Development Council (RDC) in the Ministry of Local Government. The restructuring that took place in 2012 moved the committee to the OP. According to Davies et al (2017), since the reform, the role of the BVAC has been unclear, and mostly provides information to the SADC Regional Vulnerability Assessment and Analysis Program (RVAA). The membership of BVAC is also similar to the technical team of the Multi-sectoral Committee for Food Security and Poverty Reduction (MSCFSPR), but the difference is that the BVAC conducts the assessment using a vulnerability lens, whereas the MSCFSPR uses an impact assessment lens. Botswana may consider merging these two approaches in drought assessment so that they are conducted by one committee and that there is no duplication of resources (Davies et al., 2017).

In addition, traditional vulnerability assessments have been mostly focused on biophysical impacts on ecosystems and communities and have been driven by expert opinions (ibid.). However, in recent years, the importance of considering socio-economic drivers of vulnerability including structural vulnerability as well as engaging with stakeholders in vulnerability assessments is now well known (Tschakert et al. 2013; Davies et al., 2017). More holistic vulnerability assessments have since been conducted by various research and development organisations that include multi-stakeholder consultative approaches that factor into its design issues pertaining to power, inequality, local knowledge, culture and gender (Davies et al., 2017).

Finally, improving community adaptive capacity not only depends on building its autonomous ability to implement adaptation measures, but also on improving its access to resources and the degree to which it is empowered to do so through an enabling environment. The traditional, reactive approach to drought management in Botswana has at times undermined the adaptive capacity of vulnerable communities. Whilst food security has remained relatively high in drought years due to the provision of aid relief, this has increased community dependency on hand-outs. Shifting toward a more proactive drought management paradigm will help to build the resilience of vulnerable groups. Because drought impacts occur across sectors, an integrated approach could be considered.





## Monitoring and early warning systems capacity

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

Table 2. Summarized checklist of monitoring and EWS capacity

|   |   |
|---|---|
| Official definition of drought  | ● |
| 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

Drought is currently defined as a deficiency in rainfall in terms of its timing and spatial-temporal distribution (Manthe-Tsuaneng, 2014). The year with below average rainfall is usually declared a period of drought by the President of Botswana. Generally, the whole country is declared drought-stricken during the review period. The indicators used are rainfall, area ploughed and planted to reflect food security at household level; conditions of rangelands, livestock, water and wildlife; and malnutrition levels (Manthe-Tsuaneng, 2014). Key institutions hold early warning monthly meetings to track indicators. In addition to the annual Drought and Household Food Security Outlook tour conducted each year, a series of early-warning reports are compiled on a routine basis by the various government departments and ministries.

Botswana has some elements of a drought monitoring system, but the various elements are not fully coordinated and integrated. There are many stakeholders and organisations involved with monitoring droughts that include the National Early Warning Technical Committee (EWTC), Inter-Ministerial Drought Committee, the Multi-sectoral Committee for Food Security and Poverty Reduction (MSCFSPR) and the Rural Development Council (RDC). Other institutions that monitor drought include the Ministry of Agriculture; Ministry of Health; Ministry of Local Government and Rural Development; Ministry of Environment, Wildlife and Tourism; and Ministry of Minerals, Energy and Water Resources. Located at the Department of Meteorological Services (DMS), the Monitoring for Environment and Security in Africa (MESA) program for southern Africa, an earth observation system, can provide a range of drought

information products e.g. 10-day drought maps and monthly drought risk maps. DMS also produces the National Seasonal Rainfall and Temperature Outlook, which provides a forecast for the upcoming rainfall season. A major omission with the local level arrangement is the lack of an early warning system/process that reaches local officers.

In addition to ensuring information flow between different levels of government, the roles and responsibilities of all agencies and ministries could be more clearly defined. This includes the Water Utilities Corporation (WUC), which has a national mandate for Water Services, and therefore is a core institution in the sector. In the past 10 years its mandate has become more complex, as it was originally responsible for urban water, but now has national responsibility, which especially has repercussions for the mitigation approaches it could use. The Government of Botswana has expressed interest and commitment in improving their DEWS through the operationalization of the Combined Drought Indicator for Botswana (CDI-Botswana). Strengthening the EWS in Botswana would require developing a collaborative EWS information sharing protocol that would enable easy flow of information across different scales (national to community-level). There is also the need to integrate multiple physical indicators, climatic indices and social vulnerability indicators (Davies et al., 2017). Thirdly, it is important to invest in building citizen awareness on the cyclical nature of drought, as years of good rainfall are usually followed by drought. Research institutions could focus on improved drought forecasting models and strengthen early warning systems to minimise negative impacts of drought to vulnerable groups.

