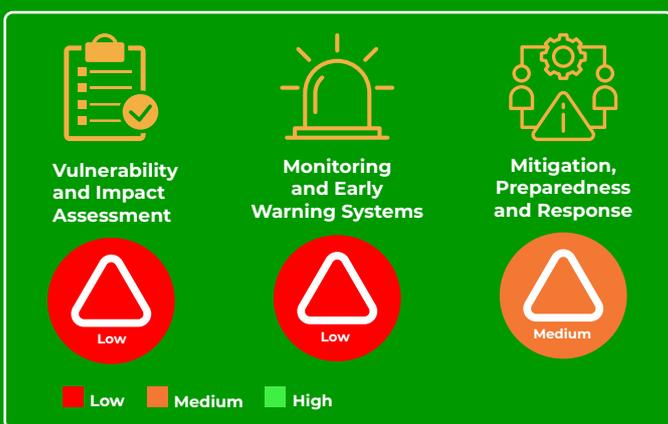
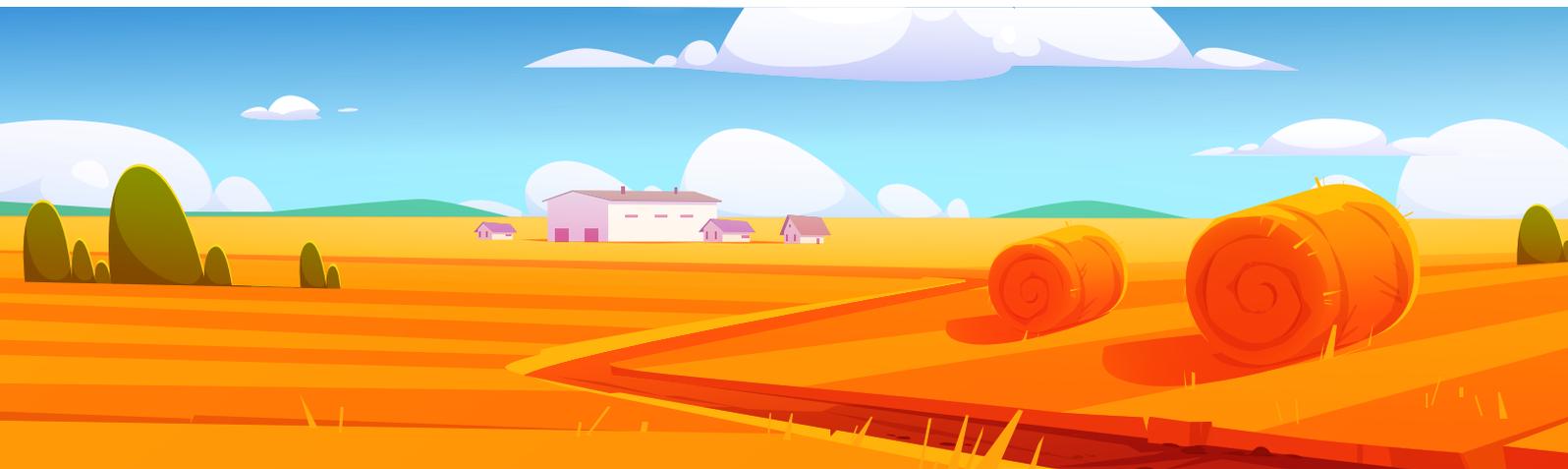


COUNTRY OVERVIEW

Madagascar is a low-income country with an estimated population of 26.97 million with a gross domestic product (GDP) per capita of USD 523.36 in 2019. The country is ranked 164 out of 189 on the Human Development Index. Almost 75% of the population lives on less than USD 1.90 a day. Madagascar is prone to natural disasters including drought. Recent estimates of annual damage/losses from natural disasters is USD 100 million. Over the past six years (2015/16-2020/21) southern Madagascar has experienced five below-average rainy seasons. The current drought affecting the 2020/21 season is the worst the country has experienced in the past decade. Between 2020-2021, the estimated number of people who need humanitarian assistance, particularly in southern Madagascar (that has experienced three years of drought), is 1.5 million people—half the region’s population. This has caused a massive decline of crop and livestock production (up to 60% losses in some southern areas) and has limited people’s access to food and water. The drought has also led to decreased wildlife foods, green maize, vegetables and wild gourds by 80% in 2020. Those experiencing “crisis” or “emergency” hunger conditions are mostly vulnerable groups such as women and children. Of the ten hardest-hit southern districts, Amboasary is the epicenter. A World Food Program (WFP) assessment conducted in 2020 in Amboasary found that three out of four children had quit school – mostly to help their parents forage for food.



This profile provides a background of Madagascar’s drought resilience capacity in the three pillars. Madagascar’s vulnerability and impact assessment capacity can be regarded as low due to the scarcity of data, and limited access to climate information by different end users.

Madagascar’s monitoring and early warning system (EWS) capacity is also categorized as low due to the slow progress made to improve the country’s capacity in drought monitoring and EWS. There is currently limited coordination and effective communication channels to disseminate drought warning information. The country also does not have a strong EWS and several international partners have also begun to provide support in this regard.

Finally, the Government of Madagascar (GoM) has made good progress to move from a reactive, post-disaster relief approach to proactive disaster risk management and measures to increase climate resilience. With the adoption of its first National DRM Strategy (Stratégie Nationale de Gestion des Risques et des Catastrophes, SNGRC) in 2003, the GoM was one of the first in sub-Saharan Africa to establish a comprehensive framework for disaster preparedness, response, recovery and prevention. Despite this progress, Madagascar’s DRM policy framework still has several strategic, financial and sectoral shortcomings. Clarity on institutional roles and responsibilities across public sector institutions responsible for DRM policy and practice could be improved. Its capacity in drought mitigation, preparedness and response is therefore categorized as medium.



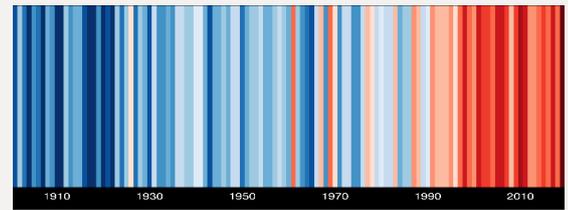
This document provides a brief overview of drought risk issues. The key resources at the end of the document provide more in-depth country and sectoral analyses. The contents of this report do not necessarily reflect the views of the World Bank, CIWA, NDMC or IWMI.



