D4 - POLICY REVIEW REPORT

SOUTH AFRICA DROUGHT MONITORING (ANIN)

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1. INTRODUCTION

Drought can be defined as "a natural occurrence caused by a decrease in rainfall and natural run-off, which occurs irrespective of anthropogenic activity." Drought is a complicated natural hazard, and its effects on a community depend on various sociological and climatic factors. These factors determine the degree of societal resilience and how vulnerable a region is to the effects of severe drought. They include;

- Population growth and redistribution
- Shifting consumption and production habits
- Changes in land use, environmental degradation, environmental awareness and regulations
- Poverty and rural vulnerability
- Weak or ineffective governance; and
- Outdated or ineffective government policies

Defining and implementing drought policies grounded in risk reduction can change regional strategies for managing droughts by focusing on minimising the effects (risk) associated with drought events. The World Meteorological Organization (WMO) and the Secretariat of the United Nations Convention to Combat Desertification (UNCCD) were motivated by this notion during the High-Level Meeting on National Drought Policy (HMNDP), which took place in Geneva from 11 to 15 March 2013. During this meeting, it was declared that developing effective drought policies was pertinent to reducing societal vulnerability to the effects of drought. It was also recognised that technological advances in drought monitoring and early warning systems would aid in robust planning and informed decision-making and ultimately reduce the consequences of drought impacts in vulnerable communities.

1.1. PURPOSE

This policy review of existing global, regional, country and local policies on drought risk mitigation, management, resilience and reduction seeks to identify guidelines and standards prescribed internationally and those adopted in Africa and the Southern African Development Community (SADC) region.

In the scope of the ANIN project, this policy review will outline accepted and currently implemented strategies that should be considered in the project's Design Phase (WP-200). Understanding existing regional and local policies will inform the design of an EO-based solution that integrates into the end-users existing practices while understanding international policies will innovate the design of a solution that bridges gaps between regional and international strategies where applicable.

1.2. SCOPE

This document is structured according to the following sections:

- Section 3, Global/Regional Approach to Drought Management – this section covers how drought management policies have been implements on a global level.
- Section 4, Adaption of National Drought Management Policy Approach outside of Africa – this section focuses on how drought management policies established globally have been adopted by countries outside of Africa
- Section 5, Adaption of National Drought Management Policy Approach in Africa – this section discusses how African nations are implementing drought management policies.
- Section 6, Conclusion – this provides a summary of the finds and recommendations on how the ANIN project should tie into existing policies.

1.3. DEFINITIONS AND ACRONYMS

1.3.1. Acronyms

Acronyms used in this document and needing a definition are included in the following table:

Table 1-1 Acronyms

Acronym	Definition
ACMAD	African Centre of Meteorological Applications for Development
CILSS	Center/Permanent Interstate Committee for Drought Control in the Sahel
DCPs	Drought Contingency Plans
DMP	Drought Management Plan
DMPs	Drought Management Plans
DMS	Drought Management Strategy
DRAPA	Drought Resilient and Prepared Africa
EC	European Commission
ESCAP	Economic and Social Commission for Asia and the Pacific
GHACOF	Greater Horn of Africa Climate Outlook Forum
GWP	Global Water Partnership
HMNDP	High-Level Meeting on National Drought Policy
HMNDP	High-Level Meeting on National Drought Policy
ICPAC	Climate Prediction and Applications Centre
IDMP	Integrated Drought Management Programme
NAPs	National Action Programmes
NDMP	National Drought Management Policies
NEWFIS	Namibia Early Warning and Food Information System
NPDM	National Policy on Disaster Management
PRESAO	Prévision Saisonnière en Afrique de l'Ouest
RBOs	River Basin Organisations
RCOFs	Regional Climate Outlook Forums
SADC	Southern African Development Community
SADC-CSC	Southern African Development Community Climate Services Center
SARCOF	Southern Africa Regional Climate Outlook Forum
UNCCD	United Nations Convention to Combat Desertification
WFD	Water Framework Directive
WFD	Water Framework Directive
WMO	World Meteorological Organization

