JAMHURI YA MUUNGANO WA TANZANIA

WIZARA YA UJENZI, UCHUKUZI NA MAWASILIANO

TANZANIA METEOROLOGICAL AGENCY

NATIONAL FRAMEWORK FOR CLIMATE SERVICES 2018 – 2025

PICTURES ON THE TOP COVER (LEFT TO RIGHT)

1) A weather radar station under Tanzania Meteorological Agency located in Kisarawe, Coast region. Observation is an important component in provision of climate services. (source: TMA, 2017)

2) Wilting maize due to drought conditions in Kiteto. Such crop failure incidences due to drought can be minimized with effective use of climate services. (source: TMA, 2017)

3) Jangwani area (Dar es Salaam, Tanzania) residents rescuing themselves from floods, which were caused by heavy rainfall on 6th May, 2015 (source: www.mwananchi.co.tz on 7/5/2015). Good use of climate information can help to take preparedness measures against disasters such as floods.

4) Mtera hydropower plant in Iringa region, Tanzania (source: www.google.co.tz). Integration of climate information in development planning can help preparedness in hydroelectric power planning.

GLOSSARY

Climate Service: is the provision of one or more climate products or advice in such a way as to assist decision-making by individuals or organizations.
Global Framework for Climate Services: is the global partnership of governments and organizations that produce and use climate information and services.

National Climate Services: are those services that, through a collaborative network of entities under a National Framework for Climate Services (NFCS), create and provide authoritative, credible, usable and dependable science-based climate information and advice that is of value to government institutions, socio-economic sectors and the broader community.

National Framework for Climate Services (NFCS): is a mechanism to enhance provision of science-based climate information and products and application for climate risk management

FOREWORD

Provision and utilization of climate services is critical for sustainable socio-economic development of any country, particularly in the context of a changing climate. Tanzania like many other countries experiences impacts of climate variability and change which include severe floods, frequent and prolonged droughts, sea level rise, declining crop yields, increased incidences of crop pests and diseases, loss of livestock, decreased water availability as well as increase in vector and water-borne diseases. In recent decades, recurrent of climate related hazards with associated extreme disaster events poses grave risks to development and have negative impacts on economy, environment, infrastructure, health and livelihoods.

Responding to these challenges implies taking effective steps to build climate sensitive society in order to minimise risks and costs as well as to seize opportunities. It also requires climate-informed decision-making at all levels. These calls for efficient climate actions through *inter alia*, establishment of a National Framework for Climate Services (NFCS). The framework will enhance the provision and use of climate services in planning and decision making to reduce threats of climate variability and change to the achievement of development goals.

This framework provides a unique opportunity to enhance resilience to climate variability and change through promoting use of climate services, providing evidence for the impacts of climate variability and change and bridge the gap between producer of climate services and users. The framework also provides an opportunity for involvement of users in establishing needs, develop appropriate products, identify capacity development requirements and influence direction of observational investments and research efforts.

I look forward to your collaborations for the implementation of this framework in Tanzania. Finally, I encourage all other stakeholders to participate actively in the implementation of this framework through the established arrangements.

Prof. Faustin Kamuzora
Permanent Secretary (Policy and Coordination)
Prime Minister's Office

PREFACE

The Global Framework for Climate Services (GFCS) aims at enabling better management of the risks of climate variability and change. It enhances adaptive capacity to climate change, through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale. This will greatly contribute among others to improve food security, enhance preparedness and reduce disaster risks. Weather and climate patterns and behaviour do not recognise institutional regulations or administrative boundaries, therefore enhanced cooperation among stakeholders is required to effectively meet society needs for weather and climate services. To ensure these views are translated into actions at the national level, the World Meteorological Organisation (WMO) encourages its Members to put in place and implement a National Framework for Climate Services.

This NFCS underline the necessity of increased political support and institutional collaborations, the urgent need for enhanced weather and climate services delivery to end users, improved access to weather and climate services for agriculture (crop production and animal husbandry), health, and water resources sectors; and disaster risk reduction. The framework further underscores the need for strengthening partnership and collaboration with relevant institutions; increased support in the provision of weather and climate services; and strengthening research efforts to address existing research gaps and needs as well as promoting provision of and access to climate services through *inter alia*, collaborations with other competent institutions at all levels.

Successful implementations of the National Framework for Climate Services will enhance provision of accurate, reliable and timely weather and climate related products and information in a cost-effective and sustainable manner. Tanzania Meteorological Agency (TMA) remains committed to lead in coordination and implementation of the NFCS within its legal and institutional mandates.

Dr. Agnes L. Kijazi
The Director General
Tanzania Meteorological Agency and
Permanent Representative of Tanzania with WMO

ACKNOWLEDGEMENT

Development of the National Framework for Climate Services has solicited the assistance, participation and cooperation of various key stakeholders and experts from public and private sector and international community. The process involved a multi-disciplinary and multi-stakeholder's national expert team from relevant ministries, departments and academia under the coordination of the Tanzania Meteorological Agency. I would like to acknowledge their efforts, support and valuable technical support in preparing this framework. I take this opportunity to thank all the sectoral ministries, government departments and agencies, United Nation agencies, international and multilateral organizations, local government authorities, research and academic institutions, private sector, non-governmental organizations, civil societies and other institutions for participating in the development of this framework.

I express gratitude to the National Steering Committee (the Tanzania Disaster Management Council - TADMAC) and Project Delivery Team (PDT) for overseeing preparation of this framework. Special thanks go to the Royal Government of Norway for the financial and technical support for development of this framework through the implementation of Global Framework for Climate Services (GFCS) programme under the World Meteorological Organization (WMO). Let me also commend the efforts of WMO and other implementing partners for their support in enhancing climate services and building a climate-resilient society in Tanzania.

I recognize tireless efforts of the National Team of Experts that includes experts from Tanzania Meteorological Agency (TMA), Prime Minister's Office Disaster Management Department (PMO-DMD), University of Dar es Salaam (UDSM), and Ministry of Agriculture (MoA) for their technical and valuable inputs in the development of this framework.

Finally, I believe the spirit of team work with multidisciplinary and multi-stakeholder involvement in development of this framework will continue in its implementation thus contribute to reduce the country's vulnerability to climate sensitive sectors such as agriculture, disaster risk management, health, tourism, infrastructure, public services and transport for climate resilience community.

Dr. Leonard M. Chamuriho
Permanent Secretary (Transport Sector)
Ministry of Works, Transport and Communication

LIST OF ACRONYMS

AU	African Union
BRN	Big Results Now
CSOs	Civil Society Organizations
EAC	East African Community
GBS	General Budget Support
GEF	Global Environment Facility
GFCS	Global Framework for Climate Services
IPCC	Intergovernmental Panel on Climate Change
LGAs	Local Government Authorities
MDAs	Ministries, Departments and Agencies
MHEWS	Multi-Hazards Early Warning Systems
MLF	Ministry of Livestock and Fisheries
MLHHSD	Ministry of Land, Housing and Human Settlements Development
MoHCDGEC	Ministry of Health, Community Development, Gender, Elderly and Children
MoWTC	Ministry of Works, Transport and Communications
NEMC	National Environment Management Council
NFCS	National Framework for Climate Services
PDT	Project Delivery Team

PMO – DMD	Prime Minister's Office – Disaster Management Department
PO-RALG	President's Office-Regional Administration and Local Government
PSC	Project Steering Committee
SADC	Southern African Development Community
SDGs	Sustainable Development Goals
SWOC	Strength, Weakness, Opportunities and Challenges
TADMAC	Tanzania Disaster Management Council
TANROADS	Tanzania National Roads Agency
TMA	The National Meteorological Service in Tanzania (NMS)
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VPO - DoE	Vice President Office - Division of Environment
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization
WWF	World Wide Fund

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CHAPTER 1

Weather and climate risks affect the implementation of various policies and programs including the Sustainable Development Goals (SDGs) 2015 – 2030, the Tanzania Development Vision 2025, National Five Year Development Plan 2016/17-2020/21 and other multi-sectorial and cross-sectorial policies.