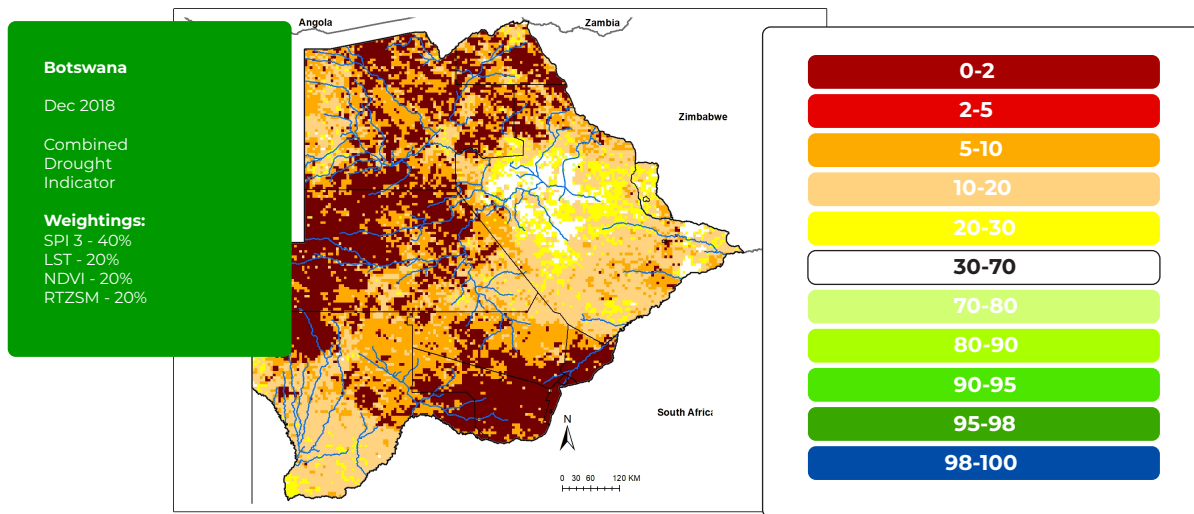
## Combined Drought Indicator (CDI)

The Government of Botswana, through the Ministry of Minerals, Energy and Water Resources, has been working with the World Bank and the National Drought Mitigation Center (NDMC) at the University of Nebraska to improve the DEWS in Botswana through the development of a consolidated set of indices and indicators into one comprehensive national drought map. The combined drought indicator (CDI) map for Botswana was created using a weighted combination of four indicators of drought: precipitation, vegetation stress, land-surface temperature and soil moisture. December 2018 was selected to depict the severity of the recent 2018/19 drought. December-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 December 2018 CDI map shows much of the country impacted by some degree of drought. The concentration was predominantly in the south-west. Without an effective drought monitoring and early warning system to deliver timely information for early action, effective impact assessment procedures and pro-active risk management measures, the country will continue to respond to drought in a reactive, crisis management mode.

