**Climate services assessment – existing capacities and needs in the Northern Districts of Zimbabwe**

**June 2017**

# Introduction

This assessment was conducted to inform development of a Green Climate Fund project proposal focused on building resilience of vulnerable and food insecure communities to climate variability and change in Zimbabwe. Specifically, the assessment aims at informing the development of a climate services component to inform appropriate climate risk management decisions and practice in food security and disaster risk reduction. Main objectives of the assessment were: (i) assess the Meteorological Services Department of Zimbabwe (MSD) capacity needs for improved climate services; (ii) assess needs for information/climate services of selected communities in target areas; (iii) collect preliminary information for the development of a communication/dissemination strategy; and (iv) recommend activities to be included in the GCF proposal with a view to address the gaps to support generation, delivery and use of climate services by targeted communities (end-users).

The assessment is divided in three sections:

**Section 1** - Overview of the capacity needs of MSD

**Section 2** - Overview of needs for climate/weather information of targeted communities in the project area

**Section 3** - Recommendations

The assessment was based on interviews and discussions with the Meteorological Services Department (MSD) of Zimbabwe, consultations with Agritex and MSD officers in Mount Darwin and Rushinga Districts, community consultations in Mount Darwin and Rushinga districts. The list of stakeholders interviewed is provided in **Annex 1**.

# Capacity Needs of the Meteorological Services Department of Zimbabwe (MSD) to provide user-informed climate services

Consultation with MSD staff took place on 30th June, 2017 and departments represented in the meeting included agro-met, public forecast, public relations. Some of the general information below (section 1.2) has been complemented by the assessment carried out by CADRI in 2016. The group discussions focused on the existing relevant policy and institutional frameworks; capacities for climate data management, climate monitoring, generation and provision of climate information to climate-sensitive sectors; and user-engagement.

Of particular relevance, MSD Director emphasized the: (i) good relationship with WFP and willingness from MSD to collaborate on joint activities under the GCF proposal; (ii) importance for MSD to be a lead partner in terms of implementing climate services activities; and (iii) engagement with Zimbabwean Universities, in particular to see whether there could be engagement with masters/doctoral programmes to build capacities at national level (a crucial element for MSD).

# Policies, Strategies, and Institutional arrangements

As the National Designated Authority on meteorology, climate and seismology, the Meteorological Services Department of Zimbabwe (MSD) is the sole institution responsible for providing meteorological, climatological and seismological products in Zimbabwe. MSD is hosted within the **Ministry of Environment, Water and Climate (MEWC)** established in 2013. MEWC houses three other technical departments in addition to MSD: Water Resources Services, Climate Change and Environment, and three support departments (Finance and Administration, Legal and Internal Audit). A CADRI evaluation carried out in 2016 identified gaps across the different departments in terms of financial resources for implementation of activities (CADRI evaluation report, 2016).

Zimbabwe is particularly vulnerable to climate related hazards, particularly droughts and floods. Given Zimbabwe’s heavy reliance on rain-fed agriculture and livestock, drought has serious implications on food security and livelihoods. Increased climate variability and change has led in past decades to an increase in the number of climate-related shocks and in erratic rainfall patterns. In particular, this has had repercussions on the agricultural sector and on existing infrastructure (including rural infrastructure). During the El Nino drought of 2015/16, an estimated 4.8 million Zimbabweans suffered food and nutrition insecurity. Although Zimbabwe ratified the UNFCCC, the country has no standalone climate change policy and legislation (CADRi assessment, 2016) and the development of a National Adaptation Plan (NAP) is still in its early stages. More recently, the country has also started the process to establish a National Framework for Climate Services under the lead of MSD that organized a first meeting in June 2017.

