



THE RIPPLE EFFECT:

A FRESH APPROACH TO REDUCING DROUGHT IMPACTS AND BUILDING RESILIENCE



In every drop of water, there is a story of life and livelihoods. Water is a crucial resource for humanity and all ecosystems on earth. The world's water resources are, however, under increasing pressure from a growing human population, expected to reach 9.7 billion by 2050, and increasing per capita consumption of water. This is largely being driven by a change of diet and water intensive food production. Water is not always available when and where people need it. Climate change, droughts and floods, along with how land and water are being managed, are all contributing to sometimes extreme local conditions. Demand for water will grow by an estimated 55 percent between now and 2050 exacerbating current pressures.

People will feel the impacts of climate change most strongly through water. The poor, who are the most vulnerable to water scarcity, are likely to be worst affected. Water scarcity translates into food price volatility, for example. However, the ripple effect is bigger than that. Droughts and falling productivity will, in turn, reduce agricultural incomes, accelerate migration pressures and trigger resource conflict. Water scarcity alone could cost some regions 6 percent of their GDP. The world's drylands in particular are affected by both water scarcity and land degradation. Land management choices are an under-valued part of our strategy to manage drought risks and build a resilient future.

This brochure highlights the impact of current droughts as well as presenting projections for the future. It strongly suggests that overcoming the prevailing paradigm of 'reactive' and 'crisis-based' approaches to drought and moving towards 'proactive' and 'risk-based' approaches will be indispensable to reducing the risks and mitigating the impacts of droughts, floods and other extreme weather events. It explains how, against this backdrop, the UNCCD is ramping up its work on drought and water scarcity issues at large.

As you will see, UNCCD is now working with countries and partners to proactively address the main pillars of drought preparedness and planning: drought monitoring and early warning, vulnerability assessment and drought risk mitigation measures. A paradigm shift, in this direction, would create a positive ripple effect. The worst impacts of drought can be reduced, policy makers would be better informed and vulnerable, at-risk populations more resilient. If land and water resources are managed sustainably and together, ecosystems will not just survive but thrive. Opportunities for growth and development, even in regions vulnerable to drought, will open up if water is sufficiently available.



Monique Barbut
Executive Secretary
United Nations Convention to Combat Desertification

A SITUATIONAL ASSESSMENT, PROJECTIONS AND IMPACT

Droughts have always caused human suffering. Recent droughts in South and Eastern Africa, large parts of Central America and the Caribbean and the Asia-Pacific have demonstrated this clearly. It is an accepted fact that droughts cause the loss of agricultural production and livestock. Nowadays, it is recognized that drought also causes significant secondary impacts in the energy, transportation, health, and other sectors.¹ Droughts cost billions of dollars to the global economy with many people having to migrate for work and better economic opportunities. Droughts have also a clear negative impact on human security and conflicts.

For example, the '2006-2010' prolonged drought in Syria is often mentioned as one of the drivers for the migration crisis in Europe. A similar pattern is unfolding in Africa. The potential for conflict is arising in the long term as droughts render land less productive. With droughts destroying more land, food insecurity and the collapse of rural livelihood systems are becoming the new drivers of conflicts and forced mass migrations.

The year 2015 was the driest since record-keeping began more than a century ago. It was also one of the hottest. Drought conditions predominated across much of the globe² aggravated by the El-Niño weather phenomenon. Many countries found themselves facing major and extensive droughts, with deaths and crop and livestock losses, while other communities experienced heavy rainfall and severe flooding.

Though the phenomenon is now ebbing and the most severe drought events will lessen over 2016, we know these weather patterns and drought itself will return. It is just a matter of when and how strongly.