# Monitoring and Early Warning Systems



Fig 8. Combined drought indicator for Botswana, December 2018



Source: NDMC, 2020

# Mitigation, Preparedness and Response



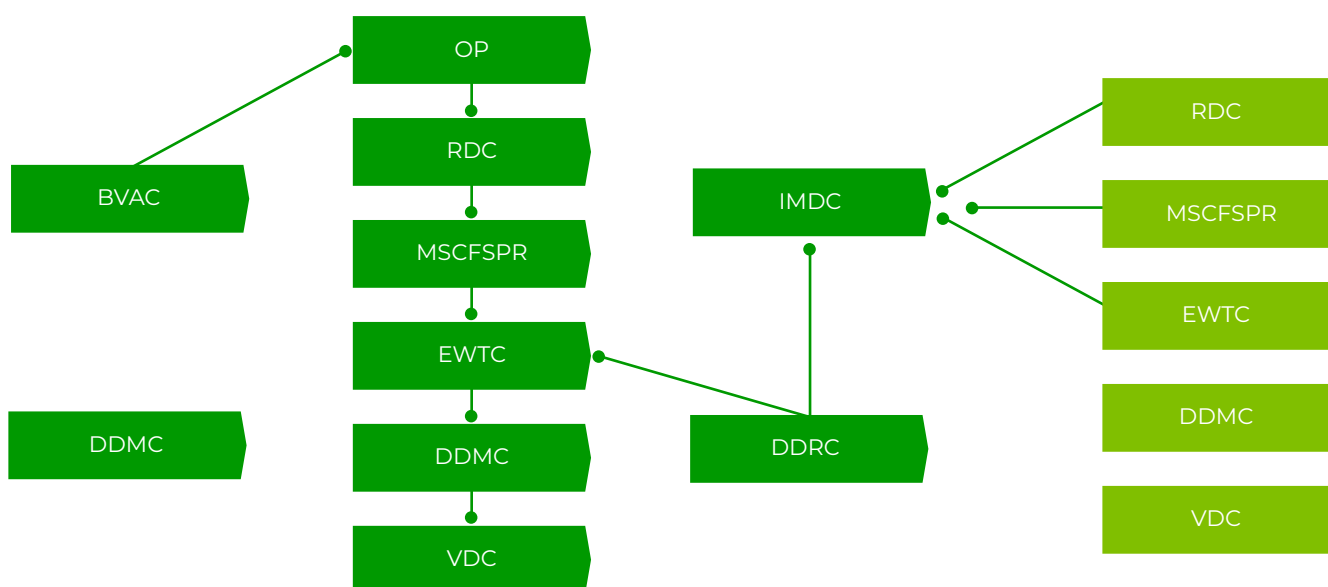
## Drought policy framework

In terms of mitigation, preparedness and response to droughts, Botswana is developing a multi-sectoral policy and institutional framework.

Botswana's drought-relevant policies include: the Urban Government Act (1969); Finance and Audit Act of 1996; National Policy on Disaster Management (NPDM), 1996; Emergency Powers Act; National Disaster Risk Management Plan (NDRMP), 2009; NDP11; Vision36; the National Poverty Eradication Policy and Strategies; National Environmental Policy; National Climate Change Policy and other sector development plans; National Disaster Risk Reduction Strategy (NDRRS), 2013-2018 and the Draft Drought Management Strategy (DMS), 2019.

Two policies that deserve to be highlighted include the NPDM and the draft DMS. Botswana approved its National Policy on Disaster Management (NPDM) in August 1996. The NPDM outlines a comprehensive disaster management programme, which focuses on reducing the impact of future disasters, mitigating the damage of disasters on vulnerable populations, and ensuring effective disaster preparedness measures are in place for effective emergency response and recovery in the event of a disaster. The draft DMS was developed in 2019 to provide a systematic and strategic framework to guide an inclusive, proactive and integrated response to drought across sectors and scales, that moves away from treating drought as an emergency, and integrates technical responses with social protection, health, climate risk management and behavioural change. It will be beneficial to ensure that the Disaster Risk Reduction Strategy, which is due to be revised soon (the current strategy extends from 2013 to 2018) is harmonised with the DMS, as currently the DRR Strategy does not fully mirror the need for a proactive and integrated approach to drought, although it does highlight the need to reduce underlying risk factors.

Fig 9. Botswana's drought institutional framework





## Legend

OP- Office of the President  
BVAC- Botswana Vulnerability Assessment Committee  
RDC- Rural Development Council  
MSCFSPR- Multi-sectoral Committee for Food Security and Poverty Reduction  
EWTC- National Early Warning Technical Committee  
IMDC- Inter-Ministerial Drought Committee  
DDMC- District Drought Management Committees  
DDRC- District Drought Committees  
VDC- Village Development Committees

## Institutions and coordination

There is an established network of stakeholders and organisations dealing with drought mitigation, preparedness and response at the national, district and village level. The National Disaster Management Office (NDMO) under the Office of the President (OP) is responsible for coordinating all disaster risk management activities in Botswana. Drought, however, is managed under the Ministry of Local Government and Rural Development (MLGRD). The Rural Development Council (RDC) was established in 1972 through a presidential directive to serve as the highest national consultative body mandated to promote and coordinate rural development in the country.

With regards to drought management, the RDC works through its various technical sub-committees to carry out the annual drought assessments. Once that is completed, the RDC receives the recommendations from the sub-committees and then provides their recommendations to cabinet and the President for a final decision and a declaration on drought.

