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Strategic Framework for Drought Management and Enhancing Resilience in Africa

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EXECUTIVE SUMMARY

Drought is a complex natural hazard that is global in nature and has cross-cutting impacts on many aspects of livelihoods and sectors of society (e.g., agriculture, energy, food security, health, water resources, migration, and resource conflict). Drought is perhaps the most obstinate and pernicious of the dramatic events that nature conjures up (NDPC, 2000). Drought impacts are more complex today as more economic sectors are affected, creating more conflicts between water users (i.e., societal vulnerability is dramatically different and changing). For years, Africans have grappled with the far-reaching consequences of drought. Drought has killed several million Africans and caused significant social, environmental, and economic damage throughout Africa's history. According to the recent IPCC (2014) report, the threat of climate change can increase the frequency, severity, duration, and spatial extent of drought events in the future. In addition, drought is threatening decades of development progress by making communities less able to absorb and adapt to a changing climate. Furthermore, population growth in Africa is a challenge multiplier on the impacts of drought.

Drought response in Africa reflects the social and economic situation of the countries in the continent. Even though some progress has been made, the current experience in many countries in Africa suggests that most governments have not yet given a proper priority to drought risk management—instead relying on the crisis management approach (ICPAC, 2016). More resources are provided by governments and donors for response activities rather than for long-term developmental activities that deal with planning, mitigation, and disaster preparedness. Given the urgency and insufficient time to plan during a drought crisis, emergency response is usually implemented inefficiently resulting in significant damage. Several studies and scientific research reports have pointed out that drought planning and proactive mitigation programs can reduce drought impacts (e.g., save millions of lives, reduce emergency relief expenditures in drought-stricken regions, etc.) and lessen conflicts over competition for water during drought. Drought must be seen as a normal natural disaster that needs to be planned for and taken into account in the policies of African governments.

The recurrent droughts in Africa that are exacerbated by climate change necessitate the need for more effective drought planning and the development and implementation of appropriate mitigation strategies. The integration of a drought risk management approach allow long-term development interventions to adapt to the changing climate. New measures to anticipate and cope with drought by focusing on long-term drought-resilience in addition to short-term response are needed in light of the evolving climate conditions. Strategically, Africa needs to ensure food security for an ever-increasing population while reducing drought vulnerability and protecting the environment. African countries should also strengthen their efforts to tackle the cross-cutting and multi-disciplinary global challenges that include climate change, energy, food, agriculture and nutrition, global health, and water.

Even though several activities have taken place (nationally, regionally, and internationally), making substantial progress towards a paradigm shift to drought risk management and efficient proactive actions, collective and collaborative efforts are needed now more than ever. Efficient

and effective organizational structure and mechanism as well as human resources with rich experience, knowledge, and skills are vital for effective disaster risk management system. However, the current assessment in Africa indicates that these have not yet been fully achieved. Thus, African nations need to establish a drought risk management and resilience strategy framework that is more focused on the human dimensions of drought and proactive drought risk reduction measures. Such a strategic framework that considers the socioeconomic and gender asymmetries of drought impacts will help Africa to reduce the likelihood of losses of lives, the severity of economic losses, and also to identify and prioritize drought risk management instruments and mitigation activities.

Leveraging past and present experiences and lessons learned in Africa, in line with the global disaster reduction frameworks such as the Sendai Framework and the High-level Meeting on National Drought Policy (HMNDP), a new strategic framework called “Drought Resilient and Prepared Africa (DRAPA)” is proposed. DRAPA is designed to build an effective drought risk management and enhanced resilience at continental, regional, national, or local/community levels for Africa. The DRAPA strategic framework will have six main elements in line with the priorities of African regional networks (e.g., IGAD drought disaster resilience and sustainability initiative), national action programmes (NAPs), and the global disaster risk reduction frameworks such as the Sendai Framework. The elements include: (i) drought policy and governance for drought risk management, (ii) drought monitoring and early warning; (iii) drought vulnerability and impact assessment, (iv) drought mitigation, preparedness, and response, (v) knowledge management and drought awareness, and (vi) reducing underlying factors of drought risk, as well as cross-cutting issues such as capacity development and reducing gender and income inequality.

The proposed DRAPA strategic framework structure is centered on African countries that specifically addresses the drought issues in Africa. It proposes to develop and implement a strategy integrating national and regional institutes in Africa under African Union leadership in collaboration with the international community including United Nations (UN) agencies. The outcome of the development and implementation of this strategic framework will be people-centered (including women and minorities), sharpening the focus on drought issues, to reduce drought impacts and enhance resilient society in Africa. The development of a strategic framework for drought risk management and enhancing drought resilience is a step forward to achieve this overarching goal.

The DRAPA strategic framework and its implementation are expected to produce a substantial reduction of drought impacts on human lives in Africa. It would also lead to a significant reduction of devastating drought impacts on economic and environmental assets of communities and countries in Africa. In collaboration with international institutes and countries around the world, Africa should be able to integrate drought risk management into sustainable development policies and planning. In addition, Africa needs to focus on the development and strengthening of national and regional institutions, cultivate efficient mechanisms, and improve capabilities to build resilience to drought.



ACRONYMS AND ABBREVIATIONS

ACMAD	African Centre for Meteorological Applications to Development, Niamey, Niger
AfDB	African Development Bank
AGRHYMET	Regional Centre for Training and Application in Agro-meteorology and Operational Hydrology, Niamey, Niger
ARC	the African Risk Capacity Center
AU	African Union
CAADP	NEPAD's Comprehensive Africa Agriculture Development Programme
CBD	Convention on Biological Diversity
CILSS	Permanent Inter-State Committee against Drought in the Sahel
CMIP5	Coupled Model Intercomparison Project
CPP	Country Programme Paper
COP	Conference of the Parties
CRED	Centre for Research on the Epidemiology of Disasters
CST	UNCCD's Committee on Science and Technology
DMC	Drought Monitoring Centre
DRAPA	Drought Resilient and Prepared Africa
DRMFSS	Disaster Risk Management and Food Security Sector, Ethiopia
DRR	WMO's Disaster Risk Reduction Programme
EDE	Ending Drought Emergencies
EM-DAT	CRED's International Disaster Database
ENSO	El Niño–Southern Oscillation
FAO	Food and Agriculture Organization of the United Nations
FEWS NET	Famine Early Warning Systems Network
GFDRR	Global Facility for Disaster Reduction and Recovery
GIEWS	Global Information and Early Warning System on Food and Agriculture
GIS	Geographic Information System
GRIP	Global Risk Identification Programme
GWP	Global Water Partnership
HFA	Hyogo Framework for Action 2005-2015: Building the Resilience of Nations and Communities to Disasters
HHAFI	Harvest Help – African Food Issues
HMNDP	High-level Meeting on National Drought Policy
ICPAC	IGAD Climate Prediction and Application Centre, Nairobi, Kenya
IDDRISI	IGAD drought disaster resilience and sustainability initiative
IDMP	Integrated Drought Management Programme
IDMP-CEE	Integrated Drought Management Programme in Central and Eastern Europe
IGAD	Intergovernmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
ITCZ	Inter-Tropical Convergence Zone



NAPs	UNCCD national action programmes
NASA	National Aeronautics and Space Administration, U.S.A.
NDMA	National Drought Management Authority, Kenya
NDMC	National Drought Mitigation Center, University of Nebraska-Lincoln, U.S.A.
NDMP	National Drought Management Policies
NEPAD	New Partnership for Africa's Development
NEWFIS	Namibia Early Warning and Food Information System
NGO	Non-governmental Organization
NMSs	National Meteorological Services
NOAA	National Oceanic and Atmospheric Administration, U.S.A.
NPSDRM	National Policy and Strategy on Disaster Risk Management, Ethiopia
PRB	Population Reference Bureau
RCMRD	Regional Center for Mapping of Resources for Development
RCP	Representative Concentration Pathway
SADC	Southern African Development Community
SADC-CSC	SADC Climate Services Centre
SDGs	Sustainable Development Goals
SFDRR	Sendai Framework for Disaster Risk Reduction
SPEI	Standardized Precipitation-Evapotranspiration Index
UNCCD	United Nations Convention to Combat Desertification
UNDP	United Nations Development Programme
UNECA	United Nations Economic Commission for Africa
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	United Nations Children's Fund
UNISDR	United Nations International Strategy for Disaster Reduction
UNOCHA	United Nations Office for the Coordination of Humanitarian Affairs
UNW-DPC	UN-Water Decade Programme on Capacity Development
USAID	United States Agency for International Development
WACDEP	Water, Climate and Development Programme
WBG	World Bank Group
WFP	United Nations World Food Programme
WMO	World Meteorological Organization



Strategic Framework for Drought Risk Management and Enhancing Resilience to Drought in Africa

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1.0 GENERAL INTRODUCTION

Drought is a complex natural hazard that occurs in every part of the world and adversely affects the lives of millions of people each year, causing significant damage to economies, the environment, and property (Tadesse et al., 2008; Wilhite, 2000). Drought, like all natural hazards, has both a natural and social dimension. In most cases, the social dimension is the factor that turns drought into a disaster. The risk associated with drought for any region is a product of both the region's exposure to the event (i.e., probability of drought occurrence at various severity levels) and the vulnerability of society to drought (Wilhite et al., 2014; Cutter et al., 2003; Blaikie et al., 1994).

Africa's climate is characterized by distinct wet and dry seasons. The spatial distribution of mean annual precipitation of Africa is shown in Figure 1. Climatologically, the annual rainfall maximum over Africa typically develops from March to May, when convection is extremely active within the "Inter-Tropical Convergence Zone (ITCZ)" in the Gulf of Guinea region, the Congo rain forest region, and equatorial eastern Africa. This maximum is followed by the annual minimum during the months of May–October when rainfall shifts to the northern tropical belt region (0°–20°N) between the Sahara Desert and central Africa that corresponds with the West African monsoon (Novella and Thiaw, 2013). After September, the gradual increase in seasonal mean precipitation is associated with the onset of the rains in central Africa, southern Africa, and equatorial eastern Africa. During this time, the distribution of rainfall is quite robust across much of the continental Southern Hemisphere and the southwestern Indian Ocean basin until approximately April (Novella and Thiaw, 2013). The annual variability of rainfall in Africa is influenced by several factors, including the change in sea surface temperatures of the surrounding oceans and global waters. For example, drought in eastern and southern Africa exhibits a correlation with El Niño (a warming of the surface water of the eastern and central Pacific Ocean) and/or the Indian Ocean, while western African rainfall is influenced by the Atlantic Ocean.

Historically, Africa has experienced moderate to extreme droughts. The drought occurrences are natural phenomena that vary temporally (e.g., seasonal and annual) and spatially. There is little, if anything, we can do to keep drought from happening (Wilhite et al., 2014). For example, meteorological drought (i.e., precipitation deficiency over an extended period of time) is a result of the occurrence of persistent large-scale disruptions in the global circulation pattern of the atmosphere (Dai, 2011; Zaho et al., 2010; Nicholls et al., 2005). Drought vulnerability, on the other hand, is determined by social factors such as population changes, population shifts (regional and rural to urban), demographic characteristics, technology, government policies, environmental awareness and degradation, water use trends, and social behavior (Shiferaw et al., 2014). Because these factors are dynamic (i.e., they change overtime), drought vulnerability is likely to increase or decrease in response to these changes. Subsequent droughts in the same region will have different effects, even if they are identical in intensity, duration, and spatial characteristics, because the drought event is overlying a society that differs from the one that

existed during a previous drought event (Wilhite et al., 2014). Adding to the complexity, in Africa, some countries and regions are more prone to drought disasters, and each country or

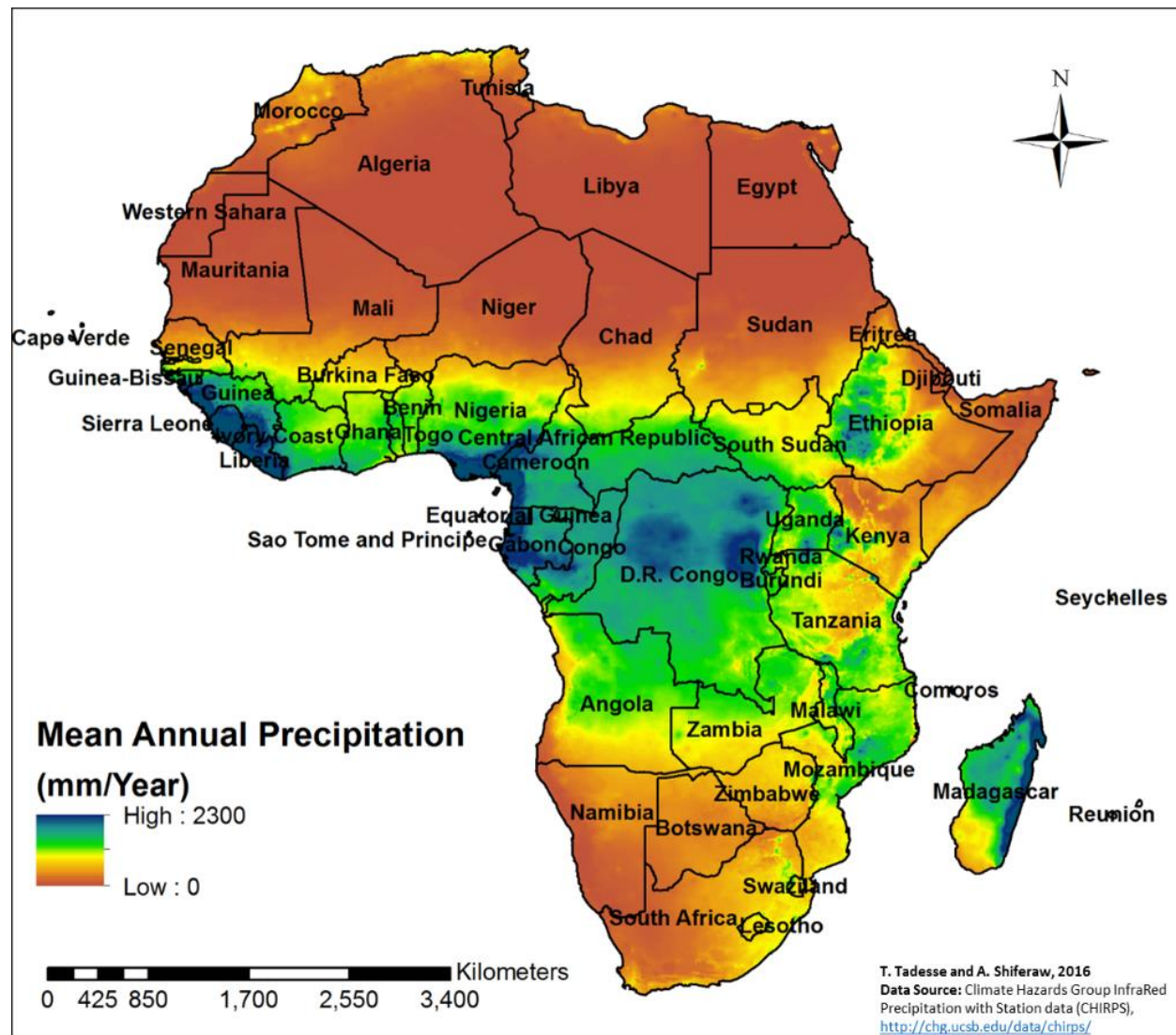


Figure 1. Mean annual rainfall (1981-2014) patterns of the African continent. (Data source: Climate Hazards Group <http://chg.ucsb.edu/data/chirps/>).

region differs in its capacity to effectively prepare for and respond to the effects of drought.

The rapid population growth in Africa is an enormous concern for vulnerability reduction efforts. According to Population Reference Bureau (PRB), Africa's population is currently about 1.1 billion, and that is projected to increase 46% (to more than 2.4 billion) by 2050 (PRB, 2015). Several African countries with rapidly growing populations are threatened by social, economic, and environmental impacts of drought. Feeding 1.5 billion people by 2030 and 2.4 billion by 2050 is a daunting challenge that Africa will be expected to meet. Africa's food security and its economies mainly rely on rainfed agriculture and the associated industries. However, most African countries have an arid or semi-arid climate (Figure 1) with a high degree of climate variability and frequent occurrences of droughts (Ogallo, 2010). Thus, no sustainable socio-

economic development can be achieved in Africa without drought risk management and enhanced resilience into continental, regional, and national strategies to cope with current and future climate variability, from local to continental levels.