1.0 INTRODUCTION

1.1 Background information

Climate variability and change trigger serious challenges to sustainable development in Tanzania. The country is vulnerable to adverse impacts of climate variability and change since the socio-economic development depends mostly on weather and climate sensitive sectors. Global, regional to local impacts of climate variability and change have fuelled a growing public demand for climate services i.e. provision of climate information to assist decision-making by individuals and organizations. There is a call for easily accessible and timely scientific climate data and information to support the government, institutions and individuals to make informed decisions.

The increasing need for delivery of sector specific weather and climate services to *inter alia*, ensure food and nutrition security, improved water and land resources management, disaster risk reduction and better health necessitate the importance of mainstreaming weather and climate services into development planning and budgeting.

Effective provision of climate services requires strengthened weather observation networks, capacity building, transfer and acquisition of relevant technologies and strengthening of weather and climate research to support development of climate information for decision-making. Climate information is a critical input for effective climate risk management.

Climate informed policy, planning, and practices will ensure that development is more resilient and less vulnerable to adverse impacts of climate variability and change. Accurate and timely weather and climate forecasts, climate analyses, predictions, dissemination and accessibility will further improve human safety, prosperity and livelihood as well as preserve precious natural resources for the benefit of communities, especially the most vulnerable.

Development and implementation of weather and climate services that are tailored to meet user needs requires multidisciplinary and multi-institutional collaboration. This is the rationale behind the GFCS, developed by WMO in collaboration with other UN system agencies and Ddevelopment partners. It is also the rationale for the implementation of GFCS at national level. The aim of the NFCS is to respond to the growing need of users of climate information countrywide.

1.2 Rationale for Development of National Framework for Climate Services

This section provides justification for establishment of a National Framework for Climate Services in Tanzania.

Agriculture, Livestock and Food Security: about 80% of Tanzanians rely on subsistence agriculture, i.e. crop production, livestock keeping and fishing, as a means of livelihood which are highly vulnerable to the adverse impacts of climate variability and change such as recurrent drought, floods and increased incidences of pests and diseases. People living at a subsistence level are easily

trapped in poverty because they cannot recover from such shocks as readily as those with greater economic resources. Timely provision and access to weather and climate information can help reduce these impacts through timely preparedness and planning. Farmers will be able to get seasonal predictions and updates to plan their crops.

Disaster Risk Reduction: studies show that about 90% of disasters occurring around the world are caused by weather and climate related hazards such as cyclones, storm surges, strong winds, extreme temperatures, landslides and wildfires. The Intergovernmental Panel on Climate Change (IPCC) Special Report on Managing the Risks of Extreme Events and Disasters conclude that all sectors of the economy and the environment will be impacted by climate variability and change, particularly increased frequency and intensity of extreme weather events. Disaster preparedness managers need to have advance warning of weather and climate extremes to help communities to proactively plan their resource allocation for water, food, medication and other core services. Development and dissemination of climate services will contribute to availability and accessibility of multi-hazards early warning as stipulated in Sendai Framework for Disaster Risk Reduction (2015-2030).

Health: Many infectious diseases have seasonal cycles that are influenced by changes in spatial and temporal prevalence. The seasonality of the diseases is driven by changes in weather and climate elements such as rainfall, temperature and humidity. The protection of public health from an increasingly variable and changing weather and climate is a priority for the health sector. Timely delivery of weather and climate information is crucial for planning intervention measures and taking appropriate decisions to reduce climate risks.

Energy: Changes in weather and climate extremes have significant impacts on energy sector, particularly in developing countries. Extreme events such as storms, floods, drought and extreme temperature significantly affect

energy production, transmission and supply. The country's power generation has been affected heavily by drought events in recent years. The protection of energy sector from an increasingly variable and changing weather and climate is a priority for the sector. Weather and climate information is crucial in supporting effective exploitation and use of renewable energy sources for climate resilience community.

Water: Water is critical sector and underpins much of the Tanzanian economy. It supports the agriculture sector and an input into industrial production. Climate variability and change has adverse impacts on the quality and quantity of water across the country. Climate services are important in planning effective and sustainable water resources management to achieve sustainable development.

1.3 Stakeholder Analysis

Provision of climate services requires partnership, collaboration and corporation among and between stakeholders from various sectors. In this section key partners and stakeholders that are directly or indirectly involved in the implementation of concrete activities of the NFCS are identified and their roles are highlighted in Annex 1. These stakeholders have important roles to play in enhancing access and use of climate services to reduce risks associated with climate and weather hazards.

Stakeholders are also critical for facilitating the delivery of weather, climate related products and services. These partners include: policy and decision makers; MDAs; research, higher learning and other training institutions; media; private sector; Civil Societies Organizations (CSOs); and development partners such as international, multilateral and United Nations agencies.

Development partners are essential in resource mobilization as well as enhancing cooperation with national and international stakeholders to enable adequate delivery of climate services; and enhancing stakeholders' engagement especially policy makers for sustainable implementation of the framework.

1.4 Vision

To enable better management of risks and utilize opportunities of climate variability and change through development and application of climate services in planning and implementation at all levels.

1.5 Mission

To strengthen efficiency and effectiveness in provision and application of climate services thereby contribute to socio-economic development.

1.6 Expected outcome

The expected outcome of the NFCS is to strengthen the institutional capacity in provision of improved climate services and promote its application to climate sensitive sectors for managing climate risk to build community resilience to the impacts of climate variability and change.

1.7 Objectives

The overall objective of the NFCS is to enhance socio economic development through provision of science-based climate services and promote its use for climate risk managements and adaptation to the impacts of climate variability and change.

The specific objectives of the NFCS are to:

i. Enhance understanding of climate risks and vulnerability associated with climate-related hazards

ii. Enhance capacity in observations and monitoring of climate systems

iii. Improve provision of climate services at the national and local levels

iv. Mainstream climate information in development planning and decision making

v. Enhance the capacity in developing, packaging and communicating weather and climate information

vi. Enhance the capacity of users in understanding and application of climate services

vii. Enhance climate related research, modelling and prediction of weather and climate

1.8 NFCS Pillars

This framework is guided by five pillars, which are in line with those in the Global Framework for Climate Services. These are:

1.8.1 Observation and Monitoring

Effective climate services require historical and real-time climate observations well distributed in spatial and temporal scales. This ensures integration of climate information and other socio-economic data to meet the needs of climate services for minimizations of losses due to climate variability and change as well as managing natural and human system effectively.

