

UNITED REPUBLIC OF TANZANIA



VICE PRESIDENT'S OFFICE

NATIONAL CLIMATE CHANGE RESPONSE STRATEGY 2021-2026

2021



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2021

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PREFACE

Review of the implementation of the previous National Climate Change Strategy (NCCS) 2012-2018, revealed some achievements as well as failures. However, there are still growing concerns of the negative impacts of climate change and variability on the country's social, economic, ecological, and physical environment. Recent climate study findings adopted global agreements, policies and agenda at national, regional and global levels present significant evidence on the concerns.

Having recently achieved lower middle-income status, five years ahead of schedule, the National Climate Change Response Strategy (NCCRS) 2021-2026 comes at the right time to guide the national climate change initiatives amid COVID-19 global recovery struggles. Tanzania's efforts towards maintaining lower middle-income or even reaching higher status may be, to a large extent, impeded by anticipated climate related shocks like natural disasters and extreme weather conditions such as abnormal rains and temperatures.

This is attributed to the high reliance of the country's economy on natural resources and its consequent low adaptive capacities. In recent years, the country has witnessed record-breaking amount of rainfalls and temperatures more frequently than before. For example, most of extreme weather events in Tanzania, including record-breaking rainfall, have been observed in the past six years (2015, 2016, 2017, 2018, 2019 and 2020), and this inclination corresponds well with global observation and trends reflected in the reports of Intergovernmental Panel on Climate Change (IPCC).

The adverse effects associated with these extreme weather events affect agricultural production and food security, water resources, marine and coastal zones, public health, energy supply and demand, infrastructure, biodiversity, ecosystem services, and tourism. Therefore, existing climate vulnerability and future climate change adverse impacts are likely to curtail Tanzania's efforts from achieving projected economic growth, sustainable development and Vision 2025 goals and poverty reduction targets as well as quick COVID -19 recovery measures.

Moreover, preparation of this Strategy coincided well with the Tanzania Third Five Years National Development Plan (TFYDP III), providing an opportunity of giving higher priority on climate change challenges and concerns in the national development agenda. It also sets precedence for the climate change agenda in the future five-year development plans.

The Strategy guides the country on climate change issues and initiatives for the next five years triggering integration into sector policies and plans, giving guidance for enhancing adaptation and resilience measures as well as harnessing of mitigation opportunities for enhancing economic and development growth.

A consultative process involving key sectors and various stakeholders, under the coordination of the Vice President's Office, has been very pivotal in revising and crafting strategic interventions put forward in this Strategy. Broader consultation ensured that inputs from all sectors and actors are taken into account and no one is left behind in the entire process. Cognizant of great contributions of women to the national economy and their higher

vulnerability to the effects of climate change, gender considerations are mainstreamed into the Strategy to ensure that strong commitments are put in place and stronger actions are taken to address and reduce vulnerability to the shocks and harmful effects of climate change to women and other marginalized groups' (including people with disabilities).

This Strategy provides a set of interventions on adaptation and mitigation, which are expected to strengthen country's resilience to the impacts of climate change and contribute to the global efforts of reducing GHGs emissions. To this end, emerging opportunities such as digital and blue economy initiatives, low emissions development pathways as well as climate financing are well prioritized in the Strategy. This will assist national actors (both state and non-state) to put in place climate smart actions in all sectors and programmes necessary for climate resilient and sustainable economic growth.

Through this Strategy, the VPO, with the support from various stakeholders will continue to work and guide other actors to adequately integrate climate change adaptation and mitigation strategies, in strengthening long term climate change actions to achieve the national development agenda. In view of this, the Government of United Republic of Tanzania is committed to effectively implement interventions put forward in this Strategy and calls upon all stakeholders and development partners to provide necessary support and cooperation to ensure achievement of the goals and objectives of this Strategy.



Hon. Selemani S. Jafo (MP)

Minister of State, Vice President's Office

ACKNOWLEDGEMENTS

The National Climate Change Response Strategy (NCCRS) 2021-2026 has been prepared in the wake of growing concerns of the negative impacts of climate change and climate variability on the country's social, economic and physical environment. The preparation and completion of this undertaking could not be possible without cooperation, commitment and hard work of many stakeholders and experts from public and private sectors, as well as civil society organizations. I would like to take this opportunity to acknowledge their contribution and efforts. It is not possible to enumerate all people and institutions whose financial and technical supports were valuable in developing this Strategy.

On a special note, I would like to register my sincere thanks to the team of experts from Vice President's Office who professionally initiated and sustained the efforts and momentum by undertaking a stocktaking exercise of the previous National Climate Change Strategy (2012-2018) that informed preparation and finalization of this Strategy.

However, deep appreciation and indebtedness is being expressed particularly to all experts from the ministries, departments and agencies (MDAs), local government authorities (LGAs), research and academic institutions, development partners, civil society organizations and other institutions for their active participation and contribution in the development of this Strategy. Their proactive commitments to contribute in different ways during stocktaking exercise, stakeholders' consultations and building a national consensus in line with national interests towards addressing challenges of climate change is highly appreciated.

Moreover, I would to extend my special thanks to partner institutions especially UONGOZI Institute (Institute of African Leadership for Sustainable Development), United Nations Development Programme (UNDP), Civil society's organisations especially Climate Action Network Tanzania (CANTZ), Care International Tanzania Tanzania, Friedrich-Ebert-Stiftung (FES) and others for their technical and financial support that enabled the Government to prepare this Strategy.



Ms. Mary Ngelela Maganga

Permanent Secretary, Vice President's Office

EXECUTIVE SUMMARY

The National Climate Change Response Strategy (NCCRS) has been revised based on the number of factors, including the planning period of the National Climate Change Strategy (NCCS) that ended in 2018 and other key developments at national, regional and international levels in the context of environment and climate change. Landmark developments include adoption of the Paris Agreement in 2015 by the United Nations Framework Convention on Climate Change that is geared towards enhancing the implementation of the Convention. The Paris Agreement aims to strengthen the global response to the threat of climate change, in the context of sustainable development goals and efforts to eradicate poverty, including limiting the global warming to well below 2⁰ Celsius above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5⁰C above pre-industrial periods, recognizing that this would significantly reduce the risks and impacts of climate change.

Similarly, in September 2015, the United Nations adopted the United Nations Agenda 2030 for Sustainable Development Goals (SDGs) with 17 global goals, one of which being dedicated entirely to climate action (SDG 13) but with all other goals closely related to climate change in one way or the other. Other major global issues that emerged during the implementation of the National Climate Change Strategy (2012) include: operationalization of the Green Climate Fund (GCF) in 2015; adoption of Sendai Framework on Disaster Risks Reduction 2015 – 2030; issuance of three special reports by the Intergovernmental Panel on Climate Change (IPCC) (i.e., Special Report on impacts of global warming of 1.5⁰C (2018); Special Report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (2019); and Special Report on the Ocean and Cryosphere in a Changing Climate (2019). All these global issues have significant implications on climate action.

Moreover, at regional level, there have been several key policy instruments developed to strengthen regional efforts in addressing climate change challenges while fostering sustainable development objectives. These include SADC (2014) Protocol on Environmental Management for Sustainable Development, which calls for harmonized strategies to address climate change and other environmental issues; The East African Community (EAC) also developed a number of relevant Climate Change frameworks for strengthening regional integration coordination and harmonization of regional climate change responses through strategies, programmes and actions. These include EAC Climate Change Master Plan (2011-2031), Disaster Risk Reduction and Management Strategy, the EAC Fifth Development Strategy (2016/17-2020/21), EAC 2050 Vision and East African Legislative Assembly (EALA) Resolutions on Climate Change, establishment of EAC Climate Change Fund and Lake Victoria Basin (LVB) Climate Change Adaptation Strategy and Action Plan, 2018. Others are the EAC Protocol on Environment and Natural Resources Management (2020), which outlines climate change adaptation and mitigation strategic actions that was formulated and approved by EAC sector council of Ministers.

In addition to the above international and regional developments, Tanzania became a lower middle-income country in July, 2020 and continues to drive the industrialization agenda in line

with the Long-Term Perspective Plan and Vision 2025. All these developments and unfolding may have implications on natural resources demand and subsequent greenhouse gases sources and sinks, and hence need for climate change intervention strategies.

Furthermore, in addition to the key developments elaborated above there have also been some gaps in the implementation of the NCCS 2012, which require improved mechanisms to address them. These gaps include: inadequate awareness and understanding of the risks posed by climate change and variability to general public and decision makers; limited platform for hosting the inventory of resources and data availability; limited national capacity to undertake research to generate climate data and information to fill existing gaps and to conduct regular climate change impacts on; socio-economic and environmental monitoring; inadequate capacity (human resources and infrastructures) and inadequate financial resources in the implementation, monitoring and evaluation of climate change impacts at all levels. It is on this basis that the review of the NCCS was undertaken in order to align with current development processes and emerging national, regional and international issues.

In a sequential series, the preparation of the NCCRS involved: participatory stocktaking exercise, followed by drafting and validation of the draft Strategy document. The stocktaking exercise involved review of the current climate change data and performance of the NCCS (2012). The purposes of stocktaking exercise were to gauge the implementation performance of the preceding Strategy and update trends; assess achievements, gaps, challenges, lessons learned; and consider emerging issues so as to inform the formulation of new Strategy.

Drafting of this Strategy adopted a Multi-stakeholder approach whereby a Task Team was formed by the Permanent Secretary, Vice President's Office. The Task Team commenced drafting of the Strategy based on stocktaking report. A draft revised Strategy was produced and shared with Ministries, Departments and Agencies (MDAs) and other stakeholders including civil society organizations (CSOs) and development partners (DPs).

The draft revised NCCRS was also posted on the VPO website, and key stakeholders were invited to review and submit comments which were incorporated in the draft Strategy document by the Task Team. To ensure quality and widen-up participation of the stakeholders, the draft Strategy was further subjected to further consultations through technical sessions and national stakeholders' workshop that were undertaken to validate and finalize the document ready for publication.

The workshops were attended by participants from Local Government Authorities, (LGA), Ministries, Departments and Agencies (MDAs), Development Partners on Environment, Civil Society Organizations (CSOs) and private sector. Comments obtained from the stakeholders were incorporated into Final Draft Strategy in March 2021.

Based on this process, the overall objective of the NCCRS is therefore to enhance the national resilience to the adverse impacts of climate change and enable the country to pursue low emission development pathways so as to achieve sustainable development.

The specific objectives of the NCCRS are to: -

- i. Enhance mainstreaming of climate change issues into national sector and local government development plans and budgets;
- ii. Facilitate implementation and monitoring of the Tanzania's Nationally Determined Contribution (NDC);
- iii. Align climate change interventions with the national development agenda of industrialized economy;
- iv. Devise and implement strategic adaptation and mitigation measures in line with the national circumstances, requirements of climate change related multilateral environmental agreements, sustainable development goals (SDGs) and related bilateral and regional agreements;
- v. Enhance research, public awareness, education and capacity building on climate change issues;
- vi. Enhance coordination and institutional capacity, including provision of climate services and implementation of the national framework for climate services;
- vii. Facilitate mobilization of sustainable and adequate finance and technologies to support climate change adaptation and mitigation interventions;
- viii. Promote and facilitate transfer of climate-smart technologies to support climate change adaptation and mitigation;
- ix. Promote gender-responsive climate change adaptation and mitigation interventions; and
- x. Promote inclusive engagement of stakeholders, including community, media, civil society organizations and private sector in designing, implementing and monitoring sustainable climate change adaptation and mitigation interventions.

As noted from the objectives above, the Strategy covers adaptation, mitigation and cross-cutting strategies that will enable the United Republic of Tanzania to benefit from the opportunities available to developing countries in their efforts to tackle climate change.

In line with its objectives, this Strategy is divided into five (5) chapters:

Chapter one is for the introduction that covers important background information to the Strategy, country profile, the economy highlighting contribution of some key climate sensitive sectors such as agriculture, industries, energy, and livestock rationale of the Strategy, objectives and process for the review of the National Climate Change Strategy 2012 – 2018.

Chapter two presents the situational analysis that includes policy, legal and institutional framework. It also presents issues on climate change impacts and vulnerabilities as well as cross-cutting issues. The policy, legal, institutional framework describes the existing situation of relevant climate policies, plans, strategies, programmes, legislations and institutional

arrangement for climate change management in Tanzania. MEAs section describes various conventions and agreements which Tanzania is a party, including United Nations Framework Convention on Climate Change, Kyoto Protocol, Paris Agreement and other conventions. The Climate change, impacts and vulnerability section describes climate trends and future scenarios, rainfall anomalies, rainfall projections, temperature projections and sectoral climate change impacts and vulnerabilities in terms of exposure, sensitivity and existing adaptive capacity. Cross-cutting issues describes issues related to capacity building, education and awareness, research, vulnerability assessment, systematic observation and impact monitoring, technology development and transfer, climate financing and gender. In addition, this section sets the baseline information that informed crafting of key intervention

Chapter three presents the required strategic interventions and action plan to address climate change in each respective sector in the area of adaptation and mitigation. The priority adaptation strategies cover sectors of freshwater resources, water sanitation and hygiene, coastal marine environment, forest and beekeeping, wildlife, agriculture, human health, tourism, energy, industry, livestock, fisheries, infrastructure, human settlements and land use. The priority mitigation strategies cover sectors of energy, forest and mangroves, industry, transport, waste management and livestock. The cross-cutting strategies covers capacity building, education and awareness, research, vulnerability assessment, systematic observation and impact monitoring, technology development and transfer, climate financing and gender. In addition, this section presented in tabular form puts forward the sectoral objectives, key intervention, target, indicative budget and proposed responsible institution.