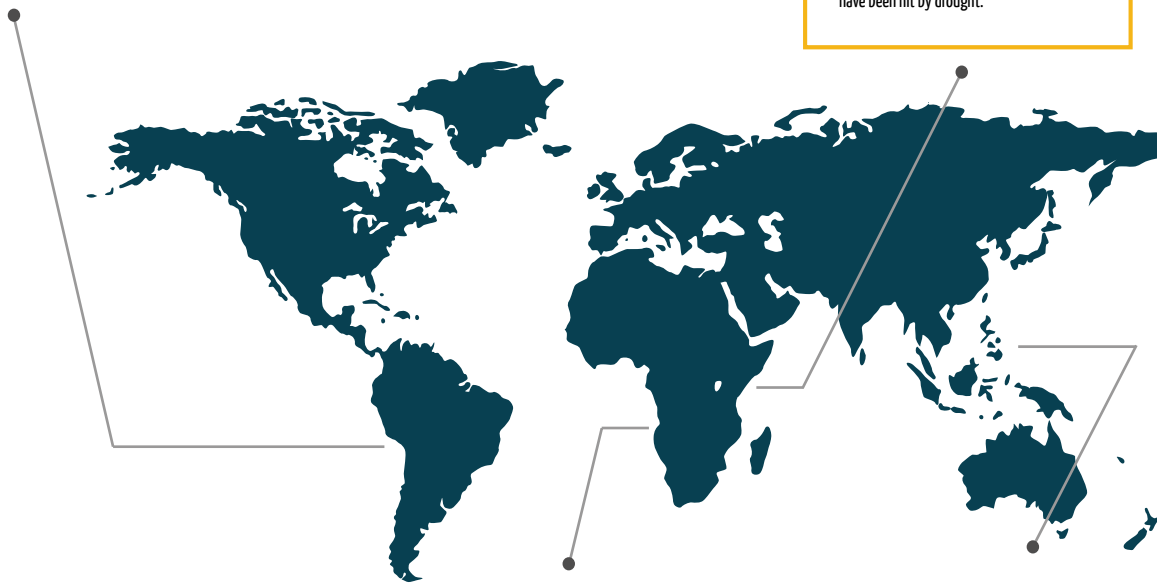
Map: Illustration of the impacts of the 2015/2016 drought

Latin America and the Caribbean

Bolivia suffered drought in the highland regions while floods have concentrated in the center. 31,000 families are affected by losses in agricultural production and 854,000 animals have been lost. In El-Salvador, 700,000 people were affected by drought who are in need of food assistance while 156,000 are facing IPC Phase 3³ of crisis. In Guatemala, droughts caused extensive crop loss of up to 50 per cent of production. Over 1 million people were food insecure. Haiti has 3.6 million people affected by drought and 1.5 million people were food insecure. In Venezuela a prolonged drought caused water levels to the main dam providing Caracas's power to drop to critical levels. In April 2016, Venezuela's government was forced to impose a two-day working week for public sector workers as a temporary measure to help overcome a serious energy crisis caused by drought.⁴

Eastern Africa:

Over 20 million people were facing food insecurity in Eastern Africa. Water shortages triggered water-borne and vector-borne diseases too. In Ethiopia alone, 10.2 million people required food aid. Droughts were causing children to drop out of school to fetch water from long distances. Sudan's drought cut cultivatable areas, reduced pastures prompting livestock migration and increased conflicts among farmers as well as reduced water availability which led to water-borne diseases and malnutrition. In Somalia, about 380,000 people were food insecure where pastures have been hit by drought.



Southern Africa:

28 million people were food insecure. According to the Famine Early Warning Systems Net Work (FEWS NET), 2.5 million people were in IPC Phase 3 (level of crisis). In Angola, over 10,000 people were displaced by floods; 1.4 million people were food insecure and 700,000 at risk of food insecurity. Lesotho was facing strong drought which affected over 370,000 people requiring immediate food and cash assistance. In Malawi, 2.8 million people were facing food insecurity. Swaziland has been affected by severe drought causing extensive crop loss and cattle deaths. In Zimbabwe, 26 per cent of the whole population was facing food shortages and 600,000 people were at IPC phase 3 because of drought. Maize production declined by about 50 per cent compared to last year's harvest. Madagascar remains at high-level risk for heavy rainfall to the north and prolonged drought to the south. Zambia has almost 800,000 food insecure people; drought caused low water levels in the hydro-electric Kariba Dam. Thousands of people lost their jobs.⁵

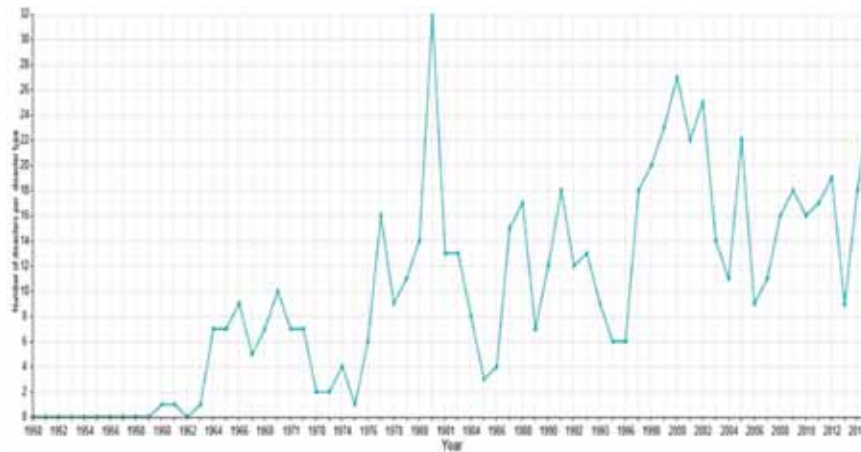
Asia and the Pacific:

In March 2016 the Philippines farmers rioted demanding government assistance after drought hit hundreds of thousands of hectares of farmland. As the drought protest turned violent, one farmer was killed⁶. The Marshall Islands declared a State of Emergency as 23 per cent of its population is experiencing severe drought and 3,500 people are experiencing moderate drought conditions. Papua New Guinea has 2.7 million people (close to 40 per cent of the population) affected by drought. Heavy rains caused flooding and landslides across a few regions. India is also hit by one the strongest droughts in decades in which at least 330 million people are affected.