The Inter-Ministerial Drought Committee (IMDC) is a national coordinating committee for drought. It comprises representatives of ministries/departments with a lead role in drought monitoring and relief operations, including but not limited to, Ministry of Environment, Wildlife and Tourism (MEWT); Ministry of Minerals, Energy and Water Resources (MMEWR); MLGRD; Ministry of Agriculture (MoA) and Ministry of Health (MoH). Its mandate is to monitor the food security situation through the Early Warning Technical Committee and advise the RDC on issues of resource allocation during periods of drought. The Committee has close contact with Districts through the District Drought Committees (DDRC). Several other district level committees exist with overlapping mandates such as the District Disaster Management Committees, which ensures the implementation of the Disaster Risk Management Plan at a local level; and the District Climate Change Committees, which support the implementation of sustainable climate change response measures at village and district levels. Finally, the Village Development Committees (VDCs) are village level organisational structures that coordinate development issues at the village/ household level.

Given the institutional complexity, the RDC have noted the need to avoid duplication and proliferation of institutions, particularly at the sub-national level. In contrast to the institutional landscape for disaster management, there is also little involvement of non-state actors in drought management. NGOs such as the Red Cross mostly get involved in disaster management, such as floods and epidemics, but no formal involvement with drought management.

## Recent drought resilience efforts and recommendations

In general, drought has traditionally been treated as an emergency in Botswana and responded to through crisis-based programmes that encouraged the dependency on state support. From 2002 to 2008, more than 6,000 projects were implemented to mitigate the effects of drought on the population, costing about USD129.2 million (UNDRR, 2020).

The types of emergency aid provided by government during times of drought have typically included increasing the employment quota for intensive labour works (Ipelegeng); purchasing of mobile water tanks to help augment human water supply shortages (emergency water supply) and feeding children and vulnerable groups in schools and child welfare clinics. Other measures have included the provision of drought relief subsidies on selected livestock feeds, vaccines and supplements and cattle purchase schemes.

Such programmes have largely taken a generalized approach that did not factor in differential vulnerability, which is linked to social and economic issues such as race, class, income and gender (Davies et al., 2017). For instance, blanket drought declarations have led to subsidies for livestock feed regardless of the economic status of the recipient, rather than targeting the most vulnerable people within communities. The persistence of a reactionary response to drought means that neither response times nor risks have been reduced, indicating that there is room for additional learning. The CDI-Botswana, being developed in partnership with the World Bank and NDMC, should help to provide a more nuanced definition of drought and facilitate more targeted support as future droughts unfold.

In more recent years however, there has been a shift from crisis management approaches to a proactive, longer-term approach. While short-term measures such as water restrictions and rationing are still in place, government has also implemented a series of drought mitigation projects. These include projects to upgrade and refurbish boreholes, build treatment plants and upgrade water treatment schemes. Recommendations for additional interventions include investing more in water harvesting, amplifying the financial support system. This especially affects vulnerable households, boosting agricultural policies to enable farmers to quickly adapt to drought, as well as advocating for a multi-sectoral drought recovery plan. Physical water losses and non-revenue water have also added significantly to water stresses, and require innovation and various context specific diverse approaches, given the different roots of losses in urban and rural areas.



# Mitigation, Preparedness and Response

## Recent drought resilience efforts and recommendations

To alleviate the impacts of livestock mortalities, farmers have been encouraged to sell some livestock and buy animal feed for the remaining. Cattle farmers are also encouraged to connect with arable farmers to use failed crop as fodder. Farmers have also been encouraged to move to drought-tolerant livestock such as the Musi composite cattle breed, developed in Botswana, and Tswana cattle and goat breeds. While the shift to a more proactive, long-term, integrated drought management paradigm is commended, some gaps still exist, especially for very vulnerable households who may not be on the government support system for one reason or another. About 38,000 people were projected to be food insecure for the peak lean season of January to March 2020.

Botswana is also in the process of finalising a Drought Management Strategy. Amongst other things, the strategy will classify drought as a permanent feature thus having it included in annual government budget plans rather than treating it as an emergency as is the case now.

There is a strong need to move away from a reactionary drought response to a more holistic and proactive approach that works to mitigate the impacts of drought, for example through improved monitoring and early warning systems, and the decentralisation of drought management efforts. To achieve this, resources that are provided by government and donors could be redirected toward long-term developmental activities that deal with planning, mitigation and disaster readiness. New strategies that build long-term drought-resilience should not replace, but complement, short-term response measures.