1.8.2 Capacity Building

Capacity Building focuses on both provider and user of climate services. This includes strengthening institutional capacity in the production and delivery of climate services for improving health and nutrition, food security, water resource management, agriculture, livestock, disaster risk reduction and other climate sensitive sectors. It also enhances the capacity of users to demand, understand and effectively utilize climate services.

1.8.3 User Interface

User interface provides a structured means for users, climate researchers and climate service providers to interact, thereby maximizing access and utilization of climate services. A well-developed user interface will enhance effectiveness in use of climate services thus significantly contribute to climate informed planning and decision-making.

1.8.4 Research, Modelling and Prediction

Research, modelling and prediction are important in developing, packaging and appropriate use of climate services. Effective implementation of the NFCS will be supported by further research, modelling and improved climate prediction for sustainable socio-economic development. This framework will build on the existing technology, achievement made in scientific prediction and modelling. It will also strengthen research to assess and promote the needs of climate services through collaborations with other institutions to better improve on existing research gaps and needs.

1.8.5 Climate Information System

Climate Information System is an important factor for operationalization of the NFCS. It provides mechanisms through which climate data is routinely collected, quality controlled, archived and processed to generate and deliver climate information and products through operational mechanisms, technical standards, communication and authentication.

1.9 Linkages with other national and international policies, strategies and programmes

This framework has been prepared in response to increasing outcry of climate change impacts and growing needs for enhancing climate change adaptation and long-term resilience through integration of climate services across sectors.

That being the case, the framework is linked to international agreements and frameworks, national policies, strategies, plans and other climate related legal and policy decisions. Some of these are the UN Framework Convention on Climate Change (UNFCCC); the WMO Convention, the Paris Agreement; Sendai Framework for Disaster Risk Reduction 2015 -2030; the National Climate Change Strategy of 2012; Intended Nationally Determined Contribution for Tanzania (INDC); National Five Year Development Plan 2016/2017 – 2020/2021; National Agriculture Policy of 2013; National

Livestock Policy of 2006; National Disaster Management Policy of 2004; Agriculture Climate Resilience Plan 2014–2019; the Water Resources Management Strategic Interventions and Action Plan for Climate Change Adaptation in Tanzania.

While the UNFCCC highlights information sharing, including on systematic observations, as one of the commitment by parties to the Convention in Article Four, Article Five of the Convention outlines clearly the role of systematic observation in supporting adaptation at all levels. The Convention stresses the need to strategically collaborate at all levels to make sure that climate services are available to enhance adaptive capacity across sectors and levels. The WMO Convention facilitates worldwide cooperation in the establishment of observation networks and promotes the establishment and maintenance of systems for the efficient exchange of climate information between countries. In addition, the Paris Agreement clearly and categorically elaborates the need to strengthen scientific knowledge on climate, including research, systematic observation of the climate system and early warning systems, in a manner that informs climate services and supports decision-making.

Likewise, the Paris Agreement recognizes the importance of addressing issues of loss and damage as a result of climate change impacts such as extreme weather events and slow onset events. Hence the need for generation, packaging, provision and access as well as appropriate use of climate services being at the cornerstone of implementing this Agreement.

As a contribution to the Paris Agreement, the Tanzania INDCs on the other hand outlines the desire of the country to embark on a climate resilient development pathway through *inter alia*, using the adaptation contributions to reduce climate related disasters from 70% to 50%, and significantly reduce the impacts of spatial and temporal variability of declining rainfall, frequent droughts and floods which have long term implications to all productive

sectors and ecosystems, particularly the agricultural sector. This cannot be made possible without generation, provision and access as well as appropriate use of climate services. It is from this understanding that the National Climate Change Strategy vows to strengthen weather forecast information sharing across sectors and levels to support climate change adaption and resilience of sectors as well as the economy.

The National Agriculture Policy of 2013 recognizes that the sector has multiple risks, which threaten farmers' livelihoods and incomes and thus undermining the viability of the agricultural sector and its potential to reduce poverty. One of the major risks is increased frequence of extreme events which limit production of crops hence the need to strengthen early warning systems for provision of timely warning signals on climatic variability and change. To translate this into actionable interventions, the Agriculture and Climate Change Resilience Plan 2014-2019 recognizes the need to strengthen knowledge and systems to better target climate action, including climate related knowledge generation, sharing and use to support adaptation and enhance resilience in the agriculture sector.

These are in line with the National Five Year Development Plan that calls for intervention on mitigation and adaptation to climate change through various measures including information collection and dissemination of early warning. The Sendai framework also give emphasis on the need to increase availability and access to multi-hazard early warning systems and disaster risk information to ensure communities are resilience to hazard impacts. The National Disaster Management Policy requires for provision of accurate and timely warning information for communities to better plan and implement development programs.

Thus, the implementation of the NFCS is indeed a translation of a number of policies, decisions, legal agreements, plans, programmes and strategies all

of which aim to support adaptation and resilience across sectors, ecosystems, livelihoods as well as the economy. Timely provision of accurate, access and appropriate use of climate information and services is thus a key aspect in enhancing adaptive capacity and resilience across sectors, ecosystems and the economy at large.

1.10 Methodology

Preparation of the NFCS involved four key steps. The process commenced with undertaking studies and assessments in 2016. The studies and assessments were undertaken as part of implementation of the GFCS programme as well as other research activities conducted in Tanzania. The next step was to present the idea to TADMAC which, under its capacity as the Steering Committee of GFCS implementation in Tanzania, formed a team of experts with its Terms of Reference for the preparation of the framework. This team constituted Prime Minister's Office – Disaster Management Department (PMO-DMD), Ministry of Agriculture, TMA and the University of Dar es Salaam Institute of Resource Assessment-Centre for Climate Change Studies.

The third step was to subject the draft framework to stakeholders at all levels for consultations to ensure their interests are taken into account. Some of the consultations included the Project Delivery Team which oversees implementation of GFCS activities at a technical level in Tanzania, the TADMAC, Tanzania Meteorological Society (TMS) as well as consultation workshops at national and district level in Kiteto and Longido. Some of the events during consultation workshops are shown on *Annex 4*. Furthermore, a number of written comments were received from MDAs, academic institutions, UN agencies, international organizations and Non-Governmental Organizations (NGOs).

Lastly a team of experts coordinated by TMA finalized the framework by incorporating all relevant comments from various institutions, experts, stakeholders' workshops as well as reviews from the literature. This framework can be reviewed regularly when the need arises.

CHAPTER 2

Due to increased impacts of climate variability and change, the demand for timely and quality weather and climate information has increased. Yet, there are several challenges in efforts to enhance quality and efficiency in provision of such services to various socio-economic sectors.

2.0 CAPACITY NEEDS ASSESSMENT FOR CLIMATE SERVICES

TMA is the institution mandated for provision of climate services in Tanzania. However, there is a range of other institutions both at national and local level that have a stake in observation, generation and application of weather and climate information. This section analyses the existing capacity and gaps, particularly in terms of infrastructure and human resources, which need to be addressed in attaining effective climate services provision in Tanzania.