2. APPLICABLE DOCUMENTS

The following documents, of the exact issue shown, form part of this document to the extent specified herein. Applicable documents are those referenced in the Contract or approved by the Approval Authority. They are referenced in this document in the form [AD.x]:

Table 1-2 Applicable Documents

Ref.	Title	Code	Version	Date
[AD.1]				
[AD.2]				
[AD.3]				
[AD.4]				

2.1. REFERENCE DOCUMENTS

The following documents, although not part of this document, amplify or clarify its contents. Reference documents are those not applicable and referenced within this document. They are referenced in this document in the form [RD.x]:

Table 1-3 Reference Documents

Ref.	Title	Code	Version	Date
[RD.1]	Strategic framework for drought risk management and enhancing resilience in Africa. In African Drought Conference. Tadesse, T.			2016
[RD.2]	Drought management strategies in South Africa and the potential for economic policy instruments. In Drought in Arid and Semi-Arid Regions. Hassan, R.			2013
[RD.3]	National drought management policy guidelines: A template for action. Integrated Drought Management Programme (IDMP) Tools and Guidelines Series, 1. Wilhite, D. A.			2014
[RD.4]	The basics of drought planning: a 10-step process. National Drought Mitigation Center (NDMC). Wilhite, D. A., Hayes, M. J., Knutson, C., & Helm Smith, K.			1999
[RD.5]	The UN Sendai framework for disaster risk reduction 2015–2030: Negotiation process and prospects for science and practice. Journal of Extreme Events. Pearson, L., & Pelling, M .			2015
[RD.6]	Drought management planning policy: From Europe to Spain. Sustainability. Hervás-Gámez, C., & Delgado-Ramos, F.			2019
[RD.7]	"Brazilian Drought Precautionary Strategy." Brazilian Institute of Space Research. Kronfol, Naim.			2019
[RD.8]	"Drought Management." International Water Management Institute,. McCartney, Michael P., et al.			2010
[RD.9]	"The Guianas shield and the making of Brazil." Science, vol. 320, no. 5874. Reid, W. V., and Plotkin, B. L.			2008
[RD.10]	Assessing State-level Drought Contingency Planning For the Unites States. Water Resources Management, vol. 32, no. 1. McNulty, Steve G., et al.			2008
[RD.11]	Improving Drought Management in the US. Great Plains: A Federal Nonpoint Source Program and the Response of Local Stakeholders. Annals of the Association of American Geographers, vol. 108. Duffy, Peter B.			2018
[RD.12]	Testing the Effectiveness of a Statewide Drought Contingency Plan in New Mexico: Lessons on the Need for Local Adaptation. Journal of the American Water Resources Association. Gooch, Matthew, et al.			2018
[RD.13]	"Climate Change: To What Extent Will It Affect the US Southwest?". National Geographic, National Geographic Society.			2016
[RD.14]	Water Resources of Arizona. US Department of the Interior. US Geological Survey.			2019

3. GLOBAL/REGIONAL APPROACH TO DROUGHT MANAGEMENT

One of the declarations made at the HMNDP (2013) was to encourage Governments to develop and implement National Drought Management Policies (NDMP) that incorporated appropriate technology and innovation to aid prediction, preparedness, and risk mitigation of drought. To achieve this, Governments were recommended to:

- Develop national drought policies and preparedness plans that emphasise risk management
- Harmonise regional, national, and local efforts to manage the risk of drought
- Monitor the World Meteorological Organization (WMO) -recommended drought indicators and use them to forecast impending drought
- Increase knowledge sharing amongst the public and stakeholders to improve the general understanding and preparedness for drought.

This led to the development of the *National Drought Management Policy Guidelines: A Template for Action* by the Integrated Drought Management Programme (IDMP), launched by the WMO and the Global Water Partnership (GWP). These policy guidelines identified ten (10) steps in the drought policies and preparedness process listed in Figure 1 below:

Figure 1 National Drought Management Plan development process

These guidelines were adapted and adopted at a regional level, where groups of countries with similar climate and socioeconomic structures drafted regional policies to tackle drought and water scarcity. The focus of the policies at the regional level adhered to the guiding principles set out at the HMNDP to migrate from reacting to drought events to actively planning, predicting, and managing the effects of droughts.