DROUGHT TRENDS AND PROJECTIONS

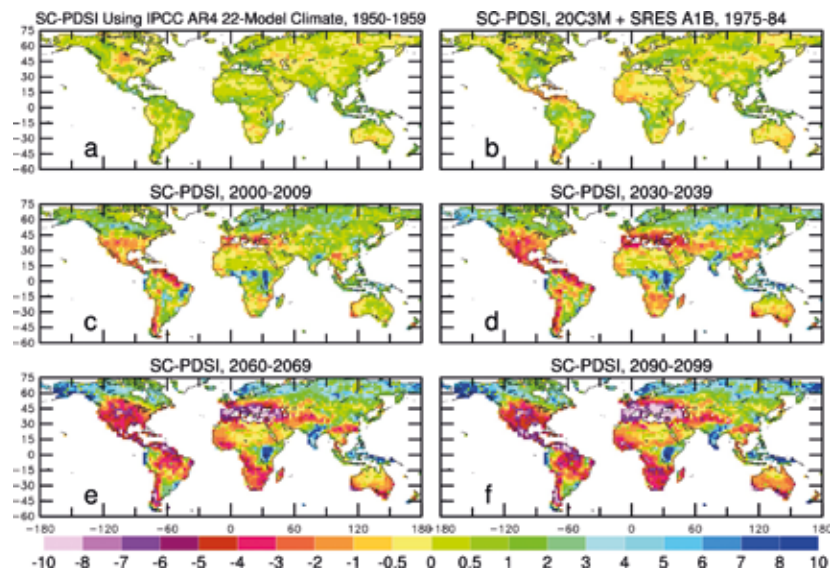
During the period 1950-2015, according to data provided by EM-DAT, there have been 685 drought events reported across the world. There is a clear trend that in the past decades, drought events are occurring frequently. The trend is projected to rise in the 21st century. (Figure 1)

Figure 1: EM-DAT the international Disaster Database. Droughts in the period 1950-2015 (Source: EM-DAT, 2016)



In the coming decades, drought is projected to increase in frequency, severity, duration and spatial extent. The major drought hotspots are Africa, Southern Europe, the Middle East, most of the Americas, Australia and Southeast Asia. (Figure 2)

Figure 2: Potential future droughts in the period from 2000–2099. Source: Dai, A. (2011)⁷



A huge part of the world's population will be exposed to drought. With climate change, precipitation will become more intense but less frequent, causing longer dry spells. This will increase flash floods/runoffs and diminish soil moisture, thus further increasing the risk of drought.

IMPACTS

Drought remains a major disaster causing huge damage to human wellbeing, the environment and the economy. EM-DAT recorded losses totaling US\$ 135 billion dollars from drought disasters between 1900 and 2013 (Table 1). It is also interesting to note that while the number of deaths caused by droughts is decreasing, the number of drought incidences is increasing (Figure 3).

Table 1: Overview of number of droughts and their impact across the world during 1900-2013

Continent	# of events	# of people killed	# of people affected	Damage ($\times 10^3$ USD)
Africa	291	847 143	362 225 799	2 920 593
Americas	134	77	69 505 391	50 471 139
Asia	153	9 663 389	1 707 836 029	44 251 865
Europe	42	1 200 002	15 488 769	25 481 309
Oceania	22	660	8 034 019	12 303 000
Total	642	11 711 271	2 163 090 007	135 427 906

Source: EM-DAT: The International Disaster Database. Centre for Research on the Epidemiology of Disasters-CRED; <http://www.emdat.be/database>, last accessed: 13 January 2014.