2.0 DROUGHT CHARACTERISTICS AND MANAGEMENT IN AFRICA

2.1 A Brief History of Drought and Its Impact in Africa.

Drought is a regular feature of life in Africa, often causing enormous social, environmental, and economic impacts, particularly in places where there are already pressures on existing water resources. During the 20th century, several periods of intense drought affected the African continent. Studies indicated that there were droughts in the 1910s and 1940s in the Sahel region. The 1910 drought was severe and extended throughout the Sahel until 1916 (Sircoulon, 1976; Vannitsem and Demaree, 1991). Beginning in the late 1960s, West Africa experienced severe drought, which peaked in the mid-1970s and lasted for several decades, displacing millions from sub-Saharan Africa (Shanahan et al., 2009). The West African Sahel region experienced severe droughts that ravaged the region in the 1970s and 1980s (Nicholson, 2013). Several studies have showed that the Sahelian droughts occurred during the years 1968-87. These droughts have been documented most notably by Nicholson (1981, 1985), Lamb (1985), and Sircoulon (1976, 1985). The severity of the 1960-1980s drought was blamed for famine and a large number of displacements from 1968 to 1974 and the early- and mid-1980s (Batterbury, 2001). The 1972–84 Sahelian drought killed more than 100,000 people. More than 750,000 people in Mali, Niger and Mauritania needed food aid in 1974, and most of the Sahel's 50 million people were affected in some way (Wijkman and Timberlake, 1984). Bader and Latif (2011) showed in their case study that the El Niño-related drought in 1983 was also extremely intense across the West African Sahel region (Figure 2). The North Africa region has experienced its worst historical drought in recent years. For example, the 1999-2007 drought in Algeria and Tunisia appears to be the worst since the middle of the 15th century, and this drought is possibly linked to climate change (Hoerling and Kumar, 2003; Seager et al., 2007).

For several decades, the Greater Horn of Africa has experienced recurrent severe droughts that resulted in serious food security emergencies, mainly driven by a combination of food availability and access issues. For example, the Horn of African countries were threatened by famine at least once each decade from 1970 to 2000 (FAO, 2000). According to FAO (2000), the Horn of Africa, which includes Djibouti, Ethiopia, Eritrea, Kenya, Somalia, Sudan, South Sudan and Uganda is one of the world's most drought-prone and food-insecure regions. Out of the combined population of 160 million people in these eight countries, 44% (about 70 million people) live in areas prone to extreme food shortages. In 2006, extreme drought affected several countries in the Horn of Africa (especially hard hit were people in the countries of Ethiopia, Somalia, Kenya, Eritrea, and Djibouti), and about 18 million people were suffering from food shortages during the drought's peak in early 2006 (UNISDR, 2009a). The 2010-11 drought affected the Horn of Africa, in particular the pastoralist communities in Kenya, Ethiopia and Somalia, caused migration across the borders and immense loss of livestock as well as human

losses, with more than 13 million people affected (Slim, 2012; UNISDR-AF, 2012). The chronic livelihoods crisis in 2011 across East Africa put extreme pressure on food prices, livestock

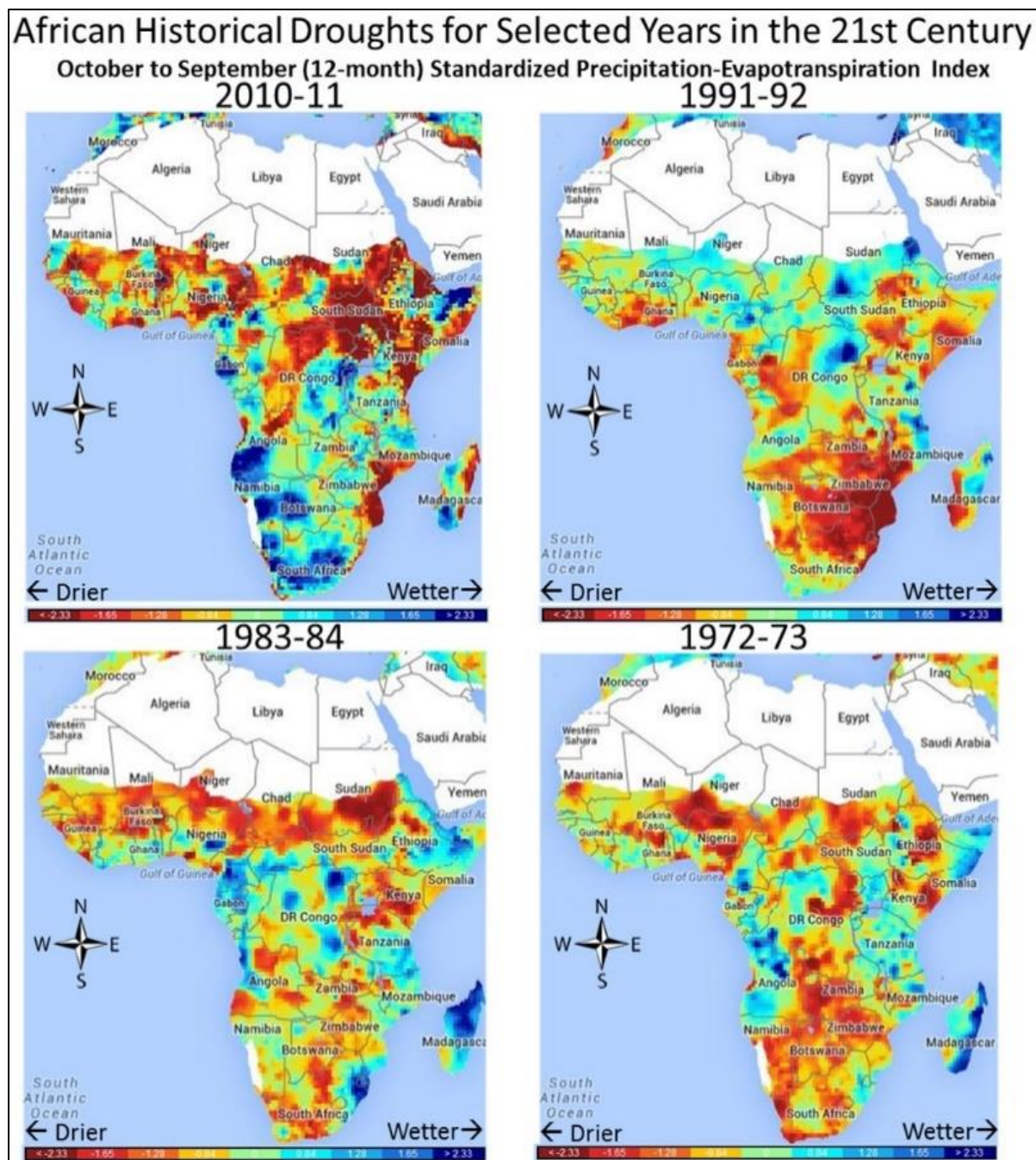


Figure 2. Examples of historic droughts in Africa in the 21st century. The maps show the severity and patterns of drought based on the 12-month Standardized Precipitation-Evapotranspiration Index (SPEI) values. The 12-month SPEI (i.e., index calculated using precipitation and temperature data) values indicate the cumulative climatic conditions from October of the previous year to September of (i) 2011, 1992, 1984, and 1973 drought years. Source: Global SPEI database <http://sac.csic.es/spei/map/maps.html>.

survival, and water and food availability (UNOCHA, 2012).

Frequent droughts have been recorded across southern Africa in the 20th century. From 1895 to 1910, a continent-wide decrease in rainfall resulted in severe droughts that culminated in 1910-11 in southern Africa. Severe droughts in most of the southern African countries were also observed in 1923-24, 1946-47, 1972-73, 1981-82, 1986-87, 1991-92, and 2001-02 (Otter et al., 2007). Zimbabwe had serious food shortages in 1903, 1916, 1922, 1933, and 1942 (Chigodora, 1997). In parts of southern Africa, moderate to severe drought was reported between 1930-31 and 1932-33, and 1946-47 is a much talked about year of famine (Otter et al., 2007). The 1967-68 drought showed the beginning of a period of successive unusually dry years across Africa, ending about 1972-73 in southern Africa. In 1982, drought intensified and prevailed throughout much of subtropical Africa. By 1983, drought or below-average rainfall affected nearly the whole continent, including southern Africa. In 1991-91, a severe drought ravaged southern Africa (Vogel et al., 1998).

In 2002, about 16 million people faced starvation in southern African countries such as Malawi, Zambia, Zimbabwe, Mozambique, Swaziland, and Lesotho (WFP, 2003). A prolonged dry season resulted in widespread crop failure in 2013 across Namibia. An estimated 780,000 people – approximately one-third of Namibia's entire population – were classified as food insecure. Of these, 330,000 people were in need of urgent support, according to the government of Namibia, which declared a state of emergency on 17 May 2013 (Wilhite et al., 2014).

Country	Year	Total Deaths	Total Affected
Somalia	2010	20,000	4,000,000
Sudan	1983	150,000	8,400,000
Ethiopia	1983	300,000	7,750,000
Chad	1981	3,000	1,500,000
Mozambique	1981	100,000	4,750,000
Somalia	1974	19,000	230,000
Ethiopia	1973	100,000	3,000,000
Ethiopia	1965	2,000	1,500,000
Cape Verde	1946	30,000	N/A
Cape Verde	1940	20,000	N/A
Cape Verde	1920	24,000	N/A
Niger	1910	85,000	32,000
Cape Verde	1900	11,000	N/A

Table 1. Reported historical drought fatalities from 1900 to 2015. Data source: EM-DAT: The CRED/OFDA International Disaster Database – <http://www.emdat.be/database>

The reported fatalities in Table 1 shows the historical mark of drought on African lives. The numbers indicate only the reported total deaths; the actual total could even be higher. For example, the recent 2015 drought report (Table 2) shows the number of people that are affected, but the fatalities have not yet been recorded on the EM-DAT (the CRED/OFDA International Disaster Database).

Since Africa's food security depends on rainfed agricultural systems, the impact of drought on food insecurity remains significant. Food crises in Africa in the second half of the 20th century were caused by a combination

of multiple factors, but all were preceded by failed harvests, due to drought or flood, causing food shortages. Millions of people were affected by malnutrition and thousands (if not millions) died from starvation despite relief efforts by the international community. The most severe food crises in Africa in the last 40 years include the Ethiopian famine in 1983-1985, the Malawian

food crisis in 2005, the Niger food crisis in 2005-2006, the Horn of Africa food crisis in 2006 and 2011, the severe food shortages in West Africa (Sahel) in 2010 (FAO, 2011; HHAFFI, 2016).

Recent Droughts in Africa

Since 2015, drought has affected millions of people across Africa including Botswana, Ethiopia,

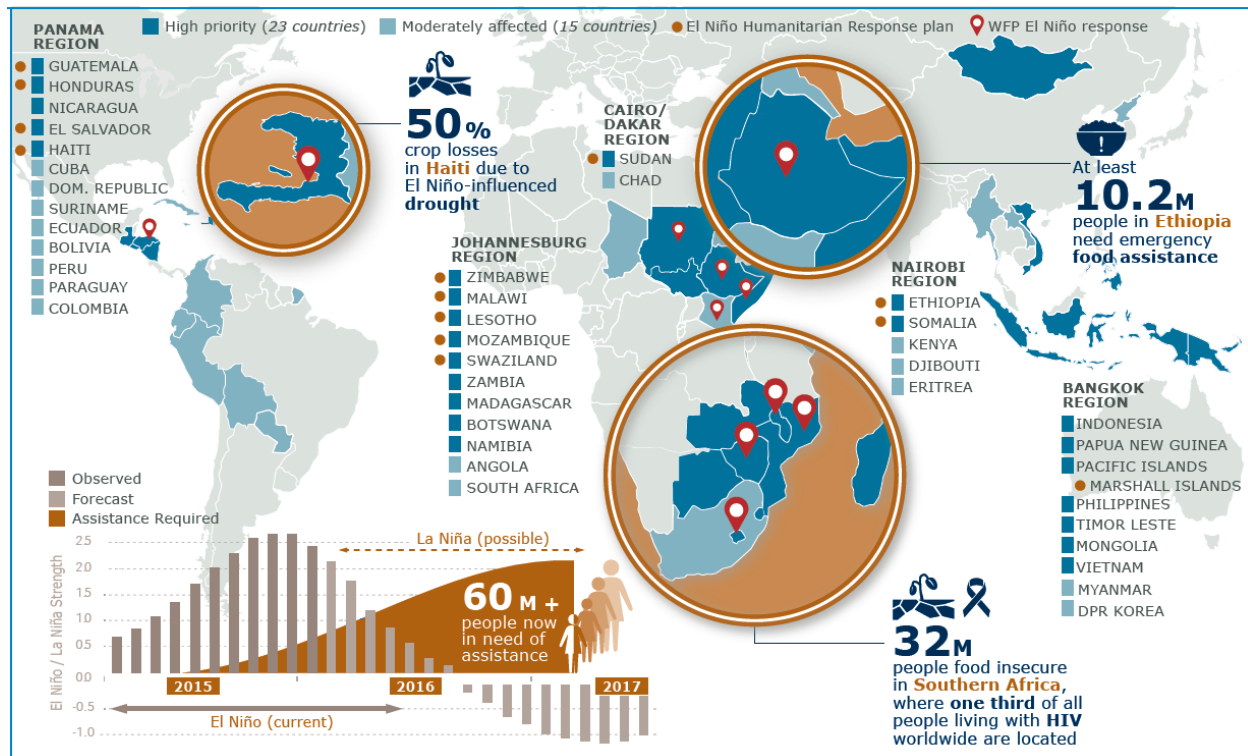


Figure 3. Recent (as of April 2016) El Niño-related food security impact in the world. Over 50% of the people affected are in Africa. **Source:** WFP, 2016b.

Gambia, Malawi, Namibia, Niger, Somalia, South Africa, Sudan, and Zimbabwe (Figure 3). For example, in the 2015-16 growing season, Ethiopia faced its worst drought in decades. It affected over 10.2 million people that required food aid. The failure of two consecutive rainy seasons, including the long rainy season (June and September), had devastating effects on livelihoods and greatly increased malnutrition rates across the country. About 435,000 children faced severe acute malnutrition, and more than 1.7 million children, pregnant women, and lactating women needed supplementary feeding. In addition, more than 5.8 million people needed emergency water, sanitation, and hygiene services. The water shortages have resulted in water-related public health concerns. The drought has also caused an interruption of school attendance for about 2 million children in Ethiopia (UNICEF, 2016). In 2015, drought resulted in crop failures, the death of livestock (from lack of water and pasture) and the failure of crops across north east Kenya and areas of Somalia. Up to 60% of cattle perished in some areas.

In April 2016, UNOCHA issued a stark warning to the global community that 32 million people across southern Africa were in need some form of assistance, and that figure was expected to increase by the end of the year (UNOCHA, 2016). According to a UNOCHA Press Release (July

Year	Country	Total Affected
2015	Ethiopia	10,200,000
2015	Somalia	4,700,000
2015	Malawi	2,800,000
2015	South Africa	2,700,000
2015	Niger	2,588,128
2015	Zimbabwe	1,490,024
2015	Sudan	800,000
2015	Namibia	11,500
2015	Botswana	N/A
2015	Gambia	N/A

Table 2. Reported number of people affected by the 2015 drought. Data source: EM-DAT: The CRED/OFDA International Disaster Database, <http://www.emdat.be/database>

2016), more than 60 million people around the world were affected by severe El Niño-linked drought and climate impacts. More than half of these drought-affected people are in Africa. WFP (2016b) reported that the 2016 El Niño-related drought has continued to severely affect the southern Africa region (Figure 4), which is suffering from the driest cropping season in at least 35 years. According to WFP, about 1.5 million people (16% of the rural population) were affected by drought in Zimbabwe through June 2016 (WFP, 2016a). In South Africa, a severe drought reduced agricultural production and hydroelectricity generation (WBG, 2016). Recently (on 24 June 2016), Namibia declared a state of emergency because of the persisting drought disaster

that has occurred in all regions of the Republic of Namibia.