It is therefore the National Climate Change Response Strategy that provides the framework for Zimbabwe approach to climate change. Under the strategy there are some specific references to the role of MSD, in particular under Pillar 1 on Adaptation and Disaster Risk Management. This include the need to:

* Strengthen the capacity of the National Meteorological and Hydrological Services to carry out research on climate change through improved data collection and management, and climate modelling;
* Strengthen the documentation of and tapping into indigenous knowledge systems to complement scientific knowledge for climate change forecasting and early warning systems.
* Establish an enabling framework for sharing and disseminating information on climate change (i.e. at provincial, district and ward levels) in the count

The MSD also provides climate information to users via two government Committees. Information related to risk management and risk reduction such as expected extreme climate events are provided to the Committee of Emergency Situations (CoES) that then uses its structures to disseminate it to the target users. All official forecasts, warnings, advisories, outlooks, and press releases on severe weather and extreme events such as, floods, droughts/ dry spell, are issued by the CoES. Climate information on environmental monitoring and protection is provided to the Committee of Environmental Protection (CoEP).

Institutions and organizations having MoU with the Hydromet can receive climate information directly from the service on request. Information such as daily weather forecast is also disseminated via radio, TV and internet. The CoES has the overall responsibility of delivery of early warning information in the Republic of Tajikistan and chairs the Rapid Emergency and Coordination Team (REACT), with UNDP country office as the secretariat. REACT is a platform for early warning information sharing and brings together all stakeholders including government agencies, NGO and humanitarian organizations.

# Weather and Climate Information Services

Currently MSD generates 1 day, 3 day and 5 days weather forecast information including information on the expected impacts for both the general public and farmers. The forecasts are produced at national level. Some of the information provided includes maximum and minimum temperatures, information on the start/end of the season, length and number of dry spell.

During the rainy season, rainfall bulletins are produced every week during the rainy season and an agromet bulletin is produced every 10 days (decadal). There is no stand-alone monthly forecast, but a monthly update of the seasonal forecast is produced (or the seasonal forecast is updated on a monthly basis). Here is more detail on the rainfall and agromet bulletins:

Weekly Rainfall Bulletin

Weekly rainfall situation report

Weekly pan evaporation map

Seasonal Rainfall situation update

Produced from November to April

Ten day weather forecast

Ten Day Agromet Bulletin

Ten day agro-weather summary

Quality of season to date

Vegetation condition maps

Ten day agro-weather forecasts

Agro-weather advisories

The service also generates a seasonal climate outlook and monthly updates with support from the SADC Climate Services Centre. Support is provided through training of meteorologists on forecasting during the Southern Africa Regional Climate Outlook Forum (SARCOF) that takes place in August, when the consensus seasonal climate outlook for the region is developed using sea temperatures and assessing how it influences rainfall.

The seasonal outlook is then downscaled at national level, and at times at district level. 10 days (decadal) updates are also provided during the season as a follow up to the seasonal forecast. The models used by MSD are the Consortium for Small-scale Modeling (COSMO) and Weather Research and Forecasting (WRF) models that provide high resolution (13 km) climate/weather forecasts. While SADC support was deemed extremely important, additional support in capacity building (outside of SARCOF meeting) would be very important for MSD.

There are examples in some districts of MSD producing local forecasts, but it was noted that further support is needed in particular to build additional capacity within MSD for numerical weather prediction through a high performance computer (HPC) to develop high resolution forecast (especially for local forecasts with a timeframe of 5/10 days, with programming in software languages/models, and forecasting (even short term/daily forecasts). The UK Met office was mentioned as a potential partner to provide support/capacity building on high-resolution forecast models to improve forecast skill and an option to further consider could be a short-term attachment of MSD staff to UK Met Office or a secondment to MSD with a view to build capacities and skills at national level.