Chapter four presents the implementation arrangements and information on institutional arrangements, coordination mechanism, information and communication arrangement, reporting arrangements, resource mobilization, monitoring and evaluation. The institutional arrangement describes the implementation of climate change adaptation strategies and action plans for sectors and cross-cutting issues in the context of Environmental Management Act (EMA) No. 20 of 2004 and related sector policies, plans, strategies, Programmes and legislations from local to national levels. The coordination mechanism for the implementation of this Strategy will follow the institutional arrangement as provided by EMA, 2004. Information and Communication Arrangement describes the need for involvement of various stakeholders as provided by EMA, 2004 and the National Climate Change Communication Strategy 2012. Reporting arrangements refer to those procedures to be followed in the implementation of this Strategy, which are in accordance to EMA, 2004. Resource Mobilization describe sources of resources both technical financial and technological from various stakeholders both international and domestic sources. The monitoring and evaluation (M&E) section sets a Mid-term review which will be undertaken after two and half years to measure the extent to which the strategic interventions and actions undertaken, focusing on achievements of the objectives, technical approach, and implementation framework towards the desired results. This section also establishes Annual National Climate Change Forum (ANCCF) which is geared towards bringing together a range of different stakeholders and actors (both state and non-state) to share experiences, challenges, solutions and opportunities on addressing climate change.

LIST OF ACRONYMS AND ABBREVIATIONS

ANCCF	Annual National Climate Change Forum
AIM	Africa's Integrated Maritime
ASDP II	Agriculture Sector Development Programme Phase II
AU	African Union
SADC	Southern African Development Community
BAP	Bali Action Plan
BASATA	Baraza la Sanaa Tanzania
BWOs	Basin Water Offices
CANTZ	Climate Action Network Tanzania
CBD	Central Business District
CCCS	Centre for Climate Change Studies
CDM	Clean Development Mechanism
CEDAW	Convention on the Elimination of All Forms of Discrimination Against Women
CPCT	Cleaner Production Centre of Tanzania
COSOTA	Copyright Society of Tanzania
COVID 19	Corona Virus Disease 2019
CRDB	Commercial Rural Development Bank
CSOs	Civil Society Organizations
DMD	Disaster Management Department
DNA	Designated National Authority
DoE	Division of Environment
EAC	East African Community
EALA	East African Legislative Assembly
EBICAM	Ecosystem Based Integrated Area Management Plan
EIA/EA	Environmental Impact Assessment
EMA	Environmental Management Act
EWURA	Energy and Water Utilities Regulatory Authority
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization
FDIs	Foreign Direct Investments
FSDMP	Financial Sector Development Master Plan
FREL	Forest Reference Emission Level
FYDP	National Five-Year Development Plan
GCA	Global Commission on Adaptation
GCAP	Global Call to Action Against Poverty
GCF	Green Climate Fund
GDP	Gross Domestic Product
GEF	Global Environment Facility
GHGs	Green House Gases
HNAP	Heath Sector Adaptation National Adaptation Plan
HEP	Hydroelectric Power

HFO	Heavy Furnace Oil
HWCs	Human Wildlife Conflicts
ICT	Information and Communication Technology
IIDS	Integrated Industrial Development Strategy
ILO	International Labour Organisation
IOD	Indian Ocean Dipole
IPCC	Intergovernmental Panel on Climate Change
IWRM	Integrated Water Resources Management
ITRC	Infrastructure Transitions Research Consortium
LATRA	Land Transport Regulatory Authority
LCFI	Local Climate Finance Initiative
LDCF	Least Developed Countries Fund
LEWS	Livestock Early Warning System
LGAs	Local Governments' Authorities
LPG	Liquefied Petroleum Gas
LSDS	Livestock Sector Development Strategy
LTMA	Lake Tanganyika Management Authority
LTPP	Long Term Perspective Plan
LUKU	Lipa Umeme Kadri Utumiavyo
LULUCF	Land Use, Land Use Change and Forestry
LVB	Lake Victoria Basin
LVBC	Lake Victoria Basin Commission
MDAs	Departments and Agencies
MEAs	Multilateral Environmental Agreements
MER	Monthly Economic Review
MMEs	Micro Manufacturing Enterprises
MNRT	Ministry of Natural Resources and Tourism
MP	Member of Parliament
MPRU	Tanzania Marine Parks and Reserves Unit
MRV	Measuring Reporting and Verification
MUHAS	Muhimbili University of Health and Allied Sciences
NAMAs	Nationally Appropriate Mitigation Actions
NAP	National Adaptation Plan
NAPA	National Adaptation Plans of Action
NBS	National Bureau of Statistics
NARCO	National Ranching Company
NCCS	National Climate Change Strategy
NCCSC	National Climate Change Steering Committee
NCCTC	National Climate Change Technical Committee
NCF	National Climate Change
NCMC	National Carbon Monitoring Centre
NDCs	Nationally Determined Contributions
NEAC	National Environmental Advisory Committee
NEAP	National Environmental Action Plan

NEEC	National Economic Empowerment Council
NEMC	National Environment Management Council
NGOs	Non-Governmental Organizations
NHBA	National Housing and Building Research
NIC	National Investment Centre
NIMR	National Institute for Medical Research
NSGRP	National Strategy for Growth and Reduction of Poverty
NWFPs	Non-Wood Forest Products
PFM	Participatory Forest Management
PO-RALG	President's Office-Regional Administration and Local Government
PPP	Public-Private Partnership
PSMP	Power System Master Plan
R&D	Research and Development
REDD	Reducing Emissions from Deforestation and Forest Degradation
REMEs	Regional Environmental Management Experts
RISDP	Regional Indicative Strategic Development Plan
RSO	Research and Systematic Observation
SADC	Southern African Development Community
SBSTA	Subsidiary Body for Scientific and Technological Advice
SCF	Special Climate Change Fund
SDGs	Sustainable Development Goals
SE4ALL	Sustainable Energy for All
SEIA	Solar Energy Industries Association
SENAPA	Serengeti National Park
SGP	Small Grants Program
SIM	Subscriber Identity Module
SMS	Short Message Service
SSTs	Sea Surface Temperatures
TAFORI	Tanzania Forestry Research Institute
TANESCO	Tanzania National Electricity Supply Company
TANROAD	Tanzania National Roads Authority
TARI	Tanzania Agriculture Research Institute
TARURA	Tanzania Rural and Urban Roads Authority
TAWA	Tanzania Wildlife Authority
TAWIRI	Tanzania Wildlife Research Institute
TAZARA	Tanzania and Zambia Railways Authority
TBA	Tanzania Building Agency
TFS	Tanzania Forest Service
TLMP	Tanzania Livestock Master Plan
TIRDO	Tanzania Industrial Research and Development Organisation
TMA	Tanzania Metrological Agency
TMDA	Tanzania Medicine and Medical Devices Authority
TNBS	Tanzania National Bureau of Statistics
TPA	Tanzania Ports Authority

TRC	Tanzania Railways Corporation
TREEP	Tanzania Rural Electrification Expansion Program
TTB	Tanzania Tourist Board
UN	United Nations
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework to Convention on Climate Change
URT	United Republic of Tanzania
USD	United States Dollars
UWASAs	Urban Water and Sewerage Authorities
VPO	Vice President's Office
WASH	Water, Sanitation and Hygiene
WMA	Wildlife Management Area
WSDP	Water Sector Development Programme

INTRODUCTION

Like other countries globally, Tanzania has been facing several challenges related to climate change that threaten livelihoods of its citizens and socio-economic development at large. In 2012, the country formulated its first National Climate Change Strategy (NCCS) aiming at enhancing technical and institutional capacity of the country to address the impacts of climate change. The NCCS was developed in response to the growing concern of the negative impacts of climate change on the country's social, economic, ecological, and physical environment. The NCCS covered adaptation, mitigation and cross-cutting interventions that focused on enabling Tanzania to tackle challenges emanated from climate change at all fronts.

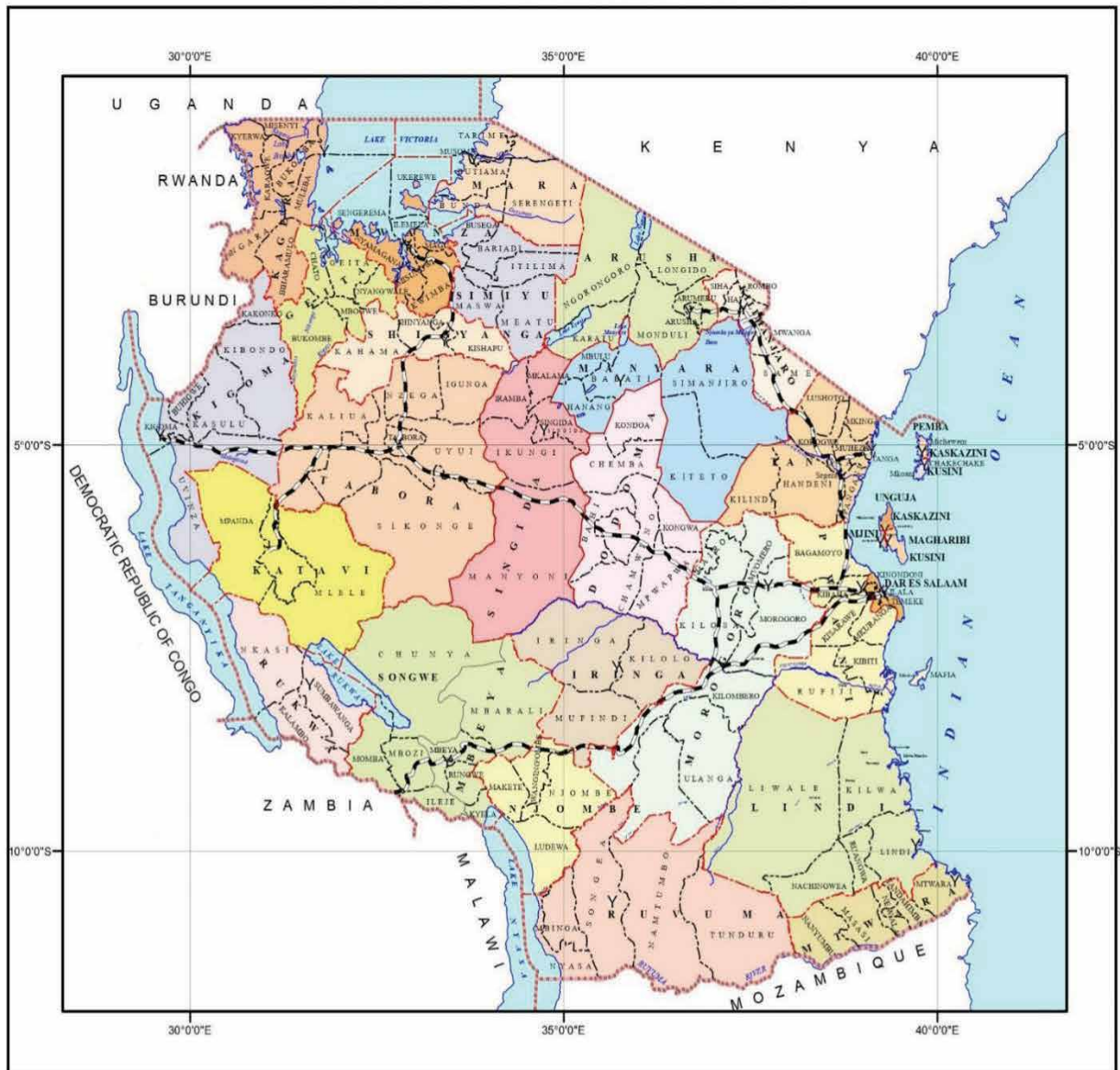
Furthermore, the NCCS underlined the fact that climate may change more rapidly than expected and may unfold to complex, long term consequences for the socio-economic development, environment, and for the production systems. In addition, it underpinned adverse impacts of climate change that are now far reaching and evident in almost all economic sectors in the country and many parts of the world. It further stressed that climate change poses a serious risk to poverty reduction given the fact that environment and natural resources are so interlinked and are valuable assets for the present and future generations. The implementation of the NCCS ended in 2018.

1.2 Country profile

1.2.1 Location and Physiography

The United Republic of Tanzania is located at the East Coast of Africa between latitudes 1° South and 12° South and between longitudes 29° East and 41° East (**Figure 1**). It extends from Lake Tanganyika in the West to the Indian Ocean in the East, Lake Victoria in the North, Lake Nyasa and River Ruvuma in the South. Tanzania shares the borders with Kenya and Uganda to the North, Rwanda, Burundi, Democratic Republic of Congo and Zambia to the West, Malawi and Mozambique to the South. The total area of Tanzania is 945,087 square kilometres, of which the Mainland comprises of 939,702 square kilometres and the islands of Zanzibar, in the Indian Ocean, comprise of 2,654 square kilometres.

Tanzania mainland is dominated by large central plateaus covered with grasslands, plains and rolling hills. The Serengeti Plain is a large geographical area that spans some 30,000 km². The country has some belts of highlands including Mount Meru (4,566 m above mean sea-level), Mount Kilimanjaro (5,895m above mean sea-level)-the highest Mountain in Africa, and other mountain ranges such as Livingstone, Kipengere, Udzungwa, Uluguru, Nguu, Usambara and Pare (URT, 1995).



Compiled & Drawn by Survey & Mapping Division, Ministry of Lands, Housing & Human Settlements Development, Dar es salaam Tanzania 2017. Polyconic Projection 1:8,000,000. Printed by Survey & Mapping Division, Ministry of Lands, Housing & Human Settlements Development, Dar es salaam Tanzania 2017. GOVERNMENT OF THE UNITED REPUBLIC OF TANZANIA

REFERENCE

District Boundary.....	-----	Capital	•
Regional Boundary	-----	Railways.....	—+—+—+—
International Boundary.....	-----	Rivers.....	———

Figure 1: The Map of the United Republic of Tanzania showing Administrative Boundaries. (Source: Survey and Mapping Division, Ministry of Lands, Housing and Human Settlements Development, 2017).

1.2.2 Climate

The United Republic of Tanzania’s topographical diversity gives rise to four distinct climatic zones; namely, the coastal area and immediate hinterland; the central plateau; the semi

temperate highland areas; and the high moist lakes regions. The meteorological seasons are well defined. From December to March, when the northeast monsoon blows, it is hot and comparatively dry. The heavy rains fall in April and May in i) hot and humid coastal belt, which has the warmest temperatures, averaging 27-30°C and receives 750 - 1,250 mm of rainfall annually, with Zanzibar receiving 1,400 - 2,000 mm; ii) hot and arid central plateau, which receives about 500 mm of rainfall; iii) cooler semi-temperate high moist lakes regions in the north and west that receive 750 - 1,250 mm of rainfall annually; and iv) highlands of the northeast and southwest including the coldest parts of the country with average temperatures of 20-23°C (Borhara et al.,2020).

