



United Nations Development Programme

Country: TANZANIA

PROJECT DOCUMENT

Project Title: Strengthening climate information and early warning systems in Tanzania for climate resilient development and adaptation to climate change.

UNDAP Outcome(s)

- 1) Communities have access to improved credible emergency information to enable early action (Outcome 2, Emergency Preparedness and Response)
- 2) Prime Minister's Office (PMO) and Chief Minister's Office –Disaster Management Departments (DMDs) effectively lead Emergency Preparedness and Response (ERP) with focus areas most susceptible to disasters
- 3) Key MDAs and LGAs integrate climate change adaptation and mitigation in their strategies and plans

UNDAP Key Action or Key Results area:

1.1.2 TA and FA to MDAs and LGAs to mainstream Climate Change Adaptation (CCA) in their development strategies;

1.1.1 Capacity Building for PMO-DMD related to effective disaster management coordination

Key UNDAP or Project Output(s):

Project components:

- 1) Transfer of technologies for climate and environmental monitoring infrastructure
- 2) Climate information integrated into development plans and early warning systems

Implementation Modality:

National Implementation (NIM)

Executing Agency/ Partner:

Vice-President's Office –Department of Environment (VPO-DOE)

Implementing Partner/ Responsible Partner:

Prime Minister's Office (PMO) Disaster Management Department (DMD)

Responsible Parties:

TMA, Ministry of Water, Ministry of Agriculture

Brief Description

The ability of decision-makers in Tanzania to understand the likely impacts of climate change in the short and long-term is of critical importance to the countries' sustainable growth aspirations. Given Tanzania's reliance on climate sensitive agriculture, natural resources management and energy, the impacts of climate change that have already been experienced have had negative effects on the nation's productive sectors and infrastructure. This projects aims at strengthening the capacity of the Government of Tanzania to observe, analyse and forecast climate information to enhance their early warning systems and for climate resilient development and adaptation to climate change.

Tanzania has several barriers with regard to EWS and hydro-met capacity: i) insufficient meteorological and hydrological observing stations to adequately and accurately monitor the current state of the climate and hydrology; ii) lengthy and ineffective means of communicating weather, climate and early warning information; iii) un-coordinated operation, maintenance and use of the hydro-climate monitoring system and information; iv) policy and institutional weaknesses in the mechanisms governing disaster management. The LDCF financing will address these constraints to ensure a stronger and more effective climate resilient development.

LDCF funds will contribute to Tanzania's NAPA priorities (Priority 6, develop an early warning system for drought and flood and priority 7, "Establish a Disaster planning framework"). This initiative will support the National Poverty Reduction and Growth Strategy (MKUKUTA), and will result in strengthening the observational and analytical capacity of the national hydro-met services and its early warning system, and supporting the disaster risk management and development planning agencies in their effort to adapt to climate change.

The project outcomes are closely aligned and coordinated with baseline efforts already underway within Tanzania to promote development which is resilient to climate change at the national and local levels. The project is focused on strengthening the capacity of national and sub-national entities to monitor climate change, generate reliable hydro-meteorological information (including early warnings for droughts and floods) and to be able to combine this information with other environmental and socio-economic data to improve evidence-based decision-making for early warning and adaptation responses and long-term planning.

Programme Period:	2013-2017	Total resources required	26,765,000USD
Atlas Award ID:	74211	Total allocated resources:	26,765,000USD
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PIMS #	5096	• Other:	
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End Date	September 2017	o UNDP (Grant)	600,000 USD
Management Arrangements:	NIM		
PAC Meeting Date	31 st July 2013		

Agreed by (Government)

Ministry of Finance:

[Signature]
16.12.2013

Date/Month/Year

PERMANENT SECRETARY
MINISTRY OF FINANCE
P.O. Box 9111
DAR ES SALAAM

Agreed by (Implementing Partner)

Prime Minister's Office

[Signature] 13.12.2013

Date/Month/Year

PERMANENT SECRETARY
PRIME MINISTER'S OFFICE

Agreed by (Executing Partner):

Vice-President's Office:

[Signature] 16.12.2013

Permanent Secretary
Vice President's Office
Date/Month/Year

UNDP *[Signature]* 16/12/13

Agreed by (UNDP):



16/12/13

Date/Month/Year



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List of Acronyms

CSO	Civil society organization
DCS	Disaster Communication Strategy
DFID	Department for International Development
DM	Disaster Management
DRR	Disaster Risk Reduction
EMA	Environment Management Act
EOU	Emergency operations unit
EWS	Early Warning Systems
GDP	Gross domestic product
GEF	Global Environment Facility
ICT	Information and Communications Technology
LDCF	Least Developed Countries Fund
MAFS	Ministry of Agriculture and Food Security
MKUKUTA	Tanzania Poverty Reduction and Growth Strategy
MoF	Ministry of Finance
MoW	Ministry of Water
NAPA	National adaptation programmes of action
NEMC	National Environmental Management Council
NGO	Non-governmental Organization
PIF	Project Identification Form
PMO	Prime Minister's Office
PMO-DMD	Prime Ministers' Office – Department of Disaster Management
REDD	Reducing Emissions from Deforestation and Forest Degradation
SMS	Small Message System
SOP	Standard Operation Procedures
SWAP	Sector-Wide Approach
TAFSIP	Tanzania Agriculture and Food Security Investment Plan
TCRA	Tanzania Communications Regulations Agency
TRCS	Tanzania Red Cross Society
TEPRP	Tanzania Emergency Preparedness and Response Plan
TMA	Tanzania Meteorological Agency
UK	United Kingdom
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNICEF	The United Nations Children's Fund
VPO-DOE	Vice President's Office – Division of Environment
WB	World Bank
WFP	World Food Programme

1 SITUATION ANALYSIS

1. Due to their dependency on rainfed agriculture, rural populations in Tanzania are at particular risk from climate variability. The anticipated impacts of climate change on Tanzania will place these populations in a position of greater vulnerability owing to unreliable rainfall patterns and an increased frequency and severity of extreme weather events. Despite recent progress, capacity to anticipate and avert climate-induced disasters remains low in Tanzania, and the capacity to ensure that development planning is founded on accurate climate information and services is not yet fully deployed at all levels.

2. Most of Tanzania's economy depends on climate-sensitive sectors and services, such as agriculture, tourism and energy. About 85 per cent of the country's poor people live in rural areas and rely on agriculture as their main source of income and livelihood. Agriculture (including livestock) is the dominant sector in Tanzanian economy, providing livelihood, income and employment to over 80% of the overall population and accounting for roughly 56 percent of GDP and about 60 percent of export earnings¹. Agricultural products include coffee, sisal, tea, cotton, pyrethrum, cashew nuts, tobacco, cloves, corn, wheat, cassava, bananas, and vegetables. Livestock production includes cattle, sheep, and goats.

3. Agricultural output remains predominately based on smallholder production, as opposed to estate cultivation, though the latter does account for production of sisal, tea, coffee, tobacco, rice, wheat, and wattle. Maize, paddy, wheat, and cassava are produced for domestic consumption. Most crops are under rainfed conditions, with an estimated 2% of arable land currently under irrigation².

4. Livestock is another major sub-sector of production that accounts for an estimated 30 per cent of the Agricultural GDP, of which 40% originates from beef production, 30% from milk production and 30% from poultry and small stock production. Commercial ranching accounts for about 2 percent of the total cattle herd, whereas pastoralism is concentrated in the northern plains and is practised in traditional grazing areas where climatic and soil conditions do not favour crop production.

5. Because of the combination of already-degraded environments, the dominance of climate-sensitive sectors in the economy and the low adaptive capacity in some regions, Tanzania will be highly vulnerable to the effects of climate change on agriculture³ and food security, water resources, human health, physical infrastructure, and ecosystems (Bezabih et al. 2011). Unless there is a concerted effort to improve its resilience to climate change, Tanzania could face serious impacts on its economy. As such, climate change has the potential to constrain economic growth and even undo some of the gains that have been made in past decades.

6. Analysis of climate data reveals various trends: for example, from 1996 to 2003, there has been an observed decline in rainfall of 50-150 mm per season (March to May) and a corresponding decline in

¹ Tanzania National Adaptation Programme of Action, 2006

² Syud Amer Ahmed, Noah S Diffenbaugh, Thomas W Hertel, David B Lobell, Navin Ramankutty, Ana R Rios, Pedram Rowhani, Climate volatility and poverty vulnerability in Tanzania, 2010.

³ For the purposes of this project, « agriculture » and « agriculture sector » are taken to include crop production, livestock, and fisheries, although the first falls within supervision of the Ministry of Agriculture and the latter two fall under the supervision of the Ministry of Livestock and Fisheries.

yields of long-cycle crops (e.g., slowly maturing varieties of sorghum and maize) across most of eastern Africa⁴.

7. Climate change scenarios developed during the National Communications and NAPA processes in Tanzania indicate that the country is likely to undergo an increase in mean daily temperature as well as in the temperature of the warmest and coolest months. Mean annual temperatures are also projected to rise by 2.2 °C by 2100, with somewhat higher increases (2.6 °C) over June, July and August, and lower values (1.9 °C) for December, January, and February⁵.

8. Annual precipitation over the whole country is projected to increase by 10% by 2100, although seasonal declines of 6% are projected for June, July and August, and increases of 16.7% for December, January, and February⁶. These overall increases are nuanced regionally and seasonally, for example:

- a) Northern and south-eastern regions of the country would experience an increase in rainfall ranging from between 5% and 45%
- b) Central, western, southwestern, southern, and eastern parts of the country might experience a decrease in rainfall of 10% to 15%.
- c) The southern highlands might similarly experience a decrease of 10%, which could alter the suitability of this area for maize cultivation.
- d) The north-eastern region expects an increase of 25%-60% in the short rains and an increase of 20-45% in the long rains,
- e) The north coastal region might get an increase of 0-20% in the short rains and a decrease of 0-10% in the long rains.

9. Additionally, the timing of rains will become less predictable and their intensity is likely to become more volatile⁷. Whilst this set of projections highlight the complex nature of climate change in Tanzania, it is important to note that these projections may change as new information becomes available e.g. through the IPCC 5th assessment report. It is therefore critical for planning adaptation that Tanzania is able to review both the latest climate trends (as measured within the country) and future projections (available through both local and international organisations).

10. Various studies have indicated direct impacts of climate change on sectors such as agriculture and fisheries which will lead to food insecurity, reductions in employment, lower agricultural export earnings and other losses associated with a decline in rural income, reduced consumption and investment, and destocking. Significant droughts already have additional multiplier effects on the economy, the rate of inflation, interest rates, credit availability, and levels of savings, the government budget deficits, and external debt stocks⁸.

⁴Funk et al., Recent drought tendencies in Ethiopia and equatorial-subtropical East Africa,

⁵Pablo Suarez, Jesse C. Ribot and Anthony G. Patt, Climate Information, equity and vulnerability reduction, 2009. Available at <http://www.icarus.info/wp-content/uploads/2009/10/Suarez-Ribot-Patt-2009.pdf>, last accessed May 20 2013.

⁶Agrawal S., Moehner A., Hemp A., Valst S. Smith J., Meena H, Mwakifwamba S.M., Hyera T and Mwaipopo O.U. (2003). Development and Climate Change in Tanzania Focus on Mount Kilimanjaro. Paris OECD <http://www.oecd.org/env/cc/21058838.pdf>

⁷id.

⁸Shemdoe R. and Kihila Jacob, Understanding community based adaptation strategies to climate variability in fishing communities of Ruliji River basin in Tanzania, African Journal of History and Culture Vol. 4(2), pp. 17-26, March 2012.

11. Droughts appear to have a bigger impact on agriculture than floods in East Africa. During the 2000 drought, agricultural GDP in East Africa declined by 14% leading to reduction in GDP growth of 5.8%. In Tanzania, Seitz and Nyangena (2009)⁹ found that a 10% change in annual rainfall results in a 1.9% change in GDP. Data from other East African countries suggest that the impact of changes in mean annual temperature is more pronounced and adverse to the economy than a similar change in annual precipitation (Seitz and Nyangena 2009).

12. Floods are also on the increase in various parts of the country, and the projected changes in rainfall patterns are also likely to exacerbate this trend. For example, the Kilosa, Mpwapwa and Kongwa, and Kilombero floods are among numerous examples of impacts of climate change on human settlement. In December 2009 and January 2010 the swollen Mkondoa River burst its banks inundating Kilosa town, an incidence that led to the displacement of a total of 23,980 people. The cost of restoring the infrastructure and services amounted to Tshs 329 billion. In April 2011, floods in the Kilombero valley (Morogoro Region) demolished 663 houses in the area and submerged 2,942 others, which made 9,000 people homeless. As the time of writing, parts of the country were inundated due to high rains, impacting the touristic routes in the Arusha region, and commercial infrastructure in Dar es Salaam.¹⁰

13. Aggregate models suggest that climate change will lead to losses of 1.5 – 2% of annual GDP by 2030 (GCAP *et al.* 2011). This implies economic losses of at least \$1.5 billion per year by 2030 (in 2006 prices). The cumulative effect of these losses is likely to reduce Tanzania's chances of achieving key economic and development targets, and to delay its plans for achieving middle income status (GCAP *et al.* 2011). According to the projections reported in URT (2007), an increase in temperature between 1.8 to 3.6°C in catchment areas of Pangani for example, will lead to a decrease of 6-9% of the annual river flow which will affect other production sectors and the livelihoods of communities.

14. Based on the impacts of climate change the population groups that are most vulnerable to climate change impacts are women, children and the disabled. Women and girls are the ones that are involved in fetching water, thus water scarcity associated with drying up of water sources pose more stress to women and children. Moreover, women form the majority of rural dwellers who are depending on subsistence rain fed-agriculture as their major source of livelihood. With less rain, fewer crops will be produced, thus negatively affecting household food security¹¹.

15. All scenarios point to increased and modified climate variability, particularly in terms of rainfall, and therefore increased uncertainty for key economic sectors such as agriculture. The increased frequency of extreme events, such as droughts and severe rainfall events leading to flooding also place vulnerable populations in an increasingly at risk position. Climate information on a range of timescales is therefore needed for planning proactive and robust adaptation actions, as well as for early warning to protect food security and livelihoods.

16. It has been argued that the availability of adequate and timely climate information can be a useful approach in reducing risks posed by climate change. Investing in climate change early warning and forecasting and ensuring that the forecasted information flows to the relevant actors and users could help in quick decision making to reduce exposure and vulnerability. Furthermore, weather and climate

⁹Seitz J. and Nyangena W., *Economic Impact of Climate Change in the East African Community*, 2009

¹⁰Department of Disaster Management, 2013, and also National Climate Change Strategy, 2013.

¹¹THE ROLE OF WOMEN IN ADAPTING TO CLIMATE CHANGE IN TANZANIA, 2009 <http://www.gendercc.net/fileadmin/inhalte/Dokumente/news/Tanzania.pdf>. See also National Climate Change Strategy, 2013

forecasts can have positive economic impacts as they affect the decisions of individuals engaged in planning and implementing economic activities¹². The unavailability or inadequacy of climate monitoring and forecast information therefore directly leads to increased vulnerability of populations to climate shocks, especially in developing countries.

17. There are various actors and stakeholders in the climate monitoring and early warning system in Tanzania. The primary information provider, the Tanzania Meteorological Agency, has the mandate to operate and maintain the system as a whole. The Prime Minister's Office, through its Disaster Management Department, is mandated to emit early warnings and to coordinate disaster response. The Ministry of Water is in charge of monitoring water resources, and as such, holds a direct role in predicting and monitoring floods and droughts. Finally, the Ministry of Agriculture is mandated to monitor rainfall in relation to crop, and to transmit relevant agro-climate information to users and producers through its extension services. These main actors work together with varying degrees of efficiency and effectiveness, and each is challenged by its own capacity constraints.

1.1 Problem statement

18. With high levels of poverty and in particular a very high degree of rural vulnerability, the Tanzania population is already at risk from current climate variability. Dependency on rainfed agriculture and the continued prevalence of subsistence modes of production place rural populations at particular risk from climate variability and therefore, from climate change. In addition, Tanzania is likely to suffer from the impacts of climate change in various ways: temperature increases, long-term changes in rainfall patterns, sea level rise and an increased exposure to extreme weather events present significant risks to Tanzanian development.

19. Despite some recent progress in addressing urgent and immediate adaptation needs in Tanzania, much remains to be done to ensure a minimum level of capacity for anticipating and averting climate-induced disasters, and to ensure that development planning is founded on accurate climate information and services. A key obstacle to promoting, upscaling and mainstreaming adaptation in Tanzania – as in many other countries – is the inadequate state of early warning systems and hydro-climatic monitoring in the country. This includes a lack of reliable and up-to-date climate data, the inaccessibility of historical records that are kept on paper, obsolete climate monitoring technology and equipment, limited forecasting and analytical capacity and inadequate communications channels. This places already vulnerable populations at an increased risk of exposure and loss from severe climate hazards such as droughts and floods, which are expected to increase in both severity and frequency in Tanzania.

20. Another key obstacle to proactive adaptation in Tanzania is the relatively slow rate of integration of climate information into development planning: while many efforts are currently being deployed at the macro policy level and some integration is occurring, it has not yet reached the lower levels of planning at ward, district or regional level. As a result, much of the development planning that occurs at local level doesn't yet take into consideration the future climate conditions, leading to potentially maladapted policies. This is in large part due to the local planning authorities' lack of access to relevant and accurate climate information services.

¹²Suarez P, Ribot J.C and Patt A.G 2009. Climate information, equity and vulnerability reduction (<http://www.icarus.info/wp-content/uploads/2009/10/Suarez-Ribot-Patt-2009.pdf>)

21. In an ideal situation, Tanzania's climate monitoring and forecasting system would include complete coverage through the use of combined monitoring technologies, including surface, marine and upper air stations, telecommunication facilities and weather radars. This would allow for the deployment of a fully operational early warning system that would identify hazards in sufficient time, communicate relevant and appropriate information in a timely manner, and enable early action and response in a coordinated manner. Such a system would also serve as a basis to inform local development planning by providing accurate scenarios and climate services on which to make informed decisions. This is not currently possible due to a number of barriers, which include: obsolete or missing climate monitoring equipment and practices, uncoordinated data collection practices, lengthy communications channels, a lack of standardized approaches to disaster response, and low levels of institutional capacity to access and understand climate information in a development planning context.

22. This project therefore seeks to address Tanzania's increasing vulnerability to severe weather and climate events such as droughts and floods by strengthening the country's capacity to operate a functional climate monitoring and forecasting system that allows for the deployment of accurate and timely early warnings, and that can serve as a basis for long-term development planning.

1.2 Long-term solution

23. The long-term preferred (normative) solution to addressing Tanzania's increased exposure to extreme weather events and climate variability starts with the establishment of a fully functioning early warning system and enhanced climate information, which can effectively monitor the current state of the weather/climate in Tanzania, forecast extreme events that may cause harmful and avoidable damages and collect climate information to inform long-term planning. This entails:

- a) Collecting high quality, high resolution climate and environmental monitoring data which geographically covers the main weather/climate related hazards and agro-climate parameters;
- b) Forecasting the occurrence of future high-impact weather events and the probability of longer-term climatic shifts;
- c) Producing relevant, timely and useful weather/climate products and services (combined with other environmental and socio-economic data) to enable both short-term responses and long-term planning;
- d) Transmitting alerts and warning information according to a well established set of standard operating procedures and protocols;
- e) Issuing warnings to the appropriate actors in real time or sufficiently in advance to allow for appropriate prevention and risk mitigation activities;
- f) Strengthening the technical, institutional and human resource capacities of agencies involved with climate-related information production and dissemination;
- g) Ensuring the sustainability of new investments in hydro-meteorological infrastructure, including recurring costs associated with expanded networks and new services

1.3 Barriers to achieving the long-term solution

24. As explained above, Tanzania faces significant challenges related to the use of EWS and climate information for responding to increases in exposure to severe weather and climate hazards such as droughts and floods under climate change. In order to implement the preferred long-term solution there are, however, several barriers that need to be addressed:

25. **Tanzania's climate monitoring system is insufficiently developed to allow for accurate, timely and reliable weather/climate monitoring and forecasts.** A large number of the climate, weather and hydrological monitoring stations are currently manually operated, meaning that they are read by individual observers and that the information is sent to the national meteorological centre (NMC) on a monthly basis, for which the observer receives a small stipend. Synoptic and agro-meteorological stations transmit data more frequently, some in real-time, depending on their level of automation. Additionally there are a limited number of weather stations (both manual and automatic), which limits the resolution and accuracy with which the weather/climate over Tanzania can be monitored. The Tanzania Meteorological Agency (TMA) currently operates 26 manual synoptic stations (regional-level data), 7 automated weather stations (AWS) funded through the Africa Adaptation Programme (AAP), 18 agro-meteorological stations, and 2056 manual rainfall stations, of which only 500 are currently providing data. The latter is due to various reasons: death or unavailability of individual observers, obsolete stations and materials, or unavailability of funds to remunerate the rainfall station observers (even though the costs per person are symbolic: \$12 every trimester, approximately). As a result, data is mostly not transmitted, leading to significant gaps in historical data at many sites.