Figure 3: Number of deaths as a result of drought in the period 1950-2015. (Source: EM-DAT, 2016)

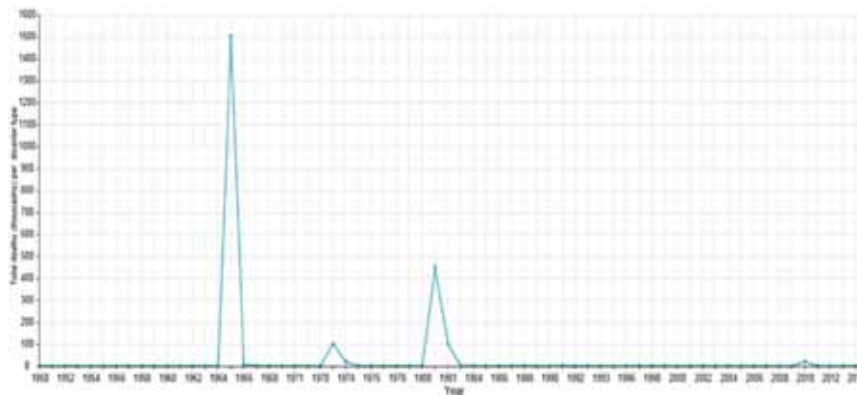


Figure 4: Total economic damage (USD billion scaled to 2014) caused by drought in the period from 1950-2015. (Source: EM-DAT 2016)

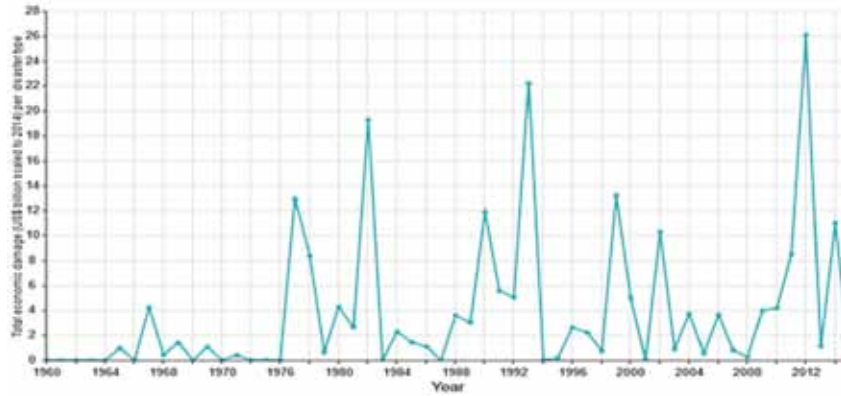


Figure 5a: Average percentage share of damage and loss of crops by type of hazard. (Source: The impacts of natural hazards on agriculture, food security and nutrition FAO,2015).

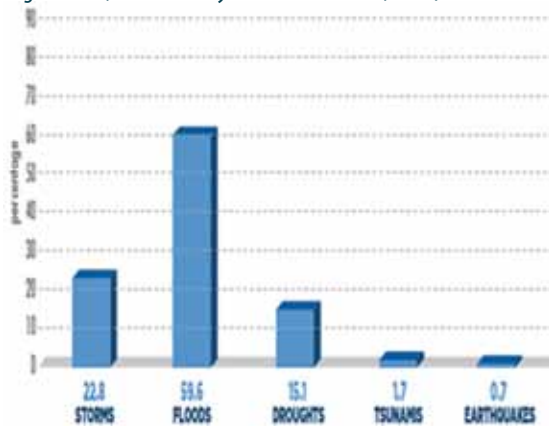
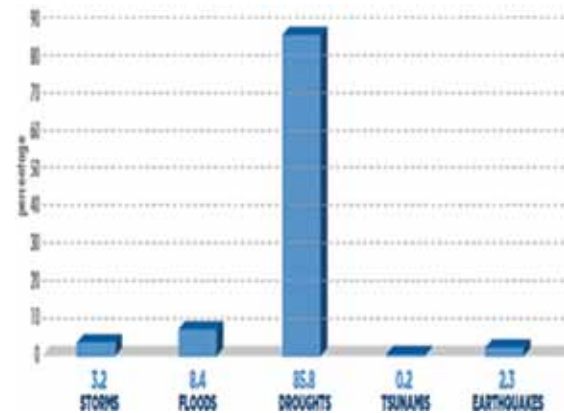