Timely, specific information can help minimize the adverse effects of extreme climate events to livelihoods and help communities take advantage of favorable weather conditions at different stages of crop growth in order to increase yield for example. At present, specific, tailored agro-meteorological services in terms of seasonal forecasts, farm weather forecasts and advisories are not generated. MSD provides information in the agromet bulletin but mostly on rainfall and it is difficult without feedback mechanisms to know whether this information reaches communities and whether the information is relevant, due also to limited numbers of Agritex officers in each district. The need for feedback mechanisms was highlighted by MSD staff as this would help them better understand what information is really needed by different users and, at the same time, potential issues with current dissemination mechanisms.

At present, the lack of sufficient observation for historical data is a constraint and data would need to be produced. For the districts of Mount Darwin, Rushinga and Masvingo we will need to assess current coverage of rain gauges and remaining needs. In terms of processing of climatic data in addition to rainfall (i.e. wind, temperatures, etc) additional infrastructure and capacity development would be needed to understand the impacts of different climate variables on the different agroclimatic zones and, for example, different crops or to inform livelihoods activities.

# Observation Networks and Climate Monitoring

At a minimum, there should be one climate/weather station per district and at least one rain gauge in every ward, but taking into account existing differences in agro-climatic zones a denser network in each ward might be needed depending on specific needs for climate services. At present, each district has a weather station, while number of raingauges varies from district to district. Challenges here relate mostly to the downloading of rainfall data.

A more robust network- at least 5 AWS per district and 1 raingage per ward- might be needed to provide more accurate, locally derived rainfall forecasts. However, to provide tailored climate services/advisories and taking also into account the different agro-climatic zones present in the districts, better data might be needed in addition to rainfall including data on temperature, pressure, humidity, evapotranspiration, etc. A more robust network, would also need additional resources in terms of capacity building and human capacity to process data.

# Climate Data Management

MSD operates and maintains a climatological data bank where various types of field weather observational data are stored and archived. These data and related information are essential for climate impact assessment, crop-weather relationship studies, and climate analysis. There are however data interruptions in the climate data as there is no real-time data quality control system in place and most of the existing data are in paper cards (hard copies) with limited capacity at present to input them. At present there is a three years backlog on data rescue (digitization) of the climate data and additional human resources with relevant technical expertise would be needed to digitize data and format it for its use as part of MSDs database.

Currently, databases are not integrated and not accessible to those at province/district levels because there isn’t a system in place to allow both the automated inputting of data and access to the database also from district levels. Manual observations are sent in hard copy to HQ.

The country has no data derived from climate change scenarios for analysis and application. MSD is working on the development of a Climate Atlas for the country with analysis work been done.

With regard to risk mapping, MSD has conducted some analysis of climatic extreme events (risk mapping) mostly at district level. The information needs to be updated and mapped to make it user friendly and enable ease of reference. In terms of seasonal climatological maps, MSD maintains analysis of climatic trends and detection of climate change at national and sub-national levels. Some data/products are produced, of which some is freely available such as products developed for ZIMVAC, MoA and the ARC analysis (these are MSD obligations), but any additional ones are produced only on demand and users need to pay for them, i.e. agromet bulletins are disseminated on a paid subscription basis. The on demand products are tailored products that they can or strive to develop depending on the need of the customer.

In terms of **Agro-ecological zoning** MSD needs additional expertise to develop agro-ecological maps to indicate/assess what crops are most suitable for different parts of the country.

# Early warning

In terms of Early warning, the country has a common alerting protocol (CAP), however this is not implemented at national level.

While the National Civil Protection Committee is mainly responsible for flood response and other rapid-onset disasters of natural or man-made origin, the National Food and Nutrition Council (NFNC) oversees drought management and response and works closely with the MSD, which provides early warning information including to the Ministry of Agriculture, Mechanisation and Irrigation Development (MAMID). It is the role of the MAMID to act on the warnings received and support farmers with needed interventions by using its extension network, media and radio to disseminate early warning information to farmers. However, constraints in resources and capacities of the Agricultural Extension Services (AGRITEX) often results in limited outreach (CADRI assessment, 2016). During the 2015/16 El Nino event, MSD provided warnings ahead of the season, but there was no follow up warning issues and there remains the need for a trigger mechanism and clear protocol for early warnings.