26. In addition to the stations operated by the TMA, the Ministry of Water (MoW) and the Water Basin Offices (WBO) also own and operate a number of hydrological, meteorological, AWS in the various basins: at least¹³ 19AWS, 10 automated rainfall gauges and recorders, and 28 general meteorological stations, in addition to their own network of manual river and rainfall observers who transmit data every month by mail, against a small stipend (here too the funding constraints mentioned above apply).

27. The Water Basin Authorities (WBA) also lacks the data to undertake real-time river and flood monitoring. Resources vary among Water Basins, and not all WBAs have the appropriate number of river gauges to monitor river levels accurately, climate/rainfall stations (or rapid access to precipitation data) or computing power to run flood models and deliver flood warnings in time. Most of the existing hydrological monitoring equipment consists of manual gauges that cannot be read during extreme flood events because they are inaccessible to monitors. In the case of registered automated stations, data transmission occurs directly from the WBA station to the TMA, who then analyses the data and emits an alert: many times this creates delays such that the flood has already occurred and caused damage by the time the local authorities are alerted. There is, in effect, no flood early warning system in areas most prone to floods (e.g. around main rivers).

28. To solve this matter, some WBAs have been able to mobilize funds from donors such as the World Bank for the acquisition of hydrological and weather stations, but some of these have not been registered with the TMA, and hence are not integrated into the national climate monitoring network. This has resulted in uncoordinated data collection, disparate data sets, duplication and unnecessary costs.

29. As a user of meteorological data, the Ministry of Agriculture maintains a network of manually observed rainfall stations, though the data is not transmitted regularly for all sites, as here too available funds have been unable to cover stipends for observers. When it is transmitted, the data arrives by mail and too late to enable any proactive analysis, early warning or short-term planning. The Ministry of Agriculture participates in the Famine Early Warning System (FEWS) funded through USAID that provides satellite-based rainfall estimates, as well as information on crop growth, price data and market

¹³For all ministries, precise data on the location, type and number of each station throughout the country were difficult to obtain, so these figures represent current best estimates based on different sources of data from TMA, MoW and the WBO. Many stations are not officially registered through the TMA.

information in order to produce famine early warnings on a regional basis. However, in the absence of accurate rainfall data (needed to verify the satellite-based estimates), the Ministry of Agriculture has been unable to fully ascertain the food security situation in many parts of the country. Recently the Ministry has acquired a satellite data receiving terminal, which will enable it to make better use of precipitation data for crop production and, combined with the surface observations and seasonal forecasts produced by the TMA, provide better agricultural advice for the current situation and coming season.

30. For all ministries, data that is sent on paper is not currently compiled into any electronic database but is conserved on paper with a limited lifespan. There are also gaps in quality of the data transmitted by station monitors, since many lack the training on climate-reading standards. Historical data that would be used to develop models and forecasts for major climate change induced hazards are only available on paper, are currently archived in inadequate and dispersed facilities (without climate control, space or categorization), and are not easily accessible.

31. As a result of these gaps in infrastructure and data communication/management, and according to the TMA's own assessment, the reliability of short-range and long-range weather/climate forecasts is low, as too few local observations are assimilated into forecasts or used to calibrate local flood and weather/seasonal/downscaling models. Such low degrees of reliability mean that local vulnerable populations are left managing a much higher level of climatic uncertainty, which leads to a decreased ability to use this information for planning.

32. **Weather, climate and hydrological information analysis and data transmission channels are lengthy and ineffective.** For the data originating from manual stations, the transmission channels are too lengthy to allow for a timely early warning system, since they are recorded up to twice a day but transmitted to the TMA or MoW on a weekly or monthly basis. There existed an SMS-based system operated by the Ministry of Agriculture that would allow for observers to transmit their recorded data via mobile phones, but it is no longer operational due to software and hardware failure, lack of funds to cover the recurring costs of data transmission (observers must be paid for the costs of the SMS) and the costs of maintaining the service with the mobile phone providers. Delays in receiving and entering the written data sent through mail or fax are lengthy, since they have to be processed manually, and often the data is only stored on paper leaving it inaccessible to many users.

33. Drought forecasting is currently undertaken by the TMA and the Ministry of Agriculture on the basis of rainfall data collected from observing stations and satellites. The TMA produces a seasonal precipitation forecast which is posted on its website and transmitted to the appropriate ministries and sectoral stakeholders. The bulletin includes some basic analysis of the impacts on agriculture, basic crop and livestock advice, as well as potential impacts on energy, water, health and disasters are also presented in the bulletins. The TMA uses numerical weather prediction models to produce short-term (daily) forecasts and some forecasts and prediction products delivered by TMA continue to be produced using manual plotting procedures due to lack of computer power for data processing and the availability of data in an electronic format. This has led to delays in the production of agro-meteorological products, including the decadal (10 day) and seasonal forecasts.

34. There are also barriers to communicating climate information, alerts and warnings to the general population and end users. Seasonal forecasts need to be interpreted before they can become truly useful to the end users, and in particular they need to be adapted to the needs of smallholder producers. The Ministry of Agriculture and its extension services therefore have a great influence on the way in which the information is transmitted and translated to users. Their capacity to deliver this role effectively is constrained by the general constraints faced by extension services in Tanzania, meaning a general lack of operational means, and out-dated skills, as well as limited access to appropriate weather/climate and

environmental information. This barrier is currently in the process of being lifted through various interventions aimed at strengthening and revitalizing the agriculture sector (e.g. Agriculture Sector Development Plan). Regarding early warnings, however, the main barrier is the medium chosen to communicate to end users, particularly in terms of rapid-onset disasters such as floods. In this regard, rural populations for the most part have access to low-technology media such as the radio; however the TMA does not have access to all frequencies, or even to a single emergency frequency. It depends on ad hoc airtime purchases and on the willingness of radio station operators to transmit the bulletins and alerts. Access to mobile phone technology is low in rural areas, but rapidly increasing. The lack of Standard Operating Procedures and specific alert codes and protocols also hinders the communication of alerts to local communities.

35. **Stakeholders and users of the climate monitoring system are uncoordinated in their operation, maintenance and use of the system and information.** The above technical and infrastructure gaps are further compounded by a number of institutional barriers. Firstly, there is a significant challenge in coordination among the key institutional partners in the climate monitoring system (TMA, PMO, MAFS, MoW and the local authorities). Each ministry and Water Basin Authority currently maintains its own network of stations and station monitors, which leads to duplication and high costs. There is no unified database on weather, climate and hydrology that can be accessed by relevant sectoral users at a central or local level, and therefore no source of information that can serve as a credible basis for long-term planning.

36. There is also uncertainty and inefficiency in the data sharing mechanisms among the key partners: for example, while TMA does not charge government ministries for climate data it collects, it does sometimes practice cost recovery with WBAs, despite the fact that their own data is transmitted to the TMA via registered stations. The TMA has said they receive approximately 60,000 US\$ annually in cost recovery and data service charges, but there is no clear policy on cost recovery, and the national budget provided to the TMA for operations and maintenance of its network is insufficient.

37. Although all of the key institutional partners have developed Operating Procedures, agreements, and ad hoc arrangements for working together, it appears that these are in fact a set of bilateral ad hoc arrangements that do not provide an overarching framework for operating a successful EWS (e.g. between TMA and MoW for the installation of 60 new stations obtained by the MoW through outside funding). During this project preparation phase, the MoW and the TMA agreed to re-initiate their negotiations on a broader MoU that will cover a range of areas of cooperation, and will assist the two organizations in better coordinating equipment acquisitions, installation, operation, as well as data sharing. Similar MoUs do not as yet exist with other sectoral partners, or with the private sector. There have been *ad hoc* agreements with some mobile phone operators and telecommunications providers, for example for the use of frequencies and airwaves during alert dissemination, or for the operation of a SMS-based rainfall data collection system, but have so far only covered partial services, or have had a limited duration, as well as high costs.

38. **Policy and institutional weaknesses in the Disaster Management framework.** Disaster Management in Tanzania is governed by the 2004 Disaster Management Policy (the 2013 revision of the Disaster Management Policy has been drafted but was not yet approved at time of formulation of this project). The Policy foresees a few elements in the disaster management process: prevention and mitigation, preparedness, response, and recovery as well as post-disaster review. The policy outlines the need to develop Standard Operating Procedures and Guidelines for each key partner in the Disaster Management Committee. The policy further highlights the institutional architecture of the Disaster Management (DM) apparatus, from national to village level.

39. The Disaster Relief Coordination Act No. 9 of 1990 is currently under revision, based on experience from the past two decades. The Government of Tanzania has developed a national emergency preparedness and response plan (TEPRP) and National Disaster Communication Strategy (DCS) that provides guidelines for coordination and response to all types of disasters and emergencies in the country. The TEPRP also defines activation levels and response procedures, as well as key lead and supporting roles for all agencies involved. The TEPRP and DCS, provides for 24-hour monitoring and response capacity to be established, but this has yet to be implemented by the Government. The proposed revised Disaster Management Act, which is due to be approved in April, also proposes that the Disaster Management Department become a semi-autonomous agency of the Government.

40. Despite this recent progress, there remain two key institutional gaps: the first is that the country has no 24-hour emergency response unit that can centralize and distribute early warning information, and make quick DRR decisions (this is still at proposal stage under the TEPRP). Currently, if data received by the TMA justifies the emission of a warning, it has to await business hours to be transmitted to the PMO's Disaster Management Department who has the legal mandate to emit warnings and launch the Tanzania disaster relief processes. This creates undue delays and places the country in a state of disaster response rather than allowing for disaster avoidance.

41. Furthermore, while the policy framework for disaster management is currently being reviewed and harmonized, there is no single set of Standard Operating Procedures for responding to identified weather and climate hazards. At present, the TMA and other partners apply the SOPs that were developed for Tsunamis, but these have significant drawbacks in that they do not apply to the same set of stakeholders, timelines and framework for action. As a result, there is no agreed mode of operation for the various ministries and local authorities to anticipate or respond to a climate-induced hazard.

42. There is also no uniform regulation or legislation concerning the use of airwaves and cellular frequencies for the emission of early warnings: as a result, individual agreements must be signed with each telecommunication provider and this has driven up the price of service delivery, and could potentially inflate the maintenance and operations budgets for the hydro-climate monitoring system. The Tanzania Tele-Communication Regulation Agency (TCRA) has begun to study how delivering EWS messages free of charge could be included in the licensing agreements of all Operators.

43. Another key policy issue concerns the costs of maintaining and operating an early warning system: many of the EWS partners are left with insufficient resources to cover operating and maintenance costs, and as a result some stop-gap measures have been taken that are not sustainable: for example, paying only a minimal number of station monitors, which reduces data inflows. A clear policy or guidelines on cost-recovery, as well as a long-term financing strategy for the system, could address some of the issues related to the long-term sustainability of the hydro-climate monitoring system.

2 STRATEGY

44. LDCF resources will be used to enable the Government of Tanzania and associated stakeholders to establish a functional early warning system and quality climate monitoring services that can support long-term planning. The objective of the project is "to strengthen the climate monitoring capabilities, early warning systems and available information for responding to climate shocks and planning adaptation to climate change in Tanzania". This objective will be achieved through two outcomes:

- a) Outcome 1: Enhanced Capacity of TMA and Water Basins to monitor (and forecast) droughts and floods
- b) Outcome 2: Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans

45. Through Outcome 1, LDCF resources will be used, in conjunction with other on-going initiatives to assist the Government of Tanzania to address some of the fundamental barriers to the deployment of an operational weather, climate and hydrological monitoring system and forecasting extreme weather and longer-term climate variability, namely by increasing the national coverage by the monitoring system and by increasing the accuracy and timeliness of forecasts and alerts. .

46. Through outcome 2 LDCF funding will be used to increase the proportion of the local population that has access to adequate climate information, both for early warning purposes and for long-term planning.

47. The approach will be to demonstrate the deployment of a fully functional EWS in two hazard-prone districts as a means of demonstrating the costs and benefits of deploying an effective EWS throughout the whole country. It is expected that this will show the socio-economic benefits of adequate climate services that will support the upscaling, operation and maintenance of the system in the long term.

48. The two districts were selected as a result of the second project design workshop that was held in December 2012. A series of criteria were proposed for selection of the districts, and a shortlist of 7 highly vulnerable districts were selected. It was decided that the selected districts should be located in different agro-climatic zones and water basins, and should demonstrate a pre-existing vulnerability and exposure to droughts and floods. As a result of these criteria, and following consultation with the main stakeholders at the national and regional level, the selection settled on the Meru and Liwale districts (Arusha and Lindi regions) and surrounding basins (Pangani and Ruvuma Water Basins).

49. The total population (2012) of Liwale district is 76,015 people, of which 38,839 are women. In the area 93% of income comes from rainfed crop agriculture, and is therefore highly dependent on climate. The divisions that have been selected for the project are Kibutuka division that is mostly affected by drought and Makata division as representative of areas affected by floods. The project expects to directly benefit at least 70% of the population in both divisions.

50. In Meru District, the population is 271,906 people (2009) of which 108,570 are women. Agriculture also occupies most of the economy, with rainfed crops and some livestock grazing. Meru district has two types of rainfall, the short and long rains which fall between October and December, and between March and May respectively. Based on these types of rainfall, the district therefore has two cropping seasons. Characteristically, the district has three different agro-ecological zones: highland/upper belt, middle zone and lower zone. The lower zone is highly affected by both drought and floods in some of the areas. Four (4) different wards have been designated for the deployment of the EWS: Nkoarisambu ward (upper catchment area), Maroroni ward (drought) and Makiba and Mbuguni wards (both droughts and floods).

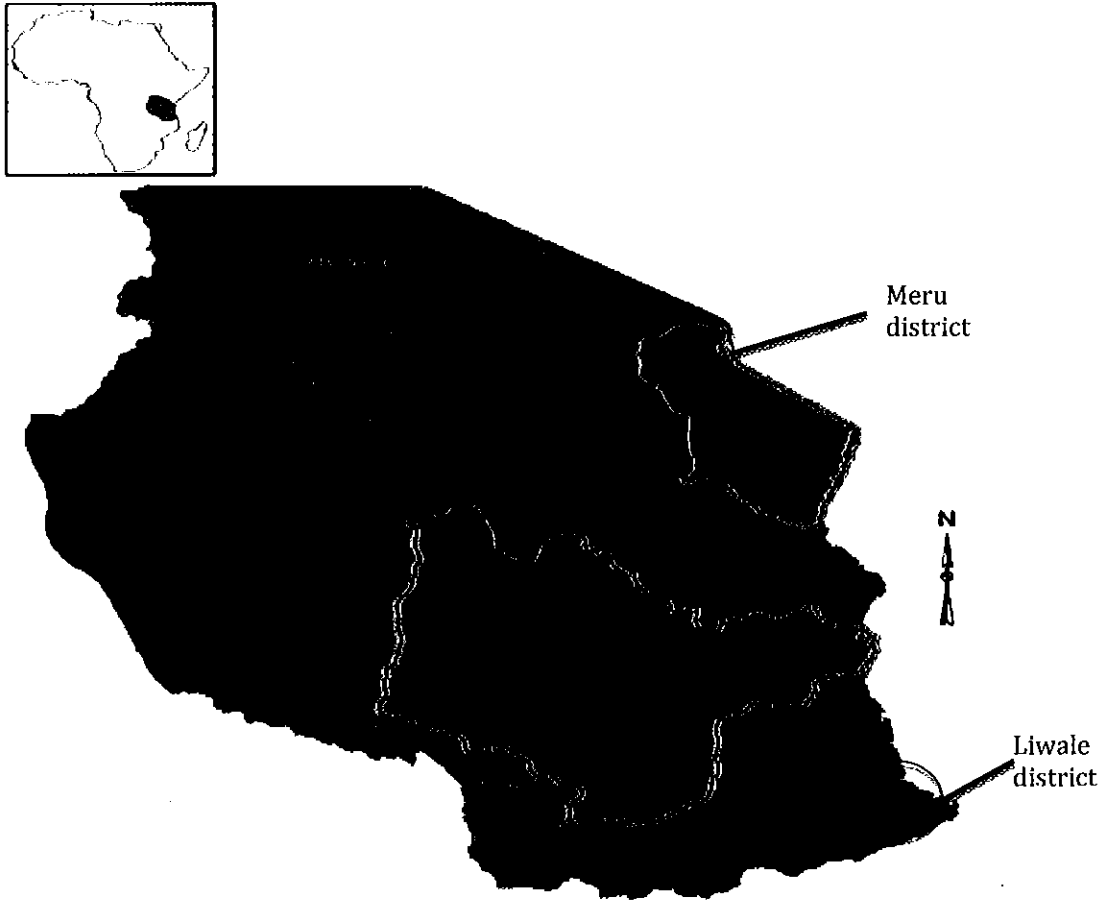


Figure 1: Tanzania Water Basins and project targeted districts

51. LDCF resources will be used to support local communities, disaster management committees, water basin offices and water user associations to deploy the early warning system that will include: improved data sources from the installation of new automated stations for agro-hydro-climate parameters, improved communication through the development of standard operating procedures, improved technical capacity through the deployment of local flood forecasting modelling skills, and improved disaster response through the establishment of a central emergency operations unit. In order to further improve information flows, the two districts will also see the development of a crowdsourced platform for “upward” transmission of hazard and damage information and “downward” transmission of agro-meteorological information, which will be used to assess impacts and plan relief efforts.

2.1 Project rationale and policy conformity

52. Tanzania is a signatory to the United Nations Framework Convention on Climate Change (UNFCCC) and has developed a National Adaptation Programme of Action (2006), as well as a National Climate Change Strategy. This project makes a direct contribution to addressing the 2007 NAPA Priorities in the water and health sectors (Priority 6, develop an early warning system for drought and flood) and in the human settlements area (priority 7, “Establish a Disaster planning framework”). The

project also falls within the framework of the Expanded NAPA of 2009, where early warning systems for droughts and floods are also mentioned as priorities in the short-, medium- and long-term for the agriculture sector, and as a cross-cutting priority.

53. Tanzania has set up a legal and institutional framework for environmental management through the Environmental Management Act of 2004. Among other things, the Act provides for establishment of climate change units at individual sector ministries. Tanzania lacks a stand-alone policy on climate change however; there are several sectoral policies, which address climate change. The policies include: National Environment Policy, National Energy Policy, Agriculture and Livestock Policy, National Forest Policy and National Water Policy. In addition, Tanzania has recently launched its 2013 National Climate Change Strategy, which aims to put in place a better institutional arrangement to adequately address climate change. The goal of the strategy is to enable Tanzania to effectively address climate change and to participate in global efforts to mitigate climate change with a view to achieving sustainable development, in line with the five-year national development plan, the Development Vision 2025, as well as national sectoral policies.

54. This project is relevant to the country's legal and development policy framework as it addresses a core issue that affects all sectors. Climate change has been given priority under section 75 of the Environment Management Act (EMA, 2004), and Disaster Management is also a priority under the Disaster Relief Coordination Act (1990, currently under review) and the Disaster Management Strategy (2004, also under review). The project also contributes to ensuring the sustainability of national development goals, including those expressed in the National Strategy for Growth and Reduction of Poverty I and II (MKUKUTA I & II). MKUKUTA II advocates for food security and climate change adaptation and mitigation.

55. The project is in line with the Tanzania Five Year Development Plan 2011/2012 – 2015/2016 that highlights five core priorities to unleash Tanzania's latent growth potentials. Most of the core priorities in the plan are climate change vulnerable sectors (agriculture, tourism), and the plan further highlights the need to enhance coordination and knowledge on climate change issues. The plan's focus on agriculture proposes ambitious objectives of transformation of agriculture for food self - sufficiency and export, development of irrigation particularly in selected agricultural corridors, and high value crops including horticulture, floriculture, spices, and vineyards. This is another area could suffer the impact of climate change, and for which accurate forecasting and climate services would be needed for decision making.

56. Finally, the Government of Tanzania recently launched the Big Results Now initiative (BRN), a programme to support the accelerated delivery of its Development Vision. The BRN initiative aims at providing renewed impetus in key sectors such as energy, transport, agriculture, and education, to achieve exceptional economic growth results rapidly. This project is in line with and contributes to removing barriers to achieving rapid results in socioeconomic development.

Consistency with the objective and priorities of the Least Developed Country Fund

57. The project fits well with the GEF Result-Based Management Framework for Adaptation to Climate Change. The project contributes directly to Objective 1 "to reduce vulnerability to the adverse impact of climate change including variability at local, national and global level" by improving quality of the data that will be used for forecasting the climate change induced impacts. Moreover this will assist in reducing vulnerability to the communities in areas frequently impacted by floods and drought by coming up with various mitigation and adaptation strategies to address the impact.

58. The project also contributes directly to the 2nd objective: “increase adaptive capacity to respond to the impact of climate change”. The information that will be generated through this project will be used in making some decisions at the local level, at short, mid- and long-term, for example crop and variety selection, emergency preparedness, land use planning.

59. LDCF resources will also enable “the transfer and adoption of adaptation technology”, by implementing new equipment, technologies and approaches for forecasting, early warning and disaster management. This will change the existing situation in the country where most of the data are collected using manual and obsolete data collection equipment.