Historical climate

- As illustrated in the #ShowYourStripes 'warming stripe' graphic in Fig. 1, the stripes for Madagascar turn from mainly blue to mainly red in more recent years, illustrating the rise in average temperature since 1901.
- Mean annual temperature is 22.5°C (1901-2016). High daily temperature variation across all seasons with higher temperatures and reduced rainfall in the northern parts of the country and increased rainfall in the southern parts of the country.
- Between 1961 and 2005, 17 of the 21 weather stations recorded statistically significant increases in daily minimum temperatures across all seasons and several stations indicated increased daily maximum temperature trends.
- Mean annual precipitation is 1419.5mm (1901-2016).
- In the central and east coastal regions, rainfall was on a steady decline between 1961 and 2005, accompanied by increases in the length of dry spells (World Bank, 2021).

Fig 1. Temperature change in Madagascar, 1901-2019



Source: Berkley Earth/#ShowYourStripes

Future climate

- While variation across models exists, temperature is expected to rise by 1.2°C – 2.1°C by 2050 (USAID, 2018).
- By 2065, in the southern part of the country, rainfall is projected to increase during the summer months of January-April, and again in October-November. Projected changes in rainfall are less certain for the north, with some models suggesting drier and others suggesting wetter conditions (World Bank, 2021).
- The frequency of cyclone is expected to decrease over the Indian Ocean at the star of the cyclone season by 2100.

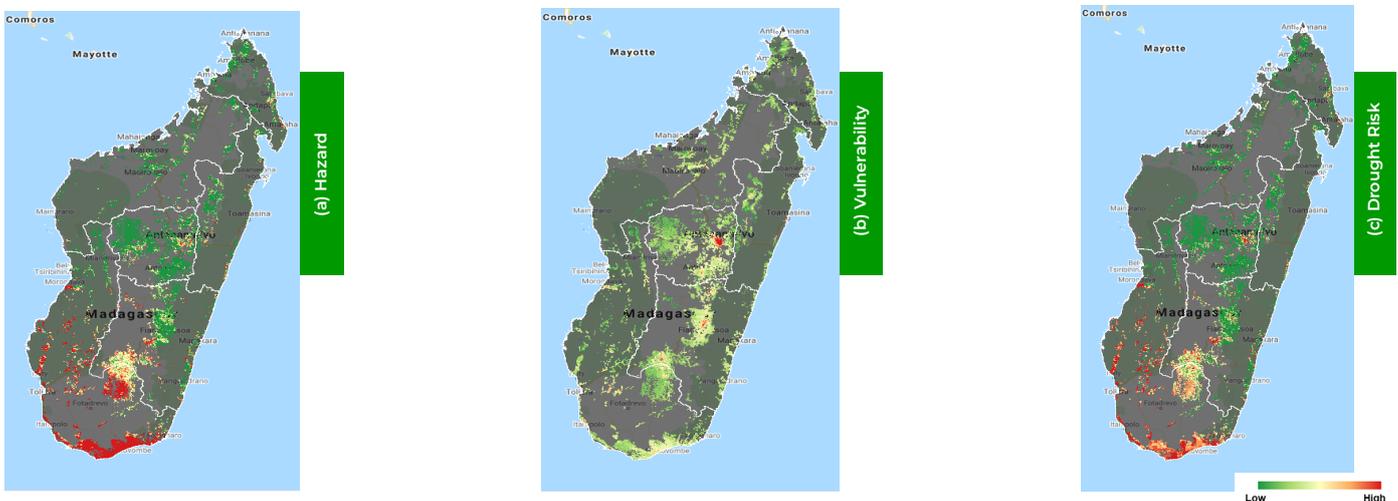
Table 1. Major droughts in Madagascar (Source: EM-DAT, 2020)

Year	Location	Affected Population
1981	Toliary, Tolagnaro	1,000,000
1988	Southern region	950,000
2000	Anosy, Androy, Atsimo Andrefana, Alaotra Mangoro, Atsinanana, Vakinankaratra	231,290
2002	Southern region	600,000
2005	Atsimo, Atsinanana	14,000
2008	Atsimo Andrefana, Androy, Anosy	720,000
2014	South-West regions	20,000
2016	Androy, Anosy, Atsimo Andrefana	1,140,000
2018	South, South East regions	1,260,000
2020-21	Southern region	1,300,000

Vulnerability and Impact Assessment



Fig 2a-c. Drought hazard, vulnerability and risk maps for Madagascar



The above maps (Fig 2a-c) depict drought hazard areas (a), areas of vulnerability (b) and drought risk (c). Drought risk is defined by characterizing hazard and exposure to vulnerability and the lack of adaptive capacity, using multisource information from satellite-derived drought indices and socio-economic conditions. In terms of components, hazard is defined through meteorological and agricultural drought i.e. Integrated Drought Severity Index (IDS); and exposure and vulnerability expressed through population density, human modification index, water risk, and irrigated systems.

Vulnerability and Impact Assessment



Agricultural production (agricultural practices i.e. irrigated area, food production as provided on HarvestChoice) was used to define levels of vulnerability which were finally combined with all three components to define levels of drought risk at the country level, referred to as the National Drought Risk Index (NDRI). The drought risk profile is therefore based on the probabilistic estimation of hazard and vulnerability to assess the drought risk in the exposed areas.

The impacts of drought differ across all regions hence their severity and intensity differ. However, more of the southern and central regions are affected as shown by the patches of red colours which measure vulnerability.

Water resources

The domestic renewable water resources in Madagascar are estimated to be 337 km³/year, with renewable surface water resources estimated to be 332 km³/year and groundwater at 55 km³/year, with a shared part between surface waters and groundwater at 50 km³/year (WaterAid, 2016). The 13 largest reservoirs have a total capacity of about 493 million m³, with 108 million m³ allocated to irrigation and 385 million m³ for hydropower generation (ibid).

Climate variability, primarily reduced rainfall and higher temperatures, could impact Madagascar's water resources, as rivers and rainfall are the primary source of water for agricultural use, household consumption and energy generation. Although fairly abundant, the country's water resources are unequally distributed geographically and underexploited; shortages are common in the east and south, and only about 4% of the country's available water is utilized.