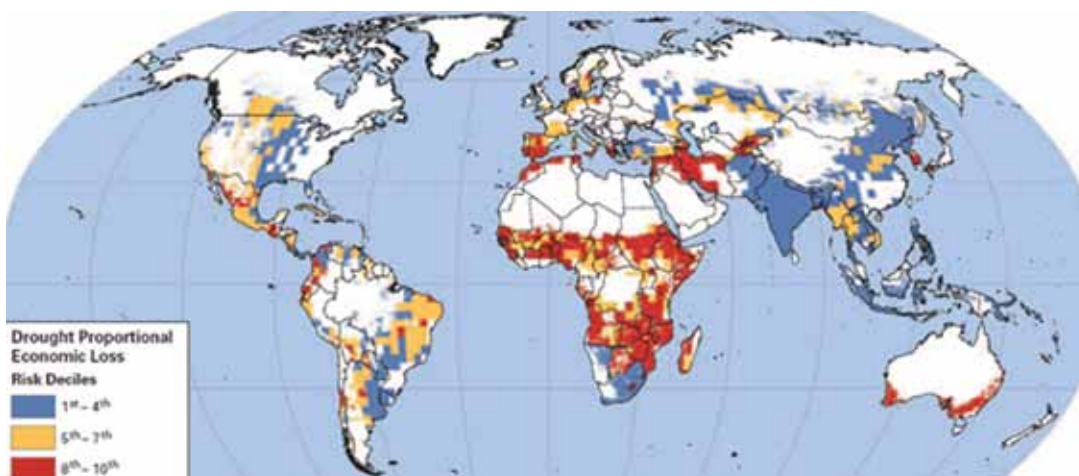
Figure 5b Average percentage share of damage and loss of livestock by type of hazard. (Source: The impacts of natural hazards on agriculture, food security and nutrition FAO,2015)



According to FAO, agriculture is badly affected by natural disasters. Over 15 per cent of these damages and losses were caused by drought (Figure 5 a). Droughts account for 85.8 percent of livestock losses and drought is the most lethal natural hazard to livestock (Figure 5b).

The distribution of drought-related losses show high relative losses in Sub-Saharan Africa (Figure 6). But Central and South America, southern Europe, the Middle East and southern Australia are also at high risk.⁸

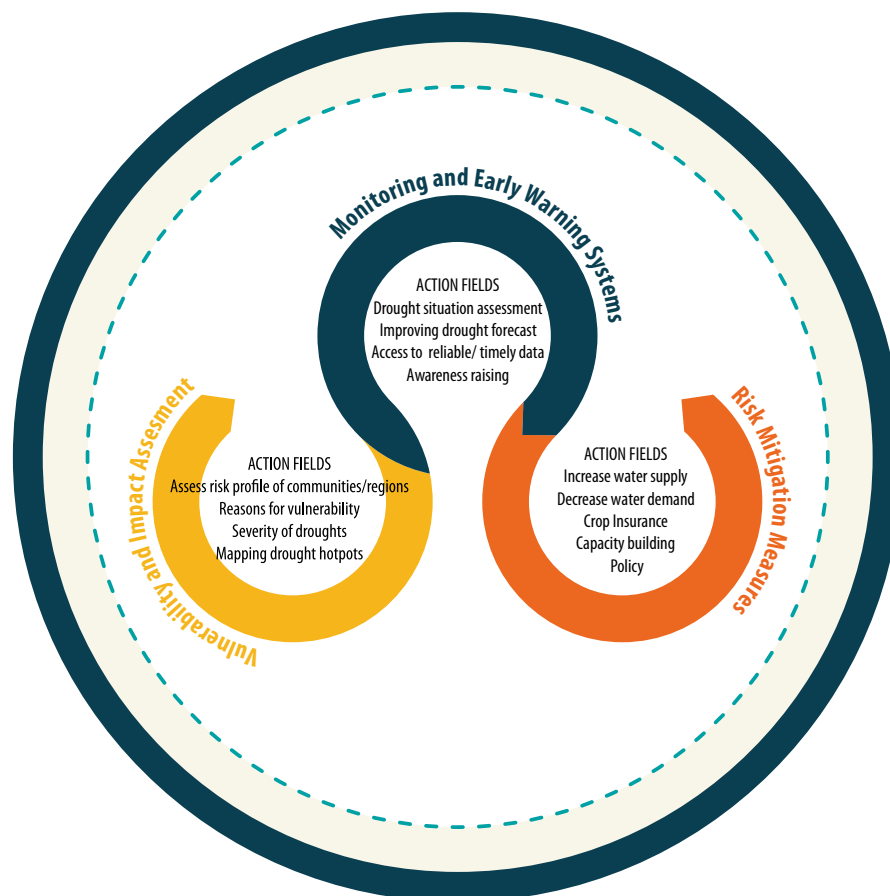
Figure 6: Global distribution of drought risk. Economic loss as a proportion of GDP Source: Natural disasters Hotspots, World Bank



With the anticipated pressures on water and with more intense and severe droughts predicted, a paradigm shift is needed. Poorly coordinated “crisis management”⁷⁹ in the face of drought will no longer suffice. A well-planned approach that focuses on reducing the impacts (risks) of drought is needed now.

The adoption of national drought policies that are focused on risk reduction and that are complemented by drought mitigation plans at various levels of government will have significant ripple effects across key sectors. It would support the implementation of Sustainable Development Goal 6 through the promotion of integrated water resources management. The vulnerability to future drought episodes can be significantly reduced and the coping capacity of communities, indeed entire nations, can be improved (Figure 7).