3.1. DROUGHT MANAGEMENT IN EUROPE

Severe drought affects many regions of Europe, and the EU has created relevant policy tools to support drought management. These tools include the Water Framework Directive (WFD), the Blueprint to Safeguard Europe's Water Resources and the Communication "An EU Strategy in adaptation to climate change". In 2007 the European Commission's communication: "Addressing the Challenge of Water Scarcity and Droughts in the European Union" was a significant milestone in managing the danger of droughts in Europe. It was agreed that several policy instruments and strategies needed to be established to address water scarcity and drought challenges at the European, national, and local levels.

Europe utilises global and regional early warning systems that use meteorological data and hydrological models to identify areas at risk of drought. This hybrid approach allows governments and other stakeholders to take proactive measures to minimise the impact of drought. When a drought event is predicted, water conservation measures, such as reducing water usage in agriculture and implementing water-saving technologies in households, are implemented.

In addition to early warning systems, Europe also employs several other policies for managing droughts, such as the use of drought insurance that provides financial support to communities affected by drought, water pricing schemes that aim to encourage water conservation, and the development of drought-resistant crops.

3.2. DROUGHT MANAGEMENT IN ASIA AND THE PACIFIC

In March 2014, the Economic and Social Commission for Asia and the Pacific (ESCAP) developed the Drought Mechanism in response to increased drought events between 1985 and 2013. It was recognised that the cost of acting after a drought is higher than preparing adequately for a drought event. The Drought Mechanism was developed to integrate analysis of information collected from space and on the ground through the following four components:

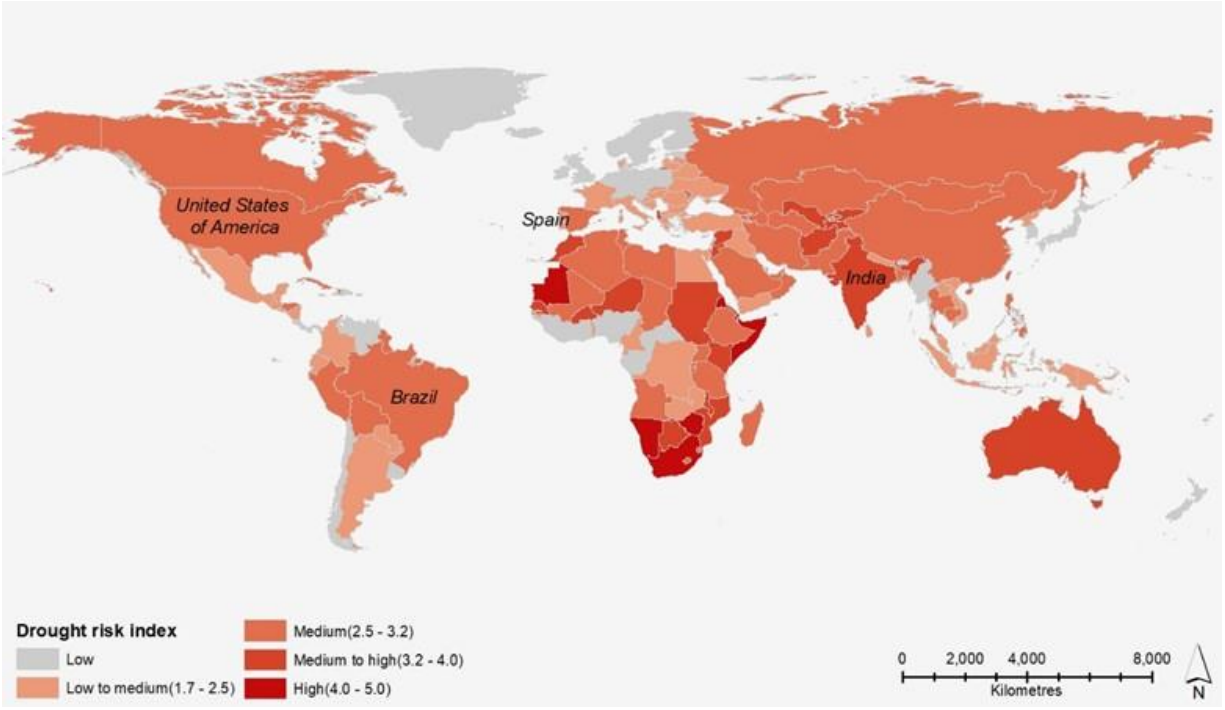
- Input data from regional satellite imagery services
- Data collected and analysed by thematic and scientific communities
- Reports submitted by a pilot community of drought-prone countries; and
- Feedback from a network of agricultural communities.