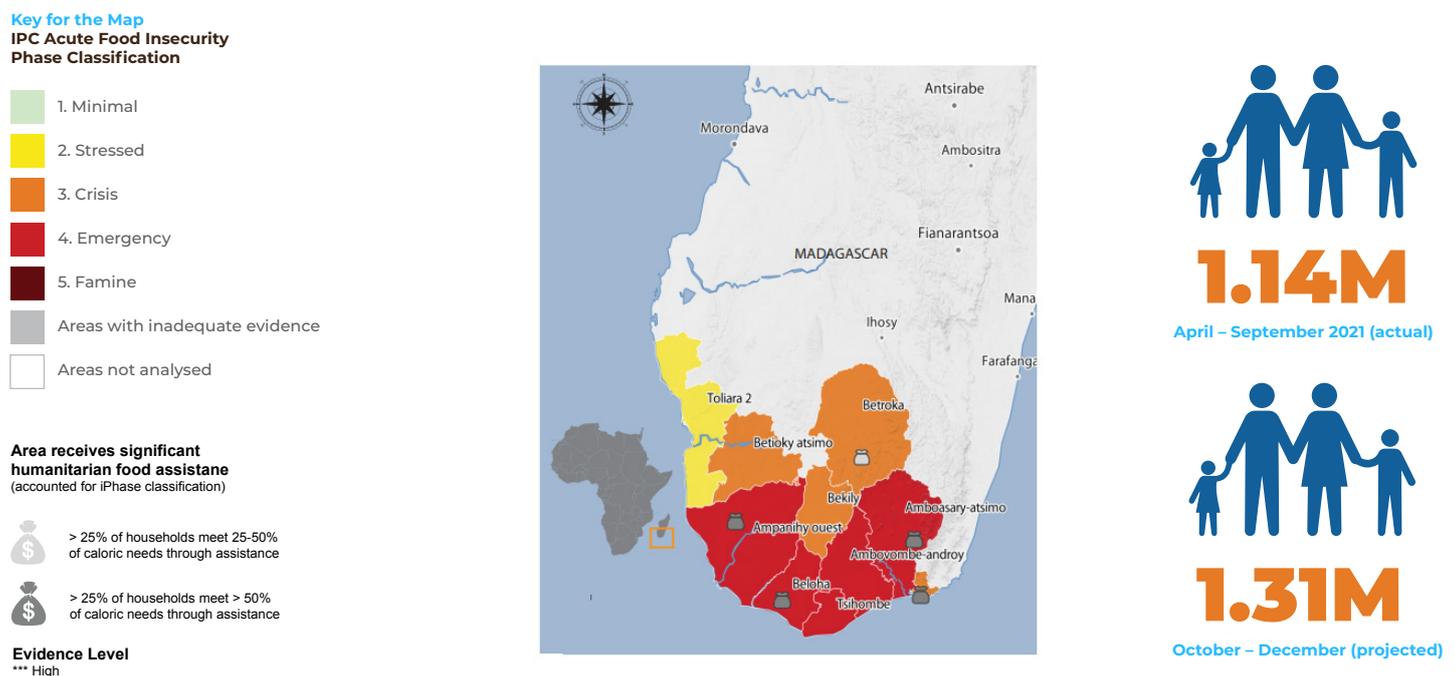
Table 2. Water resources availability in Madagascar (Source, WaterAid, 2016)

Renewable Water Resources		
Average rainfall	1,513	mm/an
Domestic renewable water resources	337	10 ⁹ m ³ /an
Total actual renewable water resources	337	10 ⁹ m ³ /an
Dependency ratio	0	%
Per capita renewable water resources 2004	18,826	m ³ /an
Total capacity of dams 2002	493	10 ⁶ m ³

Reduced rainfall as well as higher spatial and temporal variability of rainfall, and higher temperatures will exacerbate these water shortages and increase demand for irrigation, further straining water resources. Poor management of water infrastructure and increasing demand from a growing population also contribute to the sector's vulnerability. More than 58% Madagascar's people lack access to safe drinking water and nearly half of all households live without sanitation facilities (USAID, 2021).

Drought impacts on food security

Fig 3. Acute food insecurity map, October – December 2021



Vulnerability and Impact Assessment



The below average rainfall across southern and central Madagascar continues to affect the cropping system in the country. There is also high spatial and temporal rainfall variability which affects crop production.

For the period April – September 2021, around 1.14 million people out of the 2.7 million people of the Grand South of Madagascar analyzed were estimated to be facing high levels of acute food insecurity (IPC Phase 3 or above), of which nearly 14,000 people were in Catastrophe (IPC Phase 5).

Projected figures for the period October to December 2021, corresponding to the lean season period, with insufficient food stocks, high prices of staples due to COVID-19 and related restrictions and poor employment opportunities, estimate that the situation will worsen, with 1.31 million people of the Grand South likely to face high levels of acute food insecurity (IPC Phase 3 or above), including 28,000 people in Catastrophe (IPC Phase 5) (IPC, 2021).

Three years of consecutive severe drought from 2018 to 2021 have debilitated harvests and hampered people's access to food in the southern region. Of the ten hardest-hit southern districts, Amboasary Atsimo is the epicenter, with nearly 14,000 people affected by extreme lack of food and basic services, even with full employment of coping strategies (ibid).

Drought impacts on agriculture

Approximately 70% of the Malagasy population is engaged in agriculture, dominated by rain-fed, small-scale subsistence farming. Poor harvests, as a result of climate extremes, have created a vicious cycle of poverty.

In December 2020, food prices remained above 2019 and five-year average levels, especially in large cities, and prices of staple foods remained particularly elevated due to drought. This mainly affected harvests of major foodstuffs (rice, maize, cassava), with reductions of at least 60% overall compared to the averages of the last 5 years.

In 2021, the situation is particularly acute, with reduced agricultural output, in combination with the adverse effects of the COVID-19 pandemic, expected to aggravate the current severe food insecurity situation (FAO, 2021). Rapid assessments conducted by FAO in mid-January indicated that the bulk of interviewed farmers planted crops later-than-usual and reduced the area sown, citing insufficient rainfall as a primary reason, coupled with a lack of seeds. Farmers also have low production expectations, with almost all respondents estimating they would harvest less than 60% of their planted crop (ibid).

Vulnerability and impact assessment capacity

In terms of the policy and enabling environment for drought vulnerability and impact assessment, in 2010, Madagascar formulated a National Climate Change Policy. The policy aimed at promoting measures to reduce the country's vulnerability to climate change and emissions of greenhouse gases, and to develop behaviors that will help in the fight against climate change. In parallel to the National Climate Change Policy, the country also has the national strategic framework for climate change adaptation in place which is contained in the National Climate Change Policy (2010) and the National Adaptation Program of Action (NAPA) (2006).

Secondly, although the availability of data is scarce, there exist several attempts aimed at estimating the impacts of extreme weather on household welfare, most often measured through consumption- (or income-) related variables. Madagascar conducts local risk and vulnerability assessments to inform

adaptation options. This is done in collaboration with the district- and regional-level disaster risk management committees, as well as national entities such as the Direction Générale de la Météorologie (DGM), Bureau National de Coordination des Changements Climatiques (BNCCC), Cellule de Prévention et de Gestion des Urgences (CPGU), and the Bureau National de Gestion des Risques et Catastrophes (BNGRC), with international initiatives such as the Famine Early Warning Systems Network (FEWS-NET), Pilot Program on Climate Resilience (PPCR), USAID-NASA SERVIR and Enhancing National Climate Services (ENACTS).