60. The project has been designed to meet overall GEF requirements in terms of design and implementation. For example:

- a. **Sustainability:** The project is designed to deliver lasting lessons on the usefulness, operation and maintenance of the hydro-climate monitoring network, by demonstrating how enhanced climate information can better serve disaster management, risk reduction and long term planning. During the design of this initiative, progress was made on the negotiation of a MoU between the MoW and TMA, which will set the basis for future cooperation on installation, operation and maintenance, as well as data sharing. The project will also work with local communities in the two project districts to enhance their participation in the early warning system, creating conditions for long-term sustainability.
- b. **Monitoring and Evaluation:** The project is accompanied by an effective and resourced M&E framework, that will enable an on-going adaptive management of the project, ensuring that lessons are learnt, management decisions are taken based on relevant and up-to-date information, and regular progress reports are available for concerned parties.
- c. **Replicability:** The project will generate a thorough, costed, report on lessons learned that will enable the replication of project outputs and outcomes in other regions. Conditions for broader replicability will have been facilitated through the increase in national coverage of the hydro-climate monitoring system and the development of Standard Operating Procedures, which will enable the further integration of climate information into planning at all levels, and which will set the conditions for operating an EWS countrywide.
- d. **Stakeholder involvement:** Following on from the NAPA process, the design of this project was undertaken in a participatory manner. Moreover, the design of the project has ensured the appropriate involvement of stakeholders in project development and implementation (See Section 2.9 for stakeholder involvement plan).
- e. **Multidisciplinary approach:** The project was designed and is intended to be implemented in a multidisciplinary approach that brings together all sectors who are producers or users of climate information, starting with agriculture and water, but including also private sector stakeholders, NGOs and community based organizations. The project is intended to assist Tanzania in providing climate services to all sectors.
- f. **Gender equality:** The project design integrates gender considerations in a Tanzanian context. Specifically, given their particular roles in agriculture, and the large number of female-headed households in project sites, the project intends to ensure that women play an adequate part in the early warning system, that they benefit from climate information that is relevant to them and their roles, and that the information is presented and transmitted in

a way that is accessible to them, considering their specific constraints. In addition, the project will ensure that all training and capacity development opportunities are made available equally to women and men, and equal numbers of participants in meetings, committees, trainings and seminars will be sought during implementation.

- g. **Complementary approach:** The project builds on ongoing initiatives and programming in Tanzania, and specifically the increased impetus provided by the GoT in reviewing the Disaster Management Policy framework. The project therefore builds on ongoing efforts to review the legislative texts, institutional make-up of key DRM organizations, as well as emergency preparedness planning at the local level. The project also intends to pursue active coordination with other partners working on climate change and DRM in the country, through continued discussions among donors.

61. This project is also aligned with the GEF Result Based Management Framework for Adaptation to Climate Change by including activities which are directly aligned with key GEF outcomes, mainly:

- a. **Outcome 2.1:** Increased knowledge and understanding of climate variability and change-induced threats at country level and in targeted vulnerable areas
- b. **Outcome 2.2:** Strengthened adaptive capacity to reduce risks to climate-induced economic losses

62. The proposed project has been prepared fully in line with guidance provided by GEF and the LDCF Trust Fund. The project follows the guidance from the 'Programming Paper for Funding the Implementation of NAPA's under the LDC Trust Fund (GEF/LDCF 2006). The project focus is also aligned with the scope of expected interventions as articulated in the LDCF programming paper and decision 5/CP.9. As climate impacts fall disproportionately on the poor, the project recognizes the links between adaptation and poverty reduction (GEF/C.28/18, 1(b), 29).

63. The project is also consistent with the principles governing the LDCF:

- a. **Country ownership:** The Government of Tanzania has ratified the UNFCCC and is classified among the non-Annex 1 parties. These countries have also developed and submitted their National Adaptation Plans of Action (NAPA) and are entitled to benefit from the LDC Fund for the implementation of priority measures identified in their respective NAPAs. In implementing priority interventions identified in the NAPAs, the project is consistent with the Conference of Parties (COP-9) and also satisfies criteria outlined in UNFCCC Decision 7/CP.7 and GEF/C.28/18
- b. **Compliance with programme and LDC Fund policies:** The project complies with the NAPA-identified urgent needs, all of which are relevant for supporting national development goals and for achieving MDGs 1, 3, 6 and 7
- c. **Financing:** The project is designed to accommodate the additional adaptation costs of priority actions identified in the NAPAs and build on several other baseline projects and programmes. The co-funding for this project is also within the stated guidelines, with more than \$5m in prospective co-funding. The relevance of the co-financing to the proposed LDCF project is outlined below and will be further elaborated on during the project preparation phase.

- d. **Institutional Synergy and Coordination:** The project outcomes will be implemented through national execution. The PIF therefore outlines project management costs that will be incurred by implementing partners at the national level (below 5%)

2.2 Country ownership: country eligibility and country drivenness

64. With LDCF resources, Government will be better capacitated to address their priorities as articulated under the United Nations Development Assistance Plan (UNDAP 2011-2015) including: strengthening the country's enabling environment for the fulfilment of human rights and pro-poor growth, building national capacity to deliver basic services while increasing coverage and quality, and responding quickly through humanitarian assistance which is tied to long-term development objectives. Stronger hydro-climate monitoring capacity will help local communities and authorities avoid climate-induced losses in livelihoods and basic services such as food and shelter for the communities in the vulnerable areas. Moreover, having improved weather forecast will enable the government to be informed as to where there will be shortages of food and other related basic needs, and that prior plans will be made to ensure that humanitarian assistance are available to save the lives of people and their properties.

65. This project will also address the country priorities highlighted in the UNDAP 2011-2015, whereby it is expected that the production systems will be improved by ensuring the right investments, especially in the agricultural production. The project also addresses broader UNDP priorities such as strengthening the key drivers of inclusive pro-poor economic growth, including pro-poor sector policies, agro-productivity and manufacturing linkages enhancement, environmental and climate change mitigation and adaptation strategies.

66. Moreover funding will address issues that are highlighted in a number of national development plans such as the National Strategy for Economic Growth and Poverty Reduction II and the National Five Year Development Plan 2011/2012 -2015/2016 as detailed under section 2.1.

2.3 Design principles and strategic considerations

67. Hydrological and climate monitoring is recognized by the GoT as a core public service provided to all economic sectors. As such this project is founded on a solid baseline of ongoing national programming that provides the existing infrastructure, staff and resources of the early warning network. This includes all programming deployed by the Tanzania Meteorological Services, Water Basins and the Ministry of Water, as well as the Ministry of Agriculture's current programming on crop and rainfall monitoring. This project comes as an add-on to these ongoing initiatives to ensure that climate change dimensions are taken into account in the deployment of short-, medium- and long-term weather and climate services.

68. A key principle governing the design of this project is that, while the project cannot cover all needs in terms of infrastructure and climate-related information, it can provide the means by which national coverage by an efficient EWS will be scaled up to a level able to support planning and responses to climate change induced shocks and changes in the future. It is assumed that this increased coverage, along with the (existing and new) technical capacity to analyze climate information, will allow the country to benefit from efficient, accurate and legitimate climate services on which to underpin development planning. Furthermore, the project also proposes that activities at the local level to demonstrate the efficiency of the early warning system will serve as lessons towards the development of an upscaling strategy to be led by the government. The project therefore aims to deliver concrete lessons towards the sustainable deployment of EWS at all levels in the country.

69. Another strategic principle that governs the design of this project is the use of LDCF funding to provide value added to nationally led baseline programming. This provides long-term anchoring for LDCF interventions, ensures that the conditions for long-term sustainability continue to be present even after the end of the intervention, and encourages stronger ownership. This project is therefore building on ongoing programming delivered by the Tanzanian Government through the TMA, Ministry of Water, and Disaster Management Department, in addition to being closely linked to ongoing programming in Ministry of Agriculture (Crop and Irrigation Department) and other sectoral initiatives.

70. One of the strategic principles that will influence the implementation of this project are the links and synergies with the other similar projects (in Benin, Burkina Faso, Ethiopia, Liberia, Malawi, Sierra Leone, São Tomé & Príncipe, Uganda and Zambia) implemented through UNDP and funded through the LDCF. These 10 projects were designed simultaneously and as such, synergies have been and will continue to be explored among them. Common indicators have been included in the projects in order to facilitate aggregate results reporting and to allow comparisons between countries. Opportunities for joint activity delivery (training and knowledge sharing) will be explored and facilitated through UNDP and through a set of common services, including technical support and administrative assistance (see section B.3). Example activities that could be organised on a multi-country basis include:

- a. Activity 1.3.1: Flood forecasting software, tools and methodologies through training.
- b. Activity 1.4.1: Rescue, digitize and archive relevant available historical data from all ministries.
- c. Activity 2.3.4: Field visits and stakeholder consultations to understand how users of early warning advisories and warnings use the information for managing climate and weather related risks and how their decision frameworks affect the interpretation of advisories and warnings
- d. Activity 2.5.3: Analyse economic costs and benefits of an early warning system at local level, including data on economic losses avoided from the simulation exercise.
- e. Activity 2.5.4: Develop a lessons learned report including methods for replication and extrapolation of the socioeconomic benefits of EWS.

71. Opportunities for South-South cooperation and multi-country exchanges will also be pursued, including joint trainings and the production of knowledge products and guidelines that can benefit all countries supported through these LDCF-financed initiatives.

2.3.1 Ongoing relevant national and regional initiatives

72. This project is closely linked to several initiatives, some of which are providing direct co-financing to this project:

73. The UNDP Country Programme currently includes a project on **Disaster Management**, scheduled to end in 2015. Through this project, which provides US\$500,000 of co-financing, UNDP works with the Prime Minister's Offices' disaster management department to deliver outputs that are of direct relevance to this initiative, including:

- a. Revision of the National Operational Guidelines
- b. Formulation of a M&E framework.

- c. Convening of DRR national platform and formulation of a resource mobilization strategy for emergency response
- d. Development of DRR training package for the PMO-DMD

74. **The Water Sector Development Programme (2005-2025)**, jointly funded by the World Bank and the national government, which has three major components: the Water Resources Management Programme (WRMP), the National Rural Water Supply and Sanitation Programme (NRWSSP) and the Urban Water and Sewerage Programme (UWSSP). The programme is deployed with the support of all the water stakeholders, including Ministry of Water, Water Basin authorities, water user groups, utilities and suppliers, private sector and NGOs. As part of the programme, a number of climate stations have been procured to assist the Basins to better forecast rainfall events, droughts and floods. In addition, the programme foresees flood and drought management interventions that will include: (i) preparation and agreements on disaster response organizational structures; (ii) preparation, financing and implementation of disaster advance warning systems; (iii) development of disaster contingency plans and procedures and training of personnel in their use; (iv) development of dam-safety measures to mitigate the impacts of floods and droughts; and (v) the identification and conducting of studies on climate change responses, and (vi) studies on the potential for and feasibility of large, medium and small scale dams and rainwater harvesting and their development, which could have the potential for buffering against climate variability. The total amount of funding foreseen for the programme is 2,8 billion US\$ over 20 years, to be channelled through a Sector-Wide Approach (SWAP) and general budget support. Of this amount, an estimated 610,000 US\$ is a direct co-financing contribution to this project through MoW.

75. A number of other closely related projects that are not providing co-financing, but with which this initiative will seek close coordination include:

76. The UNDP-supported project “**Mainstreaming Environment and Climate Change adaptation in the implementation of National policies and Development plan**”, which is scheduled to end in 2015, will provide valuable experience and expertise, as well as a baseline of capacity among key government institutions, including VPO, National Environmental Management Council (NEMC), and Ministry of Finance (MOF). This project is being implemented through UNDP under UNDAF with additional support from DFID. Total project funding is 4.9 million US\$.

77. The World Bank has provided support to the water sector in Tanzania through its **Water Sector Support Project**, which received over US\$900 million in loan support from 2007 (scheduled end in 2014). The purpose of the loan was to assist the Water Ministry and Water Basins in developing water infrastructure to increase access to water in rural areas. The World Bank is also working with DFID to develop a new project on supporting **Climate Resilient Growth** in Tanzania, which will work with the Ministry of Agriculture to develop a climate adaptation action plan focusing on crop productivity. Close linkages are expected with this new project during implementation.

78. The Government recently launched the **Southern Agricultural Growth Corridor of Tanzania (SAGCOT)**, an initiative under the Agriculture and Food Security Investment Plan and the Agriculture Strategic Development Plan. The SAGCOT is a multi-million dollar public-private partnership platform for mobilizing investment in the agriculture sector in a broad region of the country encompassing most agricultural productive areas. SAGCOT is only beginning its implementation, by developing clusters around which to develop agriculture and related investments, including roads, infrastructure, processing facilities, as well as delivering accelerated services to farmers and producers in the region. The **Agriculture Sector Development Plan** is supported by various partners, including Danish International

Development Agency (DANIDA), Japanese International Cooperation Agency (JICA), the European Union (EU), Irish Aid (IA), and the International Fund for Agricultural Development (IFAD) and the International Development Association (IDA), to an approximate total of 1.7 billion over 7 years (2006-2013, updated figures not available.)

79. There are also a number of other relevant activities at the Water Basin level on which this initiative will build. For example the **Pangani River Basin Management Project (PRBMP)**¹⁴, which was implemented with support from the GoT, IUCN, Netherlands, the EU-ACP Water Facility, and the Global Environment Facility through UNDP, sought to strengthen Integrated Water Resources Management (IWRM) in the Basin. It performed an integrated environmental flow assessment has helped the project to develop an understanding of the hydrology of the river basin, the nature and functioning of the river ecosystem and the links between the ecosystem and the social and economic values of the rivers' resources. It also undertook some climate modelling, and the development of scenarios looking to 2025 to determine how different water allocations could impact economic development, environmental health and social well-being in the basin. As a major result of this project, Basin offices throughout the country are developing Integrated Water Resources Management Plans.

80. This project also builds on capacity developed during the implementation of UNDP's **Africa Adaptation Programme (AAP)** project "Mainstreaming CCA in the National sectoral policies of Tanzania" (with financing of \$2.97m) sought to mainstream CCA mechanisms in Tanzania's policy, development and investment frameworks.¹⁵ The project ended in December 2012, it has received a small funding and time extension until 2014. The outputs were: introduction of long term mechanisms that can cope with CC uncertainties, strengthened leadership and institutional frameworks that can manage CC risks and opportunities, enhanced CC resilient polices and measures in priority sectors, national adaptation financing options established and dissemination of CC knowledge generated, stored and shared nationally, regionally and internationally. The project has procured 7 automated weather stations¹⁶ and two cluster computers for weather forecasting at TMA. The AAP has created a baseline of experience on mainstreaming which will be built upon for this project.

81. Tanzania is also currently implementing two other adaptation initiatives with UNEP, namely the "Implementation Of Concrete Adaptation Measures To Reduce Vulnerability Of Livelihood and Economy Of Coastal Communities In Tanzania", with Adaptation Fund support of US\$ 5 million and the "Developing Core Capacity to Address Adaptation to Climate Change in the Coastal Zones of Tanzania", with LDCF Funding of US\$3.2 million.¹⁷ Both these projects provide core capacity on which this project will build, and foresee some activities that could provide linkages to this new initiative, including the development of a Climate change Observatory (focused on coastal issues in its first phase) under the AF project, which will serve as a coordinating forum and repository for information on wider aspects of adaptation and vulnerability.

82. This project builds on significant investment by the national government in the development of complete disaster management architecture, including the current operations of the climate monitoring system. Co-financing for this project is therefore largely national:

¹⁴Mainstreaming Climate Change in Integrated Water Resources Management in Pangani River Basin, which received 1 Million US\$ in GEF resources, and ended in 2011.

¹⁵Technically, not regarded as a baseline project nor included as co-financing leveraged by this LDCF project.

¹⁶Located at Nachingwea, Lindi, Tunduru, Nzega, Kisarawe, Makete, and Lugoba

¹⁷Technically, also not regarded as a baseline project nor included as co-financing leveraged by this LDCF project

Table 1: Project Co-financing

Sources of Co-financing	Name of Co-financier(s)	Purpose	Amount (\$, over duration of project)
Government of Tanzania	Tanzania Meteorological Agency	<ul style="list-style-type: none"> - Ensures current operations and maintenance of the climate monitoring system; - Delivers weather forecasts, climate forecasts, climate models and early warnings - Acts as the main climate data provider for all sectoral clients - Collects and conserves climate data 	20,575,000
Government of Tanzania	<i>Prime Minister's Office – Disaster Management Department</i>	<ul style="list-style-type: none"> - Establishes the institutional legal and regulatory framework for disaster management - Manages and coordinates DRM and Disaster Response - Establishes and implements the Tanzania Emergency Preparedness and Response Plan - Coordinates with local disaster management authorities, district councils and communities on disaster risk reduction and relief - Emits Standard Operating Procedures and guidelines - Emits Early Warnings 	1,380,000
Government of Tanzania	<i>Ministry of Water/ Water Basin Boards</i>	<ul style="list-style-type: none"> - Monitors, mobilizes and manages water resources in the country - Works with local communities to effectively manage water - Undertakes infrastructural works to mobilize, manage and conserve water - Undertakes river and surface water monitoring and flood response 	610,000
Implementing Agency	<i>UNDP</i>	<ul style="list-style-type: none"> - Support the GoT's work on Disaster Risk Reduction through financing and technical support - Support the GoT's development agenda through funding and technical support - Implement Disaster management Project 	600,000
Total Co-financing			23,165,000

2.3.2 National and local benefits

83. This project will provide broad economic and social benefits to Tanzania by providing the means to avoid losses from increased climate variability and climate extremes due to climate change. Because it will also strengthen the overall framework and infrastructure for climate monitoring, the project will provide benefits for the agriculture sector in Tanzania, enabling better planning in the short, medium and long-term. It is expected that this project will also provide benefits related to the management of water, which is already a key constraint in some parts of Tanzania, by enabling better predictive management of droughts and floods. The project is a direct contribution to MDG 7 on environmental sustainability and MDG 1 on reduction of poverty and hunger.

84. National benefits expected from this project will include reduced losses incurred by the national economy from droughts and floods. For example the study on Economic Impacts of Climate Change in Tanzania (2010) estimates that additional costs incurred from climate change could reach 2% of GDP annually by 2030, whereas the costs of a single severe drought event have been shown to reach 1% of GDP. Losses in the agriculture sector alone may be as high as 35% (yield decreases) by 2050¹⁸. Energy constraints due to droughts are also estimated to lead to high costs and reduced availability, as hydro-electricity generates 55% of the country's energy. The costs of floods are harder to estimate, but encompass losses of life and property, productive land and assets, health, with longer times of recovery during heavy rain periods. Better anticipation of severe events, stronger preparedness and more rigorous land use planning, informed by accurate weather, climate and hydrological forecasts and predictions, can reduce these losses in the short and long-term.

85. Short-term national benefits from this project will also include increased cost-savings from automation of the hydro-climate observing system, as well as cost savings and efficiencies from increased coordination and data sharing among the main stakeholders.

86. At the local level, this project expects to deploy an effective early warning system in two districts that are already highly vulnerable to climate variability. These two districts are comprised of mainly rural areas, where the proportion of poor and extremely poor is already high. Both districts have experienced repeated losses from droughts and floods over the past years. An effective EWS will provide direct benefits to these two areas in terms of avoided losses.

87. At the local level early warnings and climate hazard mapping, disseminated correctly and acted on appropriately, can provide economic benefits through reducing losses of agricultural produce, infrastructure (roads and bridges) and disruption to peoples livelihoods. This has further benefits on people's health and wellbeing. Communities are expected to benefit from this project through the deployment of the early warning system for both droughts and floods, which will reduce the losses to agriculture from climate hazards, e.g. losses of land during severe rainfall events or floods, and yield decreases during drought periods. Communities will also benefit from the availability of reliable climate data on which to base land-use planning decisions, as well as its use for flood forecasting and risk mapping. The project will also estimate the economic costs and benefits of the early warning system, to assess where, when and under what circumstances it is economically feasible to upscale the monitoring and services that are provided.

¹⁸ URT, UK Aid, Economic Impacts of Climate Change in Tanzania (2010).

2.3.3 UNDP's Comparative advantage

88. The proposed project is aligned with UNDP's comparative advantage in the area of capacity building, providing technical and policy support as well as expertise in project design and implementation. Additionally UNDP has a long history of collaboration with the Government of Tanzania, as well as a much experience managing related projects in the country, including for example the AAP, and the Disaster Management Project, Mainstreaming Environment and Climate Change Adaptation in the implementation National Policies and Development plan currently under implementation and which bear direct linkages to this initiative. UNDP has worked with the GoT on the integration of climate change issues into planning in the past¹⁹.

89. UNDP has been working with the Disaster Management Department and the UN family on two DRM projects, including "Managing Transition from Humanitarian Assistance to Sustainable Development in North Western Tanzania" and "Strengthening National Disaster Preparedness and Response Capacity". The latter focused on Zanzibar and produced a Disaster Risk and Capacity Needs Assessment, helped update the Zanzibar Disaster Management Policy, develop an Emergency Preparedness and Response Plan, and also helped in establishing an Emergency Situation Room.

90. The UNDP Country Office in Tanzania currently implements an extensive portfolio of projects, (61 active projects), for a total of \$31.4 million (of which \$3.2 million were GEF funded), in partnership with various stakeholders and national partners, including the PMO-DMD, VPO-DOE, and other UN agencies. The AAP in Tanzania was implemented through UNDP and the CO has specialized expertise in climate change and disaster management that can be brought to contribution for this project.