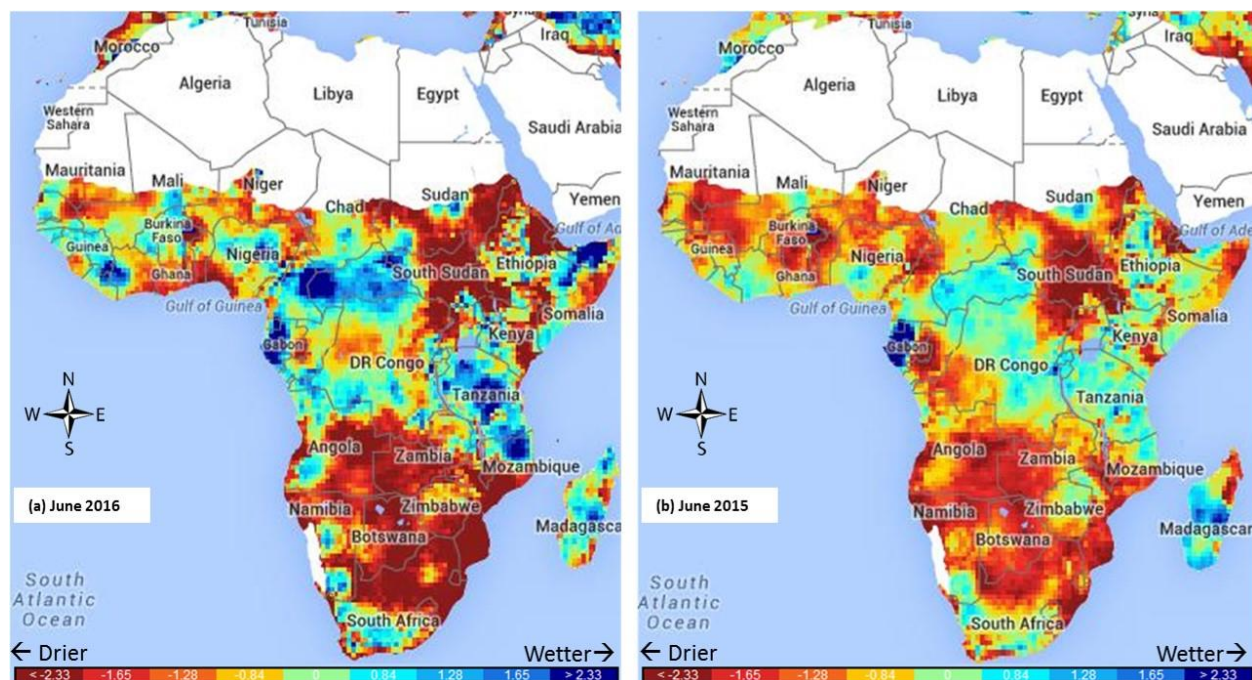


Figure 4. The current drought in Africa as compared to the previous year. The maps show the 12-month SPEI values as of (a) June 2016 and (b) June 2015. Source: Global SPEI database <http://sac.csic.es/spei/map/maps.html>.

The year-to-year variability of rainfall in sub-Saharan Africa is influenced by several factors, including the sea surface temperatures of the surrounding waters. Most of the seasonal rainfall in eastern and southern Africa exhibits a strong correlation with El Niño–Southern Oscillation (ENSO), and especially with sea surface temperatures in the Indian Ocean, while the Atlantic exerts an influence on western Africa (Novella and Thiaw, 2013; Ogallo, 2010; Manatsa et al, 2008; IPCC, 2014).

2.2. Drought Management in Africa: A Few Examples.

Some drought-prone countries in Africa have found it prudent to develop or consider developing national strategies and policies to manage droughts more effectively. A few African countries' activities as well as regional, continental, and international efforts to drought management are briefly discussed below.

2.2.1 National Level Efforts

(a) Ethiopia and Kenya

Ethiopian and Kenyan governments play leading roles in identifying needs and coordinating overall drought risk management efforts. Progress has been made as both countries have learned from their past experience in managing and responding to drought, but challenges remain (Hillier and Dempsey, 2012).

Ethiopia has experienced droughts in intervals of a few years since the 1970s, with serious drought impacts in 1972-73 and 1984-85, and more recently in 2006, 2011, and 2015. The 1972-73 drought led to famine; at that time, the country did not have a disaster management system. In

1973, an ad-hoc response to the crisis resulted in the formation of the Relief & Rehabilitation Commission (RRC), which in 1995 evolved into the Disaster Prevention and Preparedness Commission (DPPC). The DPPC had a mandate and an emphasis on linking relief with development. In 2004, the DPPC evolved to the formation of the Disaster Prevention and Preparedness Agency (DPPA) and Food Security Coordination Bureau (FSCB), with a revised mandate for DPPA to focus on emergency response and FSCB to focus on responding to chronic food insecurity. In 2007-08, the Disaster Risk Management and Food Security Sector (DRMFSS) under the Ministry of Agriculture was established with a primary emphasis on proactive disaster risk management instead of reactive crises management (IGAD, 2013; UNISDR-AF, 2012; Hillier and Dempsey, 2012). Ethiopia has been formalizing disaster risk management over the past three decades and is in the process of revising its disaster prevention and management policy to improve preparedness and response systems. In 2009, Ethiopia drafted a “National Policy and Strategy on Disaster Risk Management (NPSDRM). The policy includes planning for emergency response as well as development of an integrated risk management facility, with contingency funds and a weather-indexed insurance scheme (UNISDR, 2012; NPSDRM, 2009). Under this policy, the Disaster Risk Management Commission (DRMC) oversees all disasters including drought in the country accountable to the prime minister.

Kenya: The country has had more than 10 recurrent droughts since the 1970s. About 80% of Kenya’s landmass is classified as arid and semi-arid lands (ASALs), which are the most drought-prone areas. However, the ASALs also account for more than 80% of ecotourism and 50% of the national livestock in Kenya (Abass, 2008). Since 1985, Kenya has been attempting to address the drought management issue, starting with the design of a drought contingency planning system in Turkana, Kenya. In the early 1990s, this system was extended to other arid districts. In 1992, the system was gradually expanded by the Emergency Drought Recovery Project and its successor, the Arid Lands Resource Management Project (ALRMP). These short-term, project-based interventions were being carried out at a time when drought periods were becoming increasingly frequent and intense, directly affecting the household food security and livelihoods of millions of people. The recurrent drought and associated crisis has led Kenya to take action that considers the need for new thinking on drought management and the urgent need for increased co-ordination and coherence in long-term and short-term efforts to promote resilience. Recently, Kenya established a “Country Programming Framework” for ending recurrent drought emergencies (EDE) in the country. The framework combines the efforts of the local communities, the Government of Kenya, civil society, the private sector, states in the Horn of Africa, and development partners (EDE CPP, 2012). In 2016, recognizing the need to strengthen the sustainability and quality of drought management, the Kenyan government established the National Drought Management Authority ([NDMA](#)). NDMA is mandated to establish mechanisms that ensure that drought does not result in emergencies and that the impacts of climate change are sufficiently mitigated. The NDMA provides a platform for long-term

planning and action, as well as a mechanism for coordination across government and with all other stakeholders (NDMA, 2016).

(b) Namibia and South Africa

Namibia: In 1995, the Namibian government established a national drought task force (originally consisting of representatives from the Ministry of Agriculture, Water and Rural Development; the Ministry of Environment and Tourism; the Ministry of Lands, Resettlement and Rehabilitation; and the country's two farmers' unions, the Namibia National Farmers' Union and the Namibia Agricultural Union) to draw up a national emergency and long-term drought management policy with a package of short-term drought relief measures. The established drought task force convened several meetings from 1996 until the endorsement of the national drought policy by the government in 2005. According to the Namibian government policy, declaring drought frequently results in high costs, creating dependency among aid recipients and promoting degradation of resources through inappropriate assistance. Namibia's 1997 drought policy emphasizes developing an efficient, equitable, and sustainable approach to drought management. The policy aims to shift responsibility for managing drought risk from the government to the farmer, with financial assistance and food security interventions only being considered when a drought disaster is declared. The policy also recognizes the need to enhance the national capacity in information management and water provision as well as drought monitoring and early warning systems. For the policy implementation, the Namibia Early Warning and Food Information System (NEWFIS) is the focal point for gathering, analyzing, and reporting on drought-related matters. Recent droughts including the 2006-07 drought and the current prolonged drought (since 2012-13), have affected many people in Namibia resulting in drought declarations. The 1997 National Drought Policy and Strategy of Namibia is currently under review.

South Africa: South Africa has long history of drought management. A drought during the early 1930s that coincided with the Great Depression made a deep impression on many policy makers. Significant droughts also occurred during the 1960s, 1980s, and early 1990s. South Africa has invested a great deal of time and effort into developing a cohesive national drought policy. These efforts were accelerated by the development of the National Consultative Forum on Drought in the early 1990s, which brought more stakeholders to the planning table and allowed more sectors to be included in drought planning efforts (Wilhite, 2005). These efforts resulted in new drought policies that strove to encourage risk management, assist farmers financially, protect natural resources, promote the best use of resources for individual farmers, and help farmers maintain a nucleus breeding herd during a drought. With this policy, farmers must adopt specific resource conservation and long-term sustainability measures, such as adherence to established grazing capacities, to be eligible for financial aid. The drought policy continues to evolve, particularly with the dynamic political environment in South Africa. In 2002, an agricultural risk insurance bill was developed that sought to supplement agricultural

producers' incomes for those most susceptible to crop and livestock losses from natural disasters, including drought. However, a challenge remains for the South African government to maintain a policy balance between encouraging a risk management approach for large agricultural enterprises and providing a safety net for the resource-limited sectors of the population (Williams, 2016). Generally, despite some evidence of a paradigm shift from emergency response to more holistic drought risk management and disaster risk reduction approaches, the focus across various governance levels remains rooted in technical and financial relief solutions in southern Africa (Vogel et al., 2010).

2.2.2 Regional Level Efforts

A few regional centers were established in Africa that have been contributed to address drought management. These centers include: AGHYMET Regional Center/Permanent Interstate Committee for Drought Control in the Sahel ([CILSS](#)), African Centre of Meteorological Applications for Development ([ACMAD](#)), Climate Prediction and Applications Centre ([ICPAC](#)), SADC Climate Services Centre ([SADC-CSC](#)). These regional centers, supported by the World Meteorological Organisation (WMO) and other international institutes have made progress in different subregions of Africa in providing climate information/outlooks to decision makers in Africa. For example, the Regional Climate Outlook Forums (RCOFs), which include 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), have successfully sustained regular real-time operations. Despite the challenges of resources and human and infrastructural capacities, African RCOFs have achieved remarkable progress in regional networking and user liaison, and have substantially contributed to capacity building and user awareness, particularly in developing and least-developed countries (Aldrian et al., 2010; Njau, 2010). See Appendix 3 for brief summaries of the activities by these regional centers efforts.

2.2.3 Africa - Continental Efforts

New Partnership for Africa's Development ([NEPAD](#)) – This African Union (AU) strategic framework for pan-African socio-economic development is both a vision and a policy framework for Africa. In 2001, NEPAD was established as a merger of the Millennium Partnership for Africa's Recovery Programme (MAP) and the Omega Plan. NEPAD is an intervention by AU to address Africa's critical challenges, including poverty, development, and its marginalization internationally. NEPAD facilitates and coordinates the development of continent-wide programs and projects; mobilizes resources; and engages the global community, regional economic communities, and African countries in the implementation of these programs and projects. NEPAD's thematic areas include agriculture, food security, and nutrition. The Comprehensive Africa Agriculture Development Programme ([CAADP](#)), an integral part of NEPAD, is Africa's policy framework for agricultural transformation, wealth creation, food security and nutrition, economic growth, and prosperity for all African people. The CAADP implementation support

program aims to catalyze transformation of Africa's agricultural systems and stimulate increased and sustainable agriculture performance in member states as a means of achieving economic growth and inclusive development. CAADP is a pan-African framework – a set of principles and broadly defined strategies – to help countries critically review their own situations and identify investment opportunities with optimal impact and returns. It provides for an evidence-based planning process with knowledge as a key primary input and human resource development and partnership as a central factor (NEPAD, 2016). Since 2003, NEPAD, the African Development Bank (AfDB), and the United Nations International Strategy for Disaster Reduction (UNISDR) have been working together in providing guidance and direction to mainstream disaster risk reduction in sustainable development planning and process (AU, 2010). In addition, The AU, NEPAD, and UNISDR developed an early set of guidelines for mainstreaming disaster risk assessment (UNISDR-AF, 2014). The United Nations Development Programme (UNDP) has also created the Global Risk Identification Programme ([GRIP](#)). Generally, most of these efforts are focused on disaster reduction and development rather than specifically addressing the drought issues. Building a strategic framework for drought risk management and enhancing resilience will sharpen the focus on drought and strengthen the ongoing activities of Africa for comprehensive agricultural, environmental, and socio-economic development.

2.3. Future Prospects of Drought in Africa

There is growing evidence that the frequency and extent of drought has increased as a result of climate change. According to the most recent IPCC report (2014), projections of an increased frequency and severity of drought conditions provide further cause for concern. The report indicates that the frequency and intensity of drought have increased in the Mediterranean and West Africa since 1950. The projections of the multi-models presented under two scenarios of Representative Concentration Pathway (RCP) by the end of the century indicate an increased risk of drought (Figure 5). For example, RCP8.5 shows drought is likely (medium confidence) in presently dry regions linked to regional- to global-scale projected decreases in soil moisture. Specifically, soil moisture drying is most prominent in the Mediterranean and southern Africa, consistent with projected changes in the Hadley Circulation and increased surface temperatures, and surface drying in these regions is likely (high confidence) by the end of the 21st century (IPCC, 2014; IPCC, 2013).

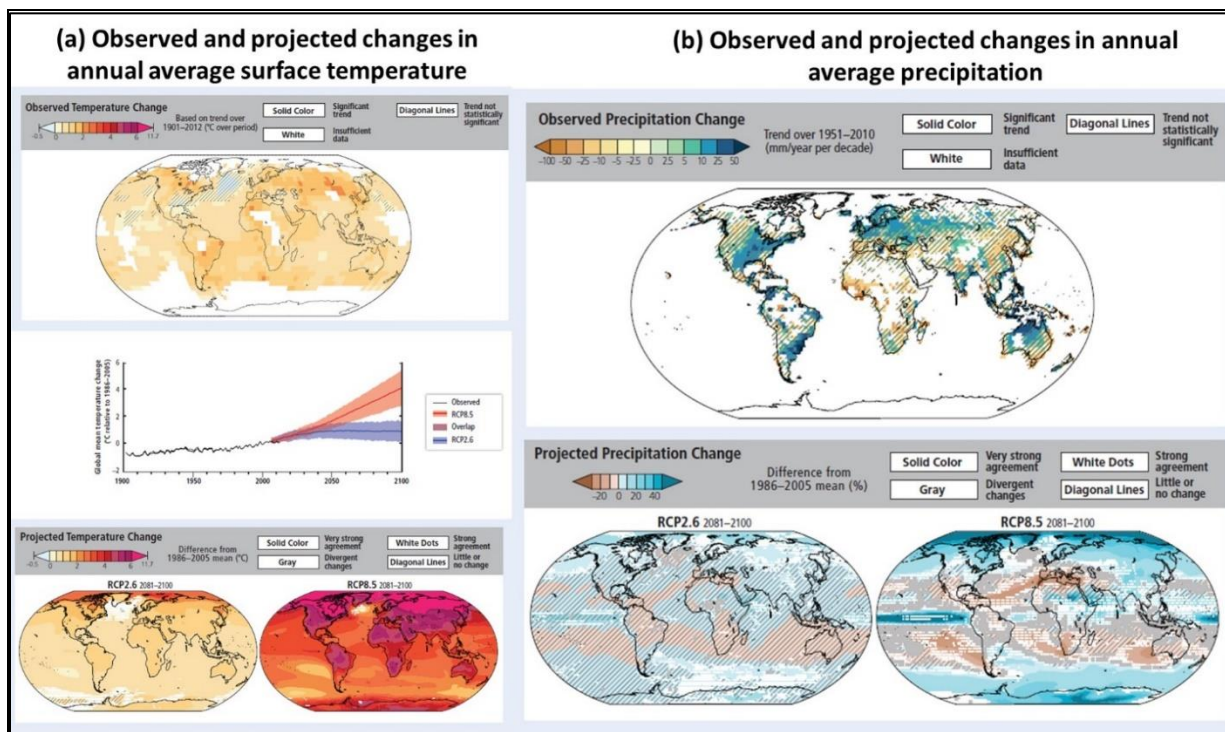


Figure 5. Observed and projected changes in annual average (a) temperature and (b) precipitation maps of CMIP5 multi-model results for the scenarios RCP2.6 and RCP8.5 in 2081–2100. Changes are shown for temperature relative to 1991–2010 and for precipitation relative to the 1986–2005 mean, in percent. This informs changes observed to date and projected changes under continued high emissions and under ambitious mitigation. Source: IPCC (2014).