The Drought Mechanism became the first step in shifting from a reactive response towards proactive prevention measures before drought occurs in the region. It also had the added benefit of networking regional space agencies, bringing together expert resources, and mobilising training centres that provided capacity building to address the drought challenge.

4. ADAPTION OF THE NDMP APPORACH OUTSIDE OF AFRICA

To narrow down the scope of this policy review, the Drought Risk Index Score of 2020 (Figure 2) was used to identify one country per continent (excluding Africa) that has a high index score (greater than 3.2). The following subsections reviewed and summarised the drought management policies for Spain, the United States of America, Brazil, and India.

Figure 2 Countries by their drought risk index score (2020)



4.1. DROUGHT MANAGEMENT POLICY IN INDIA

India is a country that is often plagued by drought, with large portions of the country experiencing this problem regularly. To combat this issue, the Indian government has implemented several policies and initiatives to improve drought management.

India's National Drought Management Policy, introduced in 2009, provides a comprehensive framework for addressing drought, focusing on short-term relief measures and long-term drought-proofing. The policy emphasises the importance of early warning systems, effective communication, and the involvement of local communities in drought management efforts.

Another important initiative is the National Water Mission, launched in 2012 as part of the National Action Plan on Climate Change. This mission aims to ensure the efficient and sustainable use of water resources, focusing on improving irrigation systems and water conservation. This includes efforts to promote rainwater harvesting, water recycling, and the use of drought-resistant crops.

The government has also implemented several schemes and programs to relieve those affected by drought. This includes providing financial assistance to farmers, supplying drinking water to drought-affected areas, and providing food and other essential supplies to those in need.

In recent years, the government has also improved the accuracy of its drought monitoring and forecasting systems. This includes using satellite technology to monitor soil moisture levels and weather patterns, as well as developing early warning systems that can alert authorities to potential drought conditions.

Overall, India's drought management policy is a multifaceted approach that seeks to address the immediate needs of those affected by drought and the underlying causes of the problem. While drought remains a persistent challenge in India, these efforts are helping to mitigate its impacts and improve the country's ability to respond to future droughts.

4.2. DROUGHT MANAGEMENT POLICY IN THE UNITED STATES

Many United states have created drought plans since the early 1980s. 47 of the 50 states have created such plans, 11 of which are more proactive and emphasise the significance of mitigation in the preparation process. Most states have used the 10-step drought planning method as a reference when creating their plans, either by using it directly or by copying the plans of other states that have used it. Overall, drought risk management in the United States focuses on applying innovative technological solutions, engaging in dialogue across varied stakeholders and implementing a more holistic understanding of risk management to improve the state's effectiveness in addressing the consequences of extreme drought.

Arizona is one state where water shortages seriously threaten community health and well-being. According to National Geographic, Arizona is the driest state in the US, and conditions are expected to worsen by 2060 due to climate change. The lack of precipitation and poor water management have caused some stretches of the Colorado River to dry up. As a result of these water shortages, residents of Arizona face water rationing, higher costs and fees, and reductions in crop irrigation, forcing the focus to shift to improved water conservation and management, both in the short and long term.

Despite individual state-level government efforts to implement various Drought Contingency Plans (DCPs) (McNulty et al. 2018), there is still no cohesive management, awareness and cooperation on a national level (Duffy 2018). The lack of federal funds and further research into effective strategies mean that, while many states have implemented measures, there are still weaknesses in implementing mitigating strategies (Gooch et al. 2018). Additionally, effective long-term strategies at the national level are required, as the current frameworks are inadequate to prepare and protect against future extreme events (Gibson et al. 133).