1.2.3 The Economy

The United Republic of Tanzania's economy depends on climate sensitive sectors that have significant contribution on employment and GDP. These sectors include agriculture, mining, tourism, fisheries, construction and transportation. For the past five years the Tanzania's economy has been growing in an average of 7 per cent. In 2019 GDP was maintained at 7.0 per cent and the growth was attributed to continued efforts to strengthen mining sector; improved transportation services; implementation of various development projects including roads, railway, airport, electric power projects, and construction and maintenance of health facilities.

During the period of 2019 mining and quarrying activities recorded the highest growth of 17.7 per cent followed by construction (14.8 per cent), entertainment and recreation (11.2 per cent) and transport and storage (8.7 per cent). The inflation rate continued to remain at a single digit at an average of 3.4 per cent in 2019. The reasons for the overall country's price stability included effective implementation of fiscal and monetary policies; stability in food supply in the domestic markets; and relatively stability of the Tanzania shillings against other currencies (URT, 2018c).

The following are examples of contributions from some few climate sensitive sectors to the national economy: Agriculture (crops) contributes about 14.1 per cent of the national GDP. Food crops production assessment conducted in December 2018 indicated that production was 16,891,974 tons (of which cereals were 9,537,857 tons and non-cereals were 7,354,117 tons) compared to the demand of 13,569,285 tons in 2018, whereby 8,627,273 tons were cereals and 4,942,012 tons were non-cereals (URT, 2018a).

Moreover, industrial manufacturing in Tanzania contributed 7.9 per cent of the national GDP in 2018 (URT, 2018c). Currently, most industrial developments in Tanzania are from either light manufacturing industries or agro-processing plants and mills located mainly in urban centres. Small-scale industries are concentrated in agro-processing for value addition and are scattered throughout the cities, municipalities and district towns.

Furthermore, Livestock contributes about 7.3 per cent of the national GDP. In 2018, the estimated number of cattle was 30.5 million, goats 18.8 million, sheep 5.3 million and pigs 1.9 million. In addition, the number of indigenous chickens was 38.2 million compared to 37.4 million in 2017. In 2018, meat production increased to 679,992 tons from 558,164 tons in

2017; whereas milk production increased to 2.40 billion litres compared to 2.08 billion litres in 2017. In 2018, egg production increased to 3.1 billion from 2.7 billion in 2017. In 2018, a total of 10 million tons of quality seed varieties of animal feeds were produced from Government and private sector farms compared to 3.9 tons in 2017. In 2018, animals worth 2.36 trillion shillings were sold compared to 1.1 trillion shillings from animal sales in 2017 (URT, 2018).

In sum, contribution of the sectors to the economy of the United Republic of Tanzania is poised to be affected if there are insufficient strategies to address climate change in the country.

1.3 Rationale for the Review of the National Climate Change Strategy 2012-2018

Notwithstanding the timeframe of the NCCS (2012), a number of development processes and environmental issues including emerging challenges, and enhanced knowledge about climate change at national, regional and international levels have been widely documented. These include adoption of the Paris Agreement in 2015, which is geared towards enhancing the implementation of the Convention. The Paris Agreement aims to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty.

Further, among others, the agreement commits Parties to the Convention to submit their post 2020 climate actions known as Nationally Determined Contributions (NDCs) that will be reviewed after every five years. Similarly, in September 2015 the United Nations adopted the United Nations Agenda 2030 for Sustainable Development Goals (SDGs) with three key dimensions: namely, economic development, social inclusion, and environmental sustainability. The UN agenda 2030 sets climate change as its 13th SDG. Also, UN adopted, the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 on 18 March 2015 which put priority on preparedness for climate related disasters. The SFDRR note that climate change is one of the underlying disaster risk drivers that can exacerbate the seriousness of a disaster. In addition, the African Union in 2013 adopted Agenda 2063 (The Africa We Want), which, among others, emphasized on environmental sustainability and climate resilience.

Other major global issues that emerged during the implementation of the NCCS (2012) include: operationalisation of the Green Climate Fund (GCF) in 2015; issuance of the three special reports by the Intergovernmental Panel on Climate Change (IPCC). The three IPCC special reports are: Special report on impacts of global warming of 1.5⁰C (IPCC, 2018); Special report on climate change, desertification, land degradation, sustainable land management, food security, and greenhouse gas fluxes in terrestrial ecosystems (IPCC, 2019); and Special report on the Ocean and Cryosphere in a Changing Climate (2019). All three IPCC special reports revealed how the very existence and survival of humankind is under huge threat from climate change: hence it is imperative for international, regional and national actors to put in place strategies to combat it.

Moreover, at national level, several major projects and other national and regional policies and plans that had a link to the National Climate Change Strategy continued to be implemented or

adopted. This included adoption of The Second and Third Five Year Development Plans (URT, 2016 & 2020) and other sector policies and strategies, Programmes and plans as well as institutions relevant to addressing climate change.

On the other hand, at regional level, there have been some instruments that have been developed to strengthen regional efforts in addressing climate change challenges while fostering sustainable development objectives. For example, SADC Protocol on Environmental Management for Sustainable Development, which calls for harmonized strategies to address climate change and other environmental issues, was adopted in 2014. The United Republic of Tanzania signed the Protocol in 2015. Similarly, in 2020 the Southern African Development Community (SADC) adopted Vision 2050 (SADC, 2020b) and Regional Indicative Strategic Development Plan (SADC, 2020a) which include climate change as one of the priority goals.

Likewise, the East African Community (EAC), which Tanzania is a member, developed EAC Climate Change Policy in (EAC, 2011) that calls for regional integration through harmonized and coordinated regional climate change strategies, programmes and actions. Since then, a number of regional instruments have been developed by EAC block. The EAC climate change related instruments include: Climate Change Strategy, EAC Climate Change Master Plan (2011-2031) that was not reflected in the Strategy, Disaster Risk Reduction and Management Strategy. EAC Fifth Development Strategy (2016/17-2020/21), EAC 2050 Vision and East African Legislative Assembly (EALA) Resolutions on Climate Change, establishment of EAC Climate Change Fund and Lake Victoria Basin (LVB) Climate Change Adaptation Strategy and Action Plan, 2018. Likewise, the EAC Protocol on Environment and Natural Resources Management (2020) that outlines climate change adaptation and mitigation strategic actions was recently formulated and approved by EAC sector council of Ministers.

Furthermore, even though there have been successes and achievements in previous efforts in implementation of NCCS (2012), there are some unsolved and emerging aspects of climate change and variability that need to be addressed. These gaps include: inadequate awareness and understanding of the risks posed by climate change and variability to general public and decision makers; limited platform for hosting the inventory of resources and data availability; limited national capacity to undertake research to generate climate data and information to fill existing gaps and to conduct regular climate; socio-economic and environmental monitoring; inadequate capacity (human resources and infrastructures) and inadequate financial resources to implement, monitor and evaluate impacts of climate change at all levels.

In addition, Tanzania became a lower middle-income country in July, 2020 (URT, 2020) and embarked on industrialization policies. All these developments and unfolding may have implications on natural resources demand and subsequent greenhouse gases sources and sinks, and hence the need for climate change intervention strategies.

With this background, review of the NCCS (2012) was necessary to align with current development processes and emerging issues. Revision of the Strategy was preceded by a stocktaking exercise to assess the challenges and good practices encountered in the course of the implementation of the NCCS and inform the process.

1.4 Objectives of the National Climate Change Response Strategy 2021-2026

The overall objective of this Strategy is to enhance overall national resilience to the potential adverse impacts of climate change and enable the country to pursue low emission development pathways to achieve sustainable development.

The specific objectives of the Strategy are to: -

- i.* Enhance mainstreaming climate change issues into national sector and local government development plans and budgets;
- ii.* Facilitate implementation and monitoring of the Tanzania's Nationally Determined Contribution (NDC);
- iii.* Align climate change interventions with the national development agenda of industrialized economy;
- iv.* Devise and implement strategic adaptation and mitigation measures in line with the national circumstances, requirements of climate change related multilateral environmental agreements, Sustainable Development Goals (SDGs), Sendai Framework for Disaster Risk Reduction (SFDRR) and related bilateral and regional agreements;
- v.* Enhance research, public awareness, education and capacity building on climate change issues;
- vi.* Promote the production and integration of traditional weather and climate services for improved warning systems and reducing climatic disaster risks;
- vii.* Enhance coordination and institutional capacity including provision of climate services and implementation of the national framework for climate services;
- viii.* Facilitate mobilization of sustainable and adequate finance and technologies to support climate change adaptation and mitigation interventions;
- ix.* Promote and facilitate transfer of climate-smart technologies to support climate change adaptation and mitigation;
- x.* Promote gender-responsive climate change adaptation and mitigation interventions; and
- xi.* Promote inclusive engagement of stakeholders, including community, media, civil society organizations and private sector, in designing, implementing and monitoring sustainable climate change adaptation and mitigation interventions.

1.5 Preparation of the National Climate Change Response Strategy 2021-2026

The formulation of this Strategy adopted the following steps and methods; namely, stocktaking, drafting of the Strategy, and stakeholder's consultation:

a) Stocktaking

Preparation of the Strategy was preceded by a stocktaking exercise that involved review of current climate change data and the performance of NCCS (2012). The purposes of stocktaking exercise were to gauge the implementation performance of the preceding NCCS and update trends; assess achievements, gaps, challenges, lessons learned; and consider emerging issues so as to inform the formulation of the new Strategy.

The first step during the stocking exercise was a desk review of current climate change information involving compilation, examination and synthesizing information from national and international documents. This involved review of policies and strategies, plans, project documents, reports and published papers related to climate change adaptation and mitigation.

The second step involved the use of various progress reports to evaluate the implementation of NCCS, which involved assessment of its achievements, challenges and lessons learnt. Based on review of current climate change information and review of NCCS (2012) a draft stocktaking report was prepared. The third step was to share the draft report with Ministries, Departments and Agencies (MDAs) and other stakeholders.

The stocktaking draft report was also posted on VPO website and key stakeholders were invited to submit comments. Comments from stakeholders were incorporated in the final stocktaking report. The final stocktaking report was published separately and uploaded in VPO website. Finalization of the stocktaking report paved a way and informed drafting of the National Climate Change Response Strategy (URT, 2012).

b) Drafting the Strategy

Drafting of the Strategy was done by a multi-stakeholder team of experts that was formed by the Permanent Secretary, Vice President's Office. The team of experts commenced drafting the Strategy based on the stocktaking report. A draft of the revised Strategy was produced and shared with Ministries, Departments and Agencies (MDAs) and other stakeholders. The draft of the revised Strategy was also posted on VPO website and key stakeholders were invited to submit comments. Comments from stakeholders were incorporated in the draft of the revised Strategy by team of experts from different sectors and institutions.

c) Consultation of stakeholders

The Draft Strategy was subjected to a broad spectrum of stakeholders through technical sessions and national stakeholders' workshops that were undertaken to validate the final revised Strategy before it was published. The workshops were attended by participants from Local Government Authorities, (LGA), Ministries, Departments and Agencies (MDAs), Development Partners on Environment, Civil Society Organizations (CSOs) and private sector. Comments obtained from the stakeholders were incorporated into Final Draft of the Strategy.

SITUATIONAL ANALYSIS

2.1 Policy, Legal, Institutional Framework and Multilateral Environmental Agreements

There are several national and international policies and legal instruments that have been applicable in addressing climate change impacts in the country. Some of them are discussed hereunder.

2.1.1 Policy Framework

a) The National Environmental Policy (1997)

The overall objective of the Policy (URT, 1997), among others, is to prevent and control degradation of land, vegetation and air, which are vital in supporting life system. It also aims at ensuring sustainability and equitable use of resources in addressing the basic needs of present and future generation without degrading the environment. Furthermore, it emphasizes the need to conserve and enhance the natural resources and manmade heritage including the biological diversity of the unique ecosystems of Tanzania.

The Policy identifies six major environmental concerns in the country; namely, land degradation; loss of biodiversity and wildlife habitat; deforestation; deterioration of aquatic and terrestrial ecosystems; and environmental pollution, particularly in urban areas. The vision and ambition of the Policy provide a viable platform to enhance adaptation and mitigation of climate change impacts.

b) National Water Policy (2002)

The Policy aims to ensure there is enough supply of quality and potable water to meet domestic, environmental and other priority development needs of the present and future generations. It advocates the need to conserve water sources via Integrated Water Resources Management (IWRM) as a way to ensure water sources are effectively used and conserved. The Policy also emphasizes on planning and implementation of water resources and other development programmes in an integrated manner and in ways that protect water catchment areas and their vegetation cover, improved management and conservation of wetlands.

c) National Wildlife Policy (2007)

The Policy promotes effective participation of all stakeholders, especially local communities and the private sector, in the management and conservation of Tanzania's wildlife resources. It provides for protection of water catchments for wildlife water supply; conservation of biodiversity; protection of fragile ecosystems; and restoration of degraded habitats for flora and fauna. The Policy also promotes sustainable management and use of wetlands, most of which are located in protected areas.

d) National Agriculture Policy (2013)

The Policy (URT, 2013) aims at addressing challenges that continue to hamper the development of the agricultural sector including low productivity, overdependence on rain-fed agriculture, inadequate participation of the private sector, environmental degradation and crop pests and diseases.

The Policy promotes environmental conservation through discouraging unsustainable agricultural practices including slashing and burning practices, cultivation in sensitive and marginal lands. It further fosters improvement of land husbandry through soil erosion control and soil fertility improvement activities contributing to sustainable land management and addressing climate change.

e) National Land Policy (1995)

The Policy intends to promote and ensure there is secure land tenure system, and to encourage the optimal use of land resources without compromising the ecological balance. It governs land tenure, land use management and administration. The Policy provides for protection of sensitive areas including water catchments, rivers, lakes, riverbanks, lake shores, beaches, forests, wetlands, mountains, national heritage and fragile biodiversity areas, and seasonal wildlife migration routes. It requires that such areas (or parts of them) should not be allocated to individuals. The Policy recognizes the need for protecting environmentally sensitive areas, including wetlands that are important sinks for greenhouse gases.

f) Human Settlements Development Policy (2000)

The goal of this policy is to facilitate equitable, safe and secure healthy and efficient sustainable human settlements in the country. According to this policy, there is rapid urbanization that has taken place in the country over the last three and half decades and will continue to affect the country's settlement pattern from the scattered small villages to large villages, towns and municipalities. The policy recognizes the need for combining socio-economic with environmental conservation approaches in managing human settlements in both urban and rural areas. Thus, the objectives and mission of the policy are in line with the overall goal of the Strategy to address climate change.

g) National Livestock Policy (2006)

The Policy addresses issues of utilization of rangelands for sustainable livestock production, which is hampered by seasonal variations of quality and quantity of forage, uncontrolled burning, overstocking and overgrazing, encroachment of grazing lands, tsetse flies and tick's infestation.