Thus, under the projected climatic conditions, drought is expected to become more frequent and intense in many parts of world, including Africa. This adds serious concern because it could result in increasing societal vulnerability, necessitating the need for more effective drought planning and mitigation strategies. These strategies could also help in mobilizing an integrated response that takes preparedness for future drought events into account.

In the future, the impacts of climate change, as well as growing populations and declining per capita agricultural capacity, are expected to further threaten food security, increase environmental degradation, and enhance the risk of outbreaks/spreading of plant and animal diseases (FAO, 2000). Since many of the drought-prone African countries are the least developed in the world, there is limited capacity to respond to drought or food crises. To prevent humanitarian emergencies and reduce pressure on agricultural production, farmers' livelihoods, and natural resources, African countries need to strengthen their ability to build long-term resilience and challenge the root causes of their vulnerability to drought.

3.0 PROACTIVE DROUGHT RISK MANAGEMENT: CONCPET, PRINCIPLES, AND APPROACH

3.1 Drought Concepts Definition.

Drought originates from a deficiency of precipitation over an extended period of time (usually a season or more) resulting in a water shortage for some activity, group, or environmental sector (NDMC, date?). Because drought cannot be viewed solely as a physical phenomenon, it is usually defined both conceptually and operationally. For example, a definition such as “drought is a protracted period of deficient precipitation resulting in extensive damage to crops, resulting in loss of yield” is a conceptual definition of drought. This conceptual definition may be important in establishing drought policy. Operational definitions help define the onset, severity,

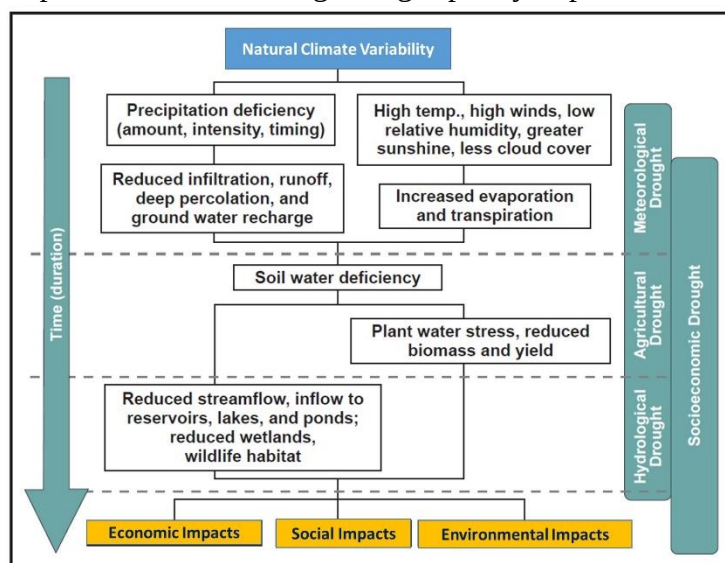


Figure 6. Relationships between meteorological, agricultural, hydrological, and socio-economic drought and their impacts (Source: National Drought Mitigation Center, University of Nebraska-Lincoln, USA).

and end of droughts. No single operational definition of drought works in all circumstances, and this is a big part of why policy makers, resource planners, and others have more trouble recognizing and planning for drought than they do for other natural disasters (NDMC, 2016).

Realistically, definitions of drought must be region and application (or impact) specific (Wilhite, 2000). In general, there are four types of drought (Wilhite, 2000; Wilhite and Glantz, 1985): (i) *meteorological drought* - a deficiency of precipitation, as compared to average conditions, over an extended period of time; (ii)

agricultural drought - a reduction in soil moisture availability below the optimal level required by a crop during each different growth stage, resulting in impaired growth and reduced yields; and (iii) *hydrological drought* - when precipitation deficiencies begin to reduce the availability of surface and subsurface water resources, when there is substantial deficit in surface runoff below normal conditions, or when there is a depletion of ground water recharge; and (iv) *socio-economic drought* - when human activities are affected by reduced precipitation and related water availability. Socioeconomic drought associates human activities with elements of meteorological, agricultural, and hydrological drought. Figure 6 shows the relationships between meteorological, agricultural, hydrological, and socio-economic drought and their impacts.

Drought Drivers: Several factors affect the development of droughts. For example, for agricultural and hydrological droughts, the main drivers include reduced precipitation, increased temperature, and/or increased evapotranspiration from higher vapor pressure (often linked to increased temperature). Under strong drought conditions, soil moisture becomes limiting for evapotranspiration, thus limits further soil moisture depletion. In addition, because soil moisture, groundwater, and surface waters are associated with water storage, they have a characteristic

memory that influences pre-conditioning of drought to occur. Other drivers such as a change in sea surface temperature could have an impact on the global atmospheric circulation. For example, the El Niño teleconnection results in changes in the atmospheric circulation, and subsequent ground-level climate impacts (e.g., can trigger a cascade of noticeable departures from the normal rainfall patterns around the globe).

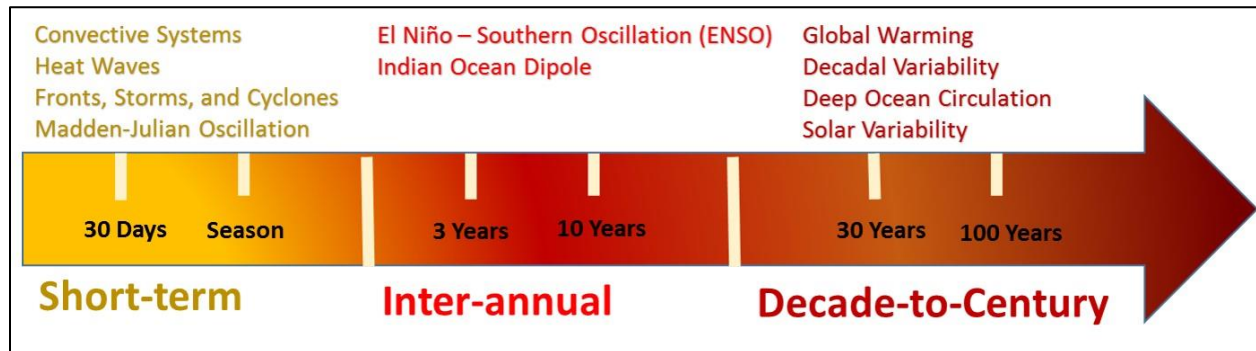


Figure 7. Examples of drought drivers in a weather-climate continuum across climate timescale (modified from Pulwarty and Sivakumar, 2014).

Generally, drought has significant economic, social, and environmental impacts (Figure 6). To assess and reduce drought impacts, efficient drought assessment and information systems are necessary in responding to climate-related risks (Pulwarty and Sivakumar, 2014). As shown in Figure 7, these climate risks span the weather-climate continuum with drought drivers starting from short-term (e.g., days to a month) to long-term (e.g., decade to century) timescales. Thus, drought risk management should include both spatial and temporal dimensions of drought.

3.2 Integrated Drought Risk Management.

Drought risk management involves a process of identifying and understanding the relevant components of drought risk, and analyzing alternative strategies to manage drought (Hayes et al., 2004). Drought risk management is a cross-cutting activity that affects every segment of society, helping develop comprehensive management structures that encompass all levels of government and community. The concept of drought risk management covers all aspects related to planning and response to drought, with the objective of managing both the risks and impacts. This includes the body of policy and administrative decisions, as operational activities, that pertain to various stages of a drought at all levels (Wilhite et al., 2014; Pulwarty and Sivakumar, 2014; Botterill and Cockfield, 2013).

On the other hand, crisis recovery measures primarily focus on addressing the impact without giving due emphasis to the root causes of vulnerability to drought. This crisis management treats only the symptoms of drought (UNW-DPC, 2015). Emergency response has a place in drought risk management, but it can also lead to greater vulnerability and decreased resilience to future drought events (Wilhite, 2014). Thus, a risk management (a proactive) approach to drought that

includes pre-impact programs - mitigation measures to reduce vulnerability and impacts - is necessary for sustainable development of Africa.

Several studies have indicated that the paradigm shift from crisis to risk management has several advantages, including reducing conflicts between water users, promoting wise stewardship of natural resources for sustainable development, and reducing the need for governmental assistance, thereby allowing resources to be invested more wisely (Wilhite et al., 2014; Pulwarty and Sivakumar, 2014; Kruse and Seidl, 2013; Botterill and Cockfield, 2013; Martin-Carrasco et al., 2013). As part of the international efforts, WMO, FAO and UNCCD organized the High-level Meeting on National Drought Policy (HMNDP), in March 2013, in Geneva, Switzerland, in collaboration with several other institutions and organizations, with the aim of promoting proactive drought risk management (<http://www.wmo.int/pages/prog/wcp/drought/hmndp/index.php>). As a follow-up to HMNDP, the Global Water Partnership (GWP) and the WMO have created the Integrated Drought Management Programme (IDMP) to promote the paradigm shift from crisis management to more proactive drought management based on risk management principles.

3.3 Key Elements “Pillars” of Integrated Drought Risk Management.

Based on the proposed elements in the Compendium of National Drought Policy (Wilhite, 2011) the three key elements (also known as the “three pillars”) of a drought preparedness plan include: (1) Drought Monitoring and Early Warning Systems, (2) Vulnerability and Risk Assessment, and (3) Drought Preparedness, Mitigation, and Response. Figure 8 shows these three key elements.

The first element includes drought monitoring that includes tracking drought indicators and indices based on several climate and biophysical variables including precipitation, temperature, soil moisture, vegetation condition, stream flow, and ground water (Svoboda and Fuchs, 2016). The second element, vulnerability and risk Assessment comprises the assessment of societal vulnerability resulting from social, economic, and environmental factors or processes that increases susceptibility of a system to the impact of drought. It also focuses on understanding the human and natural processes that add to drought vulnerability and community resilience. The third pillar, drought mitigation and response, comprises any structural or physical measures (such as appropriate crops, dams, engineering projects) and non-structural measures (such as policies, awareness, knowledge development, public commitment, legal frameworks, and operating practices) that are undertaken to limit the adverse impacts of drought. Response to drought includes the provision of assistance or intervention during or immediately after a drought disaster in line with long-term drought plan. The drought mitigation and response element is aimed at building greater resilience to drought and eliminating or at least reducing the impacts of drought when it occurs by taking appropriate measures and actions. Drought mitigation and response cover all sectors affected by drought. Details on the three-pillars of drought risk management are provide in Appendix 2.

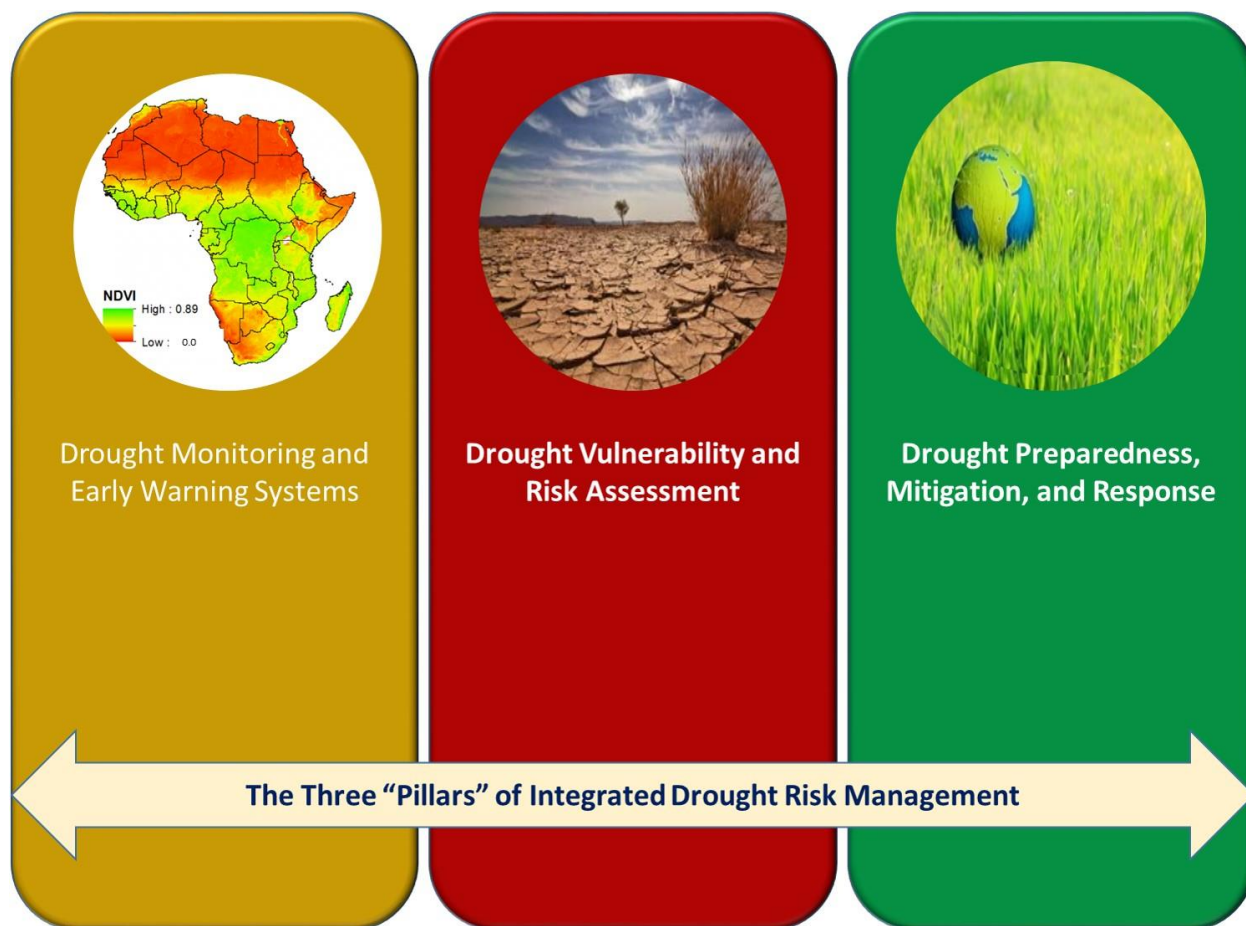


Figure 8. The three key elements “Pillars” of integrated drought risk management.

4.0 STRATEGIC FRAMEWORK FOR A DROUGHT RESILIENT AFRICA

4.1 The Challenge.

According to the IGAD Climate Prediction and Applications Centre (ICPAC), the current experience in the Horn of Africa region suggests that most governments have not given a proper priority to drought risk management—instead relying on the crisis management approach (ICPAC, 2016). In addition, more resources are provided by governments and donors for response activities rather than for long-term developmental activities that deal with planning, mitigation, and disaster preparedness across the Horn of Africa region (ICPAC, 2016). The situation is similar in many other African countries. Given the urgency and insufficient time to plan during a drought crisis, emergency response is often ineffective. Most importantly, countries rarely learn from past droughts, leading to little or no reduction in response time and risk.

Social issues related to race, class, and gender need to be addressed to build proactive and drought-resilient communities. Several studies have indicated the need to maintain gender as a variable in all studies of the social impacts of disaster (Stehlik et al., 2000). Women are an

important target group in all drought-risk management activities, along with drought risk managers, planners, risk communicators, family health-care providers, neighborhood preparedness participants, and voluntary community responders during and after disaster. Gender-focused action can shape drought risk management responses of women and men both within and outside formal drought management agencies (UNISDR and UNDP, 2009). For example, in Australia, Stehlik et al. (2000) found that women experienced the stresses and hardships caused by drought differently; couples who shared the burden through mutual decision making found their partnership strengthened and supported, and their personal response to the disaster became less overwhelming.

Even though progress has been made, the role of women in drought risk management is limited in Africa. Reflecting their historical underrepresentation in disaster management agencies nationally and/or internationally, women tend to work outside formal disaster agencies in Africa (Enarson, 1998). To target planning, mitigation, response, and recovery initiatives, African countries should assess their particular political, economic, and historical factors shaping the lives of women. For example, gender can influence many dimensions of drought risk management (e.g., risk assessment and evacuation decisions, voluntary preparedness and post-disaster helping patterns, and after-shock communication). Thus, gender-focused drought risk management research can help explain why and how women and men make critical disaster decisions based on a model of disaster decision makers as embodied actors interacting in gendered social contexts (UNISDR and UNDP, 2009).