In addition, the government of Madagascar executed the PUIRV-A3 project and the prevention and emergency management unit in the Prime Minister's Office with funding from the World Bank. The project's aim was to improve the country's preparedness for disasters and build resilience to natural and anthropogenic hazards (GoM, 2018). Through the project, the hydro-meteorological monitoring network was strengthened and it also improved the early warning systems (EWS) in municipalities. The prevention and emergency management unit provides capacity needed for emergency response. Capacity building on the use of the EWS tools is provided to technicians in order to make the diffusion of alerts more effective before, during and after hazards in the impacted zones (GoM, 2018).

Several external aid partners have supported the Government of Madagascar (GoM) with vulnerability and/or impact assessments. Between July and October 2017, different analyzes – including the Early Warning-Early Action (EWEA)/SISAV, Crop and Food Security Assessment Mission (CFSAM) and the Integrated Phase Classification (IPC) – were conducted, and pointed to the lean period starting earlier than usual, i.e. in the beginning of October rather than January. The first signs were already there in a bulletin from EWEA/SISAV in April 2017, which forecast a rapid depletion of food stocks due to a combination of years of poor consecutive harvests and an expected increase in the vulnerability of subsistence farmers. The bulletin recommended action to support the most at risk households with sustainable activities to protect their livelihoods and to prepare them for the next agricultural season. A joint WFP/FAO Crop and Food Security Assessment mission was also conducted in July and August 2017 and pointed to below-average harvests.

Despite these efforts, most local governments have limited access to relevant and regular climate information and a lack of experience with how to put this information to use. The inability to access and use relevant climate information restricts local government capacity to anticipate and act on emerging climate risks and these may hinder timely investment on adaptation over time. Farmers also suffer as a result of a lack of information such as rainfall data, mostly available at the central level but not available to farmers, and not context-specific for different regions. Several projects have sought to address this, such as the GIZ-funded Adaptation of Agricultural Value Chains to Climate Change (PrAda) project, from 2019-2021.



Vulnerability and Impact Assessment



This project supported the meteorological institute in collecting and processing data, as well as developing a model to determine moisture levels in the soil. For some agricultural crops, harvest calendars were developed and updated and digitalized so that farmers could access them on their mobile phones. However, the sustainability of these interventions in contributing to on-going vulnerability and impact assessment capacity, remains to be seen.

Monitoring and Early Warning Systems



Monitoring and early warning systems capacity

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

Table 3. Summarized checklist of monitoring and EWS capacity

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

● Yes
 ● No
 ● Limited

Despite Madagascar being one of the 10th most vulnerable countries to climate change, its EWS capacity has been limited until recently. The little EWS and monitoring information that has been available is often difficult for local governments to interpret and is not tailored for a specific area and/or user. Madagascar has been further constrained by its limited observation infrastructure. Madagascar has 19 active stations operated by the Directorate General for Meteorology (DGM) and four stations operated by the Agency for Aerial Navigation Safety in Africa and Madagascar (ASECNA). However, there is still a need for more professional staff or technicians and strengthened skills and capacity in this regard. Available funding could be channeled towards meeting human resources, equipment and transport expenses.

Good strides have however been made to improve the country's capacity in drought monitoring and EWS. Several international partners have also begun to provide EWS support. Working with national governments and humanitarian, development and scientific partners, FAO's Early Warning Early Action (EWEA) program in Madagascar monitors risk information systems and translates warnings into anticipatory actions. Every quarter, FAO's EWEA report on food security and agriculture ranks risks by their likelihood and potential impact and identifies options for intervention (FAO, 2019).

Funding channeled through the Special Fund for Emergency and Rehabilitation Activities (SFERA) Early Action Window enables partners such as FAO to act early and reduce the impact of crises. Early actions are varied and flexible, ranging from cash transfers for fishing communities to safely store their nets ahead of an impending cyclone, to livestock treatments for herders as a drought approaches, to flood defenses before a severe rainy season to protect crops (ibid).

There are also informal platforms and technical committees that have been established to promote the dissemination of climate information and services. One is the Thematic Climate Change Group (GT-CC), established in 2009 which has been particularly active in the dissemination of information among stakeholders (Nachmany, et al, 2015). As of 2015, the GT-CC had 48 member institutions representing the national ministries, NGOs and cities, civil society, technical partners and financial and research institutions (ibid).

Similarly, partnerships with the private sector are also being explored. With funding by the European Union (EU), the National Office for Risk and Disaster Management (BNGRC) and Medair, in close collaboration with Viamo and the General Directorate of Meteorology (DGM) and Earth Networks, has developed the 9-3-0 hotline that can be reached 24/7 with unlimited calling capacity and is available from the country's three phone operators: Airtel, Orange and Telma. The hotline delivers warning messages and awareness of social behavior change on climate risks to the general public. Targeted messaging is also available for local authorities on the rapid occurrence of hazards including the date of occurrence, the place, the causes and the impacts of an accident on humans, habitats, transportation and communication. Although most of the content on the 9-3-0 hotline is delivered via interactive voice response (IVR), information may also be requested to best receive and transmit information for an individual. Finally, automated SMS alerts can be activated and inform the local population of imminent danger.

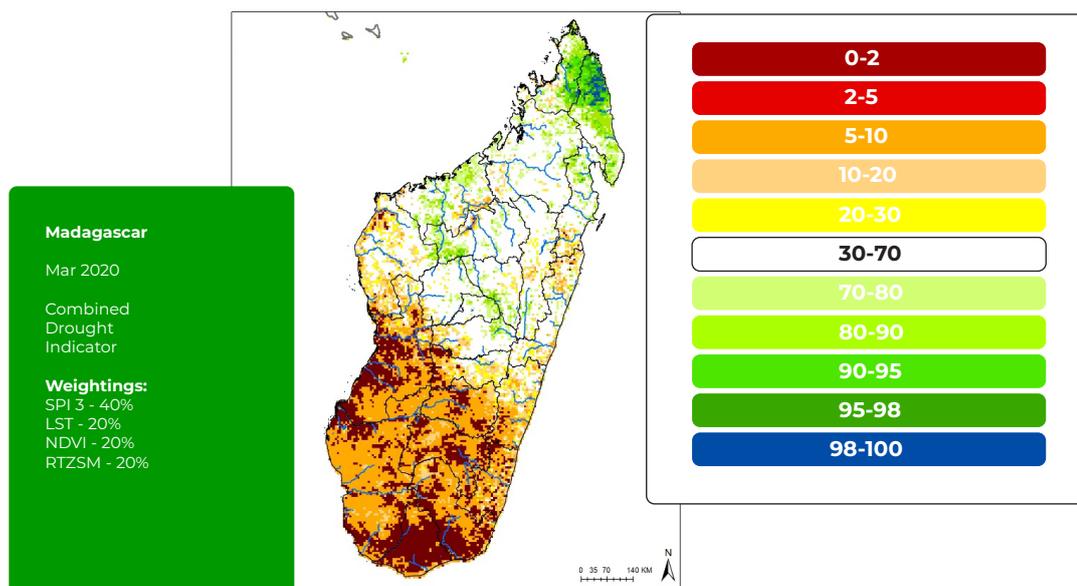


Combined Drought Indicator (CDI)