91. The UNDP country office in Tanzania is also well placed to coordinate activities between different programmes and institutes. Currently it has a focus on: Programme 1 – Sustainable Management of Protected Areas and Programme 2 – Mainstreaming environment & Energy and Sustainable Land Management. It has links with both with the TMA and office of disaster management.

92. UNDP coordinates actively with other members of the UN family and other donors, including through the One UN platform in Tanzania and through the UN Development Action Plan (UNDAP). Donor coordination occurs through regular Development Partners meetings, thematic meetings and bilateral cooperation arrangements with various partners. Related to this project, UNDP has created and will maintain close links with partners such as DFID and the UK Met service, WMO, World Bank, UNEP.

93. UNDP has a high level of experience managing other LDCF projects in the region, in particular those with an early warning component. UNDP is therefore already working with EWS in many countries and many sectors, strengthening its capability to coordinate and provide flexibility to handle changing needs between countries. The country offices are supported by Regional Technical Advisors at UNDP offices in Pretoria, as well as by policy, adaptation, economics and climate modelling experts in New York, Cape Town and Bangkok. A network of global Senior Technical Advisors provide additional technical oversight and leadership helping to ensure that programs on the ground achieve maximum policy impact. There are other LDCF, SCCF and Adaptation Fund -financed projects within the region

¹⁹c.g., Mainstreaming Climate Change into Integrated Water Resources Management in Pangani River Basin (Tanzania), ended in 2011.

with similar objectives currently supported by UNDP, which means that there is substantial in-house technical expertise within UNDP that can be exploited to support the Government with the project.

2.4 Project Objective, Outcomes and Outputs/activities

94. The objective of the project is to **strengthen the weather, climate and hydrological monitoring capabilities, early warning systems and available information for responding to extreme weather and planning adaptation to climate change in Tanzania**. The key impact indicator for the project is *the level of capacity of agencies to monitor, assess and disseminate hydro-climate information for early warnings and long-term planning*. This indicator is to be measured using a Capacity Assessment Scorecard, as developed by UNDP, using expert judgment, and includes an overall assessment of the main institutional stakeholders (TMA, PMO, MoW, WBAs, MAFS) (see Annex 1). This objective will be achieved through the two components and associated outcomes detailed below.

95. As mentioned earlier, the project is based on a solid baseline of nationally-led programming by the TMA, MoW and DMD, to which LDCF contribution is expected to bring additional adaptation benefits.

2.4.1 Component 1: *Transfer of technologies for weather, climate, hydrological and environmental monitoring infrastructure*

Co-financing: \$20,930,000 USD

LDCF project grant: \$1,914,400 USD

96. **Outcome 1:** Enhanced Capacity of TMA and Water Basins to monitor (and forecast) droughts and floods

Without LDCF/SCCF Intervention (baseline):

97. This project builds on – and addresses key gaps in - the current baseline of operations of the Tanzania Meteorological Agency in terms of climate monitoring, weather prediction and forecasting, as well as on the work of Water Basin Authorities in terms of flood monitoring and mitigation. The TMA performs regular climate monitoring services, including rainfall and other climate parameters through a network of manual and automatic stations. At the moment, the percentage of the country that is covered by the operational climate monitoring system is estimated at 50% (mostly manual stations), and the percentage covered by an automated network is estimated at 30²⁰%. Current coverage as administered by the TMA is as follows:

- a. 26 Synoptic stations that make half-hourly to hourly observations of various weather and climate parameters, of which 20 operate for 24 hours, 4 stations for 15 hours and the remaining 4 operate for 12 hours only due to energy constraints. Measurements from some (at the time of writing it was not clear how many) of these stations are transmitted to the TMA communication centre after every hour through channels such as TRANSMET (Automatic Meteorological Switching System). This information is exchanged globally through Global Telecommunication System (GTS).

²⁰These figures are estimated based on data received during project preparation and compiled using various sources, including the TMA's database of existing stations, the MoW's list of stations, and the TMA's proposed 5 year plan.

- b. 11 AWS that transmit data to the TMA manually by available channels including, where available, telephone, SMS, regular mail, and Internet.
- c. 500 of the more than 2000 manual rainfall stations currently provide measurements on a monthly basis via post and fax. Most stations are not reporting due to lack of funds to pay the station monitors.
- d. Weather monitoring radar operates in Dar es Salaam and a second one is due to be installed in Mwanza in 2013.
- e. There is 1 upper-air station currently under operation at Julius Nyerere International Airport (JNIA) Dar es Salaam.
- f. There are 157 climatological stations in Tanzania that record rainfall and temperature on a daily basis, and that are owned by the private sector and government institutions.
- g. The TMA trains meteorological observers and provides expertise in instrument maintenance to ensure that the desired standards are met to get reliable data.
- h. There are 15 agro-meteorological stations operated by TMA in collaboration with Ministry of Agriculture, Food Security and Cooperatives (MAFC).

98. Transmission and global exchange of weather data in TMA occurs along three levels of communication links, namely transmission from observation stations to collecting zonal offices then from zonal offices to Central Forecasting Office (CFO) and from CFO to the Regional Telecommunication Hub (RTH) Nairobi, Kenya. The heart of all communication links at CFO is the TRANSMET, an Automatic Message Switching System (AMSS) which routes data to and from different circuits and channels, such as forecasting tools (Synergie), satellite receiver (RETIM), RTH Nairobi circuit.

99. ICT technology is deployed at CFO for data flow and access from TRANSMET to forecasting tools (Synergie), from RETIMs to TRANSMET through Local Area Network (LAN). TMA uses telephones, Single Side Band radios (SSB's), Mobile phones, Internet and e-mail, VSAT Telecommunication System for data transmission and acquisition.

100. The TMA has drought and seasonal forecasting skills and benefits from skilled staff and a well staffed forecasting office (361 people including network operations personnel). While staff are already available and well-trained, the tools to deliver an efficient and functioning monitoring and forecasting system are missing: servers and computing power have been noted during project preparation activities as one key limitation to the development of computerized forecasts, and the prevalence of manual stations in the network results in slow data flows. TMA currently runs two Numerical Weather Prediction (NWP) models; the Weather Forecasting and Research (WRF) model and the High Resolution Model (HRM). Due to limited computing resources, TMA generates short-range forecasts with a low horizontal resolution to minimize model run time. As a result, the TMA is relatively well placed for predicting slow-onset weather events and seasonal forecasts, but lagging behind in terms of now-casting and early warning.

101. Current annual baseline costs of operating the TMA and its network are 10.8 billion TZS (approx. 6.7 million USD). The TMA's Five Year Plan for Enhancement of Meteorological Services for Sustainable Socio-economic Development in Tanzania (2010-2015) foresees an additional 135 million

US\$ over five years to enhance the services and infrastructure of the TMA. Of this amount, only 15% has been funded to date.

102. TMA and the other ministries maintain all weather/climate data on paper archives and access them manually when specific requests are made or when specific models require this information. The TMA also operates and maintains the network (in accordance with available finances) of synoptic and rainfall stations across the country. It performs weather forecasting and issues daily, decadal and seasonal bulletins, using a combination of manual and digital plotting and numerical forecasting.

103. For hydrological monitoring, the WBA each maintain, according to their resources, a network of rainfall gauges and river gauges that are read manually by station monitors (semi-volunteer observers). Data is sometimes transmitted to the TMA using paper formats or, where possible, SMS systems, and – in the case of registered automatic weather stations – through the telecommunication system. However the data cannot be recovered from the TMA once uploaded, as there is no shared database. There is currently no flood forecasting or early warning capacity in the MoW or within the WBA, in particular in the Ruvuma and Pangani Basins where the two project districts are located.

104. Where manual stations exist, river level data is read manually every two hours, but the information is transmitted according to the observers' capacity and means (by SMS, telephone, mail). The current budget is estimated at around 100,000,000 TZS (60,000 USD) for maintaining EW networks annually. In the Ministry at central level there are 50 staff employed in the EW related sections; WBAs are independently staffed with 30 to 50 professionals each depending on the size of the basin. The Ministry of Water also administers the Water Sector Development Programme, a 2,8 billion USD initiative (WSDP, 2006-2025). The programme aims at addressing shortfalls in urban and rural water supply infrastructure, to improve water resource management primarily through upgrading the country's nine Basin Water Offices, and to strengthen the sector institutions and their capacities. Under the WSDP, the MoW and various WBAs have acquired or rehabilitated 60 meteorological stations that are currently under MoW administration. Plans are underway to share the data from these stations with the TMA.

105. The Ministry of Agriculture whose mandate is to use the meteorological data to produce forecasts on food security, cannot currently deliver its functions for lack of data. Where it once maintained a parallel network of rainfall stations using SMS transmission, these have been out of operation since 2009 due to a lack of funds to cover the recurring costs. The MAFS has recently acquired a satellite receiving station that it uses to track rainfall data in relation to crop growth information it receives from the extension services. Regarding human capacity, the Ministry houses one agrometeorologist, one agronomist, one agroeconomist and one agrostatistician and the Crop Monitoring Department is comprised of 1 person. There is no designated officer for communications with the district agricultural officers in case of warning. Communications with the districts occurs using regular mail, telephone or fax. At district level, staff is generally not well versed in the interpretation of climate data, relying excessively on products and information provided by the centre.

106. Estimated total baseline funding that this project builds on under Outcome 1 is USD 20,930,000 over 4 years, based on estimated annual costs of ongoing programming by the Tanzanian government through TMA and MoW.

With LDCE/SCCF Intervention (adaptation alternative)

107. Output 1.1 will invest in the acquisition and installation of additional weather/climate monitoring equipment under the responsibility of the TMA. This equipment will enable the organization to more accurately monitor the current weather/climate and to increase the accuracy of short-term (daily) and

long-term (seasonal, decadal and climate change) forecasts, as well as warnings and alerts. Through LDCF funding the TMA will acquire a total of 36AWS with agro-meteorological sensors to be installed in and around the two project districts as a matter of priority, and then deployed nationally according to TMA's deployment plan and list of priority sites, where no station currently exists, and in coordination with other Ministries to ensure there is no duplication of equipment (See Annex 2 for preliminary list of TMA sites). In order to support this expansion of the network, the project will also support training for 6 TMA engineers and instrument specialists in the operation, calibration and repair of new stations and maintenance of the telecommunications network.

108. Output 1.2 will invest in the acquisition of hydrological monitoring equipment under the responsibility of the WBAs in Ruvuma and Pangani. LDCF funding will be used to acquire 20 hydrological monitoring stations, 20 automated river staff gauges and 20 automated rainfall gauges for local flood monitoring and forecasting, which will all be deployed in the two basins targeted by the project according to needs and specifications expressed in each Basin's Hydrographic Design. This monitoring equipment will be used to collect and generate real time data that will be available locally and transmitted to the TMA simultaneously.

109. Output 1.3 will further support the development of flood forecasting in the Ruvuma and Pangani basins, including the sub-catchment piloting areas. The LDCF funding will be used to acquire flood forecasting software and computing facilities (servers and workstations), and to enable the WBAs to develop flood forecasting models and flood risk maps using available climate and hydrological data, including updated data coming in from the new monitoring stations acquired in Output 1.2 above. The types of forecast models to be developed will be determined during the inception phase. The Water Basins will be enabled to perform various tasks using flood management software, including: real-time local flood forecasting based on hydrological and precipitation data (rainfall-runoff models, or hydrological models), development of GIS-based flood risk maps and models using varied parameters to optimize decision making, better management of hydraulic structures (e.g. dams), and environmental monitoring. Models will use the available historical climate and hydrological data for the districts and the basins that is currently kept on paper in various sites in TMA and within the Water Basins. Linkages will also be explored with the WMO initiative on Flash Flood Forecasting for SADC.

110. Output 1.4 will address the existing gaps in data coordination and data sharing by working with all climate and hydrological data users and producers to develop a shared platform for data sharing. Funding will be used to establish, through a working group comprised of TMA, MoW, MAFS and DMD, and Water Basin Boards, an integrated database of climate/hydro information that can be accessed by sectoral users in real time. Access and cost recovery protocols will also be developed around this shared platform. The database will be maintained by TMA and managed through the working group. Access by other sectoral users will be made available through online portals. Existing data concerning the two project districts, currently available only on paper, will be digitized through a systematic document management system, input into the database, and other digitally available data will be migrated into the shared platform.

Output	Indicative Activities
1.1 36 additional automated stations generate hourly climate data	1.1.1 Procurement 36 Automated weather stations 1.1.2 Siting and installation of AWS, including protective infrastructure 1.1.3 Acquisition of 2 additional servers for data storage and transmission

	1.1.2 Train 6 TMA instrumentation specialists in the operation, calibration and repair of new stations and telecommunications facilities
1.2 Real-time hydrological and river flow data available for major rivers in Pangani and Ruvuma Basins	1.2.1 Procure, site and install 20 hydrological stations, 20 river gauges and 20 rain gauges for monitoring river levels in Pangani and Ruvuma basins 1.2.2 Procure 1 computer, 1 server, and 1 modem for each Water Basin Office for local flood forecasting and data transmission
1.3. Flood forecasting models, flood forecast management systems and flood risk maps are developed for each major river within the Pangani and Ruvuma Basins	1.3.1 Acquire flood forecasting software, tools and methodologies 1.3.2 Develop flood forecasting models using rainfall and river flow data in Pangani and Ruvuma Basins 1.3.3 Develop flood risk maps in Meru and Liwale districts using available historical data (in TMA and WBs)
1.4 Hydrological and climate data collected from various monitoring systems is integrated into a harmonized database that is accessible to sectoral users	1.4.1 Rescue, digitize and archive relevant available historical data from all ministries relevant to the 2 pilot districts to be integrated in the global database. 1.4.2 Establish a working group of TMA, MoW, MAFS and DMD, and Water Basin Boards to develop a data sharing platform and agreements, including cost recovery modalities 1.4.3 Establish an integrated database of climate/hydro information that can be accessed by sectoral users in real time, housed in TMA 1.4.4 SOPs developed for the collection of new observational data made possible through this and other projects focused on supporting data collection

111. Key indicators for this outcome are:

- a. Percentage of Tanzania covered by the enhanced climate monitoring system
- b. Frequency of data transmission and reception of current weather and river levels at TMA and the WBAs (both at district and national level)

2.4.2 Component 2 - *Climate information integrated into development plans and early warning systems*

Outcome 2: Efficient and effective use of hydro-meteorological information for making early warnings and long-term development plans

Co-financing amounts for Outcome 2: 1,985,000 USD

LDCF project grant requested: 1,505,600 USD

Without LDCF/SCCF Intervention (baseline)

112. This project builds on ongoing baseline programming led by the Prime Minister's Office (Disaster Management Department) to review existing legal frameworks and to develop Emergency Preparedness Plans at national and district levels. This process is also supported by UNDP's ongoing programming in Disaster Risk Reduction, as well as the work of many partners who work on disaster relief and risk management at local level including WFP, UNICEF, UNFPA, TRCS, World Vision, Care and Plan International. The Disaster Management Department (DMD) is responsible for coordinating all disaster management issues in the country including disaster relief operations and preparedness measures. The DMD receives initial notification or warning of disaster from multiple sources, chiefly from the TMA (concerning climate-based or weather-based warnings) or from local sources (concerning occurrences of disaster). Once a notification is received, the DMD convenes the Tanzania Disaster Relief Committee (TANDREC) who informs the Prime Minister, who then informs the President of the United Republic of Tanzania accordingly. Following a disaster, the DMD coordinates relief efforts.

113. The Disaster Management Department is manned with 12 technical staffs of which three are managers, and 6 additional support staff. These technical staffs have been drawn from different fields. None of the staff members have had formal training on disaster management but they have attended short courses. The DMD annual budget is TZS 700 million (433,300 USD). The Disaster Relief Fund (which stood at 4.9 million USD in 2013) can be expended upon the authorization of the Tanzania Disaster Relief Commission (TANDREC), while the department expenditure depends on cash flow. Additional resources in the amount of 511,915 USD were mobilized by the DMD in 2012-2013 through development partners, including UNDP.

114. The DMD is currently leading a nation-wide effort to revise the Disaster Management Policy Framework. This includes developing a new Disaster Management Act which is due to be approved in 2013, and which proposes a number of changes to current institutional structures, including granting full autonomous Agency status to the DMD. In parallel, the DMD has developed the Tanzania Emergency and Preparedness Plan (TEPRP, 2013) that describes various disaster situations and planning assumptions, operational concepts, response and recovery actions, organizational and other assignments of responsibilities to the departments and government agencies tasked with local response efforts.

115. The TEPRP does not yet contain a comprehensive set of Standard Operating Procedures that highlight each partner's roles and responsibilities, the types of early warning messages, appropriate responses, resources and communication pathways to reach local communities. This lack of SOPs and the gaps in procedures means that the government and local partners must each time deal with disasters in an ad hoc manner. There is no harmonized definition of hazards and triggers, and communication of hazards does not follow established channels and codes of conduct. Most importantly, local community participation in early warnings is still ignored. This means that opportunities for bottom-up early warning, using crowdsourcing technologies for example, are not currently taken into consideration. As a result, local communities remain highly vulnerable to increased variability and frequency of extreme weather.

116. In addition, the country has no 24-hour emergency unit that can receive EW information and transmit accordingly. There is a 24-hour emergency operations unit in Dar es Salaam, but its coverage is limited. At the moment the creation of a national unit remains a plan in the TEPRP and the Draft Disaster Management Act and it is unlikely to be fully operational in the short-term. As a result, EW information transmitted by the TMA sometimes has to wait until regular business hours for the DMD to be able to launch emergency procedures.

117. There has been little thinking at national level on the costs and benefits of maintaining an appropriate weather/climate/hydrological monitoring and early warning system. Insufficient funds provided for maintenance and equipment upgrading places undue burdens on the current infrastructure and maintenance staff, and as a result, the monitoring system is under-performing and obsolete. At the moment, TMA does not perform systematic cost recovery: weather and climate data from the TMA is few, however users do pay a cost recovery fee for packaging such requested data or information (an approximate figure of 60,000 US\$ per year from private clients has been reported by TMA, but there is no available list of customers). There is much untapped potential, particularly with the large public-private partnerships being launched by the government in different sectors, including agriculture (for example Southern Agricultural Growth Corridor - SAGCOT).

118. Furthermore, there is no clear telecommunications regulation governing the use of airwaves, frequencies and networks during emergencies, which creates additional costs for the monitoring system, and which has resulted in each ministry separately entering into individual and sometimes costly agreements with telecommunications operators.

119. At the local level, as part of the TEPRP efforts, emergency preparedness plans are under development in selected districts, including the Liwale and Meru districts. However, local development planning frameworks (e.g. District Strategic Development Plans or District Budget Plans), including land use plans, do not yet take into full consideration the possible impacts of climate change and of increased climate-induced hazards. In the absence of flood risk mapping, many people continue to build and cultivate in flood-prone areas, and long-term economic development planning at local level continues to be jeopardized by climate variability and climate hazards. Drought forecasts are available at regional level from the TMA, and passed on to the MAFS for guidance and dissemination to end users through available extension services. At the moment, drought forecasts are not well translated into agricultural guidance for local land users, who practice agriculture-as-usual even in cases of rainfall failures, often leading to aggravated food insecurity.

120. Finally, a number of other development partners are also supporting the GoT in its efforts to enhance disaster preparedness as well as through disaster relief support. Tanzania Red Cross coordinates the distribution of disaster relief assistance in areas struck by disaster. World Food Programme (WFP) is engaged with the GoT on food security assessments, and UNICEF contributes disaster preparedness including support to vulnerability assessments World Vision works with local communities to develop food security, including through training of smallholder producers in improved farming methods, water management, and the dissemination of basic sanitation services.

121. This project builds on a baseline of USD 1,985,000 comprised of the ongoing operations of the DMD regarding early warnings (including UNDP support), Ministry of Water (regarding flood monitoring), as well as the UNDP's support to the DMD through its disaster risk reduction programming.

With LDCF/SCCF Intervention (adaptation alternative)

122. Output 2.1 will establish effective communications channels and procedures for issuing early warnings through both government and non-governmental channels. A set of Standard Operating Procedures for climate hazards will be developed and operationalized with the participation of all relevant stakeholders in the DRM community, under the leadership of the PMO-DMD. These SOPs will be based on the revised TEPRP and will include the following elements:

- A set of EW triggers and codes for their rapid communication

- A set of established communication pathways between TMA, DMD and other partners at local and national level
- A set of procedures for using public airwaves and telecommunications mechanisms for emitting EW bulletins
- A set of procedures for each Ministry highlighting their roles and responsibilities in each scenario or for each category of EW
- A mechanism for relaying the warnings to the district and ward-level disaster management committees
- A mechanism for feedback from local communities during and after EW, including for reporting on small-scale events such as land slides, damages and losses.

123. Output 2.2 will support the establishment of the 24-hour emergency operations unit (EOU) within PMO-DMD. This will include a feasibility study that will cover location options, long-term financing, institutional arrangements, and other managerial considerations. LDCF funding will be used to cover the costs for staff for the duration of the project and telecommunications equipment. After the end of the project, the PMO-DMD will integrate these costs into its regular budget. The purpose of this activity is to demonstrate the benefit and increased effectiveness of having an operational 24-hour operations unit that can help avoid losses through the dissemination of real-time warnings and early recovery planning.