4.3. DROUGHT MANAGEMENT POLICY IN BRAZIL

In Brazil, ever-increasing population levels and climate change amplify the frequency and intensity of drought events. Drought management in Brazil is challenging due to the extreme variations in the Brazilian climate and the widespread threats posed by climate change, land management practices, agricultural modernisation, and natural disasters (McCartney et al. 2010). Agricultural modernisation, in particular, has increased the risk of drought in Brazil as farms are pushed for more production, which necessitates increased water consumption (Reid and Plotkin 2008). Various techniques are being implemented to combat drought and the resulting adverse effects, including pre-emptive storage and water conservation, crop diversification and practices such as drip irrigation and water concession management (McCartney et al. 2010). The challenge in managing drought in Brazil is that each strategy must be tailored to reflect the particular climate and land management of individual regions.

Brazil is currently working on improving and implementing the Brazilian Drought Precautionary Strategy, which aims to understand and plan for the potential effects of droughts. The policies outlined in this strategy document are being developed through joint efforts by multi-discipline stakeholder organisations, including scientific, civilian and government bodies, who will inform and guide the long-term drought responses. From this strategy, mutual understandings and proposed approaches to mitigate and prepare for a changing climate are being developed to improve drought responses and risk management (Kronfol, n.d.).

4.4. DROUGHT MANAGEMENT POLICY IN SPAIN

Like other European nations, Spain has historically dealt with droughts by implementing emergency protocols and swift action, primarily through Emergency Drought Orders or Decrees. But the experience and lessons learned during the disastrous environmental, social, and economic effects of the drought in Spain from 1991 to 1995 showed that a paradigm shift in favour of a drought risk-reduction management approach was required. The National Hydrological Plan Act of 2001 moved Spain towards planned drought management.

During the 2004-2008 drought, Spain's Ministry of Environment published its first guidelines for developing Drought Management Plans (DMPs) and River Basin Organisations (RBOs). These guidelines led to the establishment of policies to reallocate water resources, the modification of the Water Act and outlining of strategies to mitigate the negative effects of drought.

The first key strategy implemented by Spain was adopting the use of reservoirs and other water storage facilities to manage its droughts. These facilities ensure the country has enough water to meet its needs during drought.

Another key strategy that Spain has adopted is the use of desalination plants. These plants convert seawater into freshwater, which can be used for various purposes. This not only helps to reduce the country's reliance on traditional water sources but also helps to reduce the impact of drought on the country's water supply.

In addition to these measures, Spain has also implemented many policies to promote water conservation. These include encouraging individuals and businesses to use water more efficiently and implementing regulations to limit water usage in certain sectors. By promoting conservation, Spain can reduce the overall demand for water, which can help mitigate the effects of drought.

One of Spain's key challenges in managing its droughts is balancing the competing water demands. Agriculture is a major industry in Spain, and its farmers rely heavily on water to grow their crops. At the same time, the country's growing population needs access to clean, safe drinking water. Balancing these competing demands is a complex task that Spain is committed to tackling.

Overall, Spain's drought management policies are designed to help the country mitigate the effects of drought and ensure its people have access to the water they need. By adopting a combination of water storage, desalination, and conservation measures, Spain is working to protect its water supply and ensure its people have the resources they need to thrive.

5. ADAPTION OF THE NDMP APPROACH IN AFRICA

In Africa, several regional centres were formed, which have helped manage drought at the regional level. These centres include

- SADC Climate Services Center
- African Centre of Meteorological Applications for Development (ACMAD)
- Climate Prediction and Applications Centre (ICPAC), and
- AGRHYMET Regional Center/Permanent Interstate Committee for Drought Control in the Sahel (CILSS) (SADC-CSC).

With the help of the WMO and other international institutions, these regional centres have made progress in offering climate information and outlooks to African decision-makers in various subregions of Africa. In support of these regional centres are Regional Climate Outlook Forums (RCOFs) such as the Greater Horn of Africa Climate Outlook Forum (GHACOF), Southern Africa Regional Climate Outlook Forum (SARCOF), and Prévision Saisonnière en Afrique de l'Ouest (PRESAO) that maintain real-time operations. African RCOFs have made remarkable steps in regional networking and user liaison and have significantly contributed to capacity building and user awareness, especially in developing and least-developed countries. This is despite the challenges of resources and human and infrastructural capacities.