Figure 7: Action Fields on the key drought preparedness pillars (own compilation)



A proactive approach for enhancing drought resilience and to mitigate drought risks is composed of three important pillars (Figure 7):

- Drought monitoring and early warning systems;
- Vulnerability and risk assessment, and
- Drought risk mitigation measures

STRENGTHENING MONITORING AND EARLY WARNING SYSTEMS FOR DROUGHT

A drought can be defined in various ways. A meteorological drought, for example, is when the rains fail. A hydrological drought is when the lack of rainfall goes on long enough to empty rivers and lower water tables. Agricultural drought begins when the lack of water starts killing crops and livestock. And after that, people may start dying too. When to declare a drought can often be very subjective and highly political.

Forecast mechanisms require good data and local knowledge to see how dry conditions will impact water and food supplies. So far, they have been unreliable and often not acted on – until it is too late. Studies looking back over the past three decades found that only around a quarter of droughts were successfully forecasted a month or more ahead – and almost as many warnings turned out to be false alarms. The poor rains in east Africa in late 2010 were successfully predicted, but the failure of the longer rainy season the following spring, which turned crisis into disaster, was not predicted. More research could improve that.



With better data, research and collaboration, early warning systems could reduce hunger and distressed migration as a result of drought. Parties to the UN Convention to Combat Desertification should be supported to do the science and relevant institutions to make an early warning system work and to galvanise the real-time planning and policies that could prevent drought turning to disaster.

Effective drought early warning systems are needed to evaluate current conditions and to trace and assess climate and water supply trends. An Early Warning System (EWS) provides timely and effective information to facilitate action to avoid or reduce the risk and prepare for effective response.

Numerous natural drought indicators should be monitored routinely to determine the onset and end of drought and its spatial characteristics. Although all types of droughts originate from a precipitation deficiency, it is insufficient to rely solely on this climate element to assess severity of drought.¹⁰ Effective drought early warning systems integrates precipitation and other climatic parameters with water information such as stream flow, snow pack, groundwater levels, reservoir and lake levels, and soil moisture as well as a comprehensive assessment of current and future drought and water supply conditions (WMO, 2006). Besides standard indexes, local knowledge systems, including traditional knowledge of farmers and pastoralists should also be incorporated into the information system.

STRENGTHENING EARLY WARNING SYSTEMS FOR DROUGHT (SEWS-D) PROJECT IN CENTRAL AMERICA AND THE CARIBBEAN

The intense droughts that are taking place in the so called “Dry Corridor” of Central America and some islands in the Caribbean, coupled with the high drought vulnerability of communities in the region, forced governments to implement a series of measures. The Strengthening Early Warning Systems for Drought (SEWS-D) project aims to strengthen the EWS through the incorporation of the use of drought indices derived from satellite products, including the Normalized Differential Vegetation index (NDVI), Vegetation Condition Index (VCI), the Agricultural Stress Index System of FAO (ASIS) and other related products. It also aims to contribute to the institutionalization and the improvement of EWS dedicated to drought through the combined use of satellite and in-situ information covering weather, vegetation, soils, social, and economic aspects. UNCCD contributes the policy aspect of the EWS that entails specific policy guidelines on a step-by-step approach to formulate and implement national drought policies. A regional expert meeting took place in July 18-19, 2016 in Santo Domingo, Dominican Republic. The meeting took stock of advances in the project and outlined the plan of work for the remaining of 2016 and 2017. UNCCD is collaborator of this multi-partner project coordinated by UN-SPIDER in Bonn.

MAPPING OF DROUGHT VULNERABILITY

Sometimes, and in certain places, less rain can be compensated for by access to underground water, manmade reservoirs or moisture stored in soils across forested watersheds. Elsewhere if you do not have these buffers in place, drought rapidly escalates into shrivelled crops, dead livestock and, if the people are poor and unprotected, hunger and death. Distinguishing between the two scenarios is as vital as predicting the rains. No amount of early warning will work without action to protect the most vulnerable.

So the second aspect of drought management deals with risk assessment of vulnerable sectors, population groups and regions. Vulnerability is a condition resulting from social, economic, and environmental factors or processes, which increases the susceptibility of a system to the impacts of drought hazard.

Vulnerability assessment is needed to understand “who and what is at risk and why?”