Using a combined drought indicator (CDI) approach, the National Drought Mitigation Center (NDMC) at the University of Nebraska-Lincoln, in partnership with the World Bank, has developed a Drought Monitor that represents a consolidation of indices and indicators into one comprehensive drought map. The CDI map for Madagascar was created using a weighted combination of four indicators of drought: precipitation, vegetation stress, land-surface temperature and soil moisture. March 2020 was selected to depict the severity of the most recent drought. March, being the end of the rainy season when more rain is expected, provides an assessment of the drought's magnitude (duration and intensity), spatial extent, probability of occurrence and impacts. The March 29 2020 CDI map shows the south and central part of the country severely impacted by some degree of drought.

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

Fig 4. Combined Drought Indicator for Madagascar, March 2020



Source: NDMC, 2021

Mitigation, Preparedness and Response



Drought policy framework

The GoM has started to shift its focus from post-disaster relief operations to proactive DRM and measures to increase climate resilience. Since 2015, the country has made important progress in strengthening its DRM framework, that includes drought. The GoM has adopted a strong DRM policy framework and a range of strategies for DRM and climate change adaptation, both sectoral and cross-sectoral ones, such as the Politique Nationale de Gestion des Risques et des Catastrophes (National Disaster Risk Management Policy; Law 2015-031) and the Stratégie Nationale de Gestion des Risques et des Catastrophes 2016–2030 (National Disaster Risk Management Strategy 2016–2030). Furthermore, the 2019–2023 Stratégie Nationale de Protection Sociale (National Social Protection Strategy) and the 2018 Politique Nationale de Protection Sociale (National Social Protection Policy, Law 2017-028) foresee the establishment of a social protection system that is shock-responsive and will allow to channel disaster assistance to disaster-affected poor. Other relevant policies include the National Multi-Risk and Multi-hazard Contingency Plan, the National Action Plan for Adaptation (NAPA) 2006, the National Environmental Action Plan (NEAP) 1989, Plan Emergence Madagascar (PEM, 2019-2023), the Poverty Reduction Strategy Paper (PRSP) and Madagascar Action Plan (MAP) 2006, National Development Plan (NDP) 2010 and Initiative Emergence Madagascar (IEM) 2019. In addition, Madagascar has also signed on to several international agreements that reflect its commitment to addressing climate change vulnerabilities, such as the Sendai Framework for Disaster Risk Reduction 2015 – 2030 and the Hyogo Framework 2005 – 2015.

With the adoption of its first National DRM Strategy (Stratégie Nationale de Gestion des Risques et des Catastrophes, SNGRC) in 2003, the GoM was one of the first in sub-Saharan Africa to establish a comprehensive framework for disaster preparedness, response, recovery and prevention. The strategy led to the establishment in 2005 of the National Disaster Risk Management Council (Conseil National de Gestion des Risques et de Catastrophes) (CNGRC) under the Prime Minister's Office (PMO) and a National DRM agency, the Bureau National pour la Gestion des Risques et des Catastrophes (BNGRC) under the Ministry of Interior and Decentralization (MID). Concurrently, the country also prepares National Disaster Contingency Plans on an annual basis with the support of UN-OCHA to guide actions during disasters including drought.

In addition, Madagascar also developed its Strategic Program for Climate Resilience (PPCR) as a mechanism to build spatial, sectoral, community and infrastructure resilience to climate change impacts. Also, the disaster risk financing mechanism for drought with the African Risk Capacity (ARC) is operational to cover the population affected by drought in the south of the country.