MSD disseminates also early warnings through national radio (Radio Zimbabwe), newspapers and social networks (twitter, wattsap, facebook). As mentioned already, dissemination of information is also done through AGRITEX officers and, in some cases, through the education system with teachers informing students so they can further relay the message at home as not all community members have a cell phone, radio or access to newspapers (CADRI Assessment, 2016). However, issues remain with regard to duration, timeliness and accuracy of the information and a better understanding of the climate of specific areas is needed together with shorter-time lead forecasts/information to enable farmers to receive information relevant to their specific area during crops growing times.

There are examples of collaboration with the private sector, for example with regard to using mobile network operators to rely early warning messages. While there is no established protocol/legal basis and it remains a voluntary collaboration, this seemed to have worked very well and warning sms sent by mobile network providers were free of charge. Similarly, collaboration by MSD with NetOne on sharing information ahead of the season to support planning has also been done. NetOne has however considerable challenges at present in continuing to implement the sms service, having acquired relevant equipment but struggling to implement.

A key issue is the limited focus on early action/provision of advisories to communities on what to do in terms of prevention/preparedness, with messages not providing also information on what to do.

# User Inter-face Platforms

The current system of disseminating climate/weather information doesn’t seem to be efficient and often the information does not reach local-level users in a timely manner. Even when local communities have access to radio, climate information provided during the bulletin is usually brief and very general.

At present, MSD staff do not have direct interaction with most of users[[1]](#footnote-1) there are no interface mechanisms with users and no feedback on the information provided. For example, while Agritex is one of the key users of information MSD staff do not know if all extension officers receive the information and, if they do, whether they understand it and know what message to further convey to people. Similarly, there is no feedback mechanisms from local communities for example to extension officers and back to MSD. A sharing platform at national level is provided by the National African Regional Climate Outlook Forum when MSD discusses and shares the seasonal forecast with key stakeholders (i.e. farmers organizations, army, air force, civil protection, MoMDA, etc). In case of specific alerts (i.e. cyclones) stakeholders are also called to a meeting and informed. However, this remains mostly a top-down exercise with no much emphasis on co-production and feedback mechanisms. With regard the agro-bulletins, MSD travels to the provinces and together with Agritex organize outlook forums.

While the process to establish a National Framework for Climate Services in Zimbabwe has started, at present there are no external evaluations and inputs to MSD regarding the adequacy, relevance, method of access, and availability of their climate products by most users, especially those at the local level. There are also no platforms supporting the co-production and co-tailoring of information/messages, and there exist a gap in terms of awareness raising, advocacy and training in terms of how to convey/translate messages related to seasonal or other forecasts in a way that they can be easily understood and people know how to act on them.

An important area identified by MSD as very relevant is the need to better understand indigenous knowledge systems for forecasting weather/climate and opportunities to blend scientific and traditional knowledge in the co-production of specific climate services.

# Climate and weather information needs - community consultations in Mount Darwin, Rushinga and Masvingo

Community needs assessments were carried out between June and July 2017 in the Districts of Mount Darwin, Rushinga and Masvingo, in particular with communities living in the wards 34 and 4 of Mount Darwin District, wards 16 and 17 of Rushinga District and wards 1,4,19 in Masvingo District.

Overall, some of the findings highlighted how changes in number of the frequency and intensity of extreme weather events (droughts, floods, higher temperatures, stronger winds and storms) and rainfall distribution are affecting livelihoods and ability to plan ahead of the season. Often, emergence of new risks in recent years has led to spontaneous adaptation measures being taken but without any clear understanding of patterns or guidance on how to reduce their impacts. While some climate information is available in most communities, this is often fragmented, general (i.e. national level) and there is no systematic access to information (people rely on word of mouth often, with the risk of information being distorted as it is passed on).