The objective of the Policy is to improve rangeland management and utilization in order to support sustainable livestock production and improvement of pastoral and agro-pastoral livelihoods. In this context, the Policy intends to promote inventory, identification, protection, management and use of rangeland resources; support and strengthen technical support services

on rangeland management in collaboration with other stakeholders; establish and promote livestock infrastructures in rangeland areas; promote appropriate forage conservation practices for dry season feeding; and strengthen Livestock Early Warning System (LEWS) for disaster management and impending forage shortage. These policy objectives are in line with the intervention on climate change adaptation and mitigation strategies.

h) Fisheries Policy (2015)

The objective of the policy is to develop a robust, competitive and efficient fisheries sector that contributes to food security, nutrition, growth of the national economy and improvement of the wellbeing of fisheries stakeholders while conserving the environment. The policy promotes effective management of fisheries resources through proper conservation, protection and rational utilization for sustainability of fisheries resources and aquatic environment. The policy also advocates for the participation of all stakeholders in fisheries and aquaculture development. These Policy objectives seek to enhance resilience of the fisheries sector to climate change.

i) Irrigation Policy (2010)

The objective of the Policy is to have irrigation systems that are economically viable, socially acceptable and environmentally sustainable. Plans for irrigation schemes should ensure compliance to relevant legislation; protecting and conserving water and land resources; pollution control in irrigated agriculture; and promotion of proper land use practices. These objectives are in congruence with climate change intervention strategies.

j) National Forest Policy (1998)

The aim of the Policy is to enhance the contribution of the forest sector to the sustainable development of Tanzania and the conservation and management of natural resources for the benefit of the present and future generations. The policy provides the foundation for Participatory Forest Management (PFM) and encourages the involvement of the communities and private sector in forest management through village land forest reserves, individual, group and community forests. The objectives of the Policy provide the opportunities for climate change adaptation and mitigation and how to address the challenges related to climate change and variability.

k) National Beekeeping Policy (1998)

The overall goal of the National Beekeeping Policy is to enhance the contribution of the beekeeping sub-sector to the sustainable development of Tanzania and the conservation and management of natural resources. The Policy recognizes that there is a significant demand of people living in the vicinity of the forests and game reserves, national parks and other protected areas to carry out beekeeping activities. This Policy supports adaptation and mitigation to the impacts of climate change and enhances resilience of the sub-sector.

l) National Energy Policy (2015)

The main objective of the Policy is to provide guidance for sustainable development and utilization of energy resources to ensure optimal benefits to Tanzanians and contribute towards transformation of the national economy. In addition, the policy sets specific statements geared towards promotion of sustainable renewable energy sources and energy efficiency and conservation to foster implementation of climate change adaptation and mitigation activities to support sustainable development and economic growth.

m) National Tourism Policy (1996)

The objective of the Policy is to contribute to economic development and livelihood of the people. The objective has to be achieved through encouraging the development of sustainable and quality tourism that is culturally and socially acceptable, ecologically friendly, environmentally sustainable and economically viable. The objectives respond to climate change adaptation and mitigation.

n) National Health Policy (2007)

The National Health Policy is aimed at improving provision of health services and providing a direction to sustain the quality health services to all people by reducing disability, morbidity and mortality, improving nutritional status and raising life expectancy. The policy recognizes that good health is a major resource essential for poverty eradication and economic development. The mission of the health policy is to facilitate the provision of equitable, quality and affordable basic health services, which are gender sensitive and sustainable.

To achieve this mission, the Ministry of Health states that it shall continue to emphasize on the use of various methods of advocacy and health education to address, among others, the issues related to environmental sanitation, prevention and control of communicable and non-communicable diseases including all endemic, epidemic and pandemic diseases such as malaria, cholera, malnutrition, etc.

Although the Policy does not directly provide statement on addressing climate change impacts on the health sector, the diseases mentioned are “climate sensitive” and thus addressing the climate change is critical in order to control them. Climate change affects water quality, which is the main concern in the health sector as people suffer from water related diseases, such as malaria, diarrhoea, cholera and dengue fever. These are mostly associated with the increased precipitation and temperature as a result of the global climate change.

The National Health Policy is currently under review. The issues of the impacts of climate change on the health sector have been incorporated. The draft policy underscores drastic changes in climate that expose health sector to be at risk of climate-sensitive diseases.

o) The National Disaster Management Policy (2004)

The Government developed the National Disaster Management Policy in 2004 to strengthen capacity for coordination and cooperation for comprehensive disaster risk management among key players at all levels. Experience shows that Tanzania most of recurrent disasters are related

to climate change and variability which include floods, drought, strong wind and tropical cyclone. Hence, among others issues the Policy assert the need to strengthening capacity for provision of weather related early warning, prevention and preparedness through strategic measures which ensures mainstreaming and coherence in action taken to address disaster risk reduction and climate change adaptation.

2.1.2 Legal Framework

There are several legal instruments that are relevant in combating the effects of climate change in Tanzania. Some of them are discussed hereunder

a) The Environmental Management Act No. 20 of 2004

The Act provides for legal and institutional framework for sustainable management of the environment. The Act includes provisions for institutional roles and responsibilities; impact and risk assessments; strategic environmental assessment; prevention and control of pollution; climate change; waste management; environmental quality standards; public participation in environmental decision-making, public environmental awareness and dissemination of environmental information; compliance and enforcement; implementation of international environmental instruments; state of the environment reporting; and establishment of the national environmental trust fund.

b) Plant Health Act No.4 of 2020

The Act provides for control of pesticides, phytosanitary measures, importation and use of plants and plant products, prevention of the introduction and spread of pests and establishment of the Tanzania Plant Health and Pesticides Authority. The Act, therefore, ensures for the protection of plant health and its ecosystems, hence supporting reduction of stress and adverse impacts of climate change on plants.

c) The Urban Planning Act No. 6 of 2007

The Act provides for the procedures of preparation, administration and enforcement of urban plans. It encourages the development of technology to prevent or minimize adverse effects that endanger people's health and welfare. The Act restricts development activities that have serious impacts on the urban ecological systems (environment) including wetland, flood hotspots area, ground and surface water pollution.

d) The Mining Act No. 14 of 2010 and its amendments

The Act provides for regulation of prospecting for minerals, mining, processing and dealing in minerals. It requires all holders of mining licenses to take appropriate measures for the protection of the environment in accordance with the Environmental Management Act which require, among others, to undertake environmental impact assessment in mining projects or activities. Most of the energy sources for mining activities have implications on greenhouse

gas emissions and therefore measures to limit their impacts on climate change need to be instituted.

e) The Wildlife Conservation Act No. 5 of 2009

This Act stipulates the importance of involvement of local communities in the management of Wildlife Management Areas (WMAs). These modalities influence climate change adaptation and mitigation within and outside the wildlife sector.

f) The Forest Act No. 14 of 2002

This Act provides for the management of forests, undertaking environmental impact assessments for certain development projects; establishment of forest management plan for all types of forests for the purpose of its best endeavours to achieve sustainable management of the forest reserves over the periods of time; and designates Community Forest Reserves, Mangrove Forest Reserves and encourages community-based management. The Act governs protection, conservation, management and utilization of forests and forest products in Tanzania. The Act also defines restrictions and prohibitions relevant for forest reserves and reserved (threatened) trees.

g) The Wildlife Conservation Act No. 5 of 2009

The Act has the provisions for the better conservation, management, protection and sustainable utilization of wildlife and wildlife products; provides for establishment and management of Wildlife Management Areas (WMAs) and benefit sharing; provides for management plans, environmental impact assessment, wildlife impact assessment and environmental audit; and monitoring.

In the auspices of implementation of the Paris Agreement on Reducing Emissions from deforestation and forest degradation plus enhancement of carbon stocks (REDD+), the Act is vital in ensuring that there are adaptation and mitigation measures/initiatives and other benefits at various levels in the country. Article 5 of the Paris Agreement urges parties to take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases.

It also calls upon the parties to take action to implement and support, including through results-based payments, the existing framework as set out in related guidance and decisions already agreed under the Convention for policy approaches and positive incentives for activities relating to reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries (REDD+).

h) The Land Act No. 4 of 1999

The Act governs all land matters in Tanzania. It stipulates that land in Tanzania is public property and remain vested in the President as trustee for and on behalf of all citizens of Tanzania. The Act seeks to control land use and clarify controversial issues pertaining to ownership of land and land-based resources, transactions on land, and land administration.

The Act divides land into three main categories in Tanzanian context: Village land that includes all land within the village areas of Tanzania; Reserved land which denotes land set aside for special purposes, for instance forest reserves, game parks, land for public utilities and highways; General land which includes land that does not fall in any of the above two categories such as urban areas. Management of different types of land categories influences adaptation and mitigation measures and strategies in the country.

i) The Village Land Act No. 5 of 1999

The Village Land Act governs all village land matters in Tanzania. It empowers the Village Government to have legal control on village land and its uses. The Village Land Act seeks to control land use and clarify controversial issues pertaining to ownership of land and land-based resources, transactions on land, and land administration at village level.

Furthermore, the Act also provides modalities and procedures for involvement of local communities in the management of village land resources such as forest and water, which are key local adaptation and mitigation initiatives.

j) The Land Use Planning Act No. 6 of 2007

The Act provides procedures for preparation, administration and enforcement of land use plans. The Act has distinctive authorities of land use planning in Tanzania laid down with their functions and powers. It specifies standards, norms, and criteria for the protection and maintenance of land. Land use planning on different types of land categories influences adaptation and mitigation measures and strategies in the country.

k) The Water Resources Management Act No. 11 of 2009

The Act provides for institutional and legal framework for sustainable management and development of water resources; prevention and control of water pollution; and participation of stakeholders and general public in implementation of the National Water Policy. The objective of the Act is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in a way that meets basic present and future generation human needs; and to prevent and control pollution of water resources and to protect biological diversity especially the aquatic ecosystem. Water resources management influences how adaptation and mitigation measures can be sustained within the sector and other related sectors.

l) Water Supply and Sanitation Act, No.5 of 2019

The Act provides for the institutional and legal framework for water supply in urban and rural areas. It provides for prevention and control of water pollution and participation of stakeholders and general public in implementation of the National Water Policy. Furthermore, the Act provides the measures to control water quality and quantity for the community use and protect the aquatic ecosystems. Water supply and wastewater management is of paramount importance in both adaptation and mitigation initiatives.

m) The Grazing-land and Animal Feed Resources Act No. 13 of 2010

The Act, among others, deals with the management and development of grazing-lands and animal feed resources. It provides mandate to the Local Government Authorities in safeguarding and developing grazing lands including demarcation and delineation of grazing land in accordance to Village Land Act and Land use Planning Act; grant rights to livestock movement to access water and other services that are not within the grazing land; management of communal and strategic grazing lands; grazing land development in a manner that is consistent with sustainable land use planning and management practices; stocking rate and measures in case of excess livestock units to avoid environmental destruction. Management of grazing land feed resources on different types of land categories influences adaptation and mitigation measures and strategies in the country.

n) The Marine Parks and Reserves Act No. 29 of 1994

The Act provide for establishment, management and monitoring of Marine Parks and Reserves. It aims at protecting, conserving, and restoring species and genetic diversity of living and non-living marine resources and ecosystem processes of marine and coastal areas through management of marine and coastal areas so as to promote sustainable use of existing resources, and the recovery of areas and resources that have been overexploited or damaged. Marine ecosystem is important for adaptation and mitigation initiatives within the coastal areas.

o) The Fisheries Act No. 22 of 2003

The Act provides for development and sustainable use of aquatic resources. It also ensures there is protection and conservation of aquatic genetic diversity, ecosystem integrity and endangered species. In addition, the Act advocates for the use of best available scientific information in fisheries development and sound utilization of the ecological capacity of water-based areas; minimization of pollution; assessment of adverse environmental impacts; and restoration and recovery of depleted stocks.

The Act regulates fishing activities in both fresh and marine and restricts the issuance of fishing licenses in any conserved areas. Furthermore, the Act requires formation of community-based management units for the purpose of protecting and conserving fishery resources. Sound management and sustainable utilization of aquatic resources will ensure resilience of these resources to climate change.

p) The Tanzania Meteorological Authority Act No. 2 of 2019

The Act provides mandates to the Tanzania Meteorological Authority (TMA) with regard to management, control, provision, coordination and regulation of meteorological services and importation of weather equipment by private institutions in the country. The functions of TMA, among others, are to:

- a) observe, collect, archive, regulate and disseminate meteorological and related information for the United Republic of Tanzania;

- b) provide weather, climate services and warnings for the safety of life and property to the general public and to various users including aviation, agriculture and food security, water resources, disaster management, health and construction industry;
- c) carry out research and training in meteorology and climatology and in other related fields, and cooperate with other institutions, where appropriate, to use the research findings in socio-economic development planning; and
- d) collaborate with other institutions concerned with issues related to climate variability, climate change and environment.

Enhanced functions of TMA play great and important roles in influencing adaptation, in particular early warning systems and mitigation measures and strategies in different sectors in the country.

q) Disaster Management Act No. 7 of 2015

The Act provides legal framework for coordination of disaster risk management (DRM) in the country involving prevention, mitigation, preparedness, response and recovery. The primary function for DRM coordination in the country is under the Prime Minister's Office – Disaster Management Department (PMO – DMD). The PMO - DMD seeks to ensure that appropriate response systems, procedures and resources are in place to assist those afflicted by disasters.

The PMO – DMD is also in charge to coordinate disaster prevention, mitigation and preparedness efforts and activities in order to minimize the adverse effects of hazards through hazard analysis, disaster risk mainstreaming and effective precautionary measures and to ensure timely control measures to avoid or lessen impact and appropriate and efficient organization and delivery of emergency services. Disaster risk management strategies that are encompassing good and strong actionable mechanisms increase country's resilience and adaptation to climate change.

r) The Petroleum Act No. 21 of 2015

This Act provides for regulation of upstream, midstream and downstream petroleum activities. It establishes the Petroleum Upstream Regulatory Authority and the National Oil Company in order to secure the accountability of petroleum entities and to provide for other related matters. This Act also ensures compliance with environmental principles and safeguards to any person who exercises or performs functions, duties or powers in relation to petroleum operations. In view of this, the Act supports climate change adaptation and mitigation interventions.

s) The Public Health Act No.1 of 2009

The Act provides for the promotion, preservation and maintenance of public health with a view to ensuring the provisions of comprehensive, functional and sustainable public health services to the general public and other related matters. The Act calls for programmes and facilities to ensure that the issues of climate change are well addressed.

2.1.3 National Development Frameworks, Plans and Strategies

a) Tanzania Development Vision 2025

Tanzania's Vision 2025 (URT, 1995) aims at attaining high quality livelihood for its people and develops a strong and competitive economy, among other things. Some of the strategies toward attaining these objectives are: ensuring food security and self-sufficiency; universal access to safe water; absence of abject poverty; reduction in infant and maternal mortality rates; economic growth rate of 8% per annum or more; attainment of macroeconomic stability; and an adequate level of physical infrastructure. These objectives may not be attained if climate change adaptations concerns are not factored in the development process and mitigation opportunities in the context of sustainable development are not fully exploited.

Also, SDGs have many strategies similar to those highlighted in the Tanzania Vision 2025, including the eradication of poverty and attainment of environmental sustainability. The vision 2025 is relevant in framing and formulation of Nationally Determined Contribution (NDC) and subsequent national communications under UNFCCC.

b) Integrated Industrial Development Strategy 2025

Tanzania's Integrated Industrial Development Strategy (IIDS) 2025 responds to the need for a dynamic Strategy to guide the process of resource-based industrialization. The Strategy seeks to steer the process of industrialization in the desired direction. The Strategy identifies that power supply has not been able to cope with demand for stable and reliable energy to industrial development. In order to foster sustainable industrial development, access to clean and reliable power supply for climate resilient industrial development needs to be sustained and supported.

c) Tanzania Sustainable Energy for All (SE4All) Action Agenda (2015)

The goal of this agenda is to ensure access to modern energy, preferably clean energy; improvement of energy efficiency; and increase share of renewable energy in the global mix. The Government of Tanzania fully embraces the SE4ALL objectives including the fact that access to modern energy services is a necessary precondition for achieving development goals that extend far beyond the energy sector, such as poverty eradication, access to clean water, improved public health and education, women's empowerment and increase food production.

This initiative is in line with the rural electrification program undertaken by Rural Energy Agency (REA), whereby its main role is to promote and facilitate improved access to modern energy services in rural areas of Mainland Tanzania. Promoting access to modern energy services will address climate change in the country.

d) National Five-Year Development Plans (FYDP) III (2020/2021- 2026/2027)

Tanzania has realized numerous achievements in the implementation of the second FYDP 2015/16 -2020/21. Specific strategic interventions identified and implemented in the FYDP II for addressing climate change impacts include:

- i) Combating climate change and its impacts; by putting more emphasis on emission reduction;
- ii) Integrating, harmonizing and coordinating environmentally sustainable policies and strategies for growth in key growth sectors, including climate change adaptation and mitigation; and
- iii) Mitigating and adapting to climate change, including supporting research programs to improve and develop new technologies, quality seeds, pest control, and agronomic practices e.g., tillage, soils and water conservation techniques and irrigation measures and livestock management practices, information collection and dissemination for early warning.

However, some challenges remain in addressing both adaptation and mitigation across sectors. The Third Five Year Development Plan (FYDP III), has been developed and builds on these past achievements, existing challenges and opportunities for the realization of the country's national, regional, and international agenda, including climate change gender equality commitments.

The Plan (FYDP - III) outlines new interventions to enable Tanzania industrialize in a way that will transform its economy and society. Like FYDP II, the FYDP III reiterates and underscore that impacts of global warming and climate change are felt in all economic sectors including agriculture, energy, tourism and livestock sectors. The plan underpins that local actions are needed to address such impacts.

Moreover, FYDP-III informs all national planning across all sectors and it is an important document for formulation and review of nationally determined contribution (NDC) and subsequent national communications under UNFCCC as well as preparation and implementation of different programmes and projects in the auspices of climate change convention and Paris Agreement.

e) Long Term Perspective Plan 2011/12-2025/26

The Long-Term Perspective Plan (LTPP) envisages a development path to achieve development aspirations articulated in the Vision 2025. The LTPP articulates that the socio-economic transformation will be addressed in depth through three strategic FYDPs: The First FYDP (2010-2015): Unleashing the Growth Potential; the Second FYDP (2015-2020): Nurturing an Industrial Economy; and the Third FYDP (2020-2025): Attaining Export Growth and Competitiveness. With regard to Environment and Climate Change, the objectives to be achieved by 2025 are: to ensure environmental sustainability while attaining economic development; to make the most vulnerable sections of the society and sectors resilient to climate change impacts; to effectively access climate change finance to develop adaptive capability; to mainstream issues related to climate change and environment in all national programs and policies; and to minimize the economic costs of climate change.

The LTPP identifies that among the external challenges the country has been facing, and will continue to face in the foreseeable future, include effects of climate change on the economy, with adverse effects on agricultural productivity and other key sectors. The plan projects the spending of about USD 500 million annually to reduce current vulnerability to climate change, and a further USD 100-150 million per year will be required to build capacity and enhance resilience to future climate change.

The LTPP further suggests that environment and climate change issues should attract more attention of stakeholders across all sectors owing to their widespread impacts; mitigation and adaptation mechanisms need to be put in place to minimize the negative impacts of climate change on the economy; effective institutional mechanisms to tap the global climate change funds need to be fostered to meet the huge financial demand of adaptive and mitigation strategies; and policies should be put in place to minimize the adverse environmental impacts of development. In addition, the plan suggests the development of the National Climate Change Strategy.

The LTPP promotes sustainable development and emphasizes the need to ensure that the growth path to be taken is sustainable from the economic, environmental and social (gender, health) perspectives. Sustainability shall remain an important criterion in evaluating the projects and policies during this period (2011/12-2015/26).

f) Water Sector Development Programme (WSDP) (2006 – 2025)

The objective of the WSDP is to alleviate poverty through improvements in the governance of water resources management and the sustainable delivery of water supply and sanitation services. It is designed to address shortfalls in urban and rural water supply infrastructure, to improve water resource management primarily through upgrading the country's nine Basin Water Offices (BWOs), and to strengthen the sector institutions and their capacities. The WSDP comprises of three main components: (i) water resources management; (ii) rural water supply and sanitation, and (iii) urban water supply and sewerage.

The WSDP implements the Nationally Determined Contributions (NDCs) particularly in relation to adaptation and mitigation efforts in the water sector.

g) Strategy for Urgent Actions on Land Degradation and Protection of Water Catchment (2006)

The overall objective of the Strategy is to institute measures to combat land degradation and protection of water sources in the country. Key challenges that have been highlighted include: i) prevention of environmental degradation due to illegal human activities, ii) limited public awareness on environmental management issues, iii) land use conflicts (agriculture, mining, establishment of protected areas), and, iv) pollution emanating from indiscriminate use of

plastics. Different stakeholders, Ministries and Institutions are involved in the implementation of short, medium and long-term measures to address these issues.

The review of the Strategy is in the final stages. Revised Strategy for Urgent Actions on Land Degradation and Protection of Water Catchment will boost implementation of adaptation and mitigation initiatives.

h) Strategy on Urgent Actions for the Conservation of Marine and Coastal Environment, Lakes and Rivers Ecosystems and Dams (2008)

The Strategy was put in place in 2008 as a response towards environmental degradation in coastal environment, lakes and river ecosystems and dams. The Strategy has addressed, among others, three major challenges: -

Marine and coastal challenges: i) Coral reefs destruction due to lime production from corals, beach seining and trawling and increased sediments from land-based activities; ii) Destruction of mangrove forests due to rampant harvesting for charcoal, construction purposes and boat building and salt production; iii) Marine and coastal pollution and degradation due to unplanned settlements and construction of hotels along the coast; iv) Environmental impacts due to improper use of agro-chemicals and fertilizer along the coast; and v) Degradation of marine biodiversity due to unsustainable fishing.

Lakes, rivers and dam's challenges: i) Increased sediments in lakes, rivers, and dams due to deforestation, unsustainable agriculture, livestock keeping and mining; ii) Decline of biodiversity particularly fish and other species due to illegal fishing and over-fishing in lakes, rivers and dams; iii) Wetland's degradation; and iv) Water pollution due to improper use of agro-chemicals and fertilizers, solid and liquid waste.

Cross-cutting challenges: i) Poverty among the communities in the coastal and lake areas, particularly in rural areas; ii) Inadequate public awareness and participation on conservation of marine and coastal environment, lakes, river ecosystems and dams; and iii) Inadequate human and institutional capacity to address challenges facing management of marine, lakes, rivers and dam's environment.

The Strategy was in the final stages during preparation of the new National Climate Change Response Strategy. Revised Strategy on Urgent Actions for the Conservation of Marine and Coastal Environment, Lakes and Rivers Ecosystems and Dams will boost implementation of adaptation and mitigation initiatives within relevant sectors and ecosystems.

i) Agriculture Sector Development Programme phase II (ASDP II)

The ASDP II aims at transforming the agricultural sector (crops, livestock & fisheries) towards higher productivity, commercialization and smallholder farmer income for improved livelihood, food and nutrition security and contribution to the GDP. The program seeks to transform gradually subsistence smallholders into sustainable commercial farmers by enhancing and activating sector drivers and supporting smallholder farmers to increase

productivity of target commodities within sustainable production systems and forge sustainable market linkages for competitive surplus commercialization and value chain development.

j) Livestock Sector Development Strategy (LSDS) (2010)

The overall objective of the LSDS is to develop a competitive and more efficient livestock industry that contributes to the improvement of the livelihoods of all livestock keepers and the national economy. The strategic goal of LSDS is to achieve sustainable use of land, water, pastures and rangelands. This is geared towards ensuring there is availability of grazing land for livestock improved through building the capacity and empower livestock communities to acquire and manage grazing lands; improving infrastructures for livestock production and marketing through construction/ rehabilitation of water dams, water wells and conserve watershed and catchments areas; establishing and enforcing bylaws for the conservation of water catchment areas in all villages; promoting sustainable use of pasture and rangeland resources through inventory of available grazing land and devise guidelines for their use.

The Strategy comprises measures that are of relevance in addressing land degradation, climate change adverse impacts and promotion of sustainable land management. Sector measures contained in the Strategy inform relevant adaptation and mitigation interventions within the sector.

k) Tanzania Livestock Master Plan (TLMP), 2017

Tanzania Livestock Master Plan (TLMP) is a series of five-year development implementation plans used to implement the ASDP II. It is another effort which sets out livestock-sector investment interventions, including better genetics, feed and health services, and complementary policy support, which could help meet the ASDP II targets by improving productivity and total production in the key livestock value chains.

This Master Plan outlines a number of both investment and complementary policy interventions. The proposed investments of USD 621 million, 36% and 64% from the public and private sectors, respectively, has the potential to impact positively on rural livestock keepers in increasing their incomes and on urban consumers through lowering prices of animal products. The success of the TLMP is also critical to the achievement of food and nutrition security at household and national levels.

l) National Environmental Action Plan (NEAP) (2013) and new revised NEAP (2020)

The National Environmental Action Plan (NEAP) of 2013 (under revision) is the country's effort towards a comprehensive incorporation of environmental concerns into natural resource planning and economic development. NEAP is intended to address pertinent issues in combating climate change, land degradation, biofuels, genetically modified organisms (GMOs), Invasive Alien Species (IAS) and promotion of sustainable land management.

m) National Irrigation Master Plan (2018)

Irrigation is important in Tanzania to deal with the erratic rainfall, especially in the context of climate change. Irrigation can minimize frequent food shortages that are attributable to dependence on rainfall, and, hence increasing yields. However, to do this effectively requires construction of infrastructures that will provide for a wide range of crops and efficient water use. Recognizing this need, the government of Tanzania has made ambitious commitments to expand the irrigated areas and establish the National Irrigation Master Plan that will guide the irrigation issues in general.

n) Power System Master Plan (PSMP), 2020

The Power System Master Plan (PSMP) of 2020 has a primary goal of increasing access to modern energy; and enhancing power supply availability, reliability and affordability in the country. To achieve this goal, the Government has planned to continue involving other stakeholders in the sector to implement least cost generation and transmission projects.

The plan reflects and accommodates Government policy guidelines and recent economic development experienced during the fifth Government phase, including development in electricity sub-sector. The Plan also reflects various regional visions on energy and will be used to guide power development in the country in the next 25 years. The PSMP 2020 has been prepared using data on electricity demand gathered during industrial survey in the entire country.

The PSMP promotes increased utilization of renewable energy sources in the grid to achieve planned generation mix. Currently, the total installed capacity in the country is 1,602.32 MW, which comprises of interconnected Grid System (1,565.72 MW) and isolated Grid System (36.60 MW)). The National Grid System comprises of hydro and thermal generation units owned by TANESCO and IPPs with total capacity of 1,565.72 MW (base year 2019) out of which hydro 573.70 MW (36.64 per cent), natural gas 892.72 MW (57.02 percent), liquid fuel 88.80 MW (5.6 per cent) and biomass 10.50 MW (0.67 per cent).

The Plan indicates power generation mix which varies over the planning period and by 2044 the generation mix consist of 5,690.4 MW (28.15 percent) of hydro; 6,700 MW (33.18 percent) of natural gas; 5,300 MW (26.24 per cent) of coal; 800 MW (3.96 per cent) of wind; 715 MW (3.54 per cent) of solar; and 995 MW (4.93 per cent) of geothermal of power generation. This energy mix is vital towards addressing climate change in the country.

o) National Climate Change Communication Strategy (2013)

The climate change Strategy provides for information related to vulnerability of economic sectors to climate change; policy, legal and institutional arrangements for managing climate change; sets strategic interventions and action plans for adaptation and mitigation of climate change and implementation arrangement. This information in the Strategy needs to be communicated and shared to various stakeholders including primary audience at the national, regional and international levels and secondary audiences especially the development partners for effective implementation.

Therefore, it provides for strategic action that will enhance communication and knowledge sharing using systematic and effective approaches at national and lower levels linking to regional and international communication strategies. The proposed strategic action for effective communication and knowledge sharing about the Communication Strategy is intended to amplify communication strategies in alignment with this NCCRS.

p) National Guidelines for Mainstreaming Gender into Climate Change

Adaptation related Policies, Plans, Strategies, Programmes and Budgets (2014)

Tanzania has mainstreamed gender into a number of national development frameworks and ratified international and regional gender instruments. Some of these frameworks include the National Development Vision 2025 and the National Strategy for Growth and Reduction of Poverty (NSGRP II) also known as MKUKUTA II. The country is also a party to Universal Declaration on Human Rights (1948); United Nations Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW) (1979); Beijing Platform for Action (1995); SADC Gender Declaration (1997); Charter on the Rights of Women in Africa (2003); SADC Protocol on Gender and Development of 2008; and the Sustainable Development Goals.

Therefore, the National Guidelines for Mainstreaming Gender into Climate Change Adaptation Related Policies, Plans, Strategies, Programmes and Budgets is the response to the need for the inclusion of gender into climate change interventions. This need arises from the fact that men and women are affected differently by the adverse impacts of climate change, as well as understanding that persistent gender inequalities undermine the adaptive capacity of the communities and society at large. The guidelines therefore set national frameworks for addressing gender issues in the context of implementation of this Strategy.

q) Financial Sector Development Master Plan 2020/21 - 2029/30

Monetary and prudential authorities need to be concerned along the broad categories of risks and opportunities as per Tanzania Financial Sector Development Master Plan (FSDMP) 2020/21 – 2029/30. The master plan provides the future direction of the financial sector to cater for diverse financial needs and it contains strategies that focus on enhancing existing financing resources and develop new options of green financing through the sub-sectors; namely, banks, capital markets, microfinance, social security and insurance.

2.1.4 Multilateral Environmental Agreements

The United Republic of Tanzania is a party to a number of Multilateral Environmental Agreements (MEAs). Ratification of MEAs is geared towards ensuring that Tanzania is part of the international community efforts in addressing global environmental issues. Such Multilateral Environmental Agreements to which Tanzania is a party include: -.

a) United Nations Framework Convention on Climate Change (UNFCCC)

The objective of the Convention is to achieve stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. The convention states that such stabilization should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change; to ensure that food production is not threatened; and to enable economic development to proceed in a sustainable manner. The convention provides fundamental principles and obligation of various actors at national level and international levels as well as informs preparation of national reports and other climate change related policies. Among the key principles underlined in UNFCCC are: -

- i) The Parties should protect the climate system for the benefit of present and future generations of humankind, on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities. Accordingly, the developed countries should take the lead in combating climate change and the adverse effects thereof.
- ii) The specific needs and special circumstances of developing countries, especially those that are particularly vulnerable to the adverse effects of climate change, and of those Parties, especially developing countries, that would have to bear a disproportionate or abnormal burden under the Convention, should be given full consideration.
- iii) The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. In view of this, policies and measures should take into account different socio-economic contexts, be comprehensive, cover all relevant sources, sinks and reservoirs of greenhouse gases and adaptation, and comprise all economic sectors.
- iv) The Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated within national development programmes, taking into account that economic development is essential for adopting measures to address climate change.
- v) The Parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change. Measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.

The United Republic of Tanzania signed and ratified UNFCCC in 1992 and in April 1996, respectively.

b) Kyoto Protocol (1997)

The Kyoto Protocol was adopted in 1997 and entered into force in February 16, 2005. The objective of the Kyoto Protocol is to help Parties included in Annex I to, individually or

jointly, ensure that their aggregate anthropogenic carbon dioxide equivalent emissions of the greenhouse gases (GHG) do not exceed their assigned amounts, calculated pursuant to their quantified emission limitation and reduction commitments with a view to reducing their overall emissions of such gases by at least 5 per cent below 1990 levels in the commitment period 2008 to 2012. The 6 greenhouse gases subjected to Kyoto-controlled limitations and reductions are: Carbon dioxide (CO₂); Methane (CH₄); Nitrous oxide (N₂O); Hydrofluorocarbons (HFCs); Perfluorocarbons (PFCs); and Sulphur Hexafluoride (SF₆). In 2012, Nitrogen Trifluoride (NF₃) was added to the list of greenhouse gases controlled under the Kyoto Protocol.

Mitigation initiatives/measures that have been undertaken at both local and national levels fall under the auspice of the Kyoto Protocol. In view of this, the Kyoto Protocol introduced three “flexibility” mechanisms providing Parties with more flexibility in meeting their GHG emissions limitations or reductions. These flexibility mechanisms are as follows: -

- i) Joint implementation (Article 6 of the Protocol): A mechanism whereby “any Party included in Annex I may transfer to, or acquire from, any other such Party emission reduction units resulting from projects aimed at reducing anthropogenic emissions by sources or enhancing anthropogenic removals by sinks of greenhouse gases in any sector of the economy” provided some conditions defined in the Article 6 of the Protocol.
- ii) Clean development mechanism (Article 12): “The purpose of the clean development mechanism shall be to assist Parties not included in Annex I in achieving sustainable development and in contributing to the ultimate objective of the Convention, and to assist Parties included in Annex I in achieving compliance with their quantified emission limitation and reduction commitments.”
- iii) Emissions trading (Article 17): “The Parties included in Annex I may participate in emissions trading for the purposes of fulfilling their quantified emission limitation and reduction commitments. Any such trading shall be supplemental to domestic actions for the purpose of meeting these commitments.”

The second commitment of the Kyoto Protocol was initiated in 2012 through adoption of the Doha Amendment to the Kyoto Protocol. Parties to the Kyoto Protocol adopted an amendment to the Kyoto Protocol by decision 1/CMP.8 in accordance with Articles 20 and 21 of the Kyoto Protocol, at the eighth session of the Conference of the Parties serving as the meeting of the Parties to the Kyoto Protocol (CMP) held in Doha, Qatar, on 8 December 2012. Pursuant to Article 21, paragraph 7 and Article 20, paragraph 4, the amendment is subject to acceptance by Parties to the Kyoto Protocol.

In accordance with Article 20, paragraph 4, the amendment will enter into force for those Parties having accepted it on the ninetieth day after the date of receipt by the Depository of an instrument of acceptance by at least three fourths of the Parties to the Kyoto Protocol. This means that a total of 144 instruments of acceptance are required for the entry into force of the amendment. However, as of 10 July 2020, 139 Parties have deposited their instrument of acceptance. Unfortunately, the Doha Amendment has not yet enforced.

The Protocol forms the framework for emission reduction targets to be adopted by different parties and various actors for sustainability of the global ecosystem and sustainable development.

The United Republic of Tanzania is yet to accede to the Doha Amendment; the government ratified the Kyoto Protocol in August 2002 so as to participate in forging international opportunities geared towards mitigating climate change.

c) Paris Agreement

Paris Agreement of the United Nations Framework Convention on Climate Change was adopted at COP 21 in December 2015 and entered into force in November 2016. The Agreement aims to strengthen the global response to the threat of climate change in the context of sustainable development and efforts to eradicate poverty, including by holding the increase in the global average temperature well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels; increasing the ability to adapt to impacts of climate change; and making finance flows consistent with a low GHG emissions and climate-resilient development. Tanzania ratified the Paris Agreement on 18 May, 2018.

With entry into force of the Paris Agreement, the global community has entered a new era of climate action with an emphasis on implementation in all countries with transparency. Action from both developed and developing countries is needed. The Agreement requires each country to reassess its carbon reduction commitment in every five years, where there will be an issuance of new greenhouse gas (GHG) reduction targets in five-year cycles, beginning in 2020. In every five years, a global stocktaking will assess the collective progress towards achieving the purpose of the Agreement and its long-term goals.

The outcome of the global stocktaking is to inform the preparation of future Nationally Determined Contributions (NDCs). Further, the Agreement includes provisions on finance, technology, and capacity-building to support action in developing and the most vulnerable countries. The Agreement also provides for enhanced transparency of action and support through a more transparent framework.

Implementation of the Paris Agreement would contribute to the achievement of the 2030 Agenda for Sustainable Development and its 17 Sustainable Development Goals (SDGs). Adverse impacts of climate change can undo the progress made in development and exacerbate threats such as food and water scarcity, ocean acidification, disproportionately burdening the poorest and most vulnerable. Beyond SDG 13: Climate Action, a transformation to low-emission, climate-resilient pathways can contribute to achieving and preserving the other SDGs such as SDG 2: Zero Hunger, SDG 7: Affordable and Clean Energy, SDG 9: Industry, Innovation and Infrastructure, SDG 11: Sustainable Cities and Communities, SDG 12: Responsible Consumption and Production, SDG 14: Life Below Water and SDG 15: Life on Land.

Paris Agreement informs development of new national vision and climate change strategies based on the projected global trend in emission and the required adaptation and mitigation interventions and associated costs within the realm of climate change regime and responsible corporate business for sustainable global economic growth.

d) Other Conventions

Other Multilateral Environmental Agreements that are relevant to climate change to which Tanzania is a party include:- The Convention on Biological Diversity; The International Convention for Prevention of Pollution from Ships - MARPOL 73/78; The Convention on International Civil Aviation - Environmental Protection (Annex 16); United Nations Convention to Combat Desertification; The SADC Protocol on Wildlife Conservation and Law Enforcement, 1999, ratified in 2003; The Convention for the Protection, Management and Development of the Marine and Coastal Environment of the Eastern African Region, (Nairobi Convention) 1985, ratified in 1996; The Convention on Wetlands of International Importance (Ramsar Convention), 1971, ratified in 1999; African Convention on the Conservation of Nature and Natural Resources, 1968, ratified in 1974 and Sendai Framework on disaster risks reduction (URT, 2012, 2018b, 2019). The government has formulated and now implementing a range of strategies, programs, projects and plans emanating from these conventions that are important in addressing climate change adaptations and mitigation of climate change, impacts and vulnerability.

2.2 Climate Change, Impacts and Vulnerability in Tanzania

2.2.1 Climate Trends and Future Scenarios

Evidences of changes in key climate variables have been observed in Tanzania, demonstrated by documented increase in frequency and intensity of extreme events such as strong wind, heavy rainfall, hailstorm and higher temperatures. Between 1981 and 2020 several incidences of droughts, floods and record-breaking rainfall have been observed in many parts of the country. Most of these extreme weather events including record breaking rainfall have been observed in the past five years (2015, 2016, 2017, 2018 and 2019), which is consistent with global observation and trends as documented in the IPCC reports.

a) Rainfall Anomalies

Rainfall distribution in Tanzania is characterized by bimodal patterns with peak in October - December, normally termed as short rain (*Vuli*) and March – May, normally termed as long-rain (*Masika*). However, *Vuli* and *Masika* rainfalls are more typical (Borhara et al., 2020; Japheth et al., 2021; Mahongo & Francis, 2012).

Due to the influence of climate change, in recent years, there are some evidences of uncertainties and shift in rainfall patterns recorded in many parts of the country. For instance, rainfall anomalies recorded over 50 years in Tanzania reveal strong variability of rainfall from 1970 to 2020 (Figure.2). For example, records of rainfall in 2019 show that average annual

rainfall was 1283.5 mm, which is 256.5 mm higher than the long-term total rainfall from 1981-2010 and equivalent to 125 per cent of long-term average.

Some areas around Lake Victoria Basin (Mwanza, Musoma, Bukoba, Shinyanga and Simiyu), North-eastern highland (Kilimanjaro, Arusha, Manyara, Moshi, Same), and Northern coast (Zanzibar, Dar es Salaam, Pemba, Tanga, Morogoro) experience bimodal rainfall. The southern, central and western parts of the country (including Dodoma, Singida, Kigoma, Tabora, Rukwa, Iringa, Mbeya, Mtwara and Lindi are characterized by unimodal rainfall patterns starting from November to end of April.

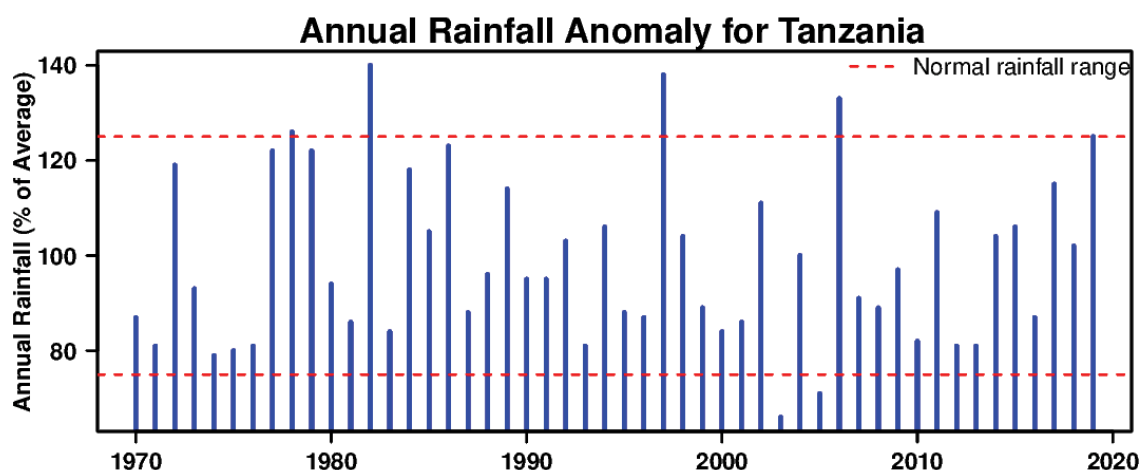


Figure 2: Trend of annual average rainfall anomaly for Tanzania in the past 50 years (Source: TMA, 2019)

From the rainfall maps, it is depicted that from 2016 to 2019 there have been significant variations in rainfall pattern and trends throughout the country for the months of October to December, January to March and April to June. While for the rainy seasons of 2016 to 2017 in October to December, January to March, most parts of the country recorded low rainfall as compared to a period from April to June 2017. Relatively high rainfall was recorded in the same months (October to December, January to March and April to June) in 2017 and 2018. Likewise, variation in rainfall in 2019 reflected different trends and patterns in rainfall during the same months (Figure 3).

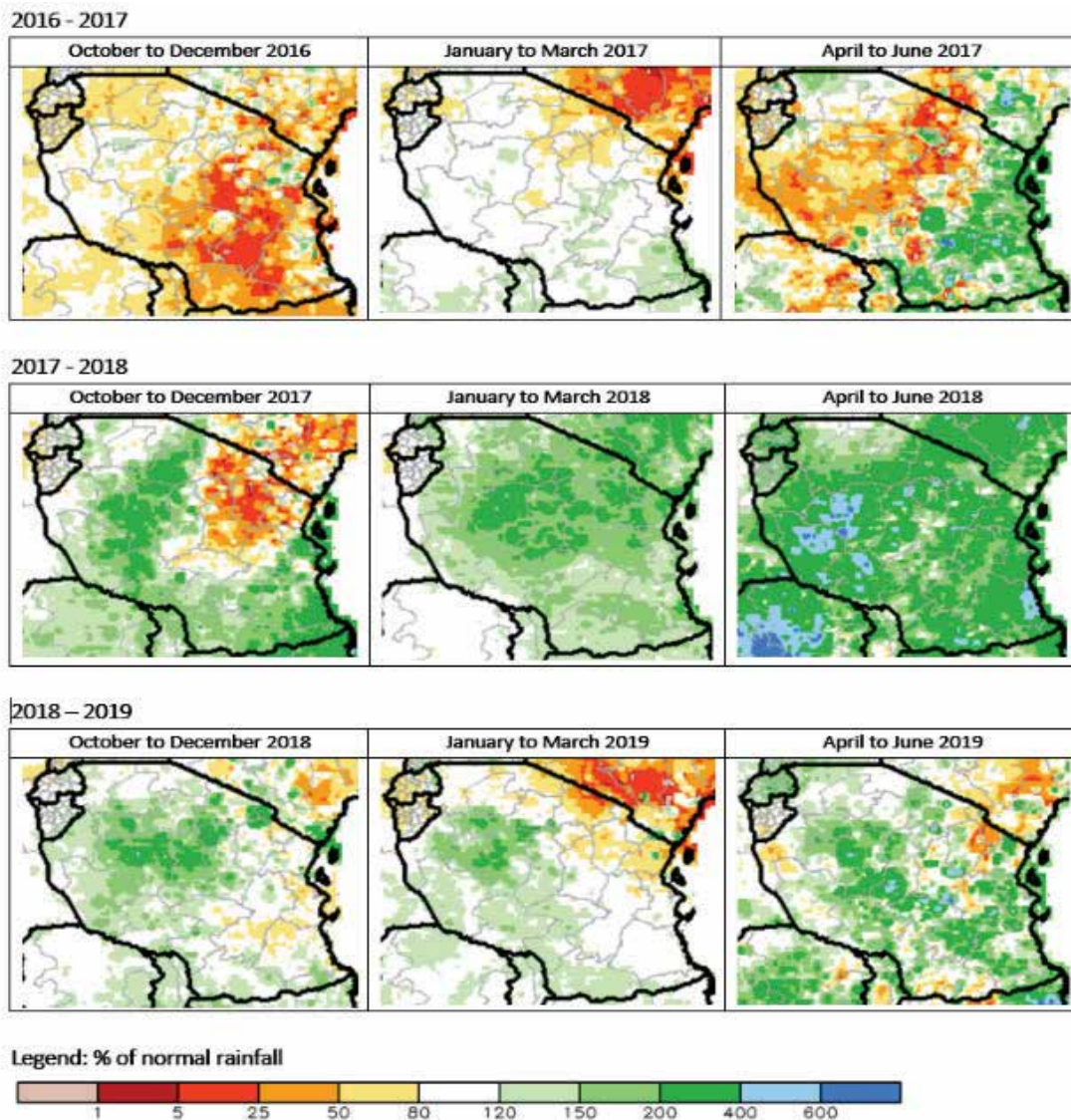


Figure 2: Maps of the rainfall variations from 2016 to 2019 (Source: GCCA, 2020)

According to the observed climatological data from the Tanzania Meteorological Authority (TMA), most part of the country received normal rainfall during March, April, and May in 2019 and below normal rainfall between November 2018 and April 2019 (Figure 4 and 5). Besides, in 2019 the country received rainfall above normal average during short rainy season (October, November and December), while May, October, November and December were the wettest months (Kabanda, 2018).

For example, Mlingano station (Tanga region) recorded 783.3 mm, likewise Pemba, Zanzibar, Bukoba (Kagera region) and Lyamungo (Kilimanjaro region) stations also recorded higher amount of rainfall exceeding 500mm in October. Up to 1048 mm of rain was recorded in Pemba in May 2019, while October was the wettest month on record, December being the second and May the third wettest months on record since 1970. On the other hand, April, 2019 was the second driest month on record since 1970 apart from July and September 2019 ranked as first driest months.

The extreme high and record breaking daily rainfall (in 24 hours) recorded in different parts of the country include: 327.8 mm of rainfall recorded in Tukuyu - Mbeya on 4th November, 2015; 247.6 mm of rainfall recorded in Mbamba Bay - Ruvuma on 9th April 2016; and 316 mm of rainfall recorded in Tanga on 8th May 2017.

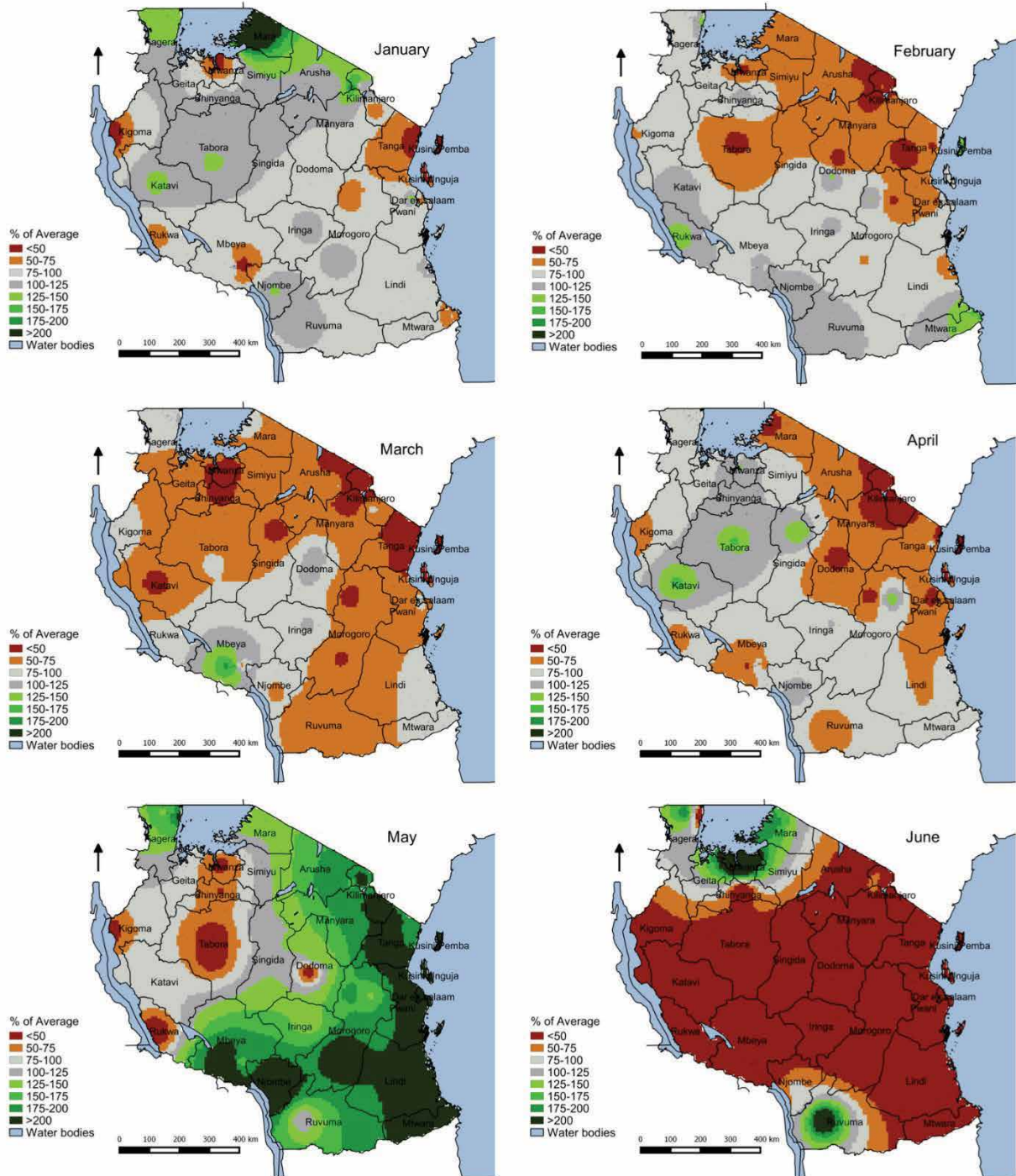


Figure 3: Monthly rainfall distribution showing percentage of long-term average for January – June 2019 (Source: TMA Report, 2019)

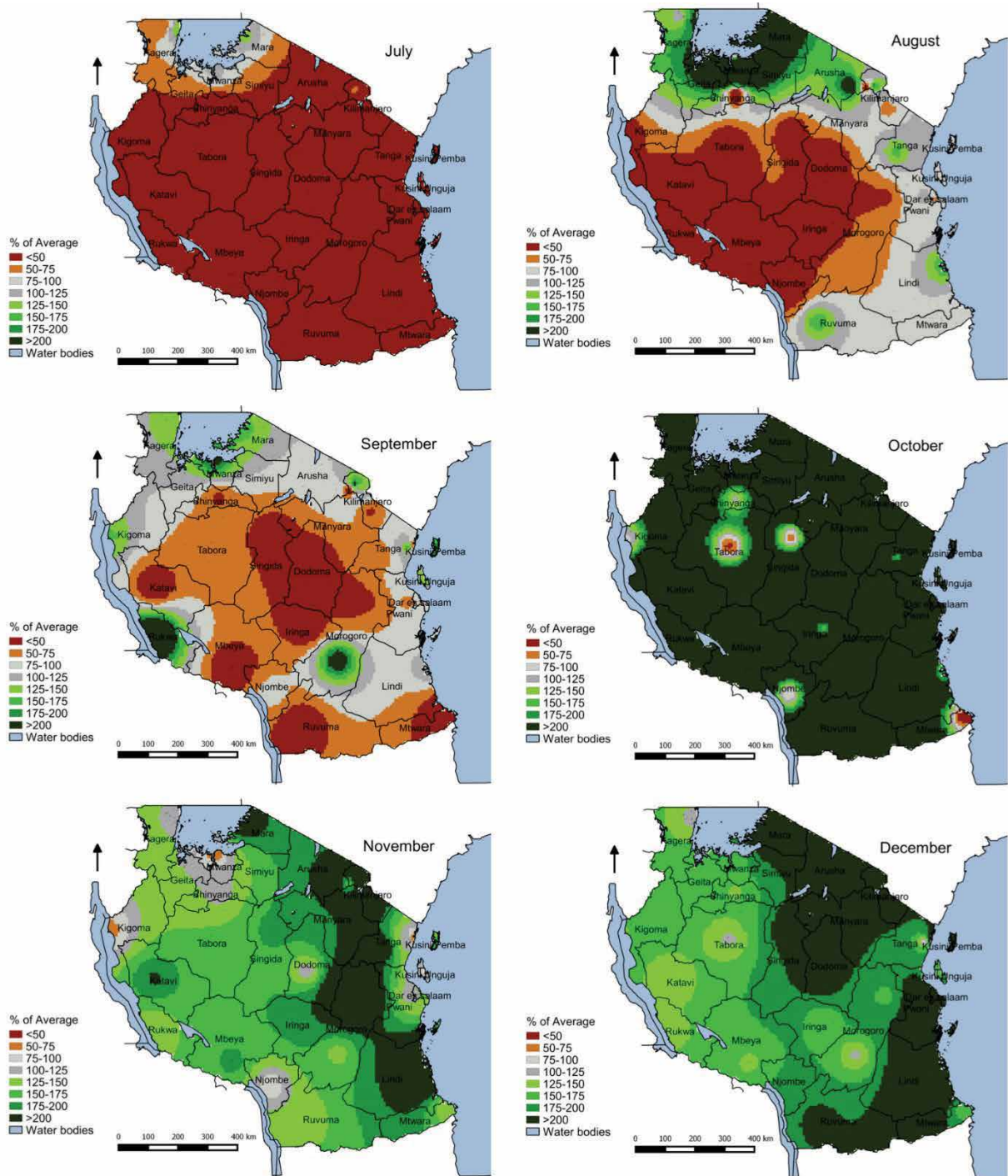


Figure 4: Monthly rainfall distribution with percentage of long-term average for July–December, 2019 (Source: TMA Report, 2019)

These extreme weather events have been largely attributed and exacerbated by the occurrence of El-Niño condition over the central Pacific Ocean. Other factors include persistence of warm sea surface temperatures (SSTs) over the eastern Atlantic Ocean (closer to Angola coast) and the South-Western and Central Indian Ocean, and the persistence of neutral SSTs in the North-West Indian Ocean (closer to Somali coast). These conditions collectively resulted into enhanced moisture to influx over the country. On the other hand, drought condition was experienced over the country towards the end of 2016. This condition was exacerbated by the

presence of La-Niña condition over the central Pacific Ocean and the negative Indian Ocean Dipole (IOD) over the Indian Ocean. All these conditions led to the deficiency of rainfall over the East African region, Tanzania inclusive.

In 2019, the strong Indian Ocean Dipole phenomenon during October-December was linked to the above normal rainfall over most regions with bimodal regime and some regions with unimodal rainfall regime. Events related to heavy rainfall occurred in the areas of Lake Victoria, north-eastern highlands, northern, coastal, central, western and southern parts of the country during October, November and December and the beginning of 2020 causing devastating floods in many parts of the country.

Above normal rainfall events reported in 2019 include: 177.6 mm of rainfall recorded in Mtwara on 15th January 2019; 126.4 mm of rainfall recorded in Arusha on 29th April, 2019. In May 2019, northern coast of Tanzania especially Zanzibar, Pemba and the vicinity including Dar es Salaam received unusual rain for ten consecutive days from 3rd to 12th May. The total amounts of rainfall were between 330 mm and 286.3 mm recorded in two days (5th and 6th May 2019) over Zanzibar and Pemba stations, respectively **Error! Bookmark not defined.**

b) Rainfall Projections by 2050 and 2100

Taking an average of 34 climate projection models, changes in annual rainfall across Tanzania show increases in the north/northeast (around 3 to 4%) and decreases in the south (-1 to -2%) by the 2040s¹. Rainfall projections indicate that some parts of the country may experience an increase in mean annual rainfall of up to 18 to 28% by 2100, particularly over the Lake Victoria Basin and North-Eastern Highland (Figure 6). An increase of about 10-12% in 2050 and 18.2 - 28.3% in 2100 is projected in Lake Victoria Zone and an increase of up to 13.4% in 2050 and 16.3% in 2100 in the North Eastern Highlands.

The South Western Highlands and Western Zones of the country are projected to experience an increase in annual rainfall by up to 9.9% in 2050 and by up to 17.7% in 2100. The North Coast Zone is projected to have an increase of about 1.8% in 2050 and 5.8% in 2100 while the Central Zone is projected to have an increase of up to 9.9% in 2050 and up to 18.4% in 2100. The Southern Coast Zone is projected to have a decrease of up to 7% in 2050 and an increase of annual rainfall of about 9.5% in 2100.

Moreover, projections by Future Climate for Africa (2017) indicate that rainfall will decrease during dry seasons and increase during wet seasons, which translates to higher risks for drought and flooding (FCFA, 2017; Luhunga et al., 2018). In addition, the southern half of Tanzania is expected to experience a slight decrease in average annual rainfall by 2030, whilst the north western region around Lake Victoria is projected to observe a slightly higher amount of annual average rainfall in the same period. By 2090 these changes can reach up to 10% of

current annual rainfall averages¹. Figure 6 shows maps of Tanzania for projected percentage change in mean annual rainfall by 2050 and mean annual rainfall by 2100.

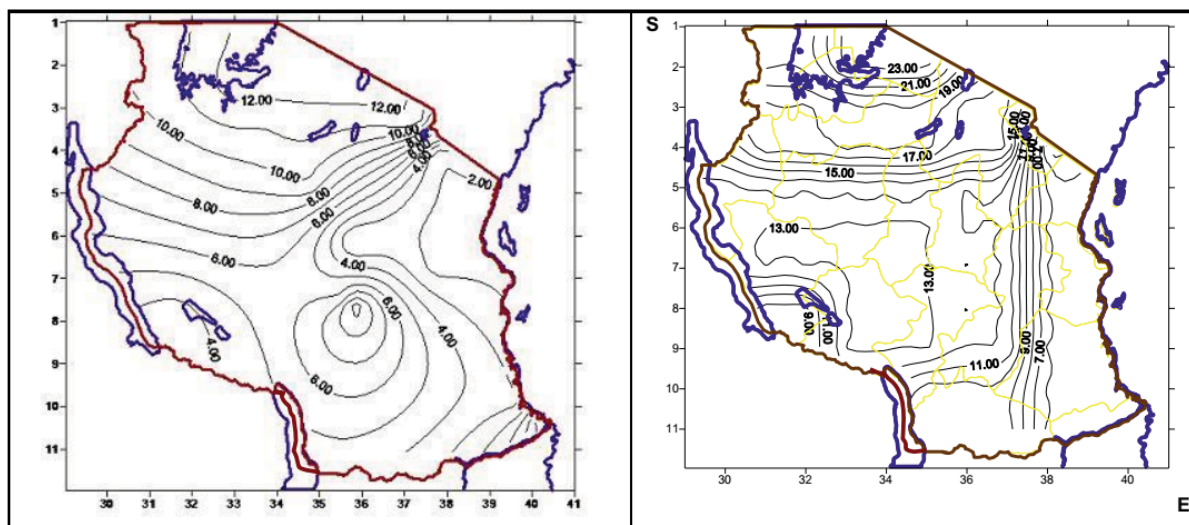


Figure 5: Projected percentage change in mean annual rainfall by 2050 and mean annual rainfall by 2100 (Source: TMA, 2019)

c) Temperature Anomalies

Temperatures across the country are normally characterized by relatively less fluctuation throughout the year. However, reports and various studies have shown trends of increased temperatures over the entire country (Osima *et al.*, 2018, Luhunga *et al.*, 2018). In 2019, the country's annual mean temperature (Tmean) was 23.8°C, which is 0.9°C warmer than long-term average (1981-2010) (Figure 7).

On the other hand, annual maximum temperature (Tmax) was 29.3°C, which is 0.6°C above the long-term average (Figure 8), while annual minimum temperature (Tmin) was 19.2°C which is 1°C warmer than long-term average (Figure 7). On average, the country experienced warmer nights (higher temperature anomalies) compared to day time temperatures. Thus, the country annual mean temperature anomaly reflects the annual minimum temperature anomaly.

¹ Future Climate for Africa (2017). *Future Climate Projections for Tanzania: Country Climate Brief*. www.futureclimateafrica.org

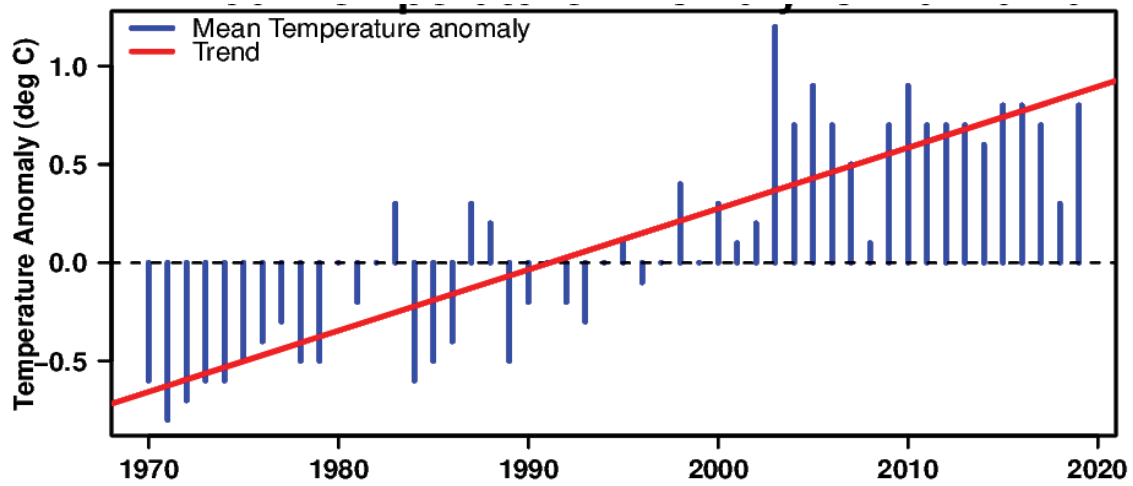


Figure 6: Trend of Annual Mean Temperature anomaly for Tanzania for 1970 – 2020 (Source: TMA, 2019)

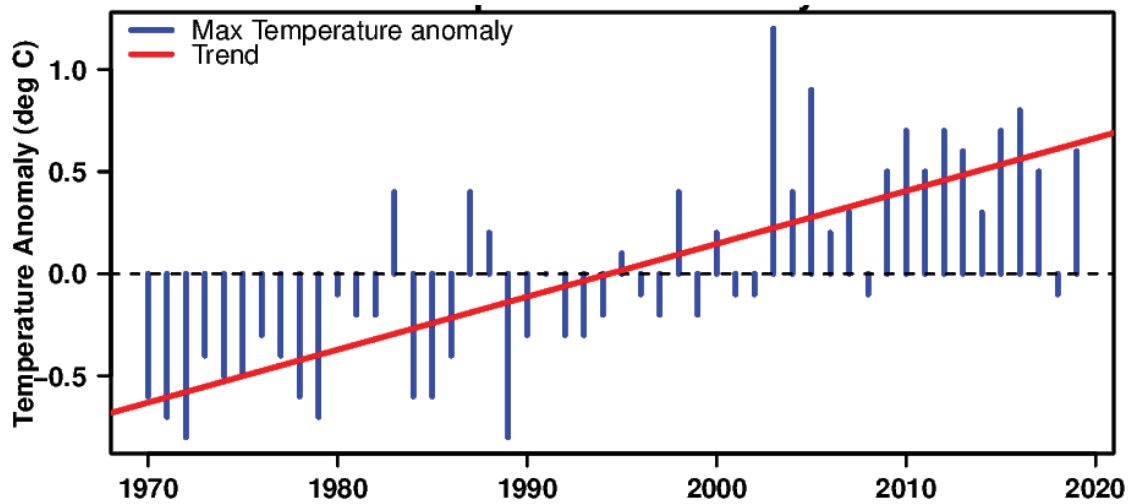


Figure 8: Trend of Annual Maximum Temperature anomaly for Tanzania for 1970 – 2020 (Source: TMA, 2019)

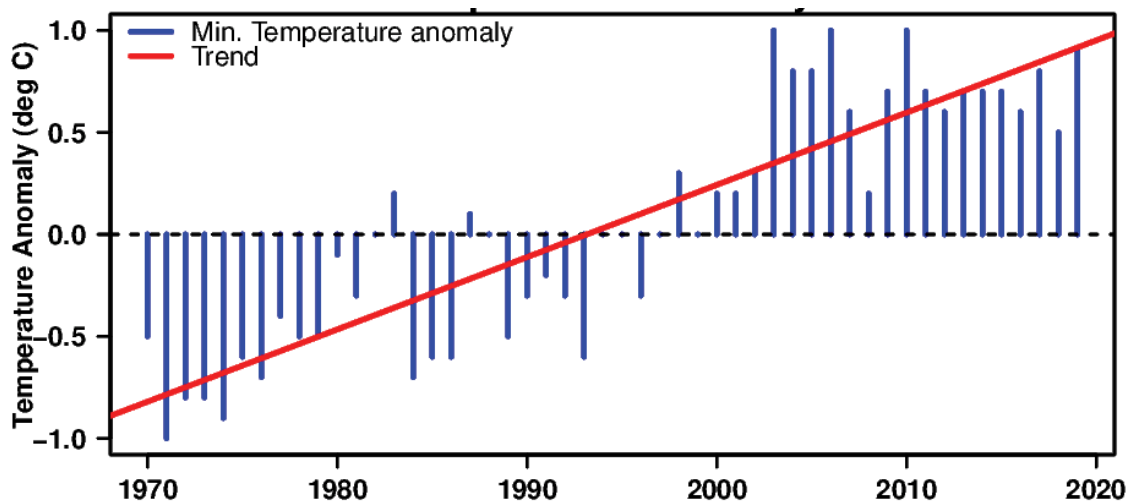


Figure 7: Trend of Annual Maximum Temperature anomaly for Tanzania for 2070 – 2020
(Source: TMA, 2019)

The annual long-term average temperature over different stations in Tanzania ranges from 14.4-26.4°C. Regions with the highest temperatures are along the coast and western parts of the country. The season with high temperatures starts from October to February or March, whilst the cold season is from May to August.

The annual minimum air temperature (Tmin) and Maximum air temperature (Tmax) across the stations in Tanzania range from 9.6-22°C and 19.1-30.7°C, respectively. In recent years, high daily temperatures were recorded in many parts of the country. For example, 38.0°C and 38.5°C were recorded in Moshi on 25th February and 25th March, 2016, respectively, which were the second and third highest values on record since 1958.

The above normal maximum temperatures for the 2019 were slightly higher than in 2018 by at least one-degree Celsius. The extreme hot temperatures were mostly experienced over the northern parts of the country and the northern coast extending to the hinterland. Large number of higher daily maximum temperature (Tmax) events exceeding 35°C occurred during January (22 events), February (76 events), March (159 events) and April (18 events).

The highest daily maximum temperature of 38.4 °C, was recorded in Mtwara on 17th April 2019, and is the 9th of above normal daily temperature recorded in the station since 1950. The second highest daily maximum temperature in the country was 37.5°C recorded at Kilimanjaro International Airport on 22nd March 2019. This temperature record at Kilimanjaro International Airport is ranked 3rd on record for March, 2019.

On the other hand, the south western highlands and southern regions were the coldest parts during June, July and August. Large number of lower daily minimum temperature events less than 5°C occurred in June (22 events), July (32 events), and August (12 events). The lowest minimum temperatures of 1.5°C and 2°C were recorded in Mbeya on 26th June, 2019 and 28th July 2019, respectively. These were the second record of lowest temperature in this decade since 2011, but lower temperatures up to -8 °C have been observed in the past years.

d) Temperature Projections by 2050 and 2100

The climate models project warming in the range of 0.8 to 1.8°C by the 2040s. In the MultiModel Ensemble, warming of roughly 1°C is relatively evenly distributed across Tanzania¹³. By the 2090s, all models project warming in the range of 1.6 to 5.0°C, with the MultiModel Ensemble warming of roughly 3-4°C fairly evenly distributed across Tanzania (slightly less warming nearer to the coast)¹. More warming is projected over the western side of the country, whereby a warming of up to 3.4°C is projected by 2100 (Luhunga et al., 2018).

A warming of less than 1.76°C for 2050 and 3.28°C for 2100 is projected over parts of the northern coast regions and north-eastern highlands, and a warming in excess of 1.77°C for 2050 and 3.3°C for 2100 is projected over the Lake Victoria zone and central zone, while a warming in excess of 1.39°C for 2050 and 3.18°C for 2100 is projected for the southern coast including Mtwara and Lindi regions. Figures 10 and 11 are the Maps of Tanzania showing projected change in mean annual temperature by year 2050 and mean annual temperature by year 2100.