However, African nations' responses to the drought remain limited at a country level and reflect their social and economic circumstances. Despite considerable advances in drought preparedness, monitoring and management on a global scale, the current situation in many African nations reveals that most governments have not yet given drought risk management the necessary priority. Most "at risk" countries utilise the crisis management strategy where Governments and donors devote funds to response efforts rather than to long-term programmes that deal with planning, mitigation, and readiness for drought-related disasters.

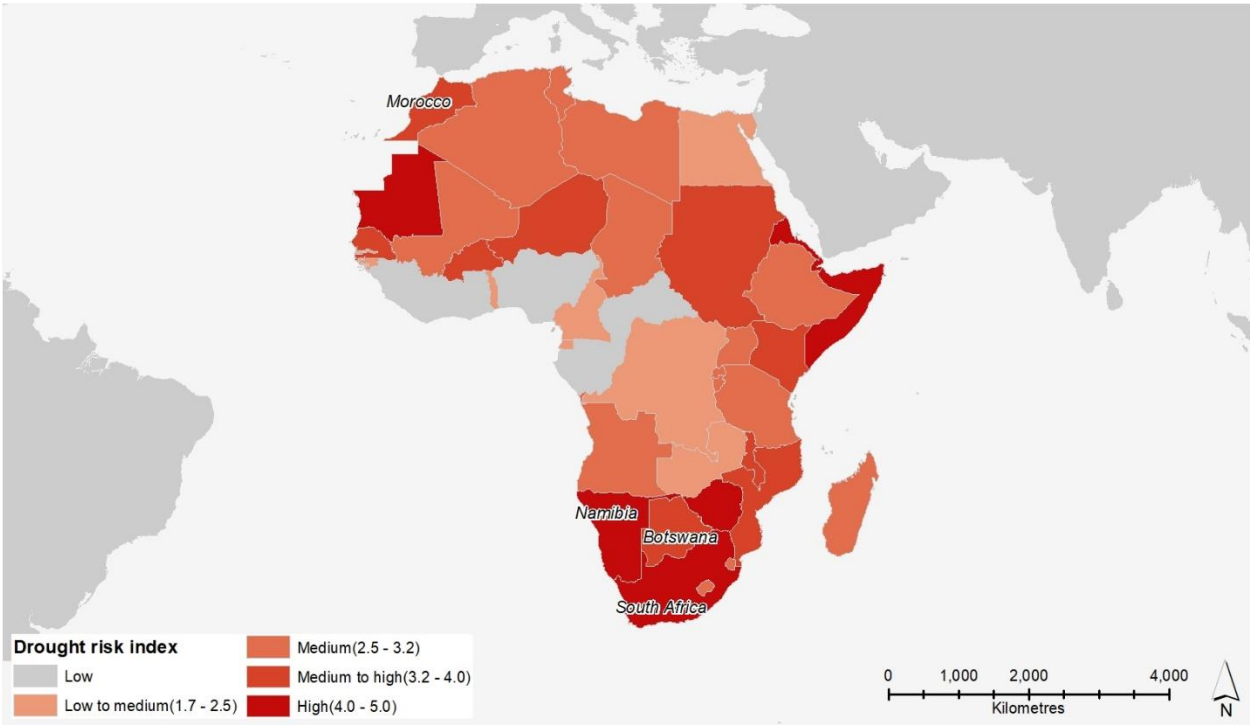
In response to this, a new strategic framework called "Drought Resilient and Prepared Africa (DRAPA)" is proposed, drawing on the experiences and lessons learned in Africa in the past and present. DRAPA is designed to work following international disaster-reduction frameworks and policies such as the Sendai Framework and the High-level Meeting on National Drought Policy (HMNDP). DRAPA aims to improve Africa's drought risk management and resilience at the continental, regional, national, and local/community levels. The DRAPA strategic framework will consist of six main components in line with national action programmes (NAPs) priorities, regional networks in Africa (such as the IGAD drought disaster resilience and sustainability initiative), and international frameworks for reducing disaster risk, such as the Sendai Framework. The components are