124. Under output 2.3, this operations centre will become the focal point for launching a simulation of the EWS in the two pilot districts, using the newly developed SOPs when available. Working with disaster management committees at district and ward level, the project will develop disaster scenarios and run a hazard simulation exercise with local communities. Each district will work with one disaster scenario representing a given climate hazard (in this case, a flood or a major drought), and run a single simulation exercise which is expected to last 1-2 months. Participants will include:

- a. The District Councils, who will be in charge of coordinating the exercise and who will act as the main information relay;
- b. The technical representatives of the key ministries, including MAFS, MoW, as well as the TMA.
- c. The DMD, who will oversee the exercise from a national perspective, looking at the application of the Standard Operating Procedures
- d. The local Disaster Management Committees in each district, who will apply actions included in the SOPs along with the ward committees
- e. Selected community volunteers (at least 50 by district, representing all socio-economic groups including women, youth, elders, crop producers, livestock managers, water user associations), who will participate in the exercise as individuals and will report back to the DMCs and the District Councils, will provide data on the hazards, and will participate in the crowdsourcing platform (see below). The volunteers will be designated through consultations led by the District Councils in each targeted ward.

125. Output 2.4 will support the deployment of a crowdsourced disaster management platform whereby local communities will be provided with telecommunications means (either simple smart phones or tablets) to upload real-time disaster and vulnerability information (including coping capacity, socio-

economic data, evaluation routes, stocks and reserves). This system will be combined with an SMS-based system for transmission of relevant agro-meteorological information, that will be designed to be usable by all users, and targeted specifically to smallholders, with gender-specific messaging as needed. Women and women's groups will be specifically targeted under this output, to ensure that i) they are direct beneficiaries of incoming agro-meteorological information, ii) that the information is relevant and understandable to them, and iii) that the messages and recommended actions are specifically applicable to women's roles and conditions. In addition, women and women's groups will receive targeted training on the EWS aspects of the platform, so as to ensure that their concerns and roles during an emergency are well integrated into the EWS.

126. It is expected that this system will provide information to the Emergency Operations Unit, while enabling the local communities to anticipate, plan and address hazards and climate variability locally. This will be supplemented by training for local media, CBOs, gender-based organizations and other NGOs active in the project regions on dissemination and interpretation of EW and climate information. The volunteers mentioned above will receive training on the use of the platform and will be required to act as information relays within their groups or community. The project will monitor the efficiency of the platform, in conjunction with the extension service, as a tool for delivering agro-meteorological information.

127. Through output 2.5, LDCF funding will support the extraction of concrete lessons learned. This will involve gathering local data on productivity, livelihoods, infrastructure assets, and providing a baseline assessment of economic productivity in the targeted district (including gender-disaggregated data). This data will then be used during the simulation exercises in output 2.3 to project potential economic and social losses from the fictional hazard, using short, mid-and long-term economic models and prediction approaches, as well as direct and indirect losses incurred. This data will then be extrapolated to assist in developing lessons on the long-term economic benefits of operationalizing an EWS and recommendations on the future expansion of the EWS.

128. To support the resilience of long-term planning, under output 2.6, the project will support, through work with the local authorities, Basin authorities, ward and district councils, the integration of climate information, climate scenarios and flood risk mapping (Output 1.3) into the local development planning processes, in particular land use planning and local development plans Meru and Liwale districts. This will include identifying information on local vulnerability, and integrating climate information and other data into the planning processes for district budget plans and district strategic development plans, according to their planning cycles. This process will use observed trends in climate, data on the potential economic losses in the short, medium and long-term produced in the output 2.5, as well as socio-economic projections, to recommend changes to the local development plans and budgets. These changes could include: changes in land use planning and urbanization plans, revised budget allocations to address emerging vulnerabilities, revised economic growth production, or new investments in infrastructure. Changes to the local development plans and budgets will be incorporated by the District Councils, during normal planning cycles, with technical assistance from the project.

129. Finally, the LDCF funding will support through Output 2.7, the development of a comprehensive sustainability and exit strategy. This will include working with the Tanzania Telecommunications Regulation Agency to address any shortcomings in the way telecommunications providers interact with government partners in terms of transmitting weather/climate data and early warnings. The expected end result will be that all private operators will be engaged and, if necessary, legislated (either by law or through enforceable licensing agreements) to provide services for the early warning system, including for accessing the crowdsourced disaster management platform. Recommendations to the government on upscaling of the EWS, on long-term financing for the hydro-climatic monitoring network, and for long-

term maintenance of the Emergency Operations Unit, based on assessments of economic costs and benefits and lessons learned from the project, will also be made at the end of the project period. The project will also support the development of a private-sector engagement platform within the TMA, which will seek to increase the revenue generated from data services. This will include a special brief on financing issues for focusing on the annual costs of maintenance to be sourced from the national budget, cost recovery mechanisms and data sharing protocols.

Indicative Activities

Outputs	Activities
2.1 Standard Operating Procedures for droughts and floods specifying EW codes, communications channels, roles and responsibilities and emergency procedures	2.1.1 Assess efficiency of available explicit and implicit operating procedures and draw lessons from available guidelines in Tanzania and other countries in the region
	2.1.2 Develop Standard Operating Procedures for droughts and floods in consultation with all partners at national and local level, including NGOs and the media
	2.1.3 Develop Early Warning and Agro-meteorological codes (including visual and graphic codes) for easy dissemination and interpretation
2.2 An operational emergency operations unit that coordinates EW emission and DR activities for the country, based on SOPs	2.2.1 Complete a feasibility study and institutional setup for the 24-hour emergency operations centre (EOU) within PMO-DMD including institutional considerations, financial sustainability issues, location, staffing. This will also incorporate lessons learned through similar activities regionally and in neighboring countries.
	2.2.2 Recruit and train staff on the Standard Operating Procedures and on other functions of the EOU
	2.2.3 Acquire and install equipment for the operations of a 24-hour operating emergency unit within PMO-DMD
2.3 One EWS simulation and adaptation planning exercise deployed in each districts generates lessons learned for upscaling and replicating	2.3.1 Mobilize local disaster management committees and CBOs to participate in the simulation exercise and to designate participants in the crowdsourcing, through consultations and training
	2.3.3 Develop emergency hazard scenarios and simulations
	2.3.3 Working with District/ward Disaster Management Committees and local NGOs and CSOs, test system of EW Codes and SOPs
	2.3.4 Field visits and stakeholder consultations to understand how users of early warning advisories and warnings use the information for managing climate and weather related risks and how their decision frameworks affect the interpretation of advisories and warnings

2.4 A crowdsourced hazard feedback platform is installed	2.4.1 Acquire, set-up and distribute mobile communication technology to designated volunteers (50 per district)
	2.4.2 Provide local training and awareness raising to platform participants and users
	2.4.3 Develop a set of graphic messages and codes for early warning and agro-meteorological information
	2.4.4 Roll-out the crowdsourced platform through training and technical support during the EWS simulation exercise
	2.4.5 Training for local media, CSOs and NGOs on dissemination and interpretation of EW and climate information, including gender-based associations
2.5 Lessons learned and recommendations on replication, including costs and benefits of EWS are available	2.5.1 Gather socio-economic data in Meru and Liwale including available climate vulnerability data
	2.5.2 Analyze potential losses at short, medium and long term, from the simulated hazards, including direct and indirect socio-economic impacts, and extrapolate data
	2.5.3 Analyze economic costs and benefits of an early warning system at local level including data on economic losses avoided from the simulation exercise.
	2.5.4 Develop a lessons learned and recommendations report including methods for replication and extrapolation of the socioeconomic benefits of EWS
2.6 Climate Change and Climate Hazards included in local development plans and land use plans in Liwale and Meru districts	2.6.1 Produce policy briefs on the impacts of climate change on local development and summaries of climate scenarios and flood forecasts
	2.6.2 Working with districts and wards, update local land use plans, district strategic development plans and district budget plans in light of emerging climate information, flood forecasts and economic scenarios
2.7 A plan for the sustainable financing for the operation and maintenance hydro-met network is developed and nationally approved	2.7.1 Work with TCRA on enhancing participation of cellphone operators in the EWS through regulatory reform
	2.7.2 Develop a brief on annual costs and benefits of maintenance of the hydro-climate monitoring network, including on cost recovery, data services and public-private partnerships to support integration into national budget
	2.7.3 Develop a private sector engagement strategy for climate info providers, including clients like agriculture, tourism, insurance, mining, transport (ports), and partners like cell phone operators, extension services, markets
	2.7.4 Prepare a costed replication strategy including lessons learned, conditions for success and institutional considerations

Key indicators for this outcome are:

- a. % of population with access to climate information and improved flood and drought warnings, % of which are women
- b. Number and type of development planning framework informed by climate information in Meru and Liwale Districts

2.5 Key indicators, risks and assumptions

130. The key impact indicator for this project is the level of capacity of agencies to monitor, assess and disseminate hydro-climate information for early warnings and long-term planning. This indicator will be measured through the use of the standardized Capacity Assessment Scorecard (Annex 1). Below are the key indicators, risks and assumptions for each outcome.

Outcome	Indicators	Baseline	Target
1. Enhanced Capacity of TMA and Water Basins to monitor and forecast droughts and floods.	% of national coverage by weather/climate monitoring system	50% of the territory is covered by some form of monitoring and 30% is covered by AWS	75% of national territory is covered by an automated network
	Frequency of data transmission and reception of current weather and river levels in TMA and the WBAs	River stations are read manually every 2 hours during rainfall but transmitted at various intervals depending on the observer's capacity, ranging from daily to weekly. Automatic river gauges transmit every 30 minutes. TMA network operates at various frequencies, with most rapid transmission being hourly from AWS and slowest being daily manual readings transmitted on a weekly basis (not including rainfall stations which may transmit on a monthly basis).	Data from river stations received in WBAs every 30 minutes and in TMA every 3 hours; Data from weather stations collected in real time, and received by TMA every three hours.

<p>Risks</p> <ul style="list-style-type: none"> - There is a risk that the increased data flows will pose additional demands on the forecasting office, which it may not be able to meet with current resources. - There is a risk that TMA cannot mobilize sufficient government financing to continue monitoring and to cover recurring O&M costs - There is a risk that the project cannot improve the current coordination between EWS agencies and with EWS-related initiatives to improve the ability to work cross-sectorally - There is a risk that natural disasters could damage infrastructure (particularly floods) - There is a risk that data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks) - There is a risk that digitization of climate records supported by the project will be insufficient to reliably increase historical data availability 	<p>Risk Mitigation Measures</p> <ul style="list-style-type: none"> - Output 2.6 in the project seeks to develop a thorough, sustainable long term financing strategy for all of TMA's needs - Output 2.6 in the project seeks to develop a thorough, sustainable long term financing strategy for all of TMA's needs. It is expected that the project will demonstrate benefits of maintaining the network - Cost savings to each individual ministry from the development of the shared database and data portal should demonstrate the benefits of coordination. - Equipment will only be installed following an environmental impact assessment with appropriate safeguards and protection - The data sharing mechanisms and protocols will ensure that all possible eventualities are covered, including technical failures, with appropriate backup and access mechanisms for all relevant stakeholders. Cost recovery measures may also be applied to ensure costs of database maintenance are covered. - Digitization is to happen gradually, with all new data coming into the shared database. Historical data will continue to be maintained on paper for specific needs
<p>Assumptions</p> <ul style="list-style-type: none"> - Data collected on river levels will be transmitted directly to the concerned Basin for early warning, simultaneously to transmission to TMA. -Telecommunication systems used for data transmission from manual and automated stations will be robust enough to withstand increased data flows - Forecast accuracy will increase through the provision of increased amounts of data in real time. - Available forecasting tools and methods (scientific skill) are adequate to emit accurate short, medium-term, and seasonal forecasts - All relevant ministries can access the shared database and continue to have adequate capacity for interpreting and using weather/climate/hydrological data for their own constituencies. - The TMA and WBAs have enough regular and predictable financing to support monitoring operations and will consider recurring O&M costs for new infrastructure in government budget lines because of the usefulness of the EWS will be demonstrated 	

Outcome	Indicators	Baseline	Target
2. Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.	% of population with access to climate information and improved flood and drought warnings % of which are women	None of the residents in the targeted areas receive drought or flood early warnings. Climate information and agro-climate information is transmitted verbally through the extension service.	At least 70% of residents in the targeted areas benefit from improved climate information, drought or early warnings, 50% of which are women

	Number and type of development planning framework informed by climate information in Meru and Liwale Districts	TAFSIP, MKUKUTA II, and other high level frameworks include climate change and mitigating measures but no plans at local level	Local land use plans and development plans in Meru and Liwale include climate change risk information
Risks <ul style="list-style-type: none"> - There is a risk that users could not be reached during the EWS simulation exercises due to lack of telecommunication infrastructure and inadequate roads. - There is a risk that the SOPs may not be finalized in due time to inform the EWS simulation exercise. - There is a risk that environmental or climate hazards will impede the deployment of the EWS simulation. - There is a risk that the government will not be able to mobilize sufficient resources to continue operating the Emergency Operations Unit after the project. - There is a risk that the private sector will resist dialogue and changes in the regulatory environment governing their access to weather/climate data - There is a risk that the community would not demonstrate sufficient uptake of the crowdsourcing platform. 		Risk Mitigation Measures <ul style="list-style-type: none"> - A thorough community engagement exercise will occur well before the EWS simulation exercise to ensure willingness to participate. Scenarios will be developed in conjunction with community-based groups. - The project will initiate the development of SOPs during its first year, while the simulation is set to occur during the last year. Should the SOPs not be available, the project will use whatever implicit or explicit Operating Procedures are available at the time of the simulation, and lessons learned will be used to inform the future SOPs. - The project sites in which the simulation would take place could be changed in consultation with the Water Basin Authorities; the simulation exercise could be delayed or the data from the actual disaster could be used to replace information on the simulation - The project's sustainability and exit strategy will demonstrate the benefits of keeping the EOU operational, including recommendations for its maintenance. Work to mobilize government support for the EOU has already begun and is well advanced, since the EOU is part of the Government's own plans. - The TMA can engage the private sector and develop its own cost recovery strategy without the integration into National Budget Frameworks. - The project will develop incentives for using the crowdsourcing platform, such as the direct dissemination of agro-meteorological information to users, in easy to understand formats. 	
Assumptions <ul style="list-style-type: none"> - Local users and communities are reachable and committed to participating in the EWS simulation exercises - The simulation exercise is conducted without interference from natural or other hazards. - The government is capable and committed to integrate the SOPs and the Emergency Operations Unit into its regular operations and budgets after the duration of the project. - The government will be willing to consider a change in regulation and national budgetary frameworks to support the ongoing operations of the monitoring system. - There is sufficient political support and capacity within the EWS agencies for successful execution and implementation of the project - There is and will continue to be sufficient qualified personnel within the NHMS to handle the new equipment, data transmission/storage/treatment - The private sector finds incentives and a vested interest in participating in the EWS 			

The Risk Log in Annex 3 contains further details.

2.6 Cost-effectiveness

131. A number of alternative options were considered for this project that proved to be less cost effective. The first option was to purchase a greater number of higher-end climate stations for deployment throughout the country. As data flows are one of the main constraints faced by the EWS, the argument was that increased data could go a long way to removing key barriers to EWS effectiveness. However, it was decided that coordination among the existing stations and data flows that are being administered by the key Ministries provided a clear option for cost savings, therefore limiting the purchase of new equipment to the minimum and their installation to priority sites to fill major gaps in coverage was deemed more cost-effective.

132. Another alternative to rainfall measuring stations would have been to invest in radar installation that would cover larger portions of the territory. This option was not retained because of high costs (upwards of 1 million US\$ per radar, not including maintenance and operation costs which are high) and because it was felt that automated weather stations could be equipped with a maximal number of sensors to serve multiple sectoral needs (including agro-meteorology) and can more easily be distributed over a wider region.

133. The maintenance of “volunteer” station monitors and rainfall observers was also considered as a means to continue involving local communities in the climate observation network and to ensure continued data flows. However, it was felt that the recurring costs (12\$ per person per trimester on an ongoing basis, or an estimated 98,000 US\$ annually for the manual rainfall stations alone) of these station monitors exceeded the benefit in terms of data and placed the system at risk – as could be seen from the current situation, a lack of funds for observers would mean an immediate cessation in data transmission. It is therefore proposed that some of the costs of station monitors be converted to cover the costs of maintenance for the infrastructure (where it replaces current manual stations), as a means to realize some savings for the government.

134. Connected to this, repairs to the SMS-based data transmission system used by the Ministry of Agriculture were also considered but were not retained as part of the project strategy for various reasons: first, the costs of the SMS system are high and the government has not had the means to cover them internally. Second, they involve continued payments to station monitors, whose quality and timeliness of data varies (see costs above). It was felt that moving towards automation and investing in system maintenance were better uses of government resources and would provide increased data quality and timeliness for multiple partners.

135. The project strategy is designed to demonstrate the cost effectiveness of an operational EWS. The simulation of the EWS in two disaster-prone districts was retained as a means to demonstrate locally the potential economic costs and benefits of maintaining an EWS, particularly in light of increased variability and extremes due to climate change.

136. From a flood prevention perspective, an option could have been to perform river-level monitoring only on selected major rivers and tributaries. This option was not retained because flooding has been shown to occur even from smaller water bodies, particularly in light of expected increases in precipitation during the rainy season. Full, Basin wide hydrological monitoring is the preferred option by MoW to reduce vulnerability to flood and to increase the knowledge on the water resources for more resilient management. It could have been possible also to limit project interventions to the development of a system whereby existing data transmitted to TMA would simultaneously be transmitted to the WBAs for EW purposes. However, on its own, this option would have left some areas already at risk of flooding uncovered by the EWS due to a lack of equipment.

137. Regarding flood risk mapping, the project could have opted to perform flood risk mapping for only the two districts concerned by the project. This option was not retained since the applicability of the software and training will assist the Water Basins in performing the functions for the whole basin and sub-basins depending on data availability. Furthermore, it was felt that Water Basins would deliver more comprehensive flood assessments if the models could be calibrated to the whole basin. For cost reasons, it was however decided not to extend the initiative to all 9 basins.

138. In order to enhance the data coordination among stakeholders, the project could have opted for a different strategy. For example, it was considered that each of the main stakeholders could sell its data to the others. However, this approach was not pursued as this would raise problems of recurring costs and was deemed an unsustainable solution. In this alternative, the Crop department in the Ministry of Agriculture in particular would lose out since it has not the means to purchase data annually. Additionally, this would raise issues of data validation, data quality and harmonization. It was also not possible to digitize and migrate all available historical data into the database for reasons of high costs. It was estimated by the TMA that the costs of digitizing all of its available paper records would cost over 1 million US\$, costs that would increase if one had to reconcile, harmonize and perform quality control on data from other ministries as well. It was decided to start by demonstrating the effectiveness and usefulness of the database around the two districts in the project, and to seek future financing opportunities from other partners who had shown an interest (e.g. DFID, Finland).

139. To address the various policy weaknesses in the system, the project could also have opted to wait until the Government of Tanzania set up its Emergency Operations Unit following approval of the TEPRP and the new DM Act. This option was not retained because of the need to demonstrate benefits of an EWS in the short term (e.g. during the project). It was also decided not to rely on Government funding to recruit the staff of the EOU during the project because of delays in recruiting project staff, and because it was felt that a demonstration of effectiveness would assist the government in making a sustainable long-term decision on staffing and funding of the EOU.

140. It was also suggested that the project could function operating with the current Standard Operating Procedures, adapted on a case-by-case basis. This option was not retained because it was the wish of the Tanzanian Government to further formalize working procedures in Disaster Management. Current operations have also been shown to lead to mis-directions, lack of coordination and duplication of efforts, leading to higher costs of DRM and Disaster response. A suggestion to develop only partial SOPs, that would not include EW codes or graphic messages for local users, but that would focus on the roles and responsibilities of ministries and government agencies, was also not retained. It was felt that one of the reasons for which the EWS was not fully efficient was that it failed to adequately reach local users. Therefore, while the activity could be less expensive, it would not be effective in addressing the target population.

141. Similarly, it would have been possible to use the crowdsourcing platform only for hazard information. This option was not retained because of the need to maximize the usefulness of the medium to the local users. The transmission of clear, easy to understand, agro-meteorological information will create an incentive for users to continue using the platform, thereby making its use more cost-efficient and potentially leveraging additional benefits for agricultural extension.

142. In terms of engaging the private sector, the project design could have opted to engage mobile phone operators on a voluntary basis, rather than using a regulatory approach. This option was not retained because it was felt that the voluntary approach, which is currently being used in an ad hoc manner, has led to high and climbing telecommunications costs for the EWS and the hydro-climate network, and because the approach provides no long-term certainty of service.

143. This LDCF project is not a standalone project; it is part of a wider multi-country programme that will implement similar initiatives on climate information and Early Warning Systems in at least 10 countries in Africa (including Benin, Burkina Faso, Ethiopia, Liberia, Malawi, Sierra Leone, São Tomé & Príncipe, Tanzania, Uganda and Zambia). Synergies between these projects will be used to enhance the cost-effective hiring of specialized technical staff, coordination of data and information (including inter-country sharing where feasible), training (operations & maintenance of equipment; forecasting techniques; tailored advisories and warnings), and effective use of communications and standard operating procedures.