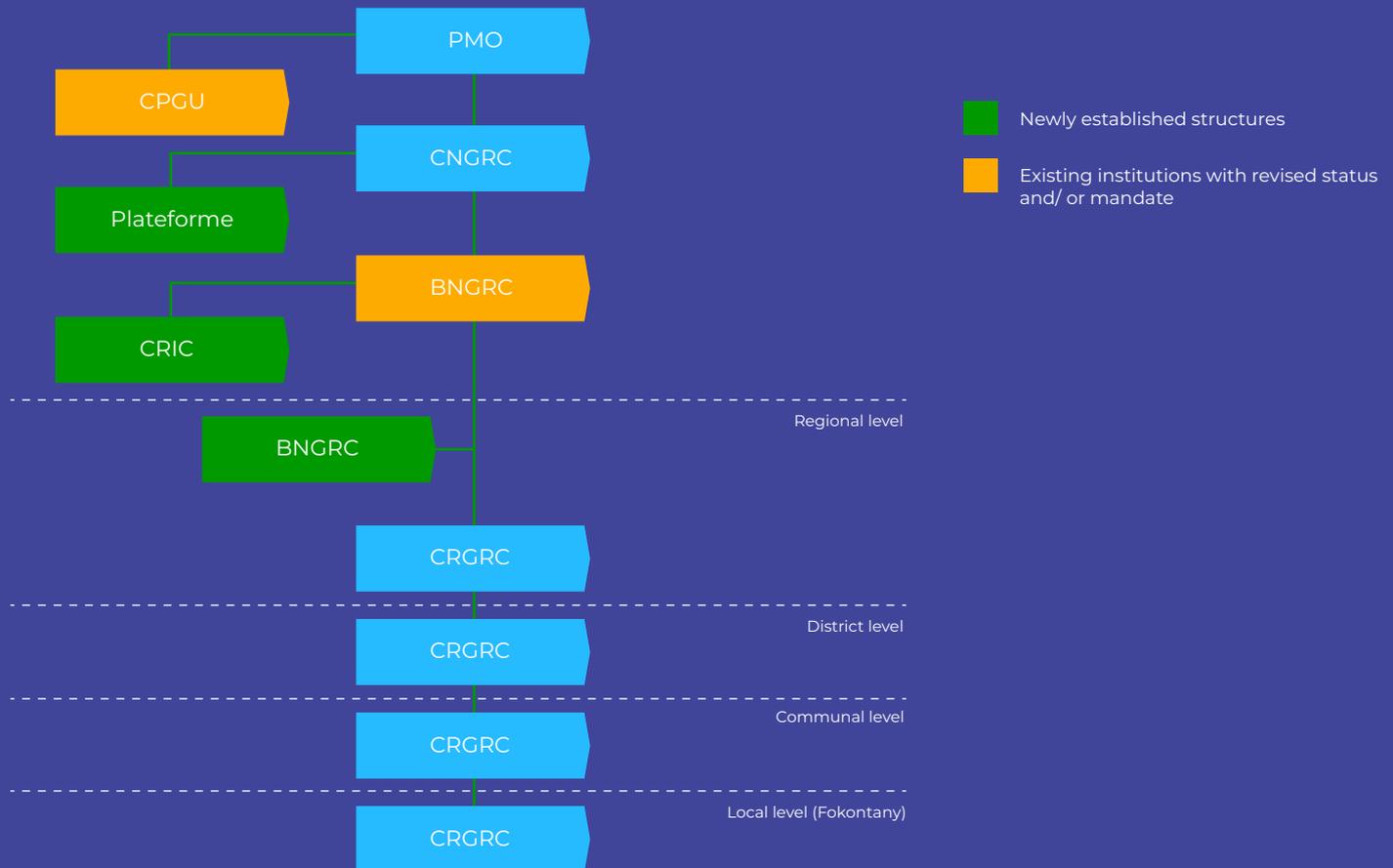
Mitigation, Preparedness and Response



Despite this progress, Madagascar's DRM policy framework still has several strategic, financial, and sectoral shortcomings. Clarity on institutional roles and responsibilities across public sector institutions responsible for DRM policy and practice could be improved. In addition, the role of social protection in DRM needs clearer operational definition regarding public sector inter-institutional coordination as well as engagement with humanitarian and development actors. As a result, disaster response capacity across national institutions and even more on a decentralized level is weak and the resilience of key sectors is limited.

It also still reflects a position of drought being embedded, and arguably not prioritized, in disaster management efforts. The World Bank and GoM have undertaken to address these challenges in an integrated way (see World Bank 2019).

Fig 5. Madagascar's drought institutional framework



Source: World Bank, 2019

Legend

- BNGRC- National Disaster Risk Management Agency (Bureau National de Gestion des Risques et des Catastrophes)
- BRGRC- Regional DRM Agency (Bureau régional de Gestion des Risques et des Catastrophes)
- CCGRC- Municipal Committee for DRM (Comités de District de Gestion des Risques et des Catastrophes)
- CDGRC- District Committee for DRM (Comité Communal de Gestion des Risques et des Catastrophes)
- CNGRC- National Disaster Risk Management Council (Conseil National de Gestion des Risques et de Catastrophes)
- CPGU- Emergency Management and Prevention Unit (Cellule de Prévention et d'Appui à la Gestion des Urgences)
- CRGRC- Regional Committee for DRM (Comité Régional de Gestion des Risques et des Catastrophes)
- CRIC- Disaster Response Coordination Mechanism (Comité de Réflexion des Intervenants aux Catastrophes)
- ELS- Local Rescue Team (Équipe Locale de Secours)
- Plateforme- Refers to the inter-ministerial technical coordination platform for DRM
- PMO- Prime Minister's Office



Institutions and coordination

In recent years, Madagascar has focused on improving its DRM institutional capacity and drought is addressed within these institutional arrangements. However, no dedicated institution and/or inter-sectoral task force exists that addresses drought specifically.

While the law established the overall DRM framework, its operationalization required the adoption of the following decrees: (a) a decree regulating Law No. 2015-031 of February 12, 2016, on National Disaster Risk Management; (b) a decree revising the organization, functioning, and role of the CPGU and (c) a decree revising the organization, functioning, and role of the BNGRC. These decrees were adopted in October 2019. The roles and responsibilities of the two primary organizations overseeing DRM in Madagascar were therefore clarified.

The PMO oversees the overall DRR operations of all sectors. The country has an Emergency Prevention and Management Unit (Cellule de Prévention et Gestion des Urgences) (CPGU) which is a technical unit within the PMO, managing DRR with the support of partners such as the UN and World Bank. The role of the CPGU is to assist the Prime Minister in his role as Chair of the CNGRC and liaises with all ministerial departments. The CPGU also chairs the national platform for disaster risk reduction which is established under the new framework to improve synergies and ensure coordination between all stakeholders, to promote the integration of disaster risk reduction into sectoral development policies and programs (World Bank, 2019).

The country also has the National Disaster and Risk Management Office (Bureau National pour la Gestion des Risques et des Catastrophes) (BNGRC), established in 2006 by the Government through the MID. BNGRC is the central operational structure for DRM and its role is to coordinate and implement the National DRM Strategy and to manage the National Disaster Fund. The BNGRC has decentralized, regional DRM offices in most regions. These offices are responsible to improve the capacities and response during emergencies. BNGRC further supports the Council for National Risk and Disaster Management (CNGRC) under the MID and provides disaster prevention, organization and management in case of an emergency, including drought (ibid).

The GoM also established the Stakeholders Committee for Reflection on Disaster (Comité de Réflexion des Intervenants en Catastrophes – CRIC) in 1999, initially as a think tank to engage on disaster-related matters, and later, in 2003, operated as a national platform for disaster risk reduction.

Apart from this committee, there are also numerous committees in the country that help in the management of drought and other natural disasters. These include: the Regional Disaster Risk Management Committee (CRGRC); the District Disaster Risk Management Committee (CDGRC); the Municipal Disaster Risk Management Committee (CCGRC) and the Local DRM Committee in Fokontany village (CLGRC).

The role of non-governmental organizations (NGOs) in Madagascar regarding DRR is also extremely important. Some NGOs are supported by the EU's Directorate General for Humanitarian Aid (ECHO) through its Disaster Preparedness Program called DIPECHO, and have developed practices in community resilience, food security and hazard-resistant buildings. While this institutional framework reflects a complex and well-established structure, coordination is a challenge. In addition, drought management is but one of the many priorities and oftentimes, gets overshadowed by sudden-onset events requiring more immediate humanitarian assistance such as cyclones, floods or bushfires.

Mitigation, preparedness and response capacity

While the GoM and partners have implemented a range of interventions to alleviate impacts prior to or during drought, they are still primarily oriented towards emergency relief, and rely heavily on humanitarian assistance.

During times of emergency, the GoM, in coordination with the private sector, NGOs and the international humanitarian community, develop a National Response Plan (NRP) that focuses on providing food and nutritional assistance to the populations that are classified under the IPC as crisis and emergency phases.

In addition, the NRP, developed under the leadership of the BNGRC, is a multi-sectoral response that also includes interventions in education, health, nutrition, protection, water, sanitation and hygiene.

But even the NRP is not fully funded. The most recent NRP, implemented up to May 2021, had an unmet need of USD 81.3 million, due to humanitarian partners' resources being depleted after responding to multiple emergencies.