2.1 Gaps and needs

The major challenges facing effective provision and utilization of climate services include inadequate meteorological infrastructure, inadequate communication facilities with other stakeholders, human resource development and inadequate facilities in weather and climate forecasting. These challenges are aggravated by the increasing running cost of operational activities and inadequate government budgetary allocations. The details on the gaps and needs are as follows:

2.1.1 Inadequate meteorological infrastructure

Tanzania has unique and diverse climatic characteristics ranging from tropical

to arid and semi- arid low lands. However, the current observation network is not sufficient enough to capture all climatic regimes and local climate. Also, lack of sufficient data due to low density of station network affects research on climate monitoring, attribution and detection. Moreover, TMA need calibration units for meteorological instrument. These units are vital to ensure accuracy of meteorological data and information. In order to fill the gap in meteorological infrastructure, more weather observation stations are required as indicated in Table 1.

Table 1: Present and required meteorological observation stations network

Description	Number of stations			
	Current	Operational	Needed	Shortage
Conversional Surface synoptic stations	29	29	32	3
AWS Surface synoptic stations	49	49	113	64
Agro-meteorological Stations	15	15	20	5
Ordinary climate stations	150	60	250	100
Rainfall stations	2056	500	-	-
Automatic rainfall stations	0	0	2500	2500
Marine weather station	0	0	12	12
Upper air stations	1	1	4	3
Pilot Balloon	1	0	5	5
Weather radar	2	1	7	5
Lightning	0	0	10	10
Orbiting satellite receiver	0	0	1	1

2.1.2 Inadequate communication facilities with other stakeholders

In order to fulfil the national and international obligations in the rapid exchange of meteorological data and products, TMA need to enhance communication facilities. The main challenge is outdated telecommunication systems. Others are lack of automatic linkages between national observing network and national communication centre at TMA. Also, there is lack of automatic linkages between TMA and specific climate information

users including disaster management institutions, farmers, media and local community at large.

2.1.3 Inadequate facilities in weather forecasting

Forecasting operations require high investments in equipment and technology. Lack of Central Forecasting building hinders investments and installations of various communication facilities due to conditions set by owners. TMA is equipped with ground satellite receiver called RETIM, which receives information from geostationary satellite. However, in order to improve efficiency and accuracy in weather forecast, TMA need to acquire receiver from polar orbiting satellites for obtaining high resolution information, adequate internet bandwidth and computing facilities for Numerical Weather Prediction. Moreover, the TMA weather studio needs to be revamped since it lacks important modern facilities.

2.1.4 Human resource development

Having the right expertise across all sections of TMA is important for the fulfilment of the agency's functions. However, adequacy of well-trained and competent experts required for effective climate services is another challenge that will need to be addressed in the course of implementation of the NFCS.

CHAPTER 3

This section sets up a plan of action to address needs and gaps stipulated in section 2 by identifying priority actions for enhancing climate services. The section highlights expected outputs, timeframe, key actors and indicators for tracking progress.

3.0 ACTION PLAN FOR PROVISION AND UTILISATION OF CLIMATE SERVICES

The implementation approach takes into account the roles of various institutions in the production, provision and application of weather and climate services in Tanzania. The time frame for implementation of NFCS is categorized into three phases as short term (0-2 years), medium term (2-5 years) and long term (5 years and above).

The actions and interventions to address the needs and gaps are enhancing understanding of climate-related hazards, vulnerability and risks; enhancing capacity in observations and monitoring of climate systems; improving provision of user tailored weather and climate services at the national and local levels; integrating climate information in development planning and decision making; enhancing the capacity in developing, packaging and communicating weather and climate information; enhancing the capacity of users in understanding and application of weather and climate services; enhancing climate related research, modelling and prediction of weather and climate.

The objectives, priority actions, expected output, timeframe, key actors and indicators are stipulated in Table 2. The estimated budget for implementation of NFCS activities is $ 30,000,000. Budget estimates for each activity is shown on annex 2.

Table 2: Action plan for provision and utilisation of climate services in Tanzania

Objectives	Priority Actions	Expected Outputs	Indicators	Time-frame	Implementers
• Enhance capacity in observations and monitoring of climate systems	1.1 Establish weather stations and enhance observation network	Weather stations established and observation network enhanced	Number of weather stations established	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	1.2 Improve database of existing weather stations	Database of existing weather stations improved	Number of weather stations in the database	Medium term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
• Enhance the capacity in developing, packaging and communicating weather and climate information	2.1 Train TMA technical staff in developing, packaging and communicating weather and climate information	Improved knowledge and skills of technical staff	Number of technical staff trained	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors
	2.2 Procure equipment and software for preparation and processing of weather and climate information	Improved process for preparation of weather and climate information	Number of equipment and software procured	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors

Objectives	Priority Actions	Expected Outputs	Indicators	Time-frame	Implementers
	2.3 Train intermediaries in communicating and disseminating weather and climate information	Improved knowledge and skills for intermediaries	Number of intermediaries trained	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	2.4 Conduct advocacy and awareness creation to stakeholders	Improved understanding of climate services to stakeholders	Number of stakeholders reached	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities, Media.
	2.5 Upgrade ICT packages for communicating weather and climate information	Improved accessibility of weather and climate information	Number of ICT packages upgraded	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities, Media.
	2.6 Identify channels for communicating weather and climate information	Improved dissemination of weather and climate information	Number of communication channels identified	Short term	TMA, MDAs, LGAs, Research, organizations, Higher Learning institutions, DPs, Non-State actors, Communities, Media.
• Enhance understanding of climate-related hazards, vulnerability and risks	3.1 Conduct training to personnel at national and local levels on climate related hazards and risks	Improved understanding of climate related hazards and risks	Number of personnel trained on climate hazards and risks	Medium term	TMA,WMO, PMO-DMD, MALF, VPO, PO-RALG

Objectives	Priority Actions	Expected Outputs	Indicators	Time-frame	Implementers
	3.2 Conduct advocacy and awareness creation to stakeholders	Improved understanding of climate services to stakeholders	Number of stakeholders reached	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities, Media.
	3.3 Mapping of climate related hazards	Reduced impact to climate related hazards	Map of climate related hazards	Short term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors
• Improve provision of and climate services at the national and local levels	4.1 Identify user needs of climate services at national and local levels	Improved understanding of end user needs for climate services	Number of products identified	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities.
	4.2 Train TMA technical staff at national and local level to produce tailor made products	Improved knowledge and skills to TMA technical staff	Number of trained TMA staff	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	4.3 Preparation of tailor made products	Improved quality of climate services	Number of tailor made products prepared	Medium term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.

Objectives	Priority Actions	Expected Outputs	Indicators	Time-frame	Implementers
• Enhance the capacity of users in understanding and application of weather and climate information	5.1 Conduct assessment of socio- economic benefit of climate information.	Improved understanding and application of climate information	Number of stakeholders assessed	Short term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities
	5.2 Train intermediaries at national and local level to produce tailor made products	Improved knowledge of intermediaries in production of tailor made products	Number of intermediaries trained	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities
	5.3 Conduct advocacy and awareness creation to stakeholders	Improved understanding and application of climate services to stakeholders	Number of stakeholders reached	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors, Communities, Media.
• Enhance climate related research, modelling and prediction of weather and climate	6.1 Develop and improve weather and climate prediction models	Improved weather and climate prediction models	Number of models developed or improved	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	6.2 Train TMA experts in Numerical Weather Prediction and climate prediction	Improved knowledge and skills of TMA staffs	Number of staff trained	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	6.3 Establish satellite receiving centers	Satellite receiving centres established	Number of satellite receiving centres established	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.