Severe drought, together with complex socioeconomic and political factors, has been a growing motivation for migration in many parts of Africa. Governments, international organizations, and policymakers have begun to recognize this growing challenges -and potential protection obligations - of climate-related migration (MPI, 2015). For example, on 13 October 2015, 110 countries participating in the Nansen Initiative's final global consultation ahead of COP21 in Paris adopted a nonbinding contract to protect those displaced by natural disasters including droughts (MPI, 2015). Accordingly, African countries should take appropriate actions as part of drought risk management.

Drought risk management in Africa reflects the social and economic situation of the countries in the continent. The lack of financial resources is one of the main challenges. Resource mobilization, strong involvement of the private sector, and investment in drought risk management are necessary to build a proactive and resilient Africa. In addition, the lack of full commitment in several African countries is a big challenge to progress in building drought risk management at national, regional, and continental levels. At the national level, according to UNW-DPC (2015), the factors that contribute to the lack of necessary government commitment could be (i) lack of awareness among various levels of government and other players about the extent of drought impacts on various sectors, population groups, and communities, (ii) lack of systematic assessments of drought severity among the primary ministries and agencies (i.e., lack of a comprehensive early warning and information delivery system), (iii) lack of drought impact

monitoring as well as insufficient knowledge about vulnerabilities and their cause, and (iv) the slow-onset nature of drought, which does not capture the attention of the media, policy makers, and the public when compared to other extreme events such as floods and hurricanes.

4.2 Rationale and Justification.

Africa should strengthen its efforts to tackle the 21st century's greatest global challenges, which include climate change, energy, food, agriculture and nutrition, global health, and water. These challenges cut across international boundaries and disciplines. The recurrent droughts and their devastating impact in recent years have resulted in loss of life and long-term negative economic, social, and environmental consequences for vulnerable people in Africa. Several studies and evaluations of drought response in Africa over the past few decades have demonstrated that disastrous consequences can be averted by proactive drought management, strengthening and protecting livelihoods systems, and building their resilience and capacity to survive the inevitable occurrence of drought. This represents an opportunity to reduce drought risks in a meaningful and coherent manner.

The complexity of drought characteristics (as a creeping phenomenon) and its significant impact indicate that drought needs to be managed more efficiently. The current assessment of drought management in Africa shows that either it is focused only on inefficient emergency response or it is contained within in the disaster reduction frameworks. According to the UNISDR (2014), there is a positive trend in the establishment or reform of national and regional institutional, legislative and policy frameworks for the disaster risk reduction (DRR). However, the lead institutions for DRR do not yet bear sufficient influence upon all relevant sectors of governments (UNISDR, 2014). Because of their higher vulnerability and risk levels, drought-prone African countries are facing several challenges that often greatly exceed their capacity to respond to and recover from drought disasters. The majority of African countries still lack resources and capacity to engage with communities at risk or implement local initiatives (UNISDR, 2014).

Several efforts and some progress have been made by the international community. In 2005, the UN member governments endorsed the “Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters,” with the primary goal of achieving a substantial global reduction in disaster risk, and contributing to the sustainable development of nations. The HFA has provided comprehensive action-oriented policy guidance based on a holistic understanding of disasters, as induced by human vulnerability to natural hazards, and it reflects a solid commitment by governments and organizations to implement an effective disaster reduction agenda. In order to support the implementation of the HFA at all levels, a strong partnership has been forged through the UNISDR system (which includes government representatives; international, regional, and UN organizations; and civil society organizations) to coordinate programs and activities, identify good practices and gaps, and promote positive action. In 2015, the HFA successor, the “Sendai Framework for Disaster Risk Reduction 2015-2030,” was adopted at the third UN World Conference in Sendai, Japan

(UNISDR, 2015b). The Sendai Framework is built on elements that ensure continuity with the work done by states and other stakeholders under the HFA and introduces a number of innovations. The emphasis of Sendai Framework is the paradigm shift from crisis to risk management. In this framework, the seven global targets include: reducing disaster risk; preventing new risk; reducing existing risk and strengthening resilience; and creating a set of guiding principles, including primary responsibility of states to prevent and reduce disaster risk, with all-of-society and all-of-state institutions engagement. In addition, the scope of disaster risk reduction has been broadened to focus on both natural and manmade hazards and related environmental, technological, and biological hazards and risks.

Any drought management policy needs to be endorsed by national government. This is a vital collaboration that should be spearheaded by the government, but that is often not the case in Africa. A focused action is needed within and across sectors by African countries at the local, national, regional, and global levels, in line with the global disaster risk reduction frameworks (e.g., Sendai Framework). In addition, there is a need for collaboration on drought management practices with national governments in Africa. While each country in Africa has the primary responsibility for managing and reducing drought risk, it is a shared responsibility between African governments and relevant stakeholders, scientific institutions, and the private sector, as well as UN agencies. All of these groups play an important role in providing support to countries, in accordance with national policies, laws, and regulations, in the implementation of strategic frameworks at the local, national, regional, and global levels.

The current global efforts, specifically the Sendai Framework, emphasize the need for improved understanding of disaster risk in all its dimensions of exposure, vulnerability, and hazard characteristics; the strengthening of disaster risk governance, including national platforms; accountability for disaster risk management; preparedness to “Build Back Better”; recognition of stakeholders and their roles; mobilization of risk-sensitive investment to avoid the creation of new risk; resilience of health infrastructure, cultural heritage, and work places; and strengthening of international cooperation and global partnership and risk-informed donor policies and programs, including financial support and loans from international financial institutions.

Even though progress has been made (nationally, regionally, and internationally) toward the paradigm shift to drought risk management and efficient proactive actions, collective and collaborative actions sharpening the focus on drought are now needed more than ever. Building a strategic framework for Africa, in line with the global efforts such as Sendai Framework, could help strengthen long-standing drought-resilience initiatives in Africa at regional, country, and local levels to advance Africa’s continental-level drought-resilience capabilities. The framework is also intended to help Africa’s Sustainable Development Goals (SDGs) that are included in the [UN’s the 2030 Agenda for Sustainable Development](#) consistent with the “Common African Position (CAP).” Government bodies need to work in tandem with all organizations involved in drought risk management in order to synchronize efforts and make the strategy as effective as possible. Thus, leveraging past and present experiences and lessons learned, a new strategic

framework that specifically focus on drought risk management and enhancing resilience in Africa, the “Drought Resilient and Prepared Africa (DRAPA)” strategic framework, is proposed.

4.3 Guiding Principles and Values of the Strategic Framework.

The general guiding principles and values of the DRAPA framework include good governance and decision making that respects fundamental human rights, partnerships and cooperation, peaceful resolution of disputes, adherence to the principles of gender sensitivity and equity, recognizing that each country is at different levels of development, and supporting development efforts of each country. Drawing from the global principles contained in the HFA and its successor Sendai framework, and Africa regional frameworks (e.g., IDDRISI), the implementation of the DRAPA framework will be guided by the following principles, while taking into account national circumstances and consistent with domestic laws as well as international obligations and commitments:

- (a) Each African country has the primary responsibility to prevent and reduce drought risk, including through international, continental, regional, transboundary, and bilateral cooperation. The reduction of drought risk is a common concern for all African countries, and the extent to which countries are able to effectively enhance and implement national drought risk management policies and measures in the context of their respective circumstances and capabilities can be further enhanced through the provision of sustainable continental and international cooperation;
- (b) Drought risk management requires a high level commitment and accountability under an overarching institution (e.g., a national drought commission) that responsibilities be shared by central governments and relevant national authorities, sectors, and stakeholders, as appropriate to their national circumstances and systems of governance;
- (c) Drought risk management is aimed at protecting persons and their property, health, livelihoods, and productive assets, as well as cultural and environmental assets, while promoting and protecting all human rights;
- (d) Drought impact reduction requires an all-of-society engagement and partnership. It also requires empowerment and inclusive, accessible, and non-discriminatory participation, paying special attention to people disproportionately affected by droughts, especially the poorest. A gender, age, disability, and cultural perspective should be integrated in all policies and practices; women and youth leadership should be promoted; and subsidiarity should be encouraged. In this context, special attention should be paid to the improvement of organized voluntary work of citizens;
- (e) Drought risk management depends on coordination mechanisms within and across sectors and with relevant stakeholders at all levels, and it requires the full engagement of all African countries’ institutions of an executive and legislative nature at national and local levels and a clear articulation of responsibilities across public and private stakeholders (including business and academia) to ensure mutual outreach, partnership, and complementarity in roles and accountability and follow-up;

- (f) Although the enabling, guiding, and coordinating roles of national governments remain essential, it is necessary to empower local authorities and local communities to reduce drought risk, including through resources, incentives, and decision-making responsibilities, as appropriate;
- (g) Drought vulnerability and impact assessment requires an inclusive risk-informed decision making based on the open exchange and dissemination of disaggregated data, including by sex, age, and disability, as well as on easily accessible, up-to-date, comprehensible, science-based, non-sensitive risk information, complemented by traditional knowledge;
- (h) The development, strengthening, and implementation of relevant policies, plans, practices, and mechanisms need to aim at coherence, as appropriate, across sustainable development and growth, food security, health and safety, climate change and variability, environmental management, and drought risk reduction agendas. Drought risk management is essential to achieve sustainable development;
- (i) While the drivers of drought risk may be local, national, regional, or global in scope, drought risks have local and specific characteristics that must be understood for the determination of measures to reduce drought risk;
- (j) Addressing underlying drought risk factors through drought risk-informed public and private investments is more cost-effective than primary reliance on post-drought response and recovery, and contributes to sustainable development.

4.4 Goals and Objectives of the Strategic Framework.

To build effective drought risk management and enhanced resilience at continental, regional, national, or local/community levels for Africa, the present document (white paper) proposes the DRAPA strategic framework. The overarching goal of the proposed framework is *to develop drought risk management strategy for Africa that will enhance resilience to drought impacts*. The strategic framework will also inspire African Countries to develop their short, medium, and long-term drought mitigation and adaptation measures/interventions and plans. The proposed DRAPA framework structure is centered on African countries, integrating the regional institutes under AU leadership in collaboration with the international community, including UN agencies. Figure 9 shows the recommended strategic framework structure of DRAPA for drought risk management and enhancing resilience in Africa. DRAPA will have six main elements in a framework, in line with the priorities of the HFA and its successor the Sendai Framework (UN, 2015), that considers the recommendations of international meetings (e.g., the 3rd African Drought Adaptation Forum, in Addis Ababa, Ethiopia), ongoing discussions, and the identification of information and good practices in Africa to build an effective drought risk management and resilience strategy at continental, regional, national, or local/community levels. In addition, African regional experience on drought management and resilience (e.g., the IGAD drought disaster resilience and sustainability initiative, IDDRSI) is also considered. The framework is designed to be integrated with the global efforts to build collaboration and implementation strategy.

The strategic objectives of the framework will include: encouraging the development of national drought policy for drought risk management and enhancing capacity at all levels of government to mitigate the effects of drought; institutionalizing a systematic approach for drought monitoring and early warning systems to enhance drought resilience as well as establishing best practices for drought risk management to enable the sharing of experiences among countries; identifying drought vulnerability and improving risk assessment; improving public awareness of drought risk management and focusing national, regional, continental, and international attention on the issue of enhancing resilience to drought impacts; and strengthening partnerships and cooperation for enhanced drought resilience.

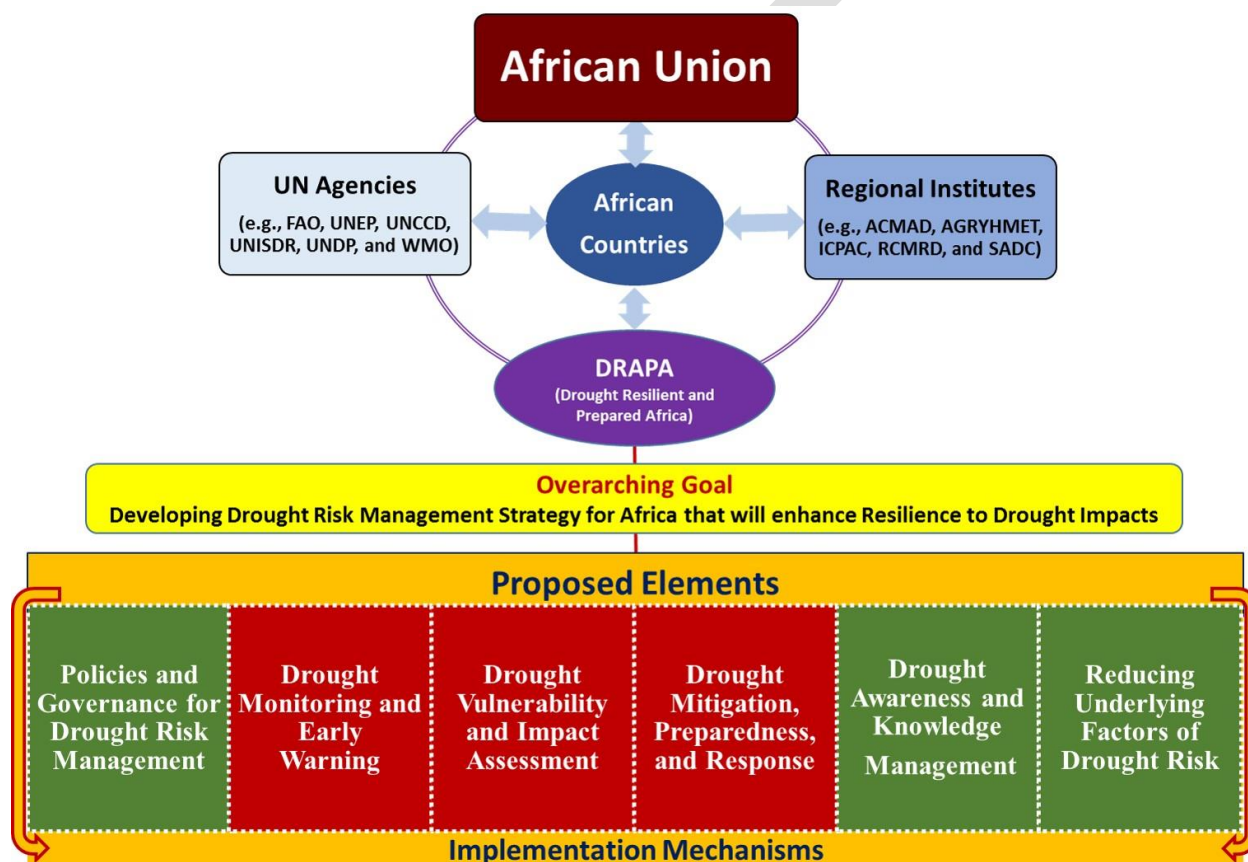


Figure 9. Proposed strategic framework structure of “*Drought Resilient and Prepared Africa*” (DRAPA) for drought risk management and enhancing resilience in Africa.

The strategic framework will have six elements to address its goal and objectives. The elements include:

1. Drought policy and governance for drought risk management;
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 of drought risk.

These DRAPA's strategic elements are focused on the three pillars of drought risk management (i.e., elements 2, 3, and 4; red boxes in Figure 9) and the enablers that include elements 1, 5, and 6 (green boxes in Figure 9).

4.5 Proposed Elements of the Strategic Framework and their Guiding Principles.

The DRAPA's six elements and their guiding principles are briefly described below.

1. *Drought Policy and Governance for Drought Risk Management*

Drought risk and resilience policy development and governance is not a standalone undertaking of the drought risk management institutions; other sectors need to be closely involved. In addition, policy and governance should be based on local needs, community participation and political commitment, networks and mechanisms, and resource availability. In addition to national and state/provincial drought policies, increased importance has also been placed on local/community level drought policy and planning, emphasizing self-reliance and drought resilience. For policies and governance, drawing from the experiences and proposals contained in the 3rd African Drought Adaptation Forum and UNISDR strategic framework, eight principles for drought risk management framework are proposed. These guiding principles for the development of continental, regional, national, and local strategies for reducing drought risk in Africa in collaboration with international community and organizations, together with the implementation of such a strategy, include:

1. Political commitment, high-level engagement, strong institutional setting, clear responsibilities at central and local levels, and appropriate governance are essential for integrating drought risk issues into a sustainable development and drought risk management process;
2. A bottom-up approach with effective decentralization and active community participation for drought risk management in planning, decision making, and implementation is essential to move from policy to practice;
3. Capacity building and knowledge development are usually required to help build political commitment, competent institutions, and an informed constituency;
4. Drought risk management policies should establish a clear set of principles or operating guidelines to govern the management of drought and its impacts, including the development of a preparedness plan that lays out a strategy to achieve these objectives;
5. Drought-related policies and plans should emphasize risk management (planning, mitigation, and preparedness) rather than relying solely on drought (often turned into famine) relief;
6. Drought monitoring, risk assessment, and other appropriate risk management measures are principal components of drought policies and plans;
7. Institutional mechanisms (policy, legislative, and organizational) should be developed and enforced to ensure that drought risk management strategies are carried out; and

8. Sound development of long-term investment in risk management measures (planning, mitigation, and preparedness) is essential to reduce the effects of drought.