This will require improved coordination at the national and subnational levels, as well as for drought management to be embedded in the country's policy framework and mainstreamed into management plans across sectors. In this regard, Botswana can benefit from avoiding duplication and proliferation of institutions and structures, especially at the sub-national level.

Institutions responsible for drought and drought risk management can benefit from close alignment with the proposed District Climate Change Committees (as set out in the draft National Climate Change Policy). An important consideration is to explore ways to enhance the role of the VDCs and build their capacity to improve implementation of disaster management (and the DMS) on the ground.

Several research gaps also exist that can be addressed including the need to improve understanding of the occurrence and magnitude of climate change-driven events, as well as the related key vulnerabilities, development impact, and possible adaptation responses; broadening the participation of the public, scientific institutions, women and local communities in planning and management, accounting for approaches and methods of gender equity; strengthening environmental monitoring capabilities for more effective environmental management; and enhancing Botswana's adaptive capacity through continuing investment in weather stations and expanding the country's national hydro-meteorological monitoring system and improved networking for the measurement of climate parameters. The latter will further benefit from an improvement of technical capacity to analyse hydro-met data and project impacts across sectors.

## Recent drought resilience efforts by the international community

Table 3. Selected projects focused on drought, or some aspect of it, in Botswana

### GIZ

Transboundary cooperation: for better water management and protection against drought and floods

**Budget (USD): Unknown**  
**Time Period: 2020-2023**

SADC Adaptation to Climate Change in Rural Areas in southern Africa (ACCRA)

**Budget (USD): Unknown**  
**Time Period: 2015-2020**

Development of integrated monitoring systems for REDD+ in the SADC region

**Budget (USD): Unknown**  
**Time Period: 2011-2015**

### Botswana Red Cross Society (BRCS)

Food Assistance Program  
**Budget (USD): 390K**  
**Time Period: 2019-2020**

### World Bank

Emergency Water Security and Efficiency Project  
**Budget (USD): 145.5M**  
**Time Period: 2017-2021**



## References and data sources

1. Davies, J., Spear, D., Omari, K., Mochain, D., Urquhart, P., Zaremba, J. (2017). Background Paper on Botswana's Draft Drought Management Strategy, Adaptation at Scale in Semi-Arid Areas, UCT, Cape Town.
2. CIMA, (2019). Building Disaster Resilience to Natural Hazards in Sub-Saharan African Regions, Countries and Communities. EU, 2019.
3. Red Cross (2013). International Disaster Response Law (IDRL) in Botswana. Botswana Red Cross Society and the International Federation of Red Cross and Red Crescent Societies, Geneva.
4. Manthe-Tsuaneng, M (2014). Drought Conditions and Management Strategies in Botswana. Ministry of Environment, Wildlife and Tourism, Gaborone.
5. Rural Development Council (2019). Drought and Household Food Security Outlook 2016/17. Ministry of Local Government and Rural Development.
6. Spear, Dian, Baudoin, Marie-Ange, Hegga, Salma, Zaroug, Modathir, Okeyo, Alicia e Haimbili, E. (2015).
7. Vulnerability and Adaptation to Climate Change in the Semi-Arid Regions of Southern Africa, 111.
8. Statistics Botswana (2019). Botswana Environment Statistics: Natural and Technological Disasters Digest, Gaborone.
9. Statistics Botswana (2015). Botswana Environment Statistics: Natural Disasters Digest, Gaborone
10. Tschakert, P., van Oort, B., St. Clair, A.L. & LaMadrid, A. (2013). Inequality and transformation analyses: a complementary lens for addressing vulnerability to climate change. *Climate and Development*, 5(4): 340–350.
11. Tsheko, R. (2003). Rainfall reliability, drought and flood vulnerability in Botswana. *Water Sa*, 29(4), 389-392.
12. UNDRR. (2020). Republic of Botswana: Risk-sensitive Budget Review. UNDRR Country Reports on Public Investment Planning for Disaster Risk Reduction
13. UNDRR and CIMA (2018). Botswana Disaster Risk Profile. Nairobi: UNDRR and CIMA Research Foundation.
14. World Bank (2020). Climate Risk Profile: Botswana.

### 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.