Objectives	Priority Actions	Expected Outputs	Indicators	Time-frame	Implementers
	6.4 Procurement of hardware for weather and climate modelling	Improved climate and numerical weather prediction	Number of hardware procured	Short term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	6.5 Carry out climate related research	Improved production of weather and climate information	Number of research reports and publications	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
• Integrating climate information in development planning and decision making	7.1 Conduct awareness/advocacy to planers and decision makers at national and district level on integration of climate information in development planning	Improved understanding and integration of climate information to planners and decision makers created	Number of Planners and decision makers reached	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.
	7.2 Conduct awareness raising to secondary school students on adaptation and mitigation of climate change impacts in socio-economic activities	Improved understanding on adaptation and mitigation of climate change	Number of schools reached	Long term	TMA, MDAs, LGAs, Research organizations, Higher Learning institutions, DPs, Non-State actors.

This section sets up a plan of action to address needs and gaps stipulated in section 2 by identifying priority actions for enhancing climate services. The section highlights expected outputs, timeframe, key actors and indicators for tracking progress.

4.0 IMPLEMENTATION, RISKS AND ASSUMPTIONS

The provision of climate services for decision-making involves generation, provision, and contextualization of information, knowledge and research findings for decision making at all levels. This requires collaboration of different stakeholders across local, national, regional, and international level in achieving socio-economic value.

The government and organizations work through collaborative mechanisms established at global, regional and national level in the implementation of various activities in provision of climate services. The National Framework for Climate Services provides a mechanism for collaboration in provision of climate services. The framework also draws partners from various key sectors in ensuring the objectives and outcomes are achieved. To ensure this and from best practice and different corporate governance codes; risk management and internal controls are critical elements of good governance in partner organisations.

This section provides information on risks and assumptions for the implementation of NFCS. It also provides summary of the risk identified and suggest suitable and applicable mitigation measures.

Table 3: Narrated summary of NFCS implementation risks and proposed mitigation measures

S/ No.	Program objectives	Risks	Consequences (if the risk is not treated/ controlled)	Mitigation
1	Enhance capacity in observations and monitoring of climate systems	Vandalism	Destruction of observational stations	• Locate the observation stations in secured areas • Deploy security mechanism
		Budgetary constraints	Failure to achieve the desired objective	Secure reliable funding sources
		Management commitment	Failure to achieve the desired objective	Prioritise the programme in management activities
2	Enhance understanding of climate-related hazards, vulnerability and risks	Misconception of the training lessons	Failure to understand the training lessons	Avoid complexity in training lessons
		Unwillingness of the public to understand climate vulnerability and risks	Failure to comprehend the concept of climate vulnerability and risks	Enhance public awareness and accountability
		Use of difficulty or uncommon terminologies	Failure to understand the terminologies	Use simple or common terminologies
3	Improve provision of tailored weather and climate services at the national and local levels	Shortage of specialized experts	Delay of provision of climate services	Strengthen institution capacity
		Limited understanding of the importance of weather and climate information	Failure to realize the concept of climate vulnerability and risks	Awareness training
		Weak infrastructure for service delivery	Failure to disseminate weather and climate related information to various levels	Enhance dissemination mechanisms

S/ No.	Program objectives	Risks	Consequences (if the risk is not treated/ controlled)	Mitigation
4	Integrating climate information in development planning and decision making	Inadequacy governance mechanisms	• Inadequate documentation, reporting and accountability requirements. • Un-realization of planned activities	• Communication of the suspected irregularities and the actions taken to decision makers • Adhering to the stipulated procedure and regulations
		Unwillingness of decision makers	Failure to Support implementation of intended activities	Sensitization and advocacy
		Lack of understanding of socio-economic value information used	Planning and decisions vulnerable to the impacts of climate variability and change	
		Weak institutional framework	Failure to support appropriate integration of climate information in development planning and decision making	Enhance governance
5	Enhance the capacity in developing, packaging and communicating weather and climate information	Inadequate funds	Less accessible climate information and tailored for planners	Reliable funding sources
		Reluctance of the management	Failure to identify the best convectional and innovative way for packaging and communicating weather and climate information	Enhance accountability
		Inadequate competent experts	Low quality and less useful weather and climate information	Provision of short and long term training to experts

S/ No.	Program objectives	Risks	Consequences (if the risk is not treated/ controlled)	Mitigation
6	Enhance the capacity of users in understanding and application of weather and climate services	Lack of knowledge and skill	Failure to apply weather and climate predictions in planning	Training and awareness
		Insufficient funding	Failure to build common ground and supplement opportunities for on-going learning among users of climate information	Reliable funding sources
7	Enhance climate related research, modelling and prediction of weather and climate	Inadequate cooperation and collaboration among institutions and interdisciplinary experts	• Failure to cultivate effectiveness, efficiency and cross-cutting Collaborations on climate related research, modelling and prediction of weather and climate • Failure to improve and Innovate Weather and Climate related products and services	Awareness training
		Unreliable climate products and information	• Loss in trust of climate products and information • Loss of institution credibility	Strengthening modelling and prediction

Tanzania Disaster Management Council (TADMAC), which is composed of permanent secretaries from government ministries, heads of early warning institutions and heads of institutions, which provide emergency services, will serve as the steering committee.

5.0 GOVERNANCE MECHANISM FOR NATIONAL FRAMEWORK FOR CLIMATE SERVICES

TMA will provide technical assistance to TADMAC on all matters concerning climate services provision. All matters discussed and agreed by TADMAC will be disseminated to the relevant sectors for actions. TADMAC will ensure political support, implementation and sustainability of the National Framework for Climate Services in the country.

The National Disaster Management Platform will be the major technical forum between providers and users of climate services in Tanzania. The Platform is composed of members from various ministries, departments and agencies (MDAs), LGAs, UN agencies, International and National Development Partners, Academicians, Private sector, religious/faith groups, civil societies and the media. The platform will discuss all major issues on production and use of climate services under NFCS and recommendations will be taken to TADMAC for decision and directives.

TMA as the centre for provision of weather and climate services in the country will serve the same purpose under this framework. In case of climate

services involving specific products between TMA and a given authority, there will be a written Memorandum of Understanding (MoU) for the requested service. Other ministries and institutions will add value in co-production of weather and climate information. The development of this framework has taken into considerations various existing national frameworks, which involve stakeholders from different institutions. The cooperation among these institutions will continue throughout the implementation of this framework. All stakeholders can participate in the implementation of the action plan, align their supports with the strategic pillars and identified needs of key stakeholder as stipulated in Figure1.

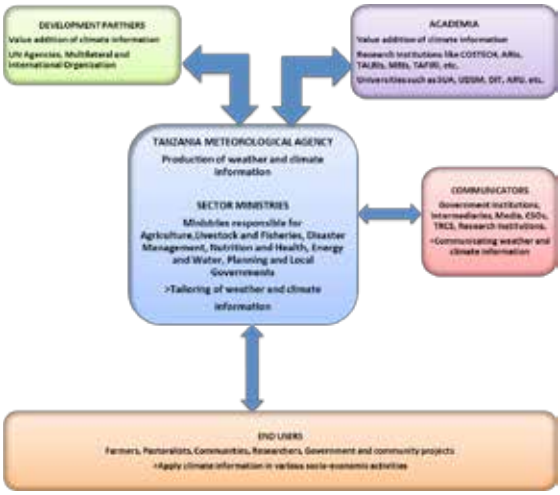

Figure 1: Schematic representation of the key actors in the development, dissemination and utilization of climate services in Tanzania

This section is about the policies and laws that will govern the implementation of the NFCS. The implementation of this framework will be governed primarily by the Meteorological Act No. 6 of 1978, which mandates the operations of TMA. Other laws in addition to the Meteorological Act include Disaster Management Act No.7 of 2015, Tanzania Civil Aviation Act No. 10 of 2003, Environmental Act No. 20 of 2004 and other legislations in different government institutions that deal with some meteorological aspects.