1. Drought policy and governance for managing drought risk
2. Drought monitoring and early warning
3. Drought vulnerability and impact assessment
4. Drought mitigation, preparedness, and response
5. Knowledge management and drought awareness, and
6. Reducing underlying factors that increase the risk of drought

It is important to note that there is a significant overlap between the DRAPA framework and the National Drought Management Policy Guidelines used in other regions around the globe. Adopting either approach to drought risk management would result in positive change for African countries.

In the ANIN project, four African countries with a high index score on the Drought Risk Index Score (2020) (Figure 3) were used to analyse their adaptation of either DRAPA or DMP Guidelines to narrow the scope of this policy review.

Figure 3 African countries by their drought risk index score (2020)



In each country review, a matrix (Figure 4) was used to gauge the success of implementing drought risk management policies. This matrix lists six (6) key attributes that form the fundamentals of successful drought management and mitigation. These attributes are derived from the policies and frameworks discussed previously in this review.

Figure 4 Policy evaluation matrix

Existence of an official drought policy
Stakeholder engagement
Conduct a data inventory and identify at risk groups
Monitoring of WMO drought indicators and seasonal forecasting
Existence of a Drought Early Warning System
Established communication channels to reach at risk communities
Use of Satellite imagery/EO data

5.1. DROUGHT MANAGEMENT POLICY IN MOROCCO

Morocco has gradually developed an integrated drought management system built around three crucial components owing to its experience over the years:

- An early warning and monitoring system: Morocco has built up its institutional and technical resources, particularly in agricultural forecasting, remote sensing, and climate modelling. To enhance forecasts, evaluate impacts, and create strategies and tools for decision support and drought preparedness, a national drought observatory was formed in 2000.
- Emergency operational plans to lessen the effects of drought: Morocco has extensive experience developing and implementing programmes to lessen the effects of drought. These programmes are built on interventions meant to provide safe drinking water for rural populations, especially; preserving livestock through feed distribution, implementing activities that generate income and jobs (such as maintaining irrigation infrastructure and rural roads), and conserving forests and natural resources.
- A long-term plan to lessen exposure to drought: Based on a risk management approach, this method lessens the vulnerability of the national economy in general and agriculture and the

rural sector in particular to drought. It involves a broad and multifaceted range of measures that consider the danger of drought in terms of its geographic diversity, economic and social ramifications, and propensity for long-term recurrence.

Existence of an official drought policy	●
Stakeholder engagement	●
Conduct a data inventory and identify at risk groups	●
Monitoring of WMO drought indicators and seasonal forecasting	●
Existence of a Drought Early Warning System	●
Established communication channels to reach at risk communities	●
Use of Satellite imagery/EO data	●

● Yes ● No ● Limited ● Unknown

5.2. NAMIBIAN DROUGHT MANAGEMENT POLICY

To develop a national emergency and long-term drought management policy, the Namibian government established a National Drought Task Force in 1995. It was initially composed of representatives from the Ministries of Agriculture, Water and Rural Development, Environment and Tourism, Lands, Resettlement and Rehabilitation, the Namibia National Farmers' Union, and the Namibia Agricultural Union. The task force held multiple sessions that resulted in the formalisation of the Namibia National Drought Policy in 2005.

The goal of Namibia's drought policy is to manage droughts in an effective, fair, and sustainable manner. The programme aims to give farmers more control over managing drought risk rather than relying solely on the government. Financial aid and food security initiatives are only considered when a drought emergency has been formally proclaimed. The policy also acknowledges the need to improve national capacity in water provision, information management, and early warning systems for droughts. The Namibia Early Warning and Food Information System (NEWFIS) is the main hub for gathering, examining, and reporting on drought-related issues for the policy's implementation.