144. Surveying the technical support needs for each country a set of common specialized technical staff were identified, each with particular skills related to the development of hydroclimatic observing systems, the effective design and implementation of standard operating procedures and tailored warnings/advisories, as well as the communication of advisories/warnings. Hiring 3-4 full-time technical staff, which can provide the needed support for all countries, will be more cost effective than hiring the same staff as consultants for each country and all projects will benefit from the diverse technical support that will be provided. Further benefits include time saved on HR procurement procedures (e.g. for hiring, advertising etc.) and the ability to compare and standardize support across countries where possible. UNDP will directly undertake the recruitment for all project staff who will support all countries in this multi-country programme.

145. Training and capacity building for operations and maintenance of the hydromet infrastructure and for modeling and forecasting (Outputs 1.1, 1.3, and 1.4) can also be done at a regional level, bringing together participants from all countries to encourage knowledge sharing and the development of collective skills. This has several advantages, namely: i) promoting the sharing of information and learning between countries; ii) encouraging discussions of best practices i.e. what works, reasons for failure etc; and iii) increasing the effective pool of skilled resources which each country can draw upon (increasing the potential for future trainings to be conducted by experts within the region). Such activities will be closely coordinated with other regional and international partners/centres e.g. WMO/GFCS, ACMAD, ICPAC etc.

146. Regional support will also be used to help strengthen the development of standard operating procedures (both the procedures themselves and their legal basis), for the issuing and communication of warnings/advisories (Output 2.1 and 2.2), where possible incorporating warnings issued by neighbouring countries e.g. in the case of shared watersheds. Where private sector engagement (Output 2.4 and 2.7) includes multinational corporations, regional support will assist engaging head offices in multiple countries, increasing the total effective services being offered and hence bargaining position of each government. In the case of mobile (cellular) communications (which may be used for both disseminating alerts and the collection of data used to generate alerts), the regional support programme will leverage collective negotiations for data services, as well as engaging with corporate social responsibility programmes to enhance services where possible

147. In addition, the project will explore the possibility of joining with some or all countries for the delivery of the following activities, which could be combined for further cost savings:

- a. Activity 1.3.1 Acquire flood forecasting software, tools and methodologies through training. This activity could be delivered through regional training with other countries who have similar priorities and use similar products.

- b. Activity 1.4.1: Rescue, digitize and archive relevant available historical data from all ministries. This activity could be delivered nationally but through a combined contracting approach to reduce costs;
- c. Activity 2.5.1: Analyse economic costs and benefits of an early warning system at local level, including data on economic losses avoided from the simulation exercise. This activity could be delivered alongside other countries to benefit from best available knowledge and promote comparative assessments.
- d. Activity 2.5.2: Develop a lessons learned report including methods for replication and extrapolation of the socioeconomic benefits of EWS. This activity could also be delivered on a regional basis, particularly in terms of the analysis of the socio-economic benefits of EWS. This would provide the activity with increased international policy leveraging power, and could potentially reduce costs.

2.7 Sustainability

148. The project has built in a number of activities designed to enhance the sustainability of outcomes in the long-term. First, the discussions that began with the project preparation phase have resulted in increased coordination among the key stakeholders, and led to the negotiations of long-term cooperation agreements. As an example, an MOU between the TMA and Ministry of Water is being finalized, that will cover cooperation on acquisition, installation, maintenance and operations of monitoring equipment, as well as data sharing. It is expected that the creation of long-term data sharing mechanisms and information sharing protocols will continue well beyond the duration of the project and the stakeholders are aware of the incentives and potential benefits to themselves of data sharing. Furthermore, the project is expecting to deliver concrete lessons and recommendations on how to maintain the network in the future, including an analysis of the costs and benefits of the early warning system, as a tool for advocacy among the finance and development ministries.

149. The government of Tanzania has expressed commitment to this project and to enhancing its own framework for disaster management, as can be seen from the large-scale policy reform activities that have been launched recently. The project makes a direct contribution to this national agenda, and it is therefore expected that project outcomes will be fully integrated into ongoing policy making at the national and local level. Many of the activities in this project, including the creation of an Emergency Operations Unit, figure among the recommended actions in the TEPRP), indicating high levels of pre-existing buy-in.

150. The project will also create the conditions for sustainability at the local level, by working with government and non-government stakeholders to integrate climate information into development planning frameworks, raising awareness and developing local capacity for disaster management and long-term climate-based planning. Enabling conditions for this activity are already in place with Tanzania taking a lead role in integrating climate change into national planning frameworks such as Poverty Reduction and Growth Strategy (MKUKUTA), sectoral plans and platforms (such as Agriculture Sector Development Plan, Water sector development). The demonstrations of benefits at local level from an effective EW, increased information and prediction ability on floods and droughts, increased agro-meteorological information, will help replicate and upscale project outcomes to other regions.

151. One key factor of risk regarding the financial sustainability of this project is the continued ability by the Tanzanian government to continue to provide adequate budgets for the operations and maintenance of the climate monitoring network. Activities in the project are designed to address this risk, including the use of more efficient automatic means for collecting and transmitting data. Additionally the project's

exit strategy, is two-fold: first, the development of a platform for engaging the private sector in covering some of the operational costs, as well as regulatory approaches to cost recovery; and second, the development of cost-benefit analyses to inform the national budgeting processes which will further suggest avenues for cost savings and provide evidence for budget increases where necessary. These activities, together with capacity building for advocacy on financing of the hydro-climate network, as well as the economic lessons that will be produced by the project, will assist in removing this barrier in the long term.

152. Various activities support the project's sustainability after the end of the LDCF period:

- a) The development of a multi-agency platform on data sharing and an open-access data portal for sectoral dissemination;
- b) Use of Disaster Management Committees at local level to support alert dissemination;
- c) Staggered approach to equipment procurement and training;
- d) Station selection placement based on available data and analysis conducted by the TMA through the development of its Five Year Plan;
- e) Training of instruments specialists who can transfer knowledge to other TMA staff
- f) Development of Standard Operating Procedures (SOPs) on climate hazards;
- g) Building capacity for local NGO/CSO and media representatives at the district and ward level to better communicate and understand alerts;
- h) Collaboration with the Ministry on Agriculture to ensure agro-meteorological information is provided in useful formats for the local populations and extension services;
- i) Development of a private sector engagement strategy within TMA to build on opportunities to provide tailored EWS and Climate services to ensure long-term financial sustainability

2.8 Replicability

153. This project will seek to develop a set of concrete actionable lessons and recommendations towards the deployment of adequate climate services for development and an effective early warning system at the national level. The lessons will include information on:

- a. Cost-savings realized by moving from manual stations to automated stations
- b. Cost- savings realized through the data sharing platform
- c. Losses avoided (e.g. crop yields, property, health) from an efficient EWS
- d. Costs and benefits of an operational hydro-climate network
- e. Recommendations on cost recovery for climate data services
- f. Recommendations on engagement with the private sector, including cost savings from a regulatory approach to engaging mobile phone operators
- g. Innovative options to source funding for operations and maintenance of the monitoring system.

154. It is expected that these lessons will help inform a replication strategy for the TMA and other actors in the future. In particular this will help design future activities to scale up the EWS in the two target districts to other districts in Tanzania.

155. Furthermore, the project will be implemented by multiple stakeholders who have also a stake in influencing policy formulation and policy implementation and whose own effectiveness in delivering their mandated development services, will depend on the effective replication and upscaling of this project. For example, the Ministries of Water and Agriculture both depend on effective climate services to deliver their core mandates, therefore it is expected that this project will help leverage their support for the ongoing maintenance of the monitoring system. The DMD also depends on effective climate information in order to be able to effectively deliver its mandate regarding DRM. As the lead implementing partner, the DMD will be able to act as a champion for the replication and upscaling of the project.

156. Any activity or improvement achieved by this project can be easily replicated because the core network of national hydro-meteorological services and communication mechanisms already exist in the country, as do the enabling conditions for upscaling.

157. This project includes a component of demonstration, whereby a simulation of the EWS will be conducted. In conducting this simulation, a Community of Practice (CoP) will be established whereby the lessons that will be generated from the pilot districts will be used as lessons that will be implemented elsewhere in the country at both local and national level. The simulation will be useful in sharing and learning among various stakeholders who will be involved at all levels, including the National Disaster Risk Reduction platform and the Adaptation Learning Mechanism. Involvement of the media will also help further disseminate the lessons of the project.

158. The feedback mechanism created by this project under Output 2.4 can also further enable learning on the effectiveness of the climate services and the EWS. This feedback mechanism is an innovation that could easily be further disseminated in the country, if the benefits to agricultural producers are well demonstrated. The transmission of agro-meteorological information, using easy to understand graphics or codes, will also greatly enhance the effectiveness of agricultural extension work and therefore could provide a useful tool for upgrading these services in the future.

2.9 Stakeholder involvement plan

159. The main stakeholders that have been and will continue to be participating in this project are as follows:

160. The Vice Presidents' Office VPO is the focal point for multilateral environmental agreements (MEAs) that Tanzania is party to. The UNFCCC is one of such agreements where VPO is the designated national authority. Consequently, VPO is representing the country at National and International levels on all matters related to climate change under the convention and the Kyoto Protocol. VPO will play a lead role in engaging with UNFCCC initiatives in Tanzania and reporting back to the conference of parties. The project will make use of the coordination capacity of VPO particularly in relation to the Adaptation Fund, the Green Climate Fund, the Climate Investment Funds, the Climate Technology Centres & Networks and any other instruments that may be useful to the project and ensuring alignment with initiatives and policy development under their mandates. In addition, the VPO is responsible for coordinating and tracking all climate-change related initiatives in the country. The VPO will assume the executing role for the project and therefore play an active role in the project as co-chairs of the Project Steering Committee and by providing advice on policy coordination, in particular initiatives under this

project designed to integrate climate change into development planning, for which it has some previous experience. The VPO will also be called upon to participate in the development of the long-term financing strategy for the hydro-climate monitoring network, including through partnerships and outreach with the private sector.

161. Disaster Management Department-Prime Minister's Office. The DMD is responsible for coordinating all disaster management response issues in the country including disaster relief operations and preparedness measures. The DMD receives initial notification or warning of disaster from multiple sources, chiefly from the TMA (concerning climate-based or weather-based warnings) or from local sources (concerning occurrences of disaster). The DMD will be the lead implementing partner for this project, will house the project management unit, will co-chair the PSC with the VPO-DOE, and will coordinate activities with all other stakeholders.

162. Tanzania Meteorological Agency, Ministry of Communication. Tanzania Meteorological Authority is the autonomous entity in charge of providing weather, climate services and warnings for the safety of life and property to the general public and to various users including aviation, marine, agriculture and food security, water resources, disaster management, health and construction industry, with its mission to provide quality, reliable and cost effective meteorological services to stakeholders expectations thereby contributing to the protection of life and property, environment and national poverty eradication goal. The TMA will be one of the main implementing partners and beneficiaries of the project, including through the acquisition, installation and operation of the new equipment. The TMA will also house and administer the shared climate database.

163. Crop Development department and Irrigation department, Ministry of Agriculture. The departments use climate and hydrological information to ensure having current/future food and water security in the country, and they need timely accurate and reliable information necessary for decision making. The focus for the ministry's work is therefore combining climate information with crop information (rate of growth, flowering) to provide an overall forecast of the food situation. Using satellite data and the shared database established by the project, the MAFS will be able to access real-time rainfall data that will enable it to deliver better crop production advice to local farmers. The MAFS will also lead in the development of agro-meteorological advice that will be transmitted through the crowdsourcing platform.

164. Ministry of Livestock and Fisheries Development. The Ministry has the mandate of overall management and development of livestock and Fisheries resources for sustainable achievement of the Millennium Development Goals, National Strategy for Growth and Reduction of Poverty, Improved Livelihood of Livestock and Fisheries Dependent Communities, Food Safety & Security without compromising animal welfare and environmental conservation. The Ministry will be invited to participate in the project through the shared database, particularly in terms of accessing rainfall data that can be of use for rangeland management, and will be invited to participate in the development of agro-meteorological advice for livestock managers in the project districts, in cooperation with MAFS.

165. Water Resources Division, Ministry of Water. To mobilize and manage water resources in the country. The MoW will work with WBAs to map out flood prone areas and whenever required and in collaboration with other agencies issue early warning related to flood forecasting and early warning (FFEW). The MoW will work with the Water Basin Authorities to deliver activities related to flood risk mapping and early warning in the project.

166. Pangani Water Basin and Ruvuma Water Basin Authorities - Ministry of Water. Water Basin Boards and authorities (WBAs) are mandated to undertake water management with full stakeholder

participation at local level. The WBAs will be lead actors in this project including through acquisition, installation and operation of hydrological monitoring equipment, training and mapping out flood risks; coordination of data collection with TMA; and in the deployment of the early warning system in their respective areas;

167. Tanzania Communications Regulatory Authority (TCRA), Ministry of Communication, Science and Technology. The TCRA has the mandate to regulate the communications and broadcasting sectors in Tanzania. The TCRA will be called upon to assist in developing a clear policy on agreements with the mobile providers on the use of frequencies, airtime and airwaves for early warning system. The TCRA is also expected to take part in the discussions on the long-term financing of the climate monitoring system through cost recovery.

168. Local Disaster management Committees, Municipal District Council. District Councils (DCs) are the local government authorities. Disaster Management Committees (DMC) exist at district and ward level. The DMCs and DCs will be the main local partner for this project and they will coordinate the deployment of the simulation exercise, participate in the development of SOPs and codes, assist in the collection of socio-economic data, and oversee the deployment of the EWS at local level.

169. Local communities in the two selected pilot project areas will participate in the deployment of the EWS at local level, testing of the flow of information, crowdsourcing and on the integration of climate information into local level development planning. These will be the ultimate beneficiaries of the project in the country. Local community groups, such as Water User Groups, women's groups, producer associations, cooperatives and other groups will be drawn upon to assist in the mobilization of local land users and to gather feedback on the project. Volunteers representing each group and major socio-economic sectors will be selected following consultations led by the District Councils, as participants in the crowdsourcing platform. These volunteers will receive agro-meteorological information directly through devices to be provided by the project, and will be required to help disseminate the information to the members of their groups and communities. They will also be required to participate in the simulation exercise by uploading hazard and damage information through the crowdsourcing mechanism.

170. The project will also actively pursue coordination with key NGOs working in the DRM area, including:

- a. Tanzania Red Cross Society, who plays an active role in coordinating disaster relief efforts throughout the country. The TRCS has expressed interest in working at local level in the two project districts and in particular in the development of SOPs and standard EW messages at local level.
- b. World Vision, who works in food security and basic human development throughout Tanzania. World Vision expressed an interest in participating in the project through the simulation in Component 2 and in particular in conjunction with activities designed to develop EW codes, gather socio-economic data and operationalize the EWS for droughts and floods. Options for partnership will be explored during the inception period.

171. During the project development two consultative stakeholder workshops were conducted, as well as local consultations with the Water Basins, district council offices, and communities. These workshops brought together a number of stakeholders those that have expressed interest and willingness to continue to be involved in the implementation of the project. This includes the government departments, ministries and the independent Departments and Agencies, UN organizations as well, as local NGOs. A report of the

project preparation phase is available in Annex 4, and the involvement matrix in the table 3 below provides an overview of how stakeholders were included in the project design.

172. The stakeholders identified during project preparation will continue to be involved in project implementation. A Stakeholder involvement plan has been created to provide a framework to guide interaction between implementing partners and the key stakeholders, particularly end-users to validate project progress. Details of the Stakeholder Involvement Plan are indicated in Annex 5.

2.10 Environmental and Social Safeguards

173. The UNDP Environmental and Social Screening template has been applied to ensure environmental and social safeguards are in place. According to this checklist, the project is considered Category 2 where no further safeguards must be incorporated because no environmental or social risks are foreseen (See Annex 6).

Table 2: Stakeholder Involvement Matrix - project preparation
Stakeholder

Stakeholder	National	Inception and 2	design	Baseline	assessment	Local	consultat	on	Role	identificat	Risk/	Barrier	Analysis	Policy/Str	ategic	alignment	to the	priority	Co-	financing	identificat	ion	Capacity	assessment	Upscale/S	ustainability	planning	Document	Endorsement
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
[Redacted]	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

	X	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓
	X	✓	✓	✓	✓	✓	X	✓	✓	✓	✓	✓	✓
	✓	✓	✓	X	✓	✓	X	X	X	X	X	X	X
	X	✓	✓	✓	✓	✓	X	X	X	X	X	X	X
	X	X	✓	X	✓	✓	X	✓	X	X	✓	✓	X
	✓	X	✓	✓	✓	✓	X	X	X	X	✓	✓	X
	✓	X	✓	✓	✓	✓	X	✓	X	X	✓	✓	X
	✓	X	✓	✓	✓	✓	X	X	X	X	✓	✓	X

	✓	X	✓	X	✓	X	X	✓	X	X	✓	X	X
	✓	X	✓	X	✓	X	X	✓	X	X	✓	X	X
	✓	X	✓	X	✓	X	X	✓	X	X	✓	X	X
	✓	X	✓	X	✓	X	X	✓	X	X	✓	X	X

3 PROJECT RESULTS FRAMEWORK

<p>This project will contribute to achieving the following UNDP outcomes:</p> <ul style="list-style-type: none"> - Communities have access to improved credible emergency information to enable early action (Outcome 2, Emergency Preparedness and Response) - Prime Minister's Office (PMO) and Chief Minister's Office –Disaster Management Departments (DMDs) effectively lead Emergency Preparedness and Response (ERP) with focus areas most susceptible to disasters - Key MDAs and LGAs integrate climate change adaptation and mitigation in their strategies and plans <p>UNDP Key Actions: TA and FA to MDAs and LGAs to mainstream Climate Change Adaptation (CCA) in their development strategies; Capacity Building for PMO-DMD related to effective disaster management coordination</p> <p>Primary applicable Key Environment and Sustainable Development Key Result Area Promote climate change adaptation</p> <p>Applicable SOF (e.g GEF) Strategic Objective and Program: LDCF Objective 2 Increase adaptive capacity to respond to the impacts of climate change, including variability, at local, national, regional and global level</p> <p>LDCF Expected Outcomes: Outcome 2.1: Increased knowledge and understanding of climate variability and change-induced threats at country level and in targeted vulnerable areas; Outcome 2.2: Strengthened adaptive capacity to reduce risks to climate-induced economic losses</p> <p>LDCF Outcome Indicators:</p> <ul style="list-style-type: none"> • Relevant risk information disseminated to stakeholders • Type and no. monitoring systems in place • % of population covered by climate change risk measures 					
	Indicator	Baseline	Targets End of Project	Source of verification	Risks and Assumptions
<p>Project Objective²¹ (equivalent to output in ATLAS)</p> <p>To strengthen the climate monitoring capabilities, early warning systems and available information for responding to</p>	<p>Level of capacity of agencies to monitor, assess and disseminate hydro-climate information for early warnings and long-term planning</p>	<p>The aggregate average level of capacity as per the Capacity Assessment Score is measured at 2.24 at the start of project.</p>	<p>The aggregate average Capacity Assessment Score at end of project is 3.5</p>	<p>Capacity Assessment Scorecard</p>	

²¹Objective (Atlas output) monitored quarterly ERBM and annually in APR/PIR

<p>climate shocks and planning adaptation to climate change in Tanzania.</p>	<p>% of national coverage by climate monitoring system</p>	<p>50% of the territory is covered by some form of monitoring, but only 30% by AWS.</p>	<p>75% of national territory is covered by an automated network</p>	<p>TMA database of network stations, MoW</p>	<p>Risks</p> <ul style="list-style-type: none"> - There is a risk that the increased data flows will pose additional demands on the forecasting office which it may not be able to meet within current resources. - There is a risk that TMA cannot mobilize sufficient government financing to continue monitoring and to cover recurring O&M costs - There is a risk that the project cannot improve the current coordination between EWS agencies and with EWS-related initiatives to improve the ability to work cross-sectorally - There is a risk that natural disasters could damage infrastructure (particularly floods) - There is a risk that data sharing is hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g., bandwidth issues or local mobile telecommunication networks) - There is a risk that digitization of climate records supported by the project will be insufficient to reliably increase historical data availability <p>Assumptions</p> <p>Data collected on river levels will be transmitted directly to the concerned Basin</p>
<p>Outcome 1²²</p> <p>1. Enhanced Capacity of TMA and Water Basins to monitor (and forecast) droughts and floods.</p>	<p>Frequency of data transmission and reception of current weather and river levels in TMA and the WBAs</p>	<p>River stations are read manually every 2 hours during rainfall but transmitted at various frequencies depending on the observer's capacity, automatic river gauges transmit every 30 minutes. TMA network operates at various frequencies, with most rapid transmission being hourly from AWS and slowest being daily manual</p>	<p>Data from river stations transmitted every three hours to TMA, every 30 minutes to the WBAs; Data from automatic weather stations received by TMA every three hours basis and from manual stations on a daily basis</p>	<p>TMA, MoW, WBAs</p>	

²² All outcomes monitored annually in the APR/PIR. It is highly recommended not to have more than 4 outcomes.