6.0 POLICY AND LEGAL FRAMEWORK

In addition to these Act, there are policies, which establish the basis for implementation of the NFCS by TMA as well as other partners in collaborations with other stakeholders. In that regard, the implementation will also involve stakeholders from various levels and thematic areas.

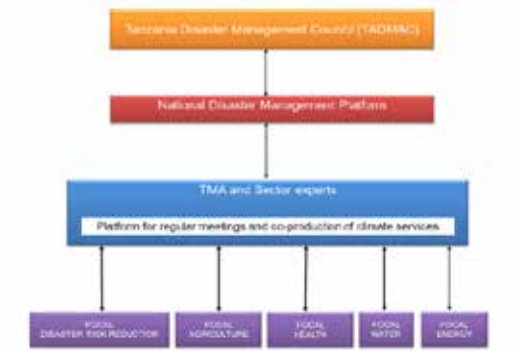

Figure 2: Governance mechanism for implementation of the NFCS

Some of the policies that will govern the implementation include National Disaster Management Policy (2004), National Transport Policy (2003), National Information and Communications Technologies Policy (2003), National Science and Technology Policy (1996), National Environmental Policy (1997) and National Agriculture Policy (2013).

Availability of resources is important for the implementation of this framework. The government has over years been providing budgetary support to TMA and other responsible institutions to ensure provision of climate services. The funds for the implementation of this framework are expected to come from government budget, private sector, as well as individual contributions.

7.0 FINANCING IMPLEMENTATION OF NATIONAL FRAMEWORK FOR CLIMATE SERVICES

7.1 Financing Plan

However, financial, technological as well as technical support from the international community will be necessary to ensure effective implementation of the framework in enhancing Tanzania's adaptive capacity to the impacts of climate change. This is within the context of climate change agreement, particularly the UNFCCC as well as the Paris Agreement. The sources of funding from international community will be as follows:

7.2 Multilateral Agreement Funds

These include funds, which were established under UNFCCC and Kyoto Protocol to facilitate implementation of climate change activities. These include Least Developed Countries Fund (LDCF), Special Climate Change Fund (SCCF), Green Climate Fund (GCF) and Adaptation Fund.

7.2.1 Least Developed Countries Fund (LDCF)

The LDCF addresses special needs of the Least Developed Countries (LDCs) under the climate change convention. Specifically, the LDCF was tasked with financing the preparation and implementation of National Adaptation Programme of Actions (NAPAs). Consistent with the funding of the NAPAs,

the LDCF focuses on reducing the vulnerability of those sectors and resources that are central to development and livelihoods, such as water; agriculture and livestock, food security; health and disaster risk reduction.

7.2.2 Special Climate Change Fund (SCCF)

The SCCF supports adaptation and technology transfer in all developing country parties to the UNFCCC. The SCCF supports both long-term and short-term adaptation activities in water resources management; land management; agriculture; health; infrastructure development; fragile ecosystems including mountainous ecosystems; and integrated coastal zone management. Since implementation of the framework may require appropriate technologies, it is possible for national adaptation programmes to include NFCS components which can be funded through the SCCF.

7.2.3 Green Climate Fund (GCF)

This fund was established with an objective of supporting projects, programmes, policies and other activities in developing countries using thematic funding windows. The fund is the window through which a balanced share of multilateral funding for adaptation and mitigation will be channelled. The fund already provides financial support to various projects and programmes and Tanzania is now in the front line to access adequate funds from this well-funded source. It is also important to underscore the fact that the fund supports projects and programmes which aim to achieve a paradigm shift, hence climate services activities of that nature will be important for the funds to be accessed.

7.2.4 Adaptation Fund (AF)

The Adaptation Fund was established by the Parties to the Kyoto Protocol of the UN Framework Convention on Climate Change to finance concrete adaptation projects and programmes in developing countries. The fund is financed with 2% of the Certified Emission Reduction (CER) issued for projects of the Clean Development Mechanism (CDM) and other sources

of funding. Tanzania is eligible to access funding from the AF in provision of climate services to support adaptation in sectors.

7.3 International Funds

Within the umbrella of climate change, there are various international sources of funding including those under the KP, the Convention, multilateral sources as well as bilateral funds. Access to such sources of funding will be a key in implementation of the framework.

7.3.1 The World Bank Funds

The World Bank is an important source of fund for environmental and natural resources management. The support has been either in form of grants where the bank acts as an implementing agency of GEF or in form of lending of its own funds. The funding is both directly to environmental projects and capacity building. Lending for environment in the World Bank falls under the theme of Environment and Natural Resources (ENRM) accounting for about 9% of all the bank's lending. The ENRM theme consists of seven sub-themes: Biodiversity, Climate Change, Environmental Policies and Institutions, Land Administration and Management, Pollution Management and Environmental Health, Water Resources Management, and other environment and natural resources management.

7.3.2 Africa Development Bank (AfDB) Funds

The Africa Development Bank (AfDB) is also becoming an important source of fund for environmental management and protection in particular climate change. The bank houses the Africa Climate Change Fund, which was launched in 2014 and currently, has already supported climate change project in some countries including Kenya, Cape Verde and Swaziland. The bank is a GEF Executing Agency enabling it to appraise and implement projects on its behalf and obtain direct access to GEF resources. Moreover, as part of AfDB commitment to supporting Africa's move toward climate resilience and low carbon development, the bank is expanding access to international climate change financing.

The aim is to blend funding for climate solutions with other MDB, national and private sector development resources, thereby leveraging substantial additional funds. By expanding CIF implementation in Africa, the AfDB hopes to inspire investor confidence in the continent and generate even more financing for clean energy and climate compatible development. The AfDB has also established the Climate for Development in Africa (Climate Development Africa); Special Fund (CDSF); the Africa Water Facility and the Congo Basin Forest Fund. It is also in the process of setting up an African Green Fund (AGF). Thus, the bank is a perfect source of fund to finance implementation of the framework.

7.3.3 Global Environment Facility (GEF)

GEF is an independent financial organization that provides grants to developing countries and countries with economies in transition for projects related to biodiversity, climate change, international waters, land degradation, the ozone layer and persistent organic pollutants. These projects benefit the global environment, linking local, national and global environmental challenges and promoting sustainable livelihoods. The GEF also works on several cross-cutting issues and programs such as Result and Learning; Earth Fund and Public Private Partnerships; Capacity Development; Small Grants Programme; and Country Support Programme. In addition the GEF serves as financial mechanism for Convention on Biological Diversity (CBD); United Nations Framework Convention on Climate Change (UNFCCC); Stockholm Convention on Persistent Organic Pollutants (POPs); and United Nations Convention to Combat Desertification (UNCCD). Although the GEF not linked formally to the Montreal Protocol on substances that deplete the ozone layer, it supports implementation of the protocol in countries with economies in transition.