Ways of accessing information include via Agritex officers (workshops on the seasonal outlook), radio (Radio Zimbabwe), sometimes sms (mostly from civil protection, but service is irregular and these are normally received ahead of a hazard, i.e. risk of floods or strong winds) and churches (pastors and prophets). Both the elderly and child headed households were seen as least able to access relevant information, with them not being able to attend Agritex workshops and not owning/knowing how to use cellphones (elderly). In particular, audio messages rather than sms would be better for elderly who might not be literate. Agritex officers do not visit farmers regularly and mainly on request, but normally they are only able to provide assistance to a small number of farmers.

The programme Murimi Wanhasi/Today’s Farmer on radio Zimbabwe provides weekly updates on the progression of the season, general crop stage and the next activities in the growth cycle of different plants. However, since the discussions are normally at national level and not specific to any area this is often not very useful, unless experts zoom into one area where there are problems (by then however it might be a bit late). Radio ownership also varies in different communities, but information is passed on.

Understanding content was also raised as an issue sometimes, with communities only able to understand part of the message. While messages in Shona are easier to understand, content might still not be clear and people raised the issue that easy to understand advisories on what to do would be extremely helpful ahead and during the season. When trying to interpret the messages received people seem to rely on teachers, extension officers and other community members. Those who have limited access to this information include the elderly who are not able to attend the workshops and who also are not able to use cell phones. The elderly also do not mix with others that much as they do not frequent social places hence the information they receive is limited.

In general, indigenous knowledge remains the most trusted source of information that is used to take decisions. As a result of information shared during the El Nino season, some of the communities highlighted how trust in forecast has now increased. However, trust in scientific forecasts is only up to a certain extent, when asked what information they would rely on most, communities clearly indicated traditional knowledge even though some recognize that because of changes in the climate traditional knowledge is also not reliable as it used to be. When scientific knowledge is available, communities often rely on a mix of the two.

Communities interviewed in Mount Darwin, highlighted that there is now a late start and early end of the season. Up to 1985 the rainfall season used to start early October, but it shifted to end of October after 1985 and then from 2014 it has moved to end November. While the rainy season used to end in April, it now tails off around February. This has had considerable impacts on crops and livestock, with reduced pastures available and an increase in pests and diseases for both crops and livestock. Increased water scarcity affects also other livelihoods activities, such as brick molding for example, and availability of water for households consumption as well. An increase in prolonged mid-season dry spells has also been observed since 1995 and communities reported an increase in the intensity and number of droughts that used to be a rare occurrence before 1985, then since 1992 the frequency of drought increased to almost 2 to 3 consecutive droughts followed by a good year. Due to changes in rainfall patterns however, the number of good years has drastically reduced. Communities also highlighted the emergence of strong winds that have increased in the past 20 years and impacts both houses and crops, while increased temperatures in summer are reducing crops, people’s ability to work and sleep during summer months. Increased incidence of lightning in the area was also reported, often resulting in casualties or fires.

In Rushinga District, communities feedback was very similar to that of communities in Mount Darwin District. In Rushinga, people also highlighted how a reduced rainy season had severe repercussions on their livelihoods. The season used to start in November and end in March, but the start of the season has now progressively moved to end of December and ends in mid-February. This effectively translates to a 2 months’ rainy season that is increasingly leading to crop failure and poor crop production, lack of water for irrigation, livestock and household consumption, increase in the amount of time needed to search for water and pasture for livestock and an increase in the number of pests (crops and livestock). Impacts on human health have also increased, with water scarcity indicated as a key issue together with a reduced variety of diet and higher temperatures. Similarly to communities in Mount Darwin, a switch to work only early in the morning has been necessary during the hotter months. Communities in Rushinga also indicated how after 1992, droughts frequency and intensity has increased progressively in the past 20 years and they are now experiencing 2 to 3 droughts followed by one good season. Communities identified the worst years when they recorded their biggest losses as being 1992, 2008/9 and 2015/16. Since 2008, high speed winds during the rainy season have progressively increased and are starting to become a serious issue destroying houses, infrastructure and crops.