Political commitment, high-level engagement, strong institutions, and appropriate governance are essential for building and maintaining the necessary support to formulate drought policies, and for integrating drought risk issues into a disaster risk management and sustainable development process. Drought risk management is a long-term commitment that should complement long-term sustainable development planning efforts. Developing national drought policy is one of the most important steps in drought risk management.

Developing and/or Improving Drought Plans and Policy: An increasing number of resources have been developed around the world to assist countries in developing drought plans. For example, the National Drought Mitigation Center (NDMC) in the United States created the “10-Step Drought Planning Process” (Figure 10) (Wilhite et al., 2000; Wilhite and Knutson, 2008) that governments in both developed and developing countries have utilized to develop drought

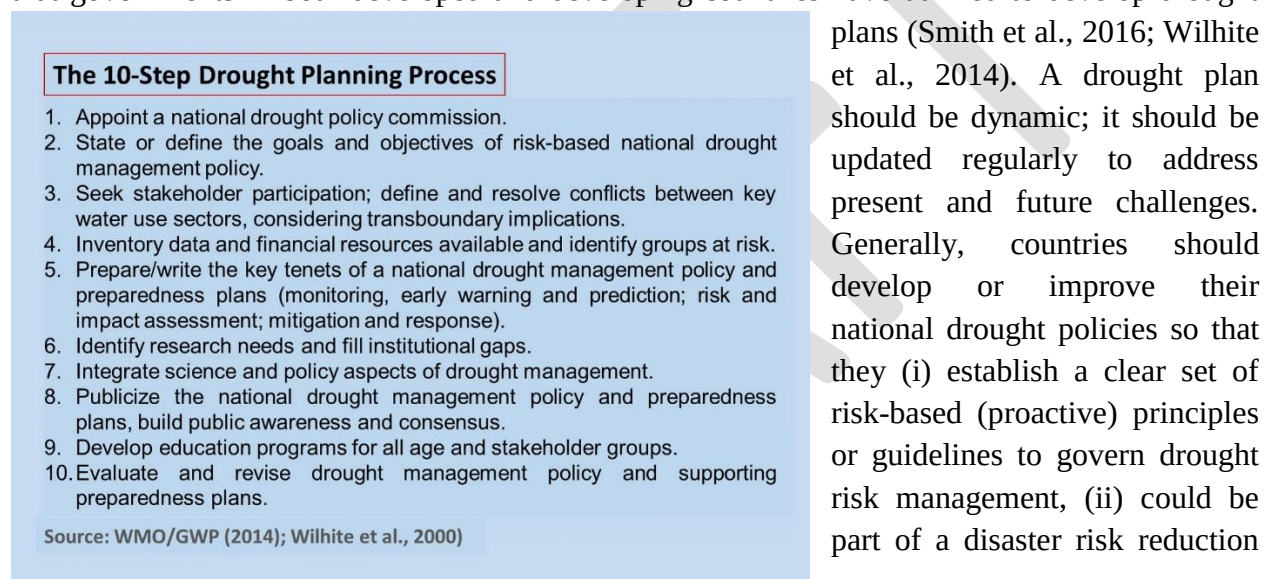


Figure 10. The 10-Step Drought Planning Process.

or climate change adaptation framework, (iii) are consistent and equitable for all regions, population groups, and economic/social sectors, (iv) are consistent with the goals of sustainable development, (v) reflect regional differences in drought characteristics, vulnerability, and impacts, and (vi) promote the principles of drought risk management by encouraging development of early warning and delivery systems, preparedness plans at all levels of government, vulnerability assessments, mitigation actions, and coordinated emergency response that ensures targeted and timely relief, consistent with drought policy goals, during drought emergencies.

Community participation capacity development: Community participation, both in decision making and implementation, is essential in order to move from policy to practice. Participation is required to develop policies and strategies that are relevant, feasible, and equitable at the local level. It may also help create a larger sense of community ownership among stakeholders that will foster commitment and responsibility when implementing drought policy. Developing an

effective drought risk management strategy and implementing it in practical actions requires the contribution and coordination of organizations and institutions at all levels. Participation can make the results of planning more likely to be accepted. This will raise their acceptance of the final planning results and raise their support and participation in the implementation. Furthermore, if stakeholders feel heard and that their interests are considered in the planning processes, they will be more likely to understand and accept the final result, whether or not their own ideas are visible in the final results. The main stakeholders include community-based organizations (particularly those representing the most vulnerable), local governments, national governments, regional institutions and organizations, international bodies (multilateral and bilateral), civil society organizations, the private sector, the media, and the scientific community. Each has a particular function for which it is responsible and accountable. Thus, to build an effective national drought management policy and supporting preparedness plans, all relevant agencies/ministries, stakeholder groups, sectors, and regions must be included in the drought policy and planning process (Wilhite, 2000).

In addition, capacity development is a central strategy for drought risk management. Although political momentum may exist to create new institutional (policy, legislative, and organizational) mechanisms for reducing risks, lack of dedicated financial resources (budgetary constraints) and trained personnel may constrain the implementation and operation of early warning systems. Drought risk management requires not only training and specialized technical assistance, but also the strengthening of the capacities of communities and individuals to recognize and reduce risks in their localities. It includes sustainable technology transfer, information exchange, network development, management skills, professional linkages, and other resources. Capacity development needs to be sustained through institutions that support capacity building and capacity maintenance as permanent ongoing objectives.

2. Drought monitoring and early warning

Enhancing drought monitoring and early warning capacities is essential to drought risk management. For improved and efficient drought monitoring and early warning systems, decision makers and scientists should work together. This will promote the development of systems that are timely, relevant, understandable, affordable, and people-centered. In order to achieve this goal, it is essential to develop the appropriate social and technological capacity to research and implement programs to better understand, monitor, and communicate drought occurrences and their impacts. This includes fostering the ability of national governments and other planning entities to support the development and sustainability of the required infrastructure and scientific, technological, and institutional capacities needed to research, observe, analyze, map, and predict drought vulnerabilities and impacts.

Data policy to conduct research and improve drought monitoring tools has been a big challenge in Africa. It is essential to support the development and improvement of relevant databases and the promotion of full and open exchange and dissemination of data for assessment, monitoring,

and drought early warning at international, regional, national, and local levels. This includes the development of decision-support models for the dissemination of drought-related information to end users and appropriate methods for encouraging feedback on climate and drought assessment products, and on other forms of early warning information. The guiding principles for drought monitoring and early warning systems include:

1. Drought monitoring and early warning systems play an important role in drought risk identification, assessment, and management;
2. Drought monitoring and early warning systems require the simultaneous consideration of multiple socio-economic and environmental variables;
3. Promotion of open exchange and dissemination of data for drought monitoring, prediction, and assessment helps to improve drought monitoring tools and drought early warning;
4. Technology transfer, information exchange, network development, and professional linkages at international, continental, regional, national, and local levels help to improve drought monitoring tools and early warning systems.

A survey of global early warning systems (UNISDR, 2006) stated that early warning systems for drought are more complex than those for other hydro-meteorological hazards and are, consequently, relatively less developed globally. There is a difference between drought monitoring and early warning systems. According to WMO, a drought monitoring system is one that will track, assess, and report climate and water supply trends and current conditions (e.g., rainfall, soil moisture, reservoirs, impacts, etc.) (WMO, 2006). An early warning system facilitates the provision of timely and effective information through identifying institutions that allow individuals exposed to a hazard to take action to avoid or reduce their risk and prepare for effective response.

To monitor drought, decision makers or scientists use drought indicators or indices. Drought indices are the means of identifying, classifying, and communicating drought conditions, and they are often used as triggers for decision making in risk management and emergency relief decisions. An integrated approach for assessing drought severity using a single drought index that combines parameters related to meteorology as well as to water, crops, and other primarily impacted sectors is the preferred methodology for countries. Recently, there has been a strong global interest and growth in developing several new combined drought indices based on various indicators. This gives decision/policy makers more choices, but it has been challenging to synthesize this into something simple enough to understand or relay to the public. However, with the advent of geographic information systems (GIS) and increased computing and display capabilities, the ability to produce simple maps has become prominent. This provides an opportunity to provide understandable and actionable drought information to decision makers.

To build efficient and effective drought monitoring tools, the availability of relevant data is crucial. However, data on drought characterization in several African countries is scarce at best, absent at worst. In the past few decades, several satellite-derived data and tools have been developed that can help drought monitoring. These satellite-based datasets and drought

monitoring tools need to be evaluated/validated using ground-based observations. Strong collaboration and open data exchange can enhance the improvement/development of drought monitoring tools. This could help decision makers utilize publicly available satellite imagery and geospatial technologies for improved drought risk management.

A drought early warning system is the foundation of a drought mitigation plan. In order to provide a broader context for designing, building, and maintaining a drought early warning system, African countries should consider how an early warning system fits into a more holistic planning process and what role it plays within such a comprehensive effort. The drought information analysis will only be as good as the spatial resolution (scale) that can be monitored. A bottom-up approach (i.e., from site/point data to grids and then to basin or provincial/district level and even national analyses) is generally preferred for a drought early warning system. Because of resource limitations, many countries or regions employ a top-down approach. Eventually, a combination capitalizing on both a top-down (e.g., national to local) and bottom-up approach may be the best way to leverage resources in order to develop the most comprehensive system for all users. Drought forecasts and warnings should also be targeted to provide key information to users for them to base their decisions on. Traditional knowledge can be integrated to supplement drought monitoring and early warning systems. In addition, while developing/improving their own drought monitoring tools (triggers) and early warning systems, African countries can leverage the freely available global drought information. The national early warning systems in Africa may capitalize on techniques, methods, and products shared by researchers and several operational global programs such as the Global Information and Early Warning System ([GIEWS](#)), the Climate Prediction Center ([CPC](#)) of the National Oceanic and Atmospheric Administration (NOAA), and the Famine Early Warning Systems Network ([FEWS NET](#)) drought information and products that cover Africa.

DRAPA (in collaboration with national, regional, and global networks) can help improve drought monitoring tools and early warning systems by customizing the drought information to a specific sector (e.g., agriculture or water) and specific country in Africa. Greater collaboration to enhance the international, continental, regional, national, and local climate observation networks and information delivery systems to improve public understanding and preparedness for drought is necessary for DRAPA drought monitoring and early warning systems. Drought monitoring and early warning in Africa are vital because the early identification of populations at risk can enable the timely and appropriate actions needed to avert possible widespread hunger, destitution, or even famine. In addition, there is an ever-increasing need to develop and implement measures to reduce societal vulnerability to drought, stressing preparedness and risk management rather than crisis management.

3. Drought vulnerability and impact assessment

Drought vulnerability and impact assessment can be a basis for promoting a culture of resilience in combination with enhancing knowledge about drought occurrence, the potential effects of the drought, and the related vulnerabilities of potentially affected people and activities. Drought risk

assessment methodologies such as drought impact assessment and vulnerability analysis will be useful in order to better understand specific trends, vulnerability, and impacts of drought for specific drought-prone areas. It is recommended that common methodologies for defining and assessing risks as well as appropriate drought hazard and vulnerability indicators be developed to meet specific local needs. The guiding principles for drought vulnerability and impact assessment include:

1. Drought risk is the combination of the natural hazard and the human, social, economic, and environmental vulnerability of a community or country, and managing risk requires understanding these two components and related factors in space and time;
2. Increasing individual, community, institutional, and national capacities is essential to reducing vulnerability to drought impact;
3. Impact assessment plays an important role in drought risk management, in particular, identifying most vulnerable groups (including women and children) and sectors to drought; and
4. Changing climate and the associated changing nature of drought poses a serious risk to the environment and hence to sustainable development and the society.

In many African countries, there is no consistent methodology for assessing drought impacts or archiving this information in a database. Integrated drought monitoring and early warning system needs to be comprehensive in scope by combining meteorology, soil, water, crop, and other relevant data. Drought vulnerability/risk assessment requires reliable drought impact and vulnerability data in order to generate information for decision makers and end users. DRAPA can assist in developing a country-level database on past drought incidences and impacts in collaboration with international databases (e.g., the Global Risk Identification Programme, [GRIP](#)). Gathering the necessary data for drought risk assessment, reviewing existing data, identifying data gaps, and working on the availability of data and data management systems as well as on user interfaces is crucial. DRAPA should join hands with the national and international community to address the data scarcity and unavailability issue. In addition, developing assessment tools and approaches to quantify drought vulnerability and impacts is a necessary step to identify and reduce drought vulnerability and impacts.

Drought risk assessment enable decision makers and the public to build a fundamental understanding of African countries' exposure to drought impact and its social, economic, environmental and physical vulnerabilities without adversely affecting the population or sectors of activity. For example, an improved understanding of the economics of drought is essential for drought risk management. Generally, the economic, social, and environmental impacts of drought exceed those of any other natural hazard (Wilhite, 2011). However, there is a need to provide more precise estimates of the costs associated with a proactive approach to drought management versus the traditional crisis management approach. This can help in understanding the Economics of Drought Preparedness (EDP). An African consortium/initiative is proposed through DRAPA that brings government bodies, research institutes, UN and international

organizations, the private sector, civil society, and donor organizations together to deal with the EDP.

4. Drought mitigation, preparedness, and response

Enhancing drought mitigation measures and preparedness can significantly reduce drought impacts and losses if decision makers, communities, and individuals are well-prepared, ready to act, and equipped with the knowledge and capacities for effective drought management. It should be recognized that mitigation and preparedness can have a greater impact on reducing the scale and effects of drought disasters than ad-hoc emergency response measures. The guiding principles include:

1. Drought mitigation and preparedness are central components of drought risk management, and are more important than relying solely on ad-hoc emergency response measures;
2. Information coordination: dialogue, exchange of information, and coordination are needed between drought risk management, development, and emergency management actors;
3. Integrated approach: the selection of appropriate drought risk management (planning, mitigation, and preparedness) measures requires many considerations, such as integrated environmental and natural resource management, social and economic development, land use planning opportunities, and climate change adaptations;
4. A combination of top-down and bottom-up approaches is required for development and implementation of effective mitigation and preparedness measures;
5. Institutional capacity, coordinated mechanisms, identification of local needs, and indigenous knowledge are required to implement effective mitigation and preparedness strategies;
6. Monitoring and early warning are key elements of drought risk management and must be closely linked to other risk reduction actions; and
7. Long-term commitment: drought risk management (planning, mitigation, and preparedness) requires a long-term commitment of resources.

A customer-oriented response that coordinates national, continental, and international institutes and drought programs is an effective and efficient approach. The level of integration of drought information should be country-specific depending on the kind of data available. Delivery of information to users in a timely manner and incorporating user needs in the development of decision support tools is recommended as part of a drought risk management plan. In addition, recognition of a safety net of emergency relief that is based on sound stewardship of natural resources and self-help at diverse governance levels is an important factor for drought response. Proactive mitigation and planning measures, risk management, public outreach, and resource stewardship are key components for DRAPA. Global partnerships such as the Global Facility for Disaster Reduction and Recovery ([GFDRR](#)) can help Africa to better understand and reduce their vulnerabilities to natural drought and adapt to climate change.

5. Drought knowledge management and drought awareness

The drought awareness, knowledge management, and education element is one of the most important enabling factors for drought risk management and building resilience. Collection, compilation, and dissemination of relevant knowledge and information on drought hazards, vulnerabilities, and capacities should be linked to community drought risk management awareness campaigns, programs, and projects. Interaction between the generators and users of information is essential for developing useful messages and helping to ensure the use of the information. Education for drought risk management is an interactive process of mutual learning among people and institutions that also involves traditional wisdom and local knowledge. Various educational programs that focus on drought risk management exist in addition to general programs on drought risk management. The guiding principles for drought awareness and knowledge management activities include:

1. Informed and motivated citizens: the effects of drought can be substantially reduced if people are well informed and motivated toward a culture of drought disaster prevention and resilience;
2. Effective information management and exchange requires strengthening dialogue and networks among drought researchers, practitioners, and stakeholders in order to foster consistent knowledge collection and meaningful message dissemination;
3. Public awareness programs should be designed and implemented with a clear understanding of local perspectives and needs, and they should promote engagement of the media to stimulate a culture of drought resilience and strong community involvement; and
4. Education and training are essential for all people in order to reduce local drought risk.