In undertaking its activities, GEF operates with its agencies that include the United Nations Development Programme (UNDP); United Nations Environment Programme (UNEP); Food and Agricultural Organization of

United Nations (FAO), United Nations Industrial Development Organizations (UNIDO), International Fund for Agricultural Development (IFAD), the African Development Bank (ADB); the European Bank for Reconstruction and Development and the Inter-American Development Bank.

7.4 Bilateral Funds

Bilateral Funds are funds, which are provided in the arrangement between one donor country and a developing country, institution, or NGO. Bilateral funds are mainly channelled through special assistance agencies in donor countries. Additional official assistance is channelled from donor to recipient countries through multilateral organizations and through international NGOs. Some bilateral donors have a regional focus whilst others prefer regional networks for example SADC, EAC, AU etc. Interest of some donors is also confined to specific aspects of climate change.

Over the past years, whole ranges of traditional donor countries have created new funds to support climate change programmes in developing countries. These include governments of Australia, Germany, Japan, Spain, Norway, the UK together with the European Union and USA. These include: -

1. The Environmental Transformation Fund (International Window) of the UK.
2. The International Climate Protection Initiative of Germany.
3. Norwegian International Climate and Forest Initiative.
4. The Global Initiative on Forests and Climate of Australia.
5. The Global Climate Change Alliance of the European Union.

7.5 General Budget Support (GBS)

A key tool in this collaboration is Performance Assessment Framework (PAF), agreed between the government and development partners. The initiative is

financed by 11 bilateral development partners, which include Norway, UK, Japan, Sweden, Denmark, Ireland, Canada, Germany, Finland, Netherlands, and Switzerland together with the European Commission, the World Bank, and the African Development Bank. In this case, GBS is encouraged to support implementation of the framework through establishment of a special climate change window.

7.6 East Africa Climate Change Funds

The East African Community has developed a Climate Change Policy. The community has also established a Climate Change Fund, which is in the process of being capitalized. The objective of the fund is to help the member states to adapt and mitigate climate change. The fund if well capitalized will be one of the important sources of finance for adaptation and mitigation to climate change in the region.

7.7 Individuals and Foundation Funds

Wealthy individuals and foundations have emerged to finance climate change adaptation and mitigation initiatives. Examples of individuals and foundations funding climate change in Tanzania include Clinton Foundation; The Bill and Mellinda Gates Foundation; Open Society Institute; START International; Rockefeller Foundation; WWF; WaterAid and Ford Foundation. These foundations and individuals can provide important source of funds for small communities/individual on climate change adaptation and mitigation projects.

7.8 National Funds

The main national funds are revenue collected by the government through taxes and charges from various investments associated to climate change mitigation. These funds are allocated to various MDAs and local government authorities through their Medium Term Expenditure Framework (MTEF) that will be reflected in their both recurrent and development budgets. Climate change interventions in such MDAs and LGAs can be supported under this arrangement. Other sources of domestic funds include established funds

such as National Environmental Trust Fund, National Climate Change Fund and REDD Funds; Payments for Environmental Services (e.g. Payment for Ecosystem Services-PES); funds obtained through Public Private Partnership and funds from local NGOs. These funds can be drawn for implementation of various planned activities by following arrangements established under such funds.

7.9 Accessing funds and implementation

Development of this framework provides an opportunity and avenue for collaboration among stakeholders at all levels to ensure climate services are accessible to and meet user needs for informed decisions and plans. Hence, implementation of this framework will bring together various local, national, international, governmental, intergovernmental and non- governmental actors. Thus, TMA will undertake the overall coordination to ensure that all activities implemented meet national interests and are within the national policy and legal frameworks.

Other stakeholders are encouraged to take part in implementation of NFCS taking into account their institutional competencies and experiences. Stakeholders, including LGAs will have to identify possible areas for interventions in which they can contribute and participate in implementation through, inter alia, government budget, and support from development partners as well as budgets from relevant institutions.

CHAPTER 8

Availability of resources is important for the implementation of this framework. The government has over years been providing budgetary support to TMA and other responsible institutions to ensure provision of climate services. The funds for the implementation of this framework are expected to come from government budget, private sector, as well as individual contributions.

8.0 MONITORING AND EVALUATION

Monitoring and evaluation of the NFCS is crucial for measuring the indicators of the actions and tracking the progress of implementation. This section explains how the process of monitoring and evaluation will be carried out during the course of implementation of the framework. The processes will follow government procedures together with the GFCS monitoring and evaluation tool. TMA will be the overall coordinator for sector specific activities while other relevant sectors will be responsible for their areas. Monitoring mechanism for implementing activities of the framework will be conducted quarterly. The evaluation mechanism will be carried out biannually. The monitoring and evaluation process will be guided by the institutional arrangement shown in Table 2.

Table 4: Monitoring and Evaluation Mechanisms

9.0 ANNEXES

Annex 1: List of stakeholders in the national chain of climate services

NO.	INSTITUTION
1	**GOVERNMENT INSITUTIONS**
	Vice President Office (VPO)
	Prime Minister's Office Disaster Risk Reduction and Management (PMO-DMD)
	President Office - Regional Administration and Local Government (PO – RALG)
	Tanzania Meteorological Agency (TMA)
	Ministry of Agriculture
	Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDGEC)
	Ministry of Water and Irrigation (MoWI)
	Tanzania Civil Aviation Authority (TCAA)
	Local Government Authorities (LGAs)
	Tanzania Airports Authority (TAA)
	Surface and Marine Transport Regulatory Authority (SUMATRA)
	Tanzania People's Defence Forces
	River Basins
	Tanzania National Roads Development (TANROADS)
	Ministry of Lands, Housing and Human Settlements Development (MoLHHSD)
	Tanzania National Parks Authority (TANAPA)
	National Environment Management Council (NEMC)
2	**ACADEMIA & RESEARCH INSITUTION**

NO.	INSTITUTION
	University of Dar es salaam (UDSM)
	Ardhi University (ARU)
	Sokoine University of Agriculture (SUA)
	Dar es salaam Institute of Technology (DIT)
	Agriculture Research Institutes (ARIs)
	Tanzania Fisheries Research Institute(TAFIRI)
	Tanzania Livestock Research Institute (TALIRIs)
	National Institute for Medical Research (NIMR)
	Ifakara Research Institute (IRI)
3	**COMMUNITY REPRESENTATIVES**
	Farmers associations
	Livestock associations
	Women Groups
	Youth Groups
	Individuals
4	**MEDIA and Communication**
	Community Radios
	TVs and Newspapers
	Telephones and mobiles phones
	Internet
5	**TECHNICAL AND FINANCIAL PARTINERS**
	UN agencies multilateral and International Organizations
	Tanzania Red Cross Societies (TRCS)