Some of the important features of vulnerability assessment include:

- Recording drought impacts on vulnerable economic sectors including rain-fed and irrigated agriculture, livestock, environment, energy, tourism, health sectors, etc.;
- Assessing the reasons for vulnerability- conditions that impact the resistance of a system to drought;
- Assessing the degree or extent of potential damage or loss in the event of a drought;
- Assessing the coping capacity of communities affected by drought;
- Assessing sectors, population groups, and ecosystems most at risk and identify appropriate and reasonable mitigation measures to address these risks;

To reduce vulnerability to drought, it is essential to identify the relevant impacts and assess their underlying causes. Information on drought impacts and their causes is crucial for reducing risk before drought occurs and for appropriate response during and after drought. It is important to combine better forecasts with detailed knowledge on how landscapes and societies respond to a lack of rain and to turn that knowledge into prompt action within weeks, sometimes within days.

PILOT PROJECT ON POLICY OPTIONS FOR DROUGHT AND IMPLICATIONS FOR FOOD SECURITY IN ETHIOPIA AND KENYA

The German Development Institute (DIE) and UNCCD are jointly carrying out a research project on the analysis of drought and food security policies and programmes in two Horn of Africa countries, Ethiopia and Kenya. In these countries, the interlinkage between drought and food security is very strong and policies as well as development cooperation is becoming dynamic. We investigate how efforts towards drought resilience and food security at regional, national and local levels led to change in political practice in the two countries. They are interesting cases for a study on drought resilience and political build-up due to their different political and institutional setups under similar ecological conditions. The regional networks and implication for Intergovernmental Authority on Development (IGAD) member countries is also being investigated. The results will serve as background information on assessing further and consulting with the country parties on the support needed for action on drought resilience. Timeline: February – August 2016.



ENHANCING DROUGHT RISK MITIGATION MEASURES

There are things that can be done at a very practical level and starting right away. A mix of measures and actions – also called drought risk management options – that either build greater resilience to drought or reduce the impacts of drought when it occurs can be deployed. These measures concern all sectors affected by drought, based on their vulnerabilities. However, working with nature and getting the right mix of measures is particularly important for agriculture and for sectors reliant on the availability of water and ecosystems services.

These measures and actions are closely related to the approaches promoted by Parties to the UNCCD as they often involve strengthening natural infrastructure and the integrated management of land and water resources.

Examples of important mitigations measures are:

- Water harvesting, protecting water sources against contamination, developing water sources such as micro dams, ponds and wells, use of reserve sources of groundwater, water rationing/allocation, etc.
- Restoration of pastures and balancing land and water resources;
- Recover water holding capacity of soils through tree planting (including fruit trees), protection of riverbanks and wetlands;
- Implementing Integrated Water Resources Management (IWRM) such as, mitigating upstream-downstream user conflicts, greater coordination between water users, communities and sectors;
- Enhancing irrigation schemes;
- Diversification of rural livelihoods through social protection, cash-transfer programs or improving access to markets and rural services: Access to markets could help create alternative non-farm employment that could reduce the impacts of droughts;
- Crop insurance;
- Shifting to drought tolerant crops; and
- Managing livestock production within the landscape: relocation of herds, nomadic migration, use of special reserved areas.

SURVEY ON DROUGHT TOLERANT CROPS

The UNCCD designed a survey to assess the position of 16 African countries and their current understanding of drought tolerant crops. All countries confirmed that they grow drought tolerant crops to some degree and recognized the role of drought tolerant crops in mitigating the effects of drought. Millet, sweet potato, yam, sorghum and cassava were mentioned as the major crops in the regard. A transition to more drought tolerant cropping (including improved local varieties) which can cope up with increasing climate change is not ruled out in most of the surveyed countries. Low awareness among farmers and the government and sometimes inflexible/traditional consumption habits as well as legislative challenges were mentioned as some of the factors stopping the shift from taking place.



NAMIBIA AFRICAN DROUGHT POLICY CONFERENCE

UNCCD is supporting the organization of the African Drought Conference due to take place in Windhoek, Namibia from 15-19 August 2016. Involving technical sessions and a high level segment with Ministers, the conference serves as a timely follow-up to the High-level Meeting on National Drought Policy (HMNDP), held in Geneva in March 2013 as well as the series of capacity building workshops subsequently undertaken in Africa and globally (<http://drought.unccd.int/drought/index.html>).

It is expected that this conference will see a draft strategy for drought management at the Africa-level emerge. The strategy can then be adjusted to fit country specific situations and implemented at the national level.

For more information: www.africandroughtconference.com



The management of drought needs a paradigm shift. The time is ripe for countries to develop and implement effective national drought policies that include all three pillars of drought action. Countries need to recognize that the traditional approach of “responding” to drought is not viable any more. It has proved to be ineffective far too often.