Although drought risk management requires an investment of financial and human resources, the crisis management approach is commonly more expensive and increases societal vulnerability in the long term. An education program to raise awareness of short- and long-term water supply issues will help people understand how to respond to drought and ensure that drought planning does not lose ground during non-drought years. Knowledge (including local and indigenous knowledge), innovation, and education should be applied to build a culture of safety and resilience. A regional and sub-regional network for knowledge management (that includes traditional knowledge) needs to be developed (UNISDR, 2014).

One practice that should be encouraged in Africa is the effort made under the theme “Disaster Risk Reduction Begins at School”, a theme selected for the World Disaster Reduction Campaign 2006-2007 that was coordinated by the UNISDR secretariat in cooperation with United Nations Educational, Scientific and Cultural Organization (UNESCO). This effort stresses (i) raising awareness within school communities, (ii) building a culture of prevention, and (iii) making school buildings safer, and it involves school children, teachers and non-academic staff, and, in some cases, the surrounding communities (UNISDR, 2007).

6. Reducing underlying factors of drought risk

Reducing underlying factors of drought risk will also contribute to reducing drought vulnerability. Drought risk factors can be reduced by effective environmental and natural resource management, social and economic development practices, and land-use planning and other technical measures. These measures, which have an impact on drought vulnerability, need to be reflected in national poverty reduction strategies, development plans, sector development planning and programs, and environment and natural resource management strategies as well as in post-disaster situations so that effective preparedness and mitigation measures can be considered. The guiding principles for reducing underlying factors of drought risk include:

1. Mechanisms should be in place to systematically bring together practitioners in drought risk management (e.g., national platform members) and key institutions involved in environmental management (e.g., adaptation to climate change, desertification, and biodiversity);
2. Areas of overlap and synergy should be identified between existing environmental programs and drought risk management activities;
3. A mechanism for carrying out joint assessments that should be institutionalized to integrate drought risk management and environmental protection parameters (e.g., integrated risk and environmental impact assessments);
4. Specific attention should be given to socio-economic high-risk factors such as age, disabilities, social disparities, and gender. By focusing on protection of the most vulnerable groups, the impacts of droughts can be reduced;
5. Post-drought recovery planning can incorporate drought risk management strategies for the future; and
6. Safety nets such as insurance mechanisms for properties as well as microcredit and financing for ensuring minimum livelihood means can accelerate post-drought recovery processes.

In several parts of the world, including Africa, many top-down approaches have failed to recognize the important role of communities, insufficiently addressed the specific local needs of vulnerable people, and ignored the potential of local resources and capacities, and they may have actually increased people's vulnerability to hazards (ADPC, 2016). The impacts of droughts are most immediately and intensely felt at the local level, placing communities at the front line of attempts to prepare for, respond to, and mitigate the effects of droughts.

Strengthening human and institutional capacities for stakeholders at all levels is an important issue for drought risk management. Capacity is required at all levels (policy and decision makers, researchers, meteorologists, technology transfer, communities, and farmers) for effective interpretation and usage of forecasting and early warning products. Currently, the low level of applied knowledge of technical and managerial personnel in most organizations issuing early warning products is a major constraint.

In many African countries, drought awareness is limited and institutional capacities are weak. Several studies and evaluations of drought response have shown that disastrous consequences of drought can be averted by strengthening and protecting livelihoods systems as well as building their resilience and capacity to survive the inevitable occurrences of drought. Thus, it is essential to enhance the capacity of various relevant players, including policy makers, state authorities, and resource managers at different levels, and promoting public awareness of drought impacts and drought risk by organizing training and advocacy programs. In addition, bringing science, policy, and practitioner constituencies together will facilitate a more integrated and proactive approach to drought management.

Incorporating comprehensive governmental and private insurance and financial strategies into drought preparedness plans helps reduce the underlying factors of drought risk. For example, the African Risk Capacity (ARC), a specialized agency of the AU, is an option that African countries could use to resist and recover from the havoc of natural disasters including drought through a weather insurance mechanism. In this mechanism, countries could purchase insurance against a drought risk and if the [Africa Risk View system](#) (a sophisticated database) sends an alert when a country has experienced a drought at the severity that warrants payment. The ARC tool combines existing operational rainfall-based early warning models on agricultural drought in Africa with data on vulnerable populations to form a standardized approach for estimating food insecurity response costs across the continent - information that is critical for financial preparedness for drought and for providing the basic infrastructure needed to establish and manage a parametric risk pool and trigger early disbursements (ARC, 2016).

Integrated strategies that combine agricultural technologies for drought management including drought-tolerant crops and varieties, improved crop management practices and water conservation methods, improved climate forecasting and early warnings systems, weather information communication, weather-index insurance systems, output/input market development and price information that will enhance drought risk management (Shiferaw et al., 2014). To reduce food insecurity and contribute more decisively to sustainable change in the agricultural sector, Africa needs to promote change and transformation in agriculture according to Africa's vision, starting from within the continent. This includes giving more emphasis to farming as a business and a profitable venture, and raising the profile of the farming profession. In addition, Africa needs to promote the systematic preference for sustainable agricultural systems from a socio-economic perspective (use of labor) and also from an environmental perspective (limited use of high-carbon inputs, promotion of agro-ecology and agroforestry). Fostering trans-sectoral dialogue and encouraging partnerships to ensure appropriation of and alignment with agricultural development strategy will help in reducing drought risk.

Integrated drought risk management should also consider a livelihoods approach that is cross-sectoral (taking into account economic, political, and cultural factors) and puts people at the center of the analysis. Understanding the asset base is also crucial, including physical assets such as land and livestock, human capital, and social capital. Generally, the stronger and more diverse

the household's asset base, the more drought-resilient it is likely to be and the greater its ability to switch between different livelihood strategies. For example, drought conditions can severely affect agricultural and pastoral livelihoods and increase vulnerability and risks for farmers, pastoralists, and people depending on such livelihoods (UNISDR, 2009a). In addition, since drought can impact biodiversity resources that people depend on directly (e.g., their livelihood, food and nutrition security, and tourism), biodiversity should be considered in drought risk management. In drought management, biodiversity can be important as a source of genetic material to support the development of drought-resistant crops and livestock and wild resources as an emergency source of food during a period of crisis. It is critically important to capture these and other dimensions in vulnerability assessments and drought mitigation measures (UNW-DPC, 2015).

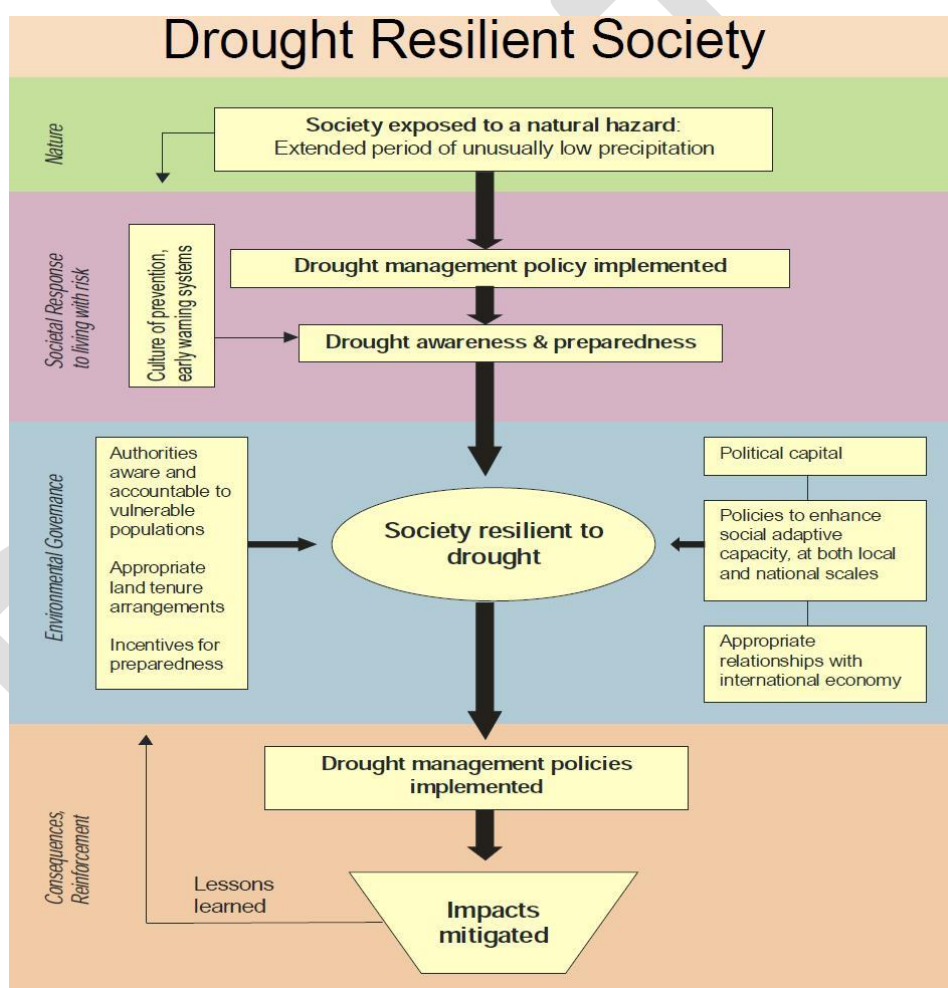


Figure 11. A drought resilient society takes societal behavior, vulnerability factors, and consequences into consideration. Source: UNISDR, 2009a.

Significant efforts are necessary in making drought risk management gender sensitive at all levels for DRAPA to be effective and efficient. Thus, through DRAPA, enhanced drought

mitigation, preparedness, and response measures will be identified and implemented to create a more drought-resilient society (Figure 11).

4.6 Implementation of the Strategic Framework.

Efficient and effective organizational structure and mechanism as well as human resource with rich experience, knowledge, and skill are vital for effective disaster risk management system. However, the current assessment in Africa indicates that these have not yet been fully achieved.

The development of a drought risk management framework involves four key components (IDMP-CEE, 2015): (i) coordination set-up and key institutional capacities required to develop drought risk management systems (institutional), (ii) the necessary procedures for assessing drought risks (methodological), (iii) the interventions that depend on the risk profile within a given context that provides an overview of the types of drought risk management options, which can be adopted for ensuring immediate responses, enhancing short-term preparedness, and promoting long-term resilience (public), and (iv) operational components that provide guidance and recommendations for developing and implementing a decision-support system that is based on indicators that are achievable in a given timeframe to support drought risk management.

The necessary mechanisms for drought risk management and enhancing resilience include (i) political will and leadership, (ii) initial investment in building greater institutional capacity, (iii) a collaborative environment that supports and encourages coordination within and between countries, and all levels of government and the private sector within each country, (iv) engaged and supportive citizens and stakeholders, and (v) an engaged research community, including higher education institutions and strong outreach and media programs (Wilhite, 2014).

The implementation of the strategic framework can help that droughts in Africa no longer (i) lead to famine and human suffering/deaths; (ii) aggravate poverty resulting in low nutritional standards of poor people; (iii) affect women and children disproportionately; (iv) distress selling of family assets; and (v) cause the migration of large numbers of people. Implementing efficient proactive management through DRAPA will increase understanding and awareness and emphasize planning ahead, and it will subsequently have major impacts on economies, the ecosystem, and the environment. These expected outcomes need coordinated efforts at all levels.

4.7 Innovative Sources of Finance for Enhancing Resilience to Drought Events.

The costs associated with the traditional crisis management can be significantly greater than the cost of a proactive approach to drought management. There could be various situations for financing to enhance resilience to drought events, and thus financing strategies should include innovative approaches to implement. Several options should be considered for funding to be available that include: private, community, national, continental, and international financial resources that involve different stakeholders. In addition, public initiative and financing; subsidies and taxes to compensate for drought impact losses; and philanthropic investments may be considered (WACDEP, 2016). Establishing an *African Drought Trust Fund* to fast-track the establishment and implementation of national drought policies, including early warning systems

in vulnerable communities. The Drought Trust Fund could be a partnership among African countries, civil society, the private sector and international agencies.

4.8 Recommendations for Implementation of the Strategic Framework.

The lessons from the recurrent droughts in Africa indicate that national governments and the international community need to collaborate in building and implementing DRAPA, in line with the international disaster risk reduction frameworks (e.g., Sendai framework). A few recommendations are listed below.

- Manage the drought risks, not the crisis. National governments should recognize their primary responsibility to meet drought risk reduction and provide political leadership. All decision makers and drought risk managers need to review their approach to drought risk management. Drought monitoring and early warning specialists need to develop a common approach to drought management triggers for early action to be used by both humanitarian and development actors.
- Integrate a drought risk management approach that allows long-term development interventions. African countries and the international aid community should integrate a drought risk management approach that allows long-term development interventions to adapt to the changing climate and undertake preventative humanitarian work. This includes developing livelihood protection and “no-regrets” options; assisting communities to prevent, mitigate, prepare for, and respond to crises; and ensuring that early warning systems are in place to integrate drought risk management into work throughout the development and humanitarian cycle, through investing significantly in people and partner organizations and reviewing organizational structures and systems.
- Institutionalize gender-sensitive drought risk assessments, implement gender-sensitive early warning systems, and use gender-sensitive indicators to monitor gender mainstreaming progress.
- Strengthen collaboration among African countries, regional institutes, and international organizations in drought risk management and implementation plans.
- Establish a common platform for all African countries and facilitating the negotiation of a binding drought protocol.
- Develop an African network that would be an integral part of the global network on drought preparedness.
- Design and develop an African drought information clearinghouse.
- Improve and use national and regional drought preparedness networks for capacity building, exchange of information, and lessons learned.
- Create an African consortium/initiative that brings government bodies, research institutes, UN and international organizations, the private sector, civil society, and donor organizations together to deal with the assessment of the economics of drought preparedness.
- Promote partnerships and allocate funds (including fundraising) for programs and activities such as public drought awareness, educate young Africans (e.g., inclusion of drought risk management into school curricula and provision of short- and long-term training), improve citizen science, and encourage volunteerism and other public participation.



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APPENDIX

1. Key Definitions

Typology of drought risk reduction measures (Source: modified from UNISDR Terminology of Disaster Risk Reduction, <http://www.unisdr.org/>).

Drought Preparedness: established policies and specified plans and activities taken before drought to prepare people and enhance institutional and coping capacities, to forecast or warn of approaching dangers, and to ensure coordinated and effective response in a drought situation (contingency planning).

Drought Planning: actions taken by individual citizens, industry, government, and others before drought occurs to mitigate impacts and conflicts arising from drought.

Response to Drought: efforts such as the provision of assistance or intervention during or immediately after a drought disaster to meet the life preservation and basic subsistence needs of those people affected. It can be of an immediate, short-term, or protracted duration.

Recovery from Drought: decisions and actions taken after a drought with a view to restoring or improving the pre-drought living conditions of the stricken community, while encouraging and facilitating necessary adjustments to reduce drought risk.

Drought Mitigation: any structural/physical measures (e.g., appropriate crops, dams, engineering projects) or non-structural measures (e.g., policies, awareness, knowledge development, public commitment, and operating practices) undertaken to limit the adverse impacts of drought.

Drought Risk Assessment: a methodology to determine the nature and extent of risk by analyzing potential drought impacts and evaluating existing conditions of vulnerability that together could potentially harm exposed people, property, services, livelihoods and the environment on which they depend.

Drought Vulnerability: the characteristics and circumstances of a community, system or asset that make it susceptible to the damaging effects of a drought.

Drought Early Warning System: the set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities and organizations threatened by a drought to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Drought Risk Management: The systematic process of using administrative directives, organizations, and operational skills and capacities to implement strategies, policies and improved coping capacities in order to lessen the adverse impacts of drought.

Drought Resilience: the ability of a system, community or society exposed to drought to resist, absorb, accommodate to and recover from the effects of a drought in a timely and efficient

manner, including through the preservation and restoration of its essential basic structures and functions.