In addition to the NRP, the United Nations Resident Coordinator launched a Flash Appeal, which complemented the NRP, and was implemented with the support of the Office for the Coordination of Humanitarian Affairs (OCHA) and the Humanitarian Country Team (HCT). The HCT brings together the humanitarian agencies of the United Nations system, international NGOs and the Red Cross in close coordination with the Government's Ministries.

However, the Flash Appeal focused solely on the most urgent life-saving and life-sustaining needs of communities in the south during the peak of the lean season.

It will therefore need to be complemented by other forms of interventions which tackle the root causes of the crisis and the underlying vulnerabilities of the communities affected, linking to the medium and long-term priorities led by the Government in the affected areas.

These include complementarity between shock-sensitive social protection, and humanitarian cash transfers; and implementation of an integrated development strategy that addresses the root causes of the cyclical crisis in the south.

Mitigation, Preparedness and Response



In terms of food assistance, organizations in the food security sector such as government, international development partners, and NGOs, provide assistance to 35% of the population in IPC 3 and 4 phases. During both response phases, organizations such as WFP work closely with FAO, USAID and other food security and livelihoods cluster members to ensure that the assistance provided is complementary to disaster affected communities and also strengthening their resilience to future shocks.

The Rapid Crop and Food Security Assessment was also carried out in September 2020 in the southeast. It was found that in Manakara, Vohipeno, Farafangana and Vangaindrano many poor households were facing difficulty meeting their non-food needs, driven by COVID-19 related impacts combined with the effect of flooding on rice crops earlier in the year. Large-scale humanitarian food assistance has been delivered in Ampanihy, Ambovombe, Amboasary, and Taolagnaro in December 2020 as a relief package.

Additionally, water supply and sanitation interventions also receive priority, particularly in the southern part of the country. The USAID has supported organizations such as Medair and UNICEF to restore access to safe drinking water, and to improve WASH conditions.

On average, while storms result in the emergency costs of USD14 million per year, more than droughts or floods, the average annual needs due to storm, drought, and flood combined are estimated to be around USD25 million. Total post-disaster expenditure has increased significantly from 2005 to 2015 (World Bank, 2019). Throughout, the GoM relied on donor support which, in most years, far exceeded government contributions (Fig. 6a). Expenditures by the GoM ranged from USD3 million to USD17 million over 2005-2015 (Fig. 6b).

Total post-disaster expenditure has increased significantly from 2005 to 2015 (World Bank, 2019). Throughout, the GoM relied on donor support which, in most years, far exceeded government contributions (Fig. 6a). Expenditures by the GoM ranged from USD3 million to USD17 million over 2005-2015 (Fig. 6b). In terms of drought financing, limited prearranged mechanisms are in place to finance disaster response, although this is being addressed through on-going efforts by the GoM and partners such as the World Bank (World Bank 2019). Financing disaster response has been a longstanding challenge for the GoM. In 2015, in the first three months after tropical storm Chedza and Fundi, the Government could only cover 6% of immediate needs. Until October 2019, when the GoM bought sovereign drought insurance from the African Risk Capacity, no prearranged mechanisms were in place to finance disaster preparedness and response in the country (ibid). The country now pays a premium of drought insurance to the ARC with the support of the African Development Bank (AfDB) through the African Disaster Risk Financing Initiative (ADRIFI). ADRIFI has financed the insurance premium for 2019-2020 with a view to the sovereign transfer of the drought risk to the GoM. In addition, the Pan-African Mutual Insurance Society for Drought Risk Management is one of the long lasting solutions to strengthen the efforts of the GoM and partners in the south, and demonstrates the mutual assistance between African countries in coping with natural disasters, particularly drought.

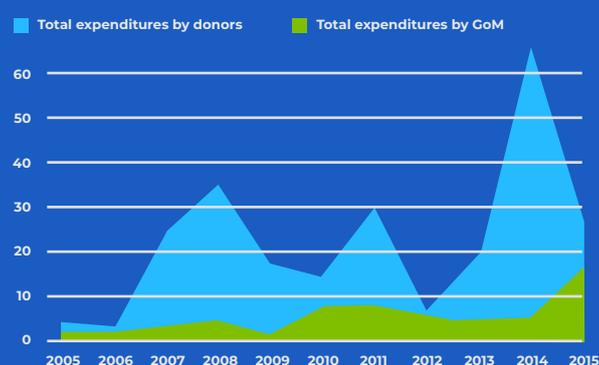
While the DRM policy outlines the establishment of a disaster fund, the management thereof is still at an early stage. As a result, the GoM has in the past relied on budget reallocations and development partners to cover response costs to a significant extent. Between 2005 and 2018, international donors have provided on average USD26 million per year to Madagascar in humanitarian response, reaching a high of USD67 million in 2017. Budget reallocations can have an opportunity cost if they divert funding from ongoing development projects; also, donor support is uncertain and sometimes slow to arrive. Through the Madagascar Disaster Risk Management Development Policy Grant with a Catastrophe Deferred Drawdown Option (Cat DDO) (P167941), the World Bank has provided the GoM with a prearranged source of funding and sets foundations for putting in place further, complementary financial instruments to increase the GoM's financial capacity to respond to disasters on time. A reserve fund, a contingent grant and sovereign insurance are currently being put in place or assessed by the GoM. A combination of pre-arranged sources to finance disaster response is typically more cost-effective than reliance on a single instrument. In addition, an assessment of expected emergency costs conducted by the World Bank found that by allocating USD4.5 million in a reserve fund, there is a 60% probability of exhausting the funds every year. Secondly, insurance is more expensive for covering low layers of risks than a reserve fund. Also, a reserve fund will not only provide quick liquidity for emergency response but can, if carefully designed and properly managed, increase accountability and make post-disaster spending more transparent (ibid).

Based on the summary of drought resilience in Madagascar provided in this profile, the following recommendations may be considered:

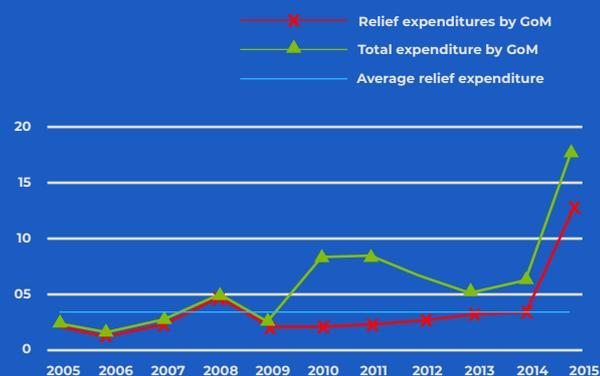
1. The development of a dedicated integrated drought strategy and plan to guide proactive planning and decision-making;
2. A drought preparedness and response plan that prioritizes longer-term resilience building in communities most affected by drought;
3. The implementation of more agriculture value chain programs to boost domestic production;
4. Strengthening coordination between different entities for better functionality in the management of drought and
5. Finally, there is a need for continued investment in early action for end-users to be able to reap longer-term development gains and increase resilience.