<p>Outcome 2. Efficient and effective use of hydro-meteorological and environmental information for making early warnings and long-term development plans.</p>	<p>Percent of population with access to improved climate information and improved flood and drought warnings % of which are women</p>	<p>30% of people in the project sites have access to some climate information, but no people in the project sites have access to improved climate information, drought or early warnings.</p>	<p>At least 70% of residents in the targeted areas benefit from improved climate information, drought or early warnings</p>	<p>Site surveys, reports on the implementation of the EWS simulation, crowdsourced information</p>	<p>for early warning, simultaneously to transmission to TMA.</p> <ul style="list-style-type: none"> - Telecommunication systems used for data transmission from manual and automated stations will be robust enough to withstand increased data flows - Forecast accuracy will increase through the provision of increased amounts of data in real time. - Available forecasting tools and methods are adequate to emit accurate short, medium-term, and seasonal forecasts - All relevant ministries can access the shared database and continue to have adequate capacity for interpreting and using climate data for their own constituencies. - The TMA and WBAs have enough regular and predictable financing to support monitoring operations and will consider recurring O&M costs for new infrastructure in government budget lines because of the usefulness of the EWS will be demonstrated <p>Risks</p> <ul style="list-style-type: none"> - There is a risk that users could not be reached during the EWS simulation exercises due to lack of telecommunication infrastructure and inadequate roads. - There is a risk that environmental or climate hazards will impede the deployment of the EWS simulation. - There is a risk that the government will not be able to mobilize sufficient resources to continue operating the Emergency Operations Unit after the project. - There is a risk that the government cannot finalize a change in regulation and national budgetary frameworks to support the
	<p>type of development planning framework informed by climate</p>	<p>TAFSIP, MKUKUTA II, and other high</p>	<p>local land use plans and development plans in Meru and Liwale</p>	<p>Local land use plans, local development</p>	

	<p>information in Meru and Liwale Districts</p>	<p>level frameworks include climate change and mitigating measures but no plans at local level</p>	<p>include climate change risk information</p>	<p>plans, district council documents</p>	<p>operations of the EWS and monitoring system</p> <ul style="list-style-type: none"> - There is a risk that the private sector will resist changes in the regulatory environment governing their access to climate data <p>Assumptions</p> <ul style="list-style-type: none"> - Local users and communities are reachable and committed to participating in the EWS simulation exercises - The simulation exercise is conducted without interference from natural or other hazards. - The government is capable and committed to integrate the SOPs and the Emergency Operations Unit into its regular operations and budgets after the duration of the project. - The government will be willing to consider a change in regulation and national budgetary frameworks to support the ongoing operations of the monitoring system. - There is sufficient political support and capacity within the EWS agencies for successful execution and implementation of the project - There is and will continue to be sufficient qualified personnel within the NHMS to handle the new equipment, data transmission/storage/treatment - The private sector finds incentives and a vested interest in participating in the EWS
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4 TOTAL BUDGET AND WORKPLAN

Award ID:	00074211	Project ID(s):	00086724
Award Title:	PIMS 5096 FSP LDCF: Strengthening climate information and early warning systems in Eastern and Southern Africa for climate resilient development and adaptation to climate change – Tanzania		
Business Unit:	TZA10		
Project Title:	Strengthening climate information and early warning systems in Eastern and Southern Africa for climate resilient development and adaptation to climate change – Tanzania		
PIMS no:	5096		
Implementing Partner (Executing Agency)	Prime Minister's Office – Department of Disaster Management		

SOF (e.g. GEF) Outcome/Atlas Activity	Responsible Party/ Implementing Agent	Fund ID	Donor Name	Atlas Budgetary Account Code	ATLAS Budget Description	Amount Year 1 (USD)	Amount Year 2 (USD)	Amount Year 3 (USD)	Amount Year 4 (USD)	Total (USD)	Note
1. Enhanced Capacity of TMA and Water Basins to monitor (and forecast) droughts and floods.	PMO + TMA	62160	GEF LDCF	72300	Materials and Goods	681,000	651,010	-	-	1,332,010	1
				72300	Materials & Goods	50,508	50,508	-	-	101,016	2
				72100	Contractual Services (Companies)	40,662	40,662	-	-	81,324	3
				71600	Travel	46,275	46,275	-	-	92,550	4
				72300	Materials and Goods)	48,500	-	-	-	48,500	5
				71200	International consultant	-	15,000	-	-	15,000	6

72200	Equipment and Furniture	-	18,000	-	-	18,000	7
72100	Contractual Services (Companies)	-	-	-	5,000	5,000	8
75700	Training workshops and conferences	-	-	10,000	-	10,000	9
72400	Communications and audio-visual equipment	-	-	15,000	-	15,000	10
71300	Local Consultants	15,000	15,000	35,000	35,000	100,000	11
75700	Training workshops and conferences	5,000	5,000	5,000	5,000	20,000	12
72200	Equipment and Furniture	10,000	-	-	-	10,000	13
71400	Contractual services	-	-	-	-	-	14
71300	Local consultants	9,000	9,000	9,000	9,000	36,000	15
71200	International consultant	-	15,000	-	15,000	30,000	31
SUB_TOTAL OUTCOME 1		905,945	865,455	74,000	69,000	1,914,400	

PMO + VPO,
MoW, MoA,
WBA

PMO

2. Efficient and effective use of hydro-meteorological information for making early warnings and long-term development plans

PMO	62160	GEF LDCF	71600	50,000	-	-	115,000	16
			71600	20,000	-	-	55,000	17
			75700	64,000	35,600	-	144,600	18
			71300	64,000	64,000	64,000	202,000	19
			72400	50,000	50,000	-	103,000	20,21
			71600	40,000	40,000	20,000	120,000	22
			71300	72,500	72,500	37,000	194,500	23
			75700	22,500	22,500	23,000	83,000	24
			72100	170,000	30,000	-	200,000	25
			72400	75,000	-	-	75,000	26

PMO + LGAs, WBA, NGOs, Communities

PMO+VPO, TMA, MoW, MeA		71300	Local Consultants	-	27,500	47,500	42,500	117,500	27
		75700	Training workshops and conferences	-	18,000	18,000	17,000	53,000	28
	PMO	71300	Local consultants	9,000	9,000	9,000	9,000	36,000	29
		71400	Contractual services						30
		71300	Local consultant	-	7,500	-	7,500	15,000	32
		71600	Travel	3,000	3,000	3,000	3,000	12,000	33
		SUB-TOTAL Outcome 2		197,500	693,000	392,100	223,000	1,505,600	
Project Management Unit	PMO	71400	Contractual Services - Ind	32,000	32,000	32,000	32,000	128,000	34
		71600	Travel	7,000	10,000	8,000	6,000	31,000	35
		75700	Training workshops and conferences	7,000	2,000	2,000	2,000	13,000	36
		72200	Equipment and furniture	2,000	2,000	2,000	2,000	8,000	37
		SUB-TOTAL PMC		48,000	46,000	44,000	42,000	180,000	
TOTAL				1,151,445	1,604,455	510,100	334,000	3,600,000	

Summary of
Funds:²³

	Amount Year 1	Amount Year 2	Amount Year 3	Amount Year 4	Total
DMD	345,000	345,000	345,000	345,000	1,380,000
TMA	5,143,750	5,143,750	5,143,750	5,143,750	20,575,000
MoW	152,500	152,500	152,500	152,500	610,000
UNDP	150,000	150,000	150,000	150,000	600,000
LDCF	1,151,445	1,604,455	510,100	334,000	3,600,000
TOTAL	6,942,695	7,395,705	6,301,350	6,125,250	26,765,000

BUDGET NOTES

- Automatic synoptic weather stations with agro-meteorological sensors and autonomous transmission capacity. Costs are estimated at 34,500 US\$ per item
 - Servers for additional storage and reception capacity for new data
 - 10 hydrological stations for monitoring river levels per Basin
- Costs of materials for installation of stations, including concrete, fencing and construction materials.

Costs of TMA technicians and specially recruited construction staff to perform installation of stations, including staff time and travel Training to be undertaken in foreign country (Indonesia) for 6 staff on instrument maintenance

- 10 staff gauges for river monitoring per basin
 - 20 rain gauges to supplement existing stations to monitor upstream rainfall and produce flood warnings
 - Computers for undertaking local flood forecasting and modeling
 - Servers for data conservation and transmission for Water Basins (1 per basin)
 - Modems for reliable river data transmission to TMA
 - Power surge protection
- International Consultant - Trainer on flood forecasting software and applications

²³ Summary table should include all financing of all kinds: GEF financing, cofinancing, cash, in-kind, etc...

- Flood forecasting and flood forecast management software packages and applications
- Printing and Mapmaking services for GIS-based representation of flood risks
- Meetings and workshops for consultation and awareness raising on flood risk mapping and flood forecasting
- Equipment to digitize available historical data, for purchase by the TMA
 - Junior staff for digitization and classification of paper archives in two districts
 - National Consultant - Database Specialist to support the establishment of the database specialist
- Meetings and workshops to support the establishment of the shared database
- Server for the shared database and online portal
- Local consultants for organising and conducting equipment surveys/reports, identifying and liaising on procurement of equipment with line ministries and facilitating training programs
- International Consultant - Disaster management Expert - for the development of Standard operating procedures
- Travel costs for IC
 - workshops on the development of Standard Operating Procedures with all stakeholders
 - Training for the staff on the operations of the EOU
 - National Consultant - Disaster Management Specialist - for the feasibility study on the Emergency Operations Unit
 - Costs of 3 staff to operate the Emergency operations Unit
- Telecommunications equipment, computers, antennas, telephones, satellite dishes, for EOU operations
- Purchase of an emergency radio frequency band to be assigned to the EOU
 - Travel for members of the EOU
 - Travel, telecom costs and transport costs during the EWS simulation exercise
 - Travel for National Consultants
 - National Consultant for the development of EWS Simulation scenarios and community mobilization
 - National Consultant - to support DCs in the revisions of local development plans
 - National Consultants - Socio-economic vulnerability specialists: to gather socio-economic data in Meru and Liwale including available climate vulnerability data
 - Community mobilization with local groups, DMCs, DCs, around EWS simulation
 - Training for local media, CSOs and NGOs on dissemination and interpretation of EW and climate information, including gender-based associations
 - Contractual services for the setting up and training on the crowd-sourcing platform
 - Contractual services for the development of graphic and SMS EWS codes
 - Printing, translation and publication costs for SOPs, EW Codes, and awareness raising materials during the EWS Simulation
- Smartphones with SIMS and Credit for the operation of the EWS simulation and crowd-sourced platform
 - National Consultants - to analyze economic costs and benefits of an early warning system at local level, including data on economic losses avoided from the simulation exercise, and to develop Lessons learned Report
 - National Consultant - To support TCRA in developing a mechanism to engage private sector and mobile phone operators in EWS operations

- National Consultant - to Develop a brief on annual costs and benefits of maintenance of the hydro-climate monitoring network
 - National Consultant - market research specialist - on the development of a private sector engagement strategy for TMA
 - National Consultant - to compile and develop a lessons learned report
 - Meetings and workshops on the development of a financing strategy for TMA and others towards budget negotiations
 - Meetings and workshops with the private sector on the development of a private sector engagement platform for TMA
- Local consultants to monitor the utility of forecasts/predictions for end-users and the efficacy of the Standard Operation Procedure for alert communication. Organise workshops, meetings and feedback sessions from users of forecasts and SOPs.

International Monitoring and Evaluation Consultant

National Monitoring and Evaluation Consultant

Consultant travel to project sites and stakeholder consultations.

- Project Manager for project management and regular operations
- Assistant coordinator for logistical, procurement, financial and administrative matters

Travel for project management

Project steering committee and inception workshop

Office equipment for PM operations

5 MANAGEMENT ARRANGEMENTS

174. The project will be implemented according to the National Implementation Modality. The UNDP will be the GEF Implementing Agency. The Prime Minister's Office – DMD will assume the role of Implementing Partner for this project, with the VPO acting as executing partner. Project finances will pass through Medium Term Expenditure Framework to ensure national accountability through the normal government procedures and according to UNDP rules and regulations.

175. The Project Board/Steering Committee will be co-chaired by PMO-DMD and VPO. The PMO will be responsible for the implementation of the project, monitoring day-to-day operations, and accountability on financial flows. The VPO will be responsible for policy guidance in the virtue of its mandate for policy development and coordination of environment and climate change issues in the country. Other ministries and the TMA will act as Responsible Partners (RP) for specific components of the project as specified in the sections above. Responsible Partners are members of the project who are responsible for delivering some activities and outputs under the project. Participating Members are members who benefit from the project's activities and who can help provide oversight and guidance to the project overall.

176. The Project Steering Committee will be comprised of the following partners:

- a. PMO-DMD (co-chair)
- b. VPO-DOE (co-chair)
- c. TMA (Responsible Partner)
- d. MoW (Responsible Partner)
- e. MAFS Crop/Irrigation Department (Responsible Partner)
- f. Ruvuma Water Basin (Responsible Partner)
- g. Pangani Water Basin (Responsible Partner)
- h. Ministry of Livestock and Fisheries (Participating member)
- i. TCRA (Participating member)
- j. UNDP (Project Assurance)

177. **The Project Board/Project Steering Committee (PSC)** is responsible for making management decisions for a project in particular when guidance is required by the Project Manager. The Project Board plays a critical role in project monitoring and evaluations by quality assuring these processes and products, and using evaluations for performance improvement, accountability and learning. It ensures that required resources are committed and arbitrates on any conflicts within the project or negotiates a solution to any problems with external bodies. In addition, it approves the appointment and responsibilities of the Project Manager and any delegation of its Project Assurance responsibilities. The PSC also approves annual workplans, reviews annual or other periodic reports, financial reports, and makes decisions on any adjustments to the project strategy. Based on the approved Annual Work Plan, the Project Board can also consider and approve the quarterly plans (if applicable) and also approve any essential deviations from the original plans.

178. In order to ensure UNDP's ultimate accountability for the project results, Project Board decisions will be made in accordance to standards that shall ensure management for development results, best value money, fairness, integrity, transparency and effective international competition. In case consensus cannot be reached within the Board, the final decision shall rest with the UNDP Project Manager.

179. Potential members of the Project Board will be reviewed and recommended for approval during the PAC meeting. Representatives of other stakeholders can be included in the Board as appropriate. The Board contains three distinct roles (see figure below), including:

- a. An Executive: individual representing the project ownership to chair the group (Prime Minister's Office – Disaster Management Department and Vice President's Office)
- b. Senior Supplier: individual or group representing the interests of the parties concerned, which provide funding for specific cost sharing projects and/or technical expertise to the project. The Senior Supplier's primary function within the Board is to provide guidance regarding the technical feasibility of the project. (UNDP Country Office)
- c. Senior Beneficiary: individual or group of individuals representing the interests of those who will ultimately benefit from the project. The Senior Beneficiary's primary function within the Board is to ensure the realization of project results from the perspective of project beneficiaries (TMA, Ministry of Water, Ministry of Agriculture, Ministry of Livestock and Fisheries, Water Basins Authorities (Pangani, Ruvuma).
- d. The Project Assurance role supports the Project Board Executive by carrying out objective and independent project oversight and monitoring functions. The Project Manager and Project Assurance roles should never be held by the same individual for the same project. (UNDP Country Office and UNDP-GEF).

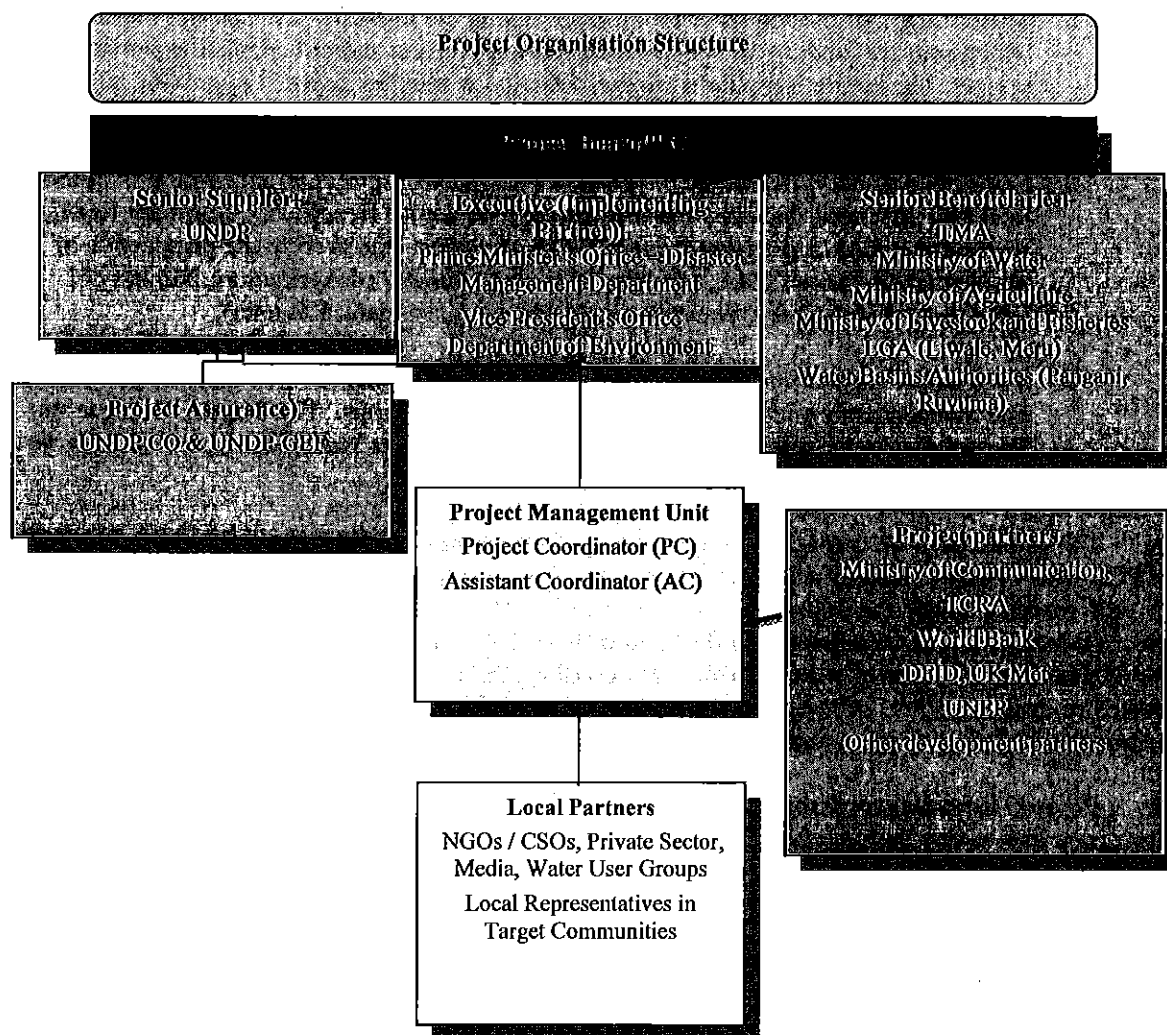
180. The project will be managed through Project Coordination Unit housed within the PMO-DMD. The PCU will be comprised of a Project Coordinator (PC) and an Assistant Project Coordinator (APC) who will function under the supervision of the PMO-DMD and the project steering committee. The Project Coordinator will be expected to dedicate 60% of their time to technical issues and support, and 40% of their time to project management and coordination, whereas the assistant coordinator will be expected to dedicate 100% of their time to project management issues, including financial management, procurement, logistical support and coordination. (TORs in Annex 7)

181. **Project Coordinator/Project Manager:** The Project Coordinator has the authority to run the project on a day-to-day basis on behalf of the Implementing Partner within the constraints laid down by the Board. The Project Coordinator's prime responsibility is to ensure that the project produces the results specified in the project document, to the required standard of quality and within the specified constraints of time and cost. The Project manager will dedicate a part of his/her time to providing technical advice towards the achievement of project outputs and outcomes, and a portion of time to the day-to-day management of the project. The terms of reference for the project coordinator are included in Annex 7.

182. **An Assistant Project Coordinator/Assistant Project Manager** will also be recruited. The Assistant Project Manager will assist the Project manager with administrative and financial issues related to the day-to-day management of the project, including production of annual and quarterly work plans and budgets, procurement, monitoring of project inputs and expenditures, and delivery of the M&E plan as per specifications. The Terms of reference for the assistant project manager are included in Annex 7.

183. As per discussions with the GEF Secretariat, this initiative is part of a multi-country set of NIM projects supported by UNDP-GEF. In response to LDCF/SCCF Council requirement that a regional component would be included to enhance coordination, increase cost effectiveness and, most importantly, benefit from a regional network of technologies, a cohort of technical advisors and a project manager will be recruited to support each of the national level project teams. In particular they will support countries to

develop robust adaptation plans and provide technical advice, training and support for accessing, processing and disseminating data for early warning and national/sectoral planning related purposes on a systematic basis. The cost of these project staff has been prorated across all country project budgets and recruitment of these posts will be undertaken by UNDP-GEF (HQ) in coordination with all UNDP Country Offices.



184. A **capacity assessment** of the PMO-DMD has been conducted in 2013 by the UNDP CO. Prior to implementation, a review of the capacity assessment will be made and measures put in place to ensure the project is implemented in full alignment with UNDP policies and procedures.

Audit Arrangements

185. The project audit will be conducted according to UNDP Financial Regulations and Rules and applicable Audit policies.