Existence of an official drought policy	●
Stakeholder engagement	●
Conduct a data inventory and identify at risk groups	●
Monitoring of WMO drought indicators and seasonal forecasting	●
Existence of a Drought Early Warning System	●
Established communication channels to reach at risk communities	●
Use of Satellite imagery/EO data	●

● Yes ● No ● Limited ● Unknown

5.3. BOTSWANA DROUGHT MANAGEMENT POLICY

In Botswana, drought has traditionally been treated as an emergency and has been addressed using crisis management programmes. This approach has placed a huge burden on government support. To shift focus to mitigation, preparedness and response to drought events, Botswana is developing a multi-sectoral policy and institutional framework, which will harmonise existing policies to address effective drought management.

Two key policies used in Botswana to manage drought events are the National Policy on Disaster Management (NPDM) and the draft Drought Management Strategy (DMS). 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.

Existence of an official drought policy	●
Stakeholder engagement	●
Conduct a data inventory and identify at risk groups	●
Monitoring of WMO drought indicators and seasonal forecasting	●
Existence of a Drought Early Warning System	●
Established communication channels to reach at risk communities	●
Use of Satellite imagery/EO data	●

● Yes ● No ● Limited ● Unknown

5.4. SOUTH AFRICA'S DROUGHT MANAGEMENT POLICY

South Africa is currently facing one of the worst droughts in its history, with some parts of the country experiencing extreme water shortages. In response, the government has implemented several drought management policies to conserve water and alleviate the effects of the drought.

One of the key policies is the implementation of water restrictions. These restrictions limit the amount of water individuals and businesses can use daily and are enforced through fines and other penalties. These restrictions aim to reduce overall water consumption and prevent the over-extraction of water from rivers and aquifers. In addition to water restrictions, the government has also invested in infrastructure projects to increase water supply. This includes the construction of new dams and the expansion of existing ones, as well as the development of desalination plants and other water treatment facilities. These projects are designed to provide a more reliable water source for households and businesses and to reduce the impact of drought on the economy.

Another important aspect of South Africa's drought management policies is the emphasis on public education and awareness. The government has launched campaigns to educate the public about water conservation's importance and encourage individuals and businesses to adopt practices that reduce water use. This includes the promotion of drought-resistant crops and the use of more efficient irrigation methods.

Overall, South Africa's drought management policies are designed to address the immediate effects of the drought while also taking steps to prevent future water shortages. While the current drought is a serious challenge, these policies are helping to ensure that the country is better prepared to deal with future droughts and water crises. While South Africa has improved drought policy and drought risk management over time, there are clear opportunities for satellite EO technology and information services developed under ANIN to strengthen the monitoring of drought indicators and to improve the early warning system.

Existence of an official drought policy	●
Stakeholder engagement	●
Conduct a data inventory and identify at risk groups	●
Monitoring of WMO drought indicators and seasonal forecasting	●
Existence of a Drought Early Warning System	●
Established communication channels to reach at risk communities	●
Use of Satellite imagery/EO data	●

● Yes ● No ● Limited ● Unknown

6. CONCLUSION

With climate change increasing the frequency, severity, duration, and spatial extent of drought occurrences, it has become increasingly important for nations to develop adequate drought management policies, early warning systems and drought mitigation practices. Sub-Saharan Africa is particularly vulnerable to drought due to its high dependence on rain-fed agriculture and limited access to reliable water resources. There is a growing need for technological, institutional, and policy options to be put in place to manage this vulnerability and enhance the livelihood resilience of the region.

The WMO and GWP National Drought Management Plan development process provides a common framework for developing drought policies and preparedness for nations. Nations are at different levels of advancement in the process. The ANIN project is an opportunity to demonstrate how EO technology can contribute to providing critical data and information for early warning. The project contributes to advancing scientific and technical research and institutional capacity by working closely with South African institutional partners. In the following stages of the project, the focus should be placed on the following:

- Developing a system allows for consolidating existing drought-related datasets collected by different stakeholders and stored on different systems.
- Increase the monitoring of WMO drought indicators.
- Developing a system that allows for two-way communication with at-risk communities.

Drought risk management organisations cannot design and regulate policies independently; other sectors must be closely involved. Additionally, local requirements, active citizenship and political commitment, networks and methods, and resource availability should be considered when formulating policies and governing bodies.

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