Drought awareness in many countries is limited and institutional capacities need to be strengthened. That means promoting public awareness and strengthening capacities of both the citizens and institutions especially at the local level: farmers, pastoralists and all those actors and stakeholders involved in decision making. They, in particular, need help to identify and disseminate good practices that work in local conditions.

By being proactive, investing in early warning systems and assessing their vulnerability, countries can emphasize “protection” rather than “recovery”. This means understanding not only where are the most drought-stricken areas in the country but also who and what is vulnerable and why. Integrated drought early warning and monitoring systems that capture information on the incidence and severity of droughts can better identify vulnerable population groups and geographic regions. This facilitates early action and can lead to the development and implementation of a wide variety of mitigation actions including better land management to reduce impacts from future drought events.

Lastly, there is a need for greater cooperation and sharing of experience and success stories among countries. Well-planned and coordinated drought action will have a positive ripple effect across sectors and across borders. The poorest and most vulnerable parts of society will benefit the most.



ENDNOTES

1. World Meteorological Organization (WMO) and Global Water Partnership (GWP) (2014) National Drought Management Policy Guidelines: A Template for Action (D.A. Wilhite). Integrated Drought Management Programme (IDMP). Tools and Guidelines Series 1. WMO, Geneva, Switzerland and GWP, Stockholm, Sweden.
2. El Nino: overview of impacts, projected humanitarian needs and response, OCHA March 2016
3. The IPC is a means to classify varying phases of current food security situations based on outcomes on human lives and livelihoods. The IPC includes five levels of food security (called 'phases'): Starting from phase 1 that is Food Secure to moderately/Borderline Food Insecure, Acute Food and Livelihood Crisis, Humanitarian Emergency and Famine/Humanitarian Catastrophe.
4. <http://www.bbc.com/news/world-latin-america-36145184>
5. El Nino: overview of impacts, projected humanitarian needs and response, OCHA March 2016
6. <http://www.reuters.com/article/us-philippines-farmers-idUSKCN0WY3SV>
7. Dai, A. 2011. Drought under global warming: a review. WIREs Climate Change, Vol. 2, Page 45 – 65. The map uses a measure called the 'Palmer Drought Severity Index'. A reading of '-4' or below is considered extreme drought. Those in the red and purple spectrum could face more unusually extreme drought conditions. The map is not intended as forecast because the actual course of projected GHG emissions and natural climate variations could alter the drought patterns. Instead, the map illustrates the potential for future droughts worldwide in the coming decades, based on current projections of future GHG emissions.
8. Surprisingly, drought risk normalized by GDP density does not seem to be as significant in Asia despite a high reliance on agriculture. This could reflect the underreporting of historical losses or low vulnerability to drought thanks to irrigation (World Bank, 2005).
9. Wilhite, Donald A. et al (2014): Managing drought risk in a changing climate: The role of national drought policy, Weather and Climate Extremes 3, p. 1.
10. World Meteorological Organization (WMO) and Global Water Partnership (GWP). 2016. Handbook of Drought Indicators and Indices. (M. Svoboda and B.A. Fuchs). Integrated Drought Management Programme (IDMP). Integrated Drought Management Tools and Guidelines Series 2. Geneva.

Cover: Albert González Farran, UNAMID <https://www.flickr.com/photos/unamidphoto/12045697505/in/album-72157633900591820/>

Cover inside: Md. Khallid Rayhan Shawon, UNCCD Photocontest 2014

p.2: EU/ECHO/Anouk Delafortrie, <https://www.flickr.com/photos/69583224@N05/26340485346/in/album-72157664723888424/>

p.4: Ismael Alonso, <https://www.flickr.com/photos/soyignatius/6285527276/sizes/o/>

p.8: Albert Gonzalez Farran, UNAMID, https://www.flickr.com/photos/unep_dc/13538502433/sizes/o/

p.10: Imal Hashemi/Taimani Films/World Bank

p.13: Tri Saputro www.trisaputro.com for CIFOR.

p.15: Ollivier Girard for Center for International Forestry Research (CIFOR), <https://www.flickr.com/photos/cifor/8637096618/in/set-72157647483472355>

p.16: Fobin Jones/UN Photo

p.17: Georgina Smith, (CIAT), <https://www.flickr.com/photos/ciat/22664641188>

p.19: Ricardo Spencer, UNCCD Photocontest 2014

ISBN English e-copy and paper ccopy

978-92-95110-27-4

978-92-95110-28-1





United Nations Convention to Combat Desertification
UN Campus, Platz der Vereinten Nationen 1, 53113 Bonn, Germany
Postal Address: PO Box 260129, 53153 Bonn, Germany
Tel. +49 (0) 228 815 2800
Fax: +49 (0) 228 815 2898/99
E-mail: secretariat@unccd.int
Web-site: www.unccd.int