# Summary and Recommendations

At present, challenges hindering MSD when looking at development of climate services in Zimbabwe include generating, storing and analyzing climate data to produce relevant climate information for decision makers and end-users. This is linked to inadequate equipment for data collection, limited resources to acquire and maintain equipment, in some cases limited human resources and lack of engagement with users with no feedback mechanisms available in country to support co-production and dissemination of relevant climate information.

Preliminary assessment with local communities in target districts clearly indicate that while they are receiving some information there remain opportunities to improve both the type of information they receive and to strengthen dissemination channels to ensure information is received in a timely manner, more often, in a clear language and with additional guidance specific to their areas.

The proposal should therefore support tailoring and dissemination of climate products to users at the community level, including by: i) strengthening the capacity of MSD to generate relevant climate information and that of end end-users to be able to use the information to make appropriate decisions; ii) establishing co-production and feedback mechanisms between MSD and end users which are currently non-existent. This would also be in support of the recently started process for the establishment of a National Framework for Climate Services.

Proposed activities include:

1. **Strengthening observation capacities in target districts if needed** by installing additional raingages/AWS where none exists. Analysis of the weather stations’ network in project areas should be conducted to identify appropriate sites for additional observation stations based on WMO criteria and/or vulnerability of specific localities that may require close monitoring.
2. **Technical and scientific support:** MSD requires various technical tools and training for climate data rescue and management, climate-hazard analysis and mapping including forecasting outputs. This includes support in developing capacity to generate locally derived monthly and seasonal climate forecasts; and monitoring crop and pasture conditions using vegetation indices using satellite derived data.
3. National food security and climate analysis to better understand the impacts that climate change will have on nutrition and food security and identify most vulnerable districts and communities.
4. **Training of Agritex extension officers and end-users** on use of climate information in climate-risk management decisions using existing tools such as Participatory Climate Services for Agriculture (PICSA) that have been successfully used elsewhere. Taking into account the limited number of Agritex officers, training should also include operating partners in the target districts/wards and of lead farmers where possibilities. Given that PICSA is a 6 step process, resources need to be allocated to ensure regular visits for the 6 steps of the process and for monitoring after the season.
5. **Delivery of Climate Information**, including ensuring co-production of both the messages and related advisories. During consultations it was obvious that some channels already exist that could be further strengthened to ensure a timely, systematic sharing of information. This could include schools, a dedicated radio programmes, tailored sms and audio messages via mobile phones. Whatever the means, introduction of specific platforms to co-produce the content is needed by, whenever possible, using already existing structures such as preparations for the seasonal outlook workshops that are delivered in each districts. Establishment of feedback mechanisms will be essential to enable MSD to refine and further tailor information to needs.
6. **Better understanding of Indigenous knowledge in target wards** is needed. Working together with MSD and national universities a better understanding of existing knowledge and observation done by local communities would support blending of traditional and scientific forecasts but also would help us to identify key entry point to build trust on information and advisories delivered.

# Annex 1: List of participants MSD interviews

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| **S/No** | **Name** | **Position** | **Institution** |
|  | Bungare Elliott | External relations | Met Services Department |
|  | Mazhara Pomokai | Acting Director MSD | Met Services Department |
|  | Manzou Becky | Deputy Director | Met Services Department |
|  | Makarau Amos | (Former) Director | Met Services Department |
|  | Madhaure Cornelius |  | Met Services Department |
|  | Pasi Tambu |  | Met Services Department |
|  | Samvura Lucy |  | Met Services Department |
|  | Mapuro John |  | Met Services Department |
|  | Mamombe V. |  | Met Services Department |

1. With exception from district level MSD officers that interact directly with Agritex extension officers for example. [↑](#footnote-ref-1)