2. Key Elements “Pillars” of Integrated Drought Risk Management.

According to the Wilhite (2011) the three key elements (also known as the “three pillars”) of a drought preparedness plan include:

1. *Drought Monitoring and Early Warning Systems:* Drought monitoring entails tracking indicators and indices of precipitation, temperature, soil moisture, vegetation condition, stream flow,

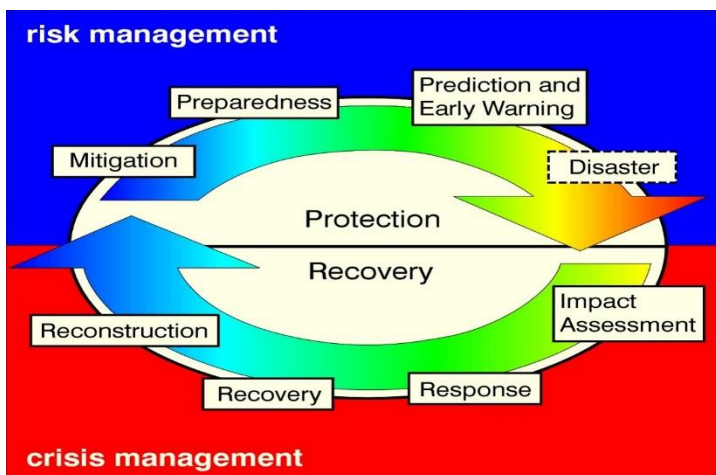


Figure 12. Monitoring and early warning systems that include drought monitoring tools and linked into decision-making and drought risk management. Source: modified from Tadesse et al., 2015.

snowpack, and ground water. It is also important to monitor the impacts associated with drought, especially on vulnerable sectors such as agriculture. The development of more reliable seasonal forecasts is critically important, as are the development of appropriate decision-support tools (e.g., drought monitoring indices) for the key sectors affected by drought. An early warning system (Figure 12)

should be linked with risk information (including people’s perception of risk) and communication system that actively

engages communities involved in preparedness (Pulwarty and Sivakumar, 2014). Early warning systems analyze a range of factors, including weather, agriculture, livestock, markets and nutrition, and are becoming more sophisticated and reliable (Verdin et al., 2005; Hillier and Dempsey, 2012). Generally, all early warning systems (EWS) must address five questions (Glantz, 2004), which can be used to educate the public about the drought hazard: (i) what is happening with respect to the hazard(s) of concern, (ii) why is this a threat in the first place (i.e., what are the underlying causes for potential adverse impacts), (iii) when is it likely to impact (providing as much lead time as possible to populations at risk), (iv) where are the regions that are most at risk, and (v) who are the people most at risk who need to be warned.

The EWS is the foundation of a drought plan that identifies early drought detection, improves proactive response, and triggers mitigation actions or measures within a drought plan. The major components of early warning systems include timely data and information acquisition, synthesis and analysis of data that are used to “trigger” a set of actions within a drought plan, and an efficient dissemination system or network (e.g., web, media, extension, and publications). The EWS also uses drought indicators and indices (e.g., climate- and satellite-based drought indices as well as vegetation monitoring indices) that provide drought information for diverse audiences

(including decision makers), simplifying complex land-atmosphere-ocean observations and relationships (Svoboda and Fuchs, 2016). The drought indices are useful for quantitative assessment of anomalous climatic conditions (e.g., drought intensity, duration, and spatial extent). In addition, local knowledge systems, including traditional knowledge of farmers and pastoralists, should be incorporated into information systems.

2. *Vulnerability and Impact Assessment:* Vulnerability is a condition resulting from social, economic, and environmental factors or processes that increases susceptibility of a system to the

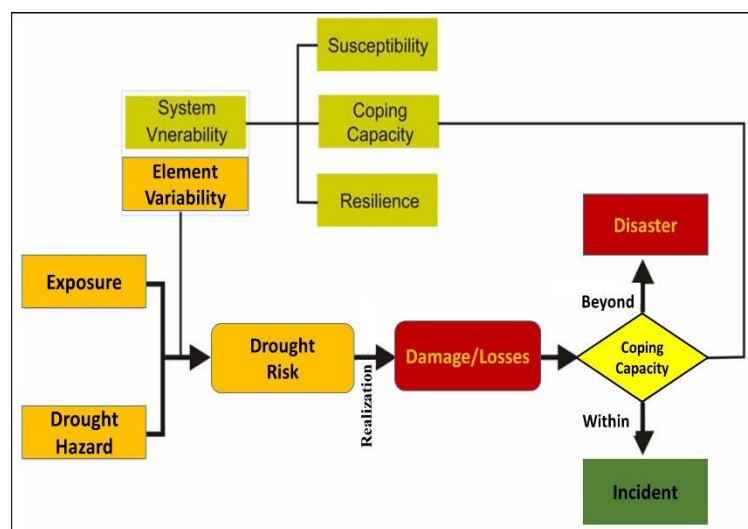


Figure 13. Drought vulnerability assessment flowchart. Source: GRIP - Global Risk identification Programme, UNDP Bureau for Crisis Prevention and Recovery (2010).

impact of drought. Despite improvements in weather forecasting and early warning systems, government programs, and the development of new tools and technologies, the costs resulting from droughts around the world are still high and rising, indicating growing societal vulnerability to drought (Hayes et al., 2004). Thus, drought impact and vulnerability assessment (Figure 13) should focus on understanding the human and natural processes that add to drought vulnerability (i.e., a vulnerability profile for key sectors) and community resilience. It also includes conducting vulnerability mapping for vulnerable communities. Figure 13 shows the steps for drought vulnerability assessment (GRIP, 2010). Generally, developing criteria for vulnerability assessment is needed to assess mitigation actions. Thus, drought vulnerability assessments include (i) recording drought impacts on vulnerable economic sectors such as rainfed and irrigated agriculture, livestock, environment (including biodiversity), energy, tourism, and health; (ii) determining who and what is at risk (and why) before, during, and shortly after drought (this requires assessment of the physical, social, economic, and environmental pressures on communities, measured at various geographical scales); (iii) assessing conditions or situations that increase the resistance/susceptibility of a system to drought; (iv) assessing the degree or extent of potential damage or loss in the event of a drought; and (v) assessing the coping capacity of communities affected by drought. Drought risk assessments for the various population groups (e.g., women, children, the elderly, the sick, the landless, farmers, pastoralists, marginalized and indigenous communities) should also be conducted. Common methodologies to measure progress in reducing vulnerability at multiple spatial scales can be done by assessing factors to identify vulnerable population groups and communities that include gender, age, ethnicity, dependency on agriculture and livestock, poverty level, and education level (Lynn et al., 2011; Cutter, 2003; Adger, 2006; Cutter, 1996).

3. *Drought Mitigation and Response:* Drought mitigation comprises any structural or physical measures (such as appropriate crops, dams, engineering projects) and non-structural measures (such as policies, awareness, knowledge development, public commitment, legal frameworks, and operating practices) that are undertaken to limit the adverse impacts of drought. Response to drought includes all efforts, such as the provision of assistance or intervention during or immediately after a drought disaster, to meet the immediate or short-term life preservation and basic subsistence needs of those people affected. The drought mitigation and response element of drought risk management is aimed at building greater resilience to drought and eliminating or at least reducing the impacts of drought when it occurs by taking appropriate measures and actions. Drought mitigation and response cover all sectors affected by drought, including agriculture, water and the environment, health, transport, and tourism.

Mitigation and response actions can be subdivided into long-term, medium-term, and short-term options. Development strategies should include development of a long-term mitigation and response plans, and these plans should be periodically revisited. Medium-term measures target the mitigation of specific impacts prior to their occurrence and are implemented in a timely manner (i.e., prior, during, and after drought) based on triggers (e.g., predetermined thresholds of specific drought index values that are provided by monitoring in early warning systems). Short-term or emergency response measures are implemented in response to a sudden occurrence of severe to extreme drought to provide targeted and timely relief, consistent with long-term drought management strategy.

An effective, proactive risk management strategy requires the best available information from operational and reliable drought monitoring tools that provide objective information for near real-time drought risk management (Tadesse et al., 2008). Recently, several climate- and satellite-based global drought indices have been developed that could be used for early warning (Svoboda and Fuchs, 2016). These types of drought monitoring and early warning products, which are freely available at national, regional, and continental scales via the internet, may help many countries in Africa that currently lack the necessary preparedness capacities. However, the definition of drought levels to trigger action, the climatological and environmental parameters to monitor drought, and the type of drought index to adopt may differ for each country in Africa. Communicating successful examples of drought monitoring and early warning in countries affected by drought can serve as a guide for other countries. Indigenous local practices and knowledge are often important in mitigating drought impacts. Such relevant practices should be included in the drought plan.

3. Regional Level Efforts in Drought Monitoring and Management in Africa.

AGHYMET Regional Center/Permanent Interstate Committee for Drought Control in the Sahel (CILSS) – CILSS was created in 1973-74 in response to a severe drought in the region. The thirteen member countries of CILSS are Benin, Burkina Faso, Cape Verde, Chad, Ivory Coast, Gambia, Guinea, Guinea Bissau, Mali, Mauritania, Niger, Senegal, and Togo. CILSS'

research focuses on food security and combatting the effects of drought and desertification, with the aim of helping vulnerable populations in the Sahel and West Africa to prepare for, adapt to, and recover from droughts. In 1995, CILSS focused its activities on basic food security and the use of natural resources.

Created in 1974, the AGRHYMET Regional Center is a specialized agency of CILSS. AGRHYMET's main objectives include contributing to food security and increased agricultural production in member countries of CILSS and ECOWAS, and helping to improve the management of natural resources of the Sahel and West Africa. AGRHYMET also provides information and training in agro-ecology (e.g., agro-climatology and hydrology) in the region. The 2015-2016 joint UN and CILSS work plan defines priority areas for cooperation geared to strengthen households' abilities to cope with climate shocks and natural and manmade disasters. The core of the UN-CILSS partnership is the creation of a "resilience measurement platform" dedicated to analyzing communities' exposure to risks and their ability to withstand shocks. The priority areas include the development of policies and practices to strengthen the resilience of the region's pastoralists, collaboration on disaster risk reduction, and management and governance of natural resources (UNISDR, 2015a).

African Centre of Meteorological Applications for Development (ACMAD): ACMAD, the weather and climate center with African continental competence, was created in 1987 by the Conference of Ministers of the United Nations Economic Commission for Africa (UNECA) and the WMO. It has been operational in Niamey since 1992. ACMAD is composed of the then 53 member states of Organization of Africa (OU) to provide weather and climate information and promote sustainable development in Africa (notably within the context of national strategies for poverty eradication), in the fields of agriculture, water resources, health, public safety, and renewable energy. ACMAD is involved in capacity building for the 53 national meteorological services (NSMs) of its member countries in weather prediction, drought/climate monitoring, transfer of technology, and research. In addition, ACMAD encourages the NMSs to prepare strategic development plans that integrate new African initiatives (e.g., NEPAD) and the socio-economic conditions related to the changing global environment (ACMAD, 2016).

Climate Prediction and Applications Centre (ICPAC): In 1989, the Drought Monitoring Centre-Nairobi (DMCN) and a sub-center in Harare (Drought Monitoring Centre-Harare, DMCH) were established as a project by 24 African countries with support of the UNDP and WMO in response to devastating weather-related disasters. In 2003, DMCN was adopted as a specialized IGAD institution. The name of the institution was at the same time changed to IGAD Climate Prediction and Applications Centre (ICPAC) in order to better reflect all its mandates, mission, and objectives within the IGAD system. ICPAC has 11 member countries: Burundi, Djibouti, Eritrea, Ethiopia, Kenya, Rwanda, Somalia, South Sudan, Sudan, Tanzania, and Uganda. Since its establishment, ICPAC has been able to demonstrate that mainstreaming of climate information can significantly contribute to climate risk reduction and climate change

adaptation for sustainable development. The IGAD's Drought Disaster and Sustainability Initiative (IDDRISI) is another effort to end drought emergencies in the Horn of Africa.

SADC Climate Services Centre ([SADC-CSC](#)): This center provides operational regional services for monitoring and predicting extremes in climate condition. SADC-CSC develops and disseminates meteorological, environmental, and hydro-meteorological products that contribute to improved disaster risk management in the region, and helps to ensure that SADC member states are better prepared for weather and climate disasters, conservation, and protection of natural resources. SADC-CSC, established in 1990 as the Drought Monitoring Centre, has made a great impact in its member states, and many users have publicly acclaimed its services and products as being of utmost importance to their operations. Some of the principal target beneficiaries of the products are the member states' national meteorological/hydrological services, which are members of disaster preparedness and management committees consisting of government ministries and departments (Aldrian et al., 2010).

Regional Center for Mapping of Resources for Development ([RCMRD](#)): The RCMRD was established in 1975 in Nairobi (Kenya) under the auspices of the UNECA and the (then) Organization of African Unity (OAU), today African Union (AU). RCMRD is an inter-governmental organization and currently has 20 Contracting Member States in the Eastern and Southern Africa regions; Botswana, Burundi, Comoros, Ethiopia, Kenya, Lesotho, Malawi, Mauritius, Namibia, Rwanda, Seychelles, Somali, South Africa, South Sudan, Sudan, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe. The RCMRD's primary undertaking is to promote sustainable development in its member states through generation, application, and dissemination of geo-information and associated information and communications technology, products, and services. RCMRD has been very instrumental in capacity building in resource survey, mapping, remote sensing, GIS, and natural resources assessment and management in Africa. RCMRD also provides training for technical officers from its member states and other African countries in the fields of surveying and mapping, remote sensing, GIS, and natural resources assessment and management. In 2008, RCMRD established a joint partnership between the United States Agency for International Development (USAID) and National Aeronautics and Space Administration (NASA), in collaboration with regional institutions in East Africa, Himalaya, and Mesoamerica. With this partnership, RCMRD established the "[SERVIR's Eastern and Southern Africa hub](#)," which is a unique science/technology project that enables improved environmental decision making in the region. The overarching goal of the SERVIR project is to improve environmental management and resilience to climate change. With an eye toward this goal, the SERVIR project works to build the capacity of SERVIR regional hub institutions, governments, and other key stakeholders to integrate earth observation information and geospatial technologies into environmental decision making.

The Famine Early Warning Systems Network ([FEWS NET](#)) is one of the providers of early warning and analysis on food insecurity. FEWS NET was created in 1985 USAID after devastating famines in East and West Africa, FEWS NET provides objective, evidence-based

analysis to help government decision-makers and relief agencies plan for and respond to humanitarian crises. FEWS NET provides evidence-based analysis on more than 36 of the world's most food-insecure countries (including Africa) to help government decision-makers and relief agencies plan for and respond to humanitarian crises. FEWS NET products include: monthly reports and maps detailing current and projected food insecurity; timely alerts on emerging or likely crises; and specialized reports on weather and climate, markets and trade, agricultural production, livelihoods, nutrition, and food assistance. FEWS NET is also involved in the humanitarian and development communities, participating in global committees to improve classification, remote sensing, and other aspects of food security analysis. FEWS NET also support and conduct training and capacity-building for national early warning systems, weather services, and other agencies.

4. International Efforts toward Drought Risk Management and Risk Reduction.

The international community has responded to Africa's drought impact challenge in several ways, mainly on a humanitarian basis. Several countries and international institutes have been assisting Africa for a long time. Because of the need for a paradigm shift from crisis management to a drought risk management concept, many international organizations are working with African governments, private sectors, and non-governmental organizations (NGOs) to promote a proactive approach. The UN and its organizations and specialized agencies, including the Food and Agriculture Organization (FAO), United Nations Convention to Combat Desertification (UNCCD), UNDP, United Nations Environment Programme (UNEP), United Nations Framework Convention on Climate Change (UNFCCC), UNISDR, UNESCO, United Nations World Food Programme (WFP), and WMO are making efforts to accomplish this paradigm shift. For example, WMO has a DRR Programme within its mission to provide scientific and technical services that include observing, detecting, monitoring, predicting, and early warning of a wide range of weather-, climate-, and water-related hazards. The UNCCD is also addressing the issue of drought through the Committee on Science and Technology (CST) that was established as a subsidiary body of the Conference of the Parties (COP) to provide information and advice on scientific and technological matters relating to combating desertification and mitigating the effects of drought. Even though CST addresses the water scarcity and drought issues, its focus is not only on drought.

In addition, WMO, FAO, UNCCD, and the Convention on Biological Diversity (CBD) in collaboration with the UN-Water Decade Programme on Capacity Development (UNW-DPC) have collaborated to implement a capacity development initiative on National Drought Management Policies (NDMP). The main goal of this joint initiative is to increase the capacities of developing countries and countries in transition in the development of risk-based national drought management policies. Six regional capacity building workshops on national drought management policy were held from 2013 to 2015. Generally, as food security in Africa is one of the biggest challenges, the international community and UN agencies such as FAO and WFP have been involved in the eradication of hunger, food insecurity, and malnutrition; the



elimination of poverty; the promotion of economic and social progress; and the sustainable management and utilization of natural resources through disaster management for the benefit of society in Africa and other parts of the world.

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