Annex 2: Budget estimates

Objectives	Priority Actions	Expected Outputs	Estimated budget (USD)
• Enhance capacity in observations and monitoring of climate systems	1.1 Establish weather stations and enhance observation network	Weather stations established and observation network enhanced	28,555,000
	1.2 Improve database of existing weather stations	Database of existing weather stations improved	10000
• Enhance the capacity in developing, packaging and communicating weather and climate information	2.1 Train TMA technical staff in developing, packaging and communicating weather and climate information	Improved knowledge and skills of technical staff	40,000
	2.2 Procure equipment and software for preparation and processing of weather and climate information	Improved process for preparation of weather and climate information	70,000
	2.3 Train intermediaries in communicating and disseminating weather and climate information	Improved knowledge and skills for intermediaries	50,000
	2.4 Conduct advocacy and awareness creation to stakeholders	Improved understanding of climate services to stakeholders	50,000
	2.5 Upgrade ICT packages for communicating weather and climate information	Improved accessibility of weather and climate information	120,000
	2.6 Identify channels for communicating weather and climate services	Improved dissemination of weather and climate information	5,000
• Enhance understanding of climate-related hazards, vulnerability and risks	3.1 Conduct training to personnel at national and local levels on climate related hazards and risks	Improved understanding of climate related hazards and risks	40,000
	3.2 Conduct advocacy and awareness creation to stakeholders	Improved understanding of climate services to stakeholders	40,000
	3.3 Mapping of climate related hazards	Reduced impact to climate related hazards	30,000
• Improve provision of tailored weather and climate services at the national and local levels	4.1 Identify user needs of climate services at national and local levels	Improved understanding of end user needs for climate services	20,000
	4.2 Train TMA technical staff at national and local level to produce tailor made products	Improved knowledge and skills to TMA technical staff	40,000
	4.3 Preparation of tailor made products	Improved quality of climate services	30,000

Objectives	Priority Actions	Expected Outputs	Estimated budget (USD)
• Enhance the capacity of users in understanding and application of weather and climate services	5.1 Conduct assessment of socio-economic benefit of climate services.	Improved understanding and application of climate information	40,000
	5.2 Train intermediaries at national and local level to produce tailor made products	Improved knowledge of intermediaries in production of tailor made products	50,000
	5.3 Conduct advocacy and awareness creation to stakeholders	Improved understanding and application of climate services to stakeholders	30,000
• Enhance climate related research, modelling and prediction of weather and climate	6.1 Develop and improve weather and climate prediction models	Improved weather and Climate Prediction Models	150,000
	6.2 Train TMA experts in Numerical Weather Prediction and climate prediction	Improved knowledge and skills of TMA staffs	100,000
	6.3 Establish satellite receiving centres	Satellite receiving centres established	80,000
	6.4 Procurement of hardware for weather and climate modelling	Improved climate and numerical weather prediction	150,000
	6.5 Carry out climate related research	Improved production of weather and climate information	200,000
• Integrating climate information in development planning and decision making	7.1 Conduct awareness/advocacy to planers and decision makers at national and district level on integration of climate information in development planning	Improved understanding and integration of climate information to planners and decision makers created	50,000
	7.2 Conduct awareness raising to secondary school students on adaptation and mitigation of climate change impacts in socio-economic activities	Improved understanding on adaptation and mitigation of climate change	50000
Grand total (USD)			**30,000,000**

Annex 3: Monitoring and evaluation indicators

Objectives	Priority Actions	Expected Outputs	Indicators
• Enhance capacity in observations and monitoring of climate systems	1.1 Establish weather stations and enhance observation network	Weather stations established and observation network enhanced	Number of weather stations established
	1.2 Improve database of existing weather stations	Database of existing weather stations improved	Number of weather stations in the database
• Enhance the capacity in developing, packaging and communicating weather and climate information	2.1 Train TMA technical staff in developing, packaging and communicating weather and climate information	Improved knowledge and skills of technical staff	Number of technical staffs trained
	2.2 Procure equipment and software for preparation and processing of weather and climate information	Improved process for preparation of weather and climate information	Number of equipment and software procured
	2.3 Train intermediaries in communicating and disseminating weather and climate information	Improved knowledge and skills for intermediaries	Number of intermediaries trained
	2.4 Conduct advocacy and awareness creation to stakeholders	Improved understanding of climate services to stakeholders	Number of stakeholders reached
	2.5 Upgrade ICT packages for communicating weather and climate information	Improved accessibility of weather and climate information	Number of ICT packages upgraded
	2.6 Identify channels for communicating weather and climate services	Improved dissemination of weather and climate information	Number of communication channels identified

• Enhance understanding of climate-related hazards, vulnerability and risks	3.1 Conduct training to personnel at national and sub-national levels on climate risks and vulnerability	Improved understanding of climate related hazards and risks	Number of personnel trained on climate risks and vulnerability
	3.2 Conduct advocacy and awareness creation to stakeholders	Improved understanding of climate services to stakeholders	Number of stakeholders reached
	3.3 Mapping of climate related hazards	Reduced impacts to climate related hazards	Map of climate related hazards
• Improve provision of tailored weather and climate services at the national and local levels	4.1 Identify user needs of climate services at national and local levels	Improved understanding of end user needs for climate services	Number and types of user needs identified
	4.2 Train TMA technical staff at national and local level to produce tailor made products	Improved knowledge and skills to TMA technical staff	Number of trained TMA staff in production of tailor made products
	4.3 Preparation of tailor made products	Improved quality of climate services	Number of tailor made products prepared
• Enhance the capacity of users in understanding and application of weather and climate services	5.1 Conduct assessment of socio- economic benefit of climate services.	Improved understanding and application of climate information	Number of stakeholders assessed
	5.2 Train intermediaries at national and local level to produce tailor made products	Improved knowledge of intermediaries in production of tailor made products	Number of intermediaries trained
	5.3 Conduct advocacy and awareness creation to stakeholders	Improved understanding and application of climate services to stakeholders	Number of stakeholders reached

• Enhance climate related research, modelling and prediction of weather and climate	6.1 Develop and improve weather and climate prediction models	Improved weather and climate prediction model	Number of developed or improved models
	6.2 Train TMA experts in Numerical Weather Prediction and climate prediction	Improved knowledge and skills of TMA staff	Number of trainees
	6.3 Establish satellite receiving centres	Satellite receiving centres established	Number of satellite receiving centres established
	1.4 Procurement of hardware for weather and climate modelling	Improved climate and numerical weather prediction	Number of hardware procured
	6.5 Carry out climate related research	Improved production of weather and climate information	Number of research reports and publications
• Integrating climate information in development planning and decision making	7.1Conduct awareness/advocacy to planers and decision makers at national and district level on integration of climate information in development planning	Improved understanding and integration of climate information to planners and decision makers created	Number of institutions reached
	7.2 Conduct awareness raising to secondary school students on adaptation and mitigation of climate change impacts in socio-economic activities	Improved understanding on adaptation and mitigation of climate change	Number of schools reached in awareness raising on adaptation and mitigation of climate change impacts

Annex 4: Events during stakeholders' consultation workshops on the NFCS at National and District level

Plate 1: NFCS workshop participants posing for a group photo during the National stakeholders' consultation workshop, Dar-es-Salaam on 10thJanuary, 2017

Plate 2: NFCS workshop participants posing for a group photo during the District level stakeholders' consultation workshop in Kiteto district on 23rd February, 2017

Plate 3: TMA Director of Research and Applied Meteorology, Dr. Ladislaus Chang'a giving remarks from TMA during the NFCS District level stakeholders' consultation workshop in Longido district on 21st February, 2017

Plate 4: Ms. Mecklina Merchades, a GFCS desk Officer at TMA making a presentation on the NFCS during NFCS consultation workshop to the Tanzania Meteorological Society (TMS) on 16th December, 2016 in Dar es Salaam