6 MONITORING FRAMEWORK AND EVALUATION

186. The project will be monitored through the following M&E activities. The M&E budget is provided in the table below.

Project start:

187. A Project Indicator Baseline study will be launched immediately upon project inception. A Project Inception Workshop will be held within the first 2 months of project start with those with assigned roles in the project organization structure, UNDP country office and where appropriate/feasible regional technical policy and programme advisors as well as other stakeholders. The Inception Workshop is crucial to building ownership for the project results and to plan the first year annual work plan.

188. The Inception Workshop should address a number of key issues including:

- Assist all partners to fully understand and take ownership of the project. Detail the roles, support services and complementary responsibilities of UNDP CO and RCU staff vis à vis the project team. Discuss the roles, functions, and responsibilities within the project's decision-making structures, including reporting and communication lines, and conflict resolution mechanisms. The Terms of Reference for project staff will be discussed again as needed.
- Based on the project results framework and the relevant Source of Fund (e.g. GEF) Tracking Tool if appropriate, as well as based on the results of the Baseline Study finalize the first annual work plan. Review and agree on the indicators, targets and their means of verification, and recheck assumptions and risks.
- Provide a detailed overview of reporting, monitoring and evaluation (M&E) requirements. The Monitoring and Evaluation work plan and budget should be agreed and scheduled.
- Discuss financial reporting procedures and obligations, and arrangements for annual audit.
- Plan and schedule Project Board meetings. Roles and responsibilities of all project organisation structures should be clarified and meetings planned. The first Project Board meeting should be held within the first 12 months following the inception workshop.

189. An Inception Workshop report is a key reference document and must be prepared and shared with participants to formalize various agreements and plans decided during the meeting.

Quarterly:

190. Progress made shall be monitored in the UNDP Enhanced Results Based Management Platform.

191. Based on the initial risk analysis submitted, the risk log shall be regularly updated in ATLAS. Risks become critical when the impact and probability are high. Note that for UNDP GEF projects, all financial risks associated with financial instruments such as revolving funds, microfinance schemes, or capitalization of ESCOs are automatically classified as critical on the basis of their innovative nature (high impact and uncertainty due to no previous experience justifies classification as critical).

192. Based on the information recorded in Atlas, a Project Progress Reports (PPR) can be generated in the Executive Snapshot.

193. Other ATLAS logs can be used to monitor issues, lessons learned etc... The use of these functions is a key indicator in the UNDP Executive Balanced Scorecard.

Annually:

194. Annual Project Review/Project Implementation Reports (APR/PIR): This key report is prepared to monitor progress made since project start and in particular for the previous reporting period (1 July to 30 June). The APR/PIR combines both UNDP and SOF (e.g. GEF) reporting requirements.

195. The APR/PIR includes, but is not limited to, reporting on the following:

- Progress made toward project objective and project outcomes - each with indicators, baseline data and end-of-project targets (cumulative)
- Project outputs delivered per project outcome (annual).
- Lesson learned/good practice.
- AWP and other expenditure reports
- Risk and adaptive management
- ATLAS QPR
- Portfolio level indicators (i.e. GEF focal area tracking tools) are used by most focal areas on an annual basis as well.

Periodic Monitoring through site visits:

196. UNDP CO and the UNDP RCU will conduct visits to project sites based on the agreed schedule in the project's Inception Report/Annual Work Plan to assess first hand project progress. Other members of the Project Board may also join these visits. A Field Visit Report/BTOR will be prepared by the CO and UNDP RCU and will be circulated no less than one month after the visit to the project team and Project Board members.

Mid-term of project cycle:

197. The project will undergo an independent Mid-Term Evaluation at the mid-point of project implementation (insert date). The Mid-Term Evaluation will determine progress being made toward the achievement of outcomes and will identify course correction if needed. It will focus on the effectiveness, efficiency and timeliness of project implementation; will highlight issues requiring decisions and actions; and will present initial lessons learned about project design, implementation and management. Findings of this review will be incorporated as recommendations for enhanced implementation during the final half of the project's term. The organization, terms of reference and timing of the mid-term evaluation will be decided after consultation between the parties to the project document. The Terms of Reference for this Mid-term evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-EEG. The management response and the evaluation will be uploaded to UNDP corporate systems, in particular the UNDP Evaluation Office Evaluation Resource Centre (ERC).

198. The relevant SOF (GEF) Focal Area Tracking Tools will also be completed during the mid-term evaluation cycle.

End of Project:

199. An independent Final Evaluation will take place three months prior to the final Project Board meeting and will be undertaken in accordance with UNDP and SOF (e.g. GEF) guidance. The final evaluation will focus on the delivery of the project's results as initially planned (and as corrected after the mid-term evaluation, if any such correction took place). The final evaluation will look at impact and sustainability of results, including the contribution to capacity development and the achievement of global environmental benefits/goals. The Terms of Reference for this evaluation will be prepared by the UNDP CO based on guidance from the Regional Coordinating Unit and UNDP-EEG.

200. The Terminal Evaluation should also provide recommendations for follow-up activities and requires a management response which should be uploaded to PIMS and to the UNDP Evaluation Office Evaluation Resource Centre (ERC).

201. The relevant SOF (e.g. GEF) Focal Area Tracking Tools will also be completed during the final evaluation.

202. During the last three months, the project team will prepare the Project Terminal Report. This comprehensive report will summarize the results achieved (objectives, outcomes, outputs), lessons learned, problems met and areas where results may not have been achieved. It will also lay out recommendations for any further steps that may need to be taken to ensure sustainability and replicability of the project's results.

Learning and knowledge sharing:

203. Results from the project will be disseminated within and beyond the project intervention zone through existing information sharing networks and forums.

204. The project will identify and participate, as relevant and appropriate, in scientific, policy-based and/or any other networks, which may be of benefit to project implementation though lessons learned. The project will identify, analyze, and share lessons learned that might be beneficial in the design and implementation of similar future projects.

205. Finally, there will be a two-way flow of information between this project and other projects of a similar focus.

M&E workplan and budget

Adjust budget details as required.

Activity	Responsible Parties	Budget	Frequency
Inception Workshop and Report	<ul style="list-style-type: none"> ▪ Project Manager ▪ UNDP CO, UNDP CCA 	Indicative cost: 5,000	Within first two months of project start up
Measurement of Means of Verification for Project Progress on <i>output and implementation</i>	<ul style="list-style-type: none"> ▪ Oversight by Project Manager ▪ Project team 	To be determined as part of the Annual Work Plan's preparation.	Annually prior to ARR/PIR and to the definition of annual work plans
ARR/PIR	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP RTA ▪ UNDP EEG 	None	Annually
Periodic status/progress reports	<ul style="list-style-type: none"> ▪ Project manager and team 	None	Quarterly

Component / Activity	Responsible Parties	Indicative Cost	Time Frame
Mid-term Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	Indicative cost: 15,000	At the mid-point of project implementation.
Final Evaluation	<ul style="list-style-type: none"> ▪ Project manager and team, ▪ UNDP CO ▪ UNDP RCU ▪ External Consultants (i.e. evaluation team) 	Indicative cost: 30,000	At least three months before the end of project implementation
Project Terminal Report	<ul style="list-style-type: none"> ▪ Project manager and team ▪ UNDP CO ▪ Local consultant 	0	At least three months before the end of the project
Audit	<ul style="list-style-type: none"> ▪ UNDP CO ▪ Project manager and team 	Indicative cost per year: 3,000	Yearly
Visits to field sites	<ul style="list-style-type: none"> ▪ UNDP CO ▪ UNDP RCU (as appropriate) ▪ Government representatives 	For GEF supported projects, paid from IA fees and operational budget	Yearly
TOTAL indicative COST		US\$ 57,010	
Excluding project team staff time and UNDP staff and travel expenses			

7 LEGAL CONTEXT

If the country has signed the Standard Basic Assistance Agreement (SBAA), the following standard text must be quoted:

206. This document together with the CPAP signed by the Government and UNDP which is incorporated by reference constitute together a Project Document as referred to in the SBAA and all CPAP provisions apply to this document.

207. Consistent with the Article III of the Standard Basic Assistance Agreement, the responsibility for the safety and security of the implementing partner and its personnel and property, and of UNDP's property in the implementing partner's custody, rests with the implementing partner.

208. The implementing partner shall:

- a) Put in place an appropriate security plan and maintain the security plan, taking into account the security situation in the country where the project is being carried;

- b) Assume all risks and liabilities related to the implementing partner's security, and the full implementation of the security plan.

209. UNDP reserves the right to verify whether such a plan is in place, and to suggest modifications to the plan when necessary. Failure to maintain and implement an appropriate security plan as required hereunder shall be deemed a breach of this agreement.

210. The implementing partner agrees to undertake all reasonable efforts to ensure that none of the UNDP funds received pursuant to the Project Document are used to provide support to individuals or entities associated with terrorism and that the recipients of any amounts provided by UNDP hereunder do not appear on the list maintained by the Security Council Committee established pursuant to resolution 1267 (1999). The list can be accessed via <http://www.un.org/Docs/sc/committees/1267/1267ListEng.htm>. This provision must be included in all sub-contracts or sub-agreements entered into under this Project Document.

ANNEXES

Annex 1 – Capacity Assessment Scorecard

Annex 2 – List of priority sites for installation of AWS

Annex 3 – Risk Log

Annex 4 – Report of Project Preparation Phase

Annex 5 – Stakeholder Involvement Plan

Annex 6 – Environmental and Social Screening

Annex 7 – Terms of Reference for key personnel

Annex 8 – Co-financing letters

Annex 9 - Results of Capacity Assessment of Implementing Partner

Annex 1 – Capacity Assessment Scorecard

Key:

1. No evidence of capacity
2. Anecdotal evidence of capacity
3. Partially developed capacity
4. Widespread, but not comprehensive capacity
5. Fully developed capacity

CAPACITY OF AGENCIES TO PRODUCE INFORMATION			
Capacity Indicator	Baseline Level of Existing Capacity	Target level of Capacity in the Project timeframe	Priority of Capacity (h/m/l)
Capacity to service the observational infrastructure e.g. hydrological and meteorological stations, radar, upper air monitoring, satellite technology etc.	2.00	3	H
Capacity to generate weather/climate forecasts e.g. Numerical weather prediction (1-7 days), seasonal forecasts etc.	3.00	4	H
Capacity to utilize internationally and regionally available monitoring and forecast products	3.33	4	M
Capacity to send local observations to international centres	4.00	5	M
Capacity to record and use national/local observations for monitoring current meteorological and hydrological hazards in a timely manner	2.00	4	H
Capacity to record and use national/local observations to forecast future meteorological and hydrological hazards in a timely manner	2.00	3	H
Capacity to utilize satellite information for climate and environmental monitoring.	2.33	3	M

Capacity to form partnerships with key stakeholders to ensure effective delivery of agricultural/hydrological support services	3.00	3	H
Capacity to monitor the cost of operations and maintenance of current equipment	3.00	4	M
Capacity to assess and understand key stakeholder's needs for climate information	2.33	4	H
Capacity to enable a free flow of information (e.g. generate, and provide access to data and information to partners and other users)	2.00	4	H
Capacity to plan cost recovery mechanisms	1.00	3	M
Capacity to sell products to the private sector	1.00	3	L

2.38

3.62

CAPACITY OF AGENCIES TO PACKAGE INFORMATION

Capacity Indicator	Baseline Level of Existing Capacity	Target level of Capacity in the Project timeframe	Priority of Capacity (H/M/L)
Capacity to fully understand impacts of climate variability and change on food security (e.g. on fisheries, crop production, livestock, etc.)	3.00	4	H
Capacity to fully understand impacts of climate variability and change on water resources and flooding (e.g. dam management and flood risk modeling)	3.00	4	H
Capacity to combine climate monitoring and forecast information with current agricultural assessments to provide agriculturally specific advisories	2.67		H
Capacity to combine climate monitoring and forecast information with current hydrological assessments to provide hydrologically specific advisories	2.00	3	M

Capacity to partner with national government structures and academic institutions to develop tailored, sectorally specific information and packaged products	1.33	3	L
Capacity to feed climate information into policy briefs and long-term strategies	1.33	3	H
Capacity to analyze relevant data/information for policy strategies such as agricultural production, infrastructure development, credit, insurance and marketing	2.00	3	M
Capacity to feed climate information, forecasts and tailored information to disaster risk management agencies and frameworks	2.00	3	H
Capacity of disaster risk management agencies to assess information in a timely manner	2.00	4	H
	2.15	3.38	

CAPACITY OF AGENCIES TO DISSEMINATE INFORMATION

Capacity Indicator	Baseline Level of Existing Capacity	Target level of Capacity in the Project time frame	Priority of Capacity (h/m/l)
Capacity to disseminate warnings and advisories in local languages	2.33	4	H
Capacity to disseminate warnings and advisories related to existing indigenous practices and technologies.	1.33	2	L
Capacity to disseminate alerts in a wide range of media (e.g., privileged telephone communication systems, CB radios, SMS alerts etc.)	3.00	4	H
Capacity for district and community focal points to understand the content of warnings and advisories	2.00	3	H
Capacity to establish and sustain mechanisms to raise awareness on the impacts of climate shocks and long-term change	1.33	2	M

Capacity to coordinate with government agencies to respond to warnings	2.33	3	H
Capacity to coordinate with CSOs to respond to warnings	2.00	3	M
Capacity to disseminate warnings and advisories to the district level or community focal points	2.33	3	H
Capacity of local populations to understand climate change and its long term effects	1.67	3	H
Capacity to receive feedback on the usefulness of alerts from affected communities	1.00	3	M
	1.93	3.00	

CAPACITY OF LEGISLATIVE AND GOVERNANCE FRAMEWORK

Capacity Indicator	Baseline Level of Existing Capacity	Target level of Capacity in the project timeframe	Priority of Capacity (h/m/l)
Capacity for national coordination of emergency response activities	2.67	4	M
Capacity of standard operating procedures to guide the production, dissemination and response to warnings	2.00	4	H
Capacity of legislative system to mandate designated authorities e.g. which authority will disseminate warnings, which will produce warnings etc.	3.00	4	M
Capacity of multiple agencies to contribute to the issuing of warnings through national structures e.g. disaster management committees etc.	2.33	4	H
	2.50	4.00	

TOTAL AVERAGE SCORE

2.24

3.50

Annex 2 – List of Sites for installation of climate monitoring equipment by TMA

s/n	NAME OF STATION	REASON FOR THEIR PRIORITY
1	Nachingwea 63969	Already have registrations
2	Mafia 63895	
3	Lindi	An old region with no single main weather station
4	Njombe	Stations with identical weather pattern
5	Lushoto	
6	Mafinga	
7	Mufindi	Cool weather
8	Makambaku	An area with very strong winds
9	Kigamboni	Dar es Salaam stations for improvement of regional forecasts
10	Kimbiji	
11	Mbweni	
12	Chanika	
13	Mpiji	
14	Sam Nujoma	
15	Kigomasha	Expansion of Island weather stations network
16	Mkoani Pemba	
17	Ifakara	Areas with normal to above normal rainfall
18	Namanyere	
19	Mufindi	
20	Ludewa	
21	Newala	

22	Ngara	
23	Liwale	
24	Kibaya	
25	Bagamoyo	
26	Kasanga	Areas near Lakes e.g. Tanganyika and Victoria
27	Karema	
28	Ukerewe	
29	Mbinga	
30	Mbambabay	
31	Manyoni	Areas with normal to below normal rainfall
32	Maswa	
33	Ruangwa	
34	Loliondo	
35	Nzega	
36	Tunduru	
37	Engasumet	
38	Ngorongoro	
39	Igunga	
40	Iramba	
41	Masasi	
42	Mugumu	
43	Msembe	Wildlife area
44	Luhombero	These areas have been chosen to reduce gaps between stations
45	Meru	
46	Mpurukasese	

47	Mpatora	
48	Ushiroambo	
49	Uvinza	
50	Sekenke	
51	Terat	
52	Pangani	
53	Maneromango	
54	Mtera	
55	Kipembawe	
56	Bahi	
57	Ikungi	
58	RomboMkuui	
59	Longido	
60	Bunda	
61	Rongai	
62	Utete	
63	Mkomazi	
64	Mbulu	
65	Saadani	
66	Kahama	
67	Kaisho	
68	Rungwa	
69	Kibiti	
70	Kasulu	

Annex 3 – Risk Log

#	Description of the risk	Potential consequence	Mitigation / Mngt response	Type (Risk category)	Probability & Impact (1-5, low to high)	Owner	Submitted updated by	Last Update	Status
	- The increased data flows could pose additional demands on the forecasting office which it may not be able to meet within current resources.	TMA will incur additional costs for forecasting	Output 2.6 in the project seeks to develop a thorough, sustainable long term financing strategy for all of TMA's needs	Financial	P - 2	UNDP			
	- TMA cannot mobilize sufficient government financing to continue monitoring and to cover recurring O&M costs	Equipment purchased will become obsolete or fall into disrepair	Output 2.6 in the project seeks to develop a thorough, sustainable long term financing strategy for all of TMA's needs. It is expected that the project will demonstrate benefits of maintaining the network	financial	P - 3 I - 4	UNDP			

<p>- The project could not improve the current coordination between EWS agencies and with EWS-related initiatives to improve the ability to work cross-sectorally</p>	<p>Different ministries will continue to purchase and operate different equipments for monitoring hydroclimate conditions, leading to costs</p>	<p>Cost savings to each individual ministry from the development of the shared database and data portal should demonstrate the benefits of coordination.</p>	<p>financial</p> <p>P-1</p> <p>I-3</p> <p>UNDP</p>
<p>- natural disasters could damage infrastructure (particularly floods)</p>	<p>Damage to equipment</p>	<p>Equipment will only be installed following an environmental impact assessment with appropriate safeguards and protection</p>	<p>financial</p> <p>P-1</p> <p>I-3</p> <p>UNDP</p>
<p>- data sharing could be hindered by lack of coordination / willingness of agencies to share data or by technical constraints (e.g. bandwidth issues or local mobile telecommunication networks)</p>	<p>Different ministries could see their data needs not met, hindering their ability to deliver their mandates</p>	<p>The data sharing mechanisms and protocols will ensure that all possible eventualities are covered, including technical failures, with appropriate backup and access mechanisms for all relevant stakeholders. Cost recovery measures may also be applied to ensure costs of database maintenance are covered.</p>	<p>Organizational</p> <p>P-1</p> <p>I-3</p> <p>UNDP</p>
<p>- Digitization of climate records supported by the project could be insufficient to reliably increase historical data availability</p>	<p>Climate data will not be available for running models and scenarios</p>	<p>Digitization is to happen gradually, with all new data coming into the shared database. Historical data will continue to be maintained on paper for specific needs</p>	<p>Operational</p> <p>P-2</p> <p>I-1</p> <p>UNDP</p>

<p>users could not be reachable during the EWS simulation exercises due to lack of telecommunication infrastructure and inadequate roads.</p>	<p>The EWS simulation exercise could then be insufficient to demonstrate sufficient benefits</p>	<p>Operational</p>	<p>P-1</p>	<p>A thorough community engagement exercise will occur well before the EWS simulation exercise to ensure willingness to participate. Scenarios will be developed in conjunction with community based groups.</p>
<p>The Standard Operating Procedures could not be finalized in time to inform the EWS simulation exercise</p>	<p>The EWS simulation exercise would not be able to demonstrate the value of new SOPs</p>	<p>Operational</p>	<p>P-1 I-3</p>	<p>The development of SOPs is planned to occur from year 1 of the project whereas the simulation is set to take place during the final year of the project. Should the SOPs not be available by then, the simulation will use existing mechanisms and procedures and will deliver lessons learned that can be incorporated into the SOPs</p>
<p>Environmental or climate hazards could impede the deployment of the EWS simulation.</p>	<p>This could result in delays or in cancellation of the simulation exercise</p>	<p>Environmental</p>	<p>P-2</p>	<p>In the event of a disaster in the project sites, the simulation exercise could be delayed or the data from the disaster could be used to replace information on the simulation</p>
			<p>I=4</p>	

<p>Communities could insufficiently buy into the crowdsourcing platform for economic or cultural reasons</p>	<p>The project intends to create a system of incentives by using the platform as an upload and download mechanisms whereby users also receive agro-meteorological information in readily usable formats. This is expected to create an incentive for continued use. There will be no costs to the user for the pilot phase. Should the platform continue to be unusable, the project will continue to use traditional information sharing mechanisms (physical observation, site visits, extension services, phones, mail)</p>	<p>Operational</p> <p>P = 3 I = 2</p> <p>UNDP</p>	<p>This would result in the platform becoming uselessly as a mechanism for disaster management</p>
<p>The government could not be able to mobilize sufficient resources to continue operating the Emergency Operations Unit after the project.</p>	<p>The project's sustainability and exit strategy will demonstrate the benefits of keeping the EOU operational, including recommendations for its maintenance. Work to mobilize government support for the EOU has already begun and is well advanced, since the EOU is part of the Government's own plans.</p>	<p>Operational</p> <p>P = 2</p>	<p>The EOU will cease to operate after the project, leading to capacity loss</p>

The private sector could resist changes in the regulatory environment governing their access to climate data

Private sector and other stakeholder engagement will continue to be left ad hoc, leading to opportunities lost for financing

The TMA can engage the private sector and develop its own cost recovery strategy without the integration into National Budget Frameworks.

P-2

Financial

I-2