Fig 6 a-b. Post-disaster Expenditure by Development Partners and the GoM (USD, millions)

(a) By development partners and the GoM



(a) By the GoM





Recent drought resilience efforts by the international community

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

World Bank	GFDRR	UNICEF	UNDP/GEF
<p>Madagascar Disaster Risk Management Development Policy Grant with a Catastrophe Deferred Drawdown Option (Cat DDO) (P167941) Budget (USD): 50M Time Period: 2020–2023</p> <p>Support for resilient livelihoods in the South of Madagascar Budget (USD): 100M Time Period: 2021–2025</p> <p>AF (1-3) Social Safety Net Drought Response Budget (USD): 35M (AF1) Budget (USD): 90M (AF2) Budget (USD): 150M (AF3) Time Period: 2016–2022</p>	<p>Natural Disasters and Social Protection Systems in Madagascar: Shocks and Adaptation Strategies-Part 1 Budget (USD): 100K Time Period: 2019–2020</p> <p>Building Urban Resilience in Greater Antananarivo, Madagascar Budget (USD): 500K Time Period: 2018–2020</p> <p>Adapting Madagascar's Safety Net Programs to Climate Change Budget (USD): 250K Time Period: 2018–2020</p> <p>Social Resilience in Southern Madagascar Budget (USD): 850K Time Period: 2017–2020</p>	<p>WASH in Alaotra Mangoro, Analanjirofo, Atsinanana, and Sofia Regions Budget (USD): 501K Time Period: 2017</p> <p>Nutrition, WASH in Southern Madagascar Budget (USD): 1.6M Time Period: 2017</p> <p>WFP</p> <p>3,300 MT of Regionally Purchased Food in the Southern Madagascar Budget (USD): 2.7M Time Period: 2017</p> <p>3,100 MT of U.S. In-Kind Food Assistance in the Southern Madagascar and Cyclone-Affected Areas Budget (USD): 5.3M Time Period: 2017</p>	<p>Adapting Coastal Zone Management to Climate Change in Madagascar Considering Ecosystem and Livelihoods Budget (USD): 17,3M Time Period: 2014–2019</p> <p>Enhancing the Adaptation Capacities and Resilience to Climate Change in Rural Communities in Analamanga, Atsinanana, Androy, Anosy, and Atsimo Andrefana Budget (USD): 67,4M Time Period: 2016–2021</p> <p>AfDB/GEF</p> <p>Enabling Climate Resilience in the Agriculture Sector in the Southwest Region of Madagascar Budget (USD): 39,4M Time Period: 2014–2018</p>
<p>GIZ</p> <p>Adaptation of Agricultural Value Chains to Climate Change Budget (USD): 26,8M Time Period: 2016–2022</p>	<p>CARE</p> <p>Shelter and Settlements in Sava Region Budget (USD): 100K Time Period: 2017</p>	<p>Medair</p> <p>Risk Management Policy and Practice, WASH in Analanjirofo Region Budget (USD): 500K Time Period: 2017</p>	

References and data sources

1. ADB. (2016). Humanitarian emergency aid with the assistance with the fight against malnutrition following the recurring drought in the.
2. FAO. (2018). FAO against food insecurity and malnutrition in Madagascar, Comoros, Mauritius, Seychelles.
3. FAO (2019). Madagascar, Impact of Early Warning Early Action. Rome. 28 pp. Licence: CC BY-NC-SA 3.0 IGO.
4. FAO (2021). GIEWS Update. Madagascar. 9 February 2021.
5. FEWS-NET (2021). Below-average rainfall across southern and central Madagascar continues to affect cropping season. January 2021.
6. Government of Madagascar (GoM), (2018). Madagascar, a country resilient to the effects of hazards and protected from damage for sustainable development. Prevention and Emergency Management Unit - Prime Minister's office.
7. IPC (2021). Madagascar: Grand South. Integrated Food Security Phase Classification Snapshot, October – December 2021.
8. Matera, M.(2019). Appraisal Program Information Document (PID) - Madagascar Disaster Risk Management Development Policy Financing with a Catastrophe Deferred Drawdown Option (Cat DDO) - P167941 (English). Washington, D.C. : World Bank Group. <http://documents.worldbank.org/curated/en/625801573457194133/p-raisal-Program-Information-Document-PID-Madagascar-Disaster-Risk-Management-Development-Policy-Financing-with-a-Catastrophe-Deferred-Drawdown-Option-Cat-DDO-P167941>.
9. Nachmany, M., Fankhauser, S., Davidová, J., Kingsmill, N., Landesman, T., Roppongi, H., ... & Townshend, T. (2015). The 2015 global climate legislation study: a review of climate change legislation in 99 countries: summary for policy-makers.
10. USAID (2018). Climate risks in urban and urbanizing geographies. https://www.climate-links.org/sites/default/files/asset/document/180404_USAID-ATLAS_Climate-Risks-in-Urban-and-Urbanizing-Geographies-Madagascar_French.pdf.
11. USAID (2021). Water. Madagascar. <https://www.usaid.gov/madagascar/water>.
12. SADC-VAC, (2017). Madagascar Vulnerability Assessment Committee Results 2017.
13. UNDP. (2018). National report of the human development Madagascar.
14. WaterAid (2015). Country Programme Strategy 2016-2021: WaterAid Madagascar.
15. WaterAid (2016). Vitality & Vulnerability of water resources in Madagascar. Month of the Malagasy Language- June 2015.
16. World Bank (2016) Disaster risk profile Madagascar. GFDRR.
17. World Bank (2017). Estimation of Economic Losses from Tropical Cyclone Enawo.
18. World Bank (2019). Madagascar - Disaster Risk Management Development Policy Financing with a Catastrophe Deferred Drawdown Option Project (English). Washington, D.C. : World Bank Group. <http://documents.worldbank.org/curated/en/137521576465305187/-/Madagascar-Disaster-Risk-Management-Development-Policy-Financing-with-a-Catastrophe-Deferred-Drawdown-Option-Project>.
19. World Bank (2021). Madagascar. Climate Change Knowledge Portal. <https://climateknowledgeportal.worldbank.org/country/madagascar/climate-data-historical>.

Data Sources:

Climate Data: CHIRPS

Drought Risk : International Water Management Institute (IWMI)

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

Population Data: WorldPop

Livestock, GDP: FAO, World Bank

About the Southern Africa Drought Resilience Initiative (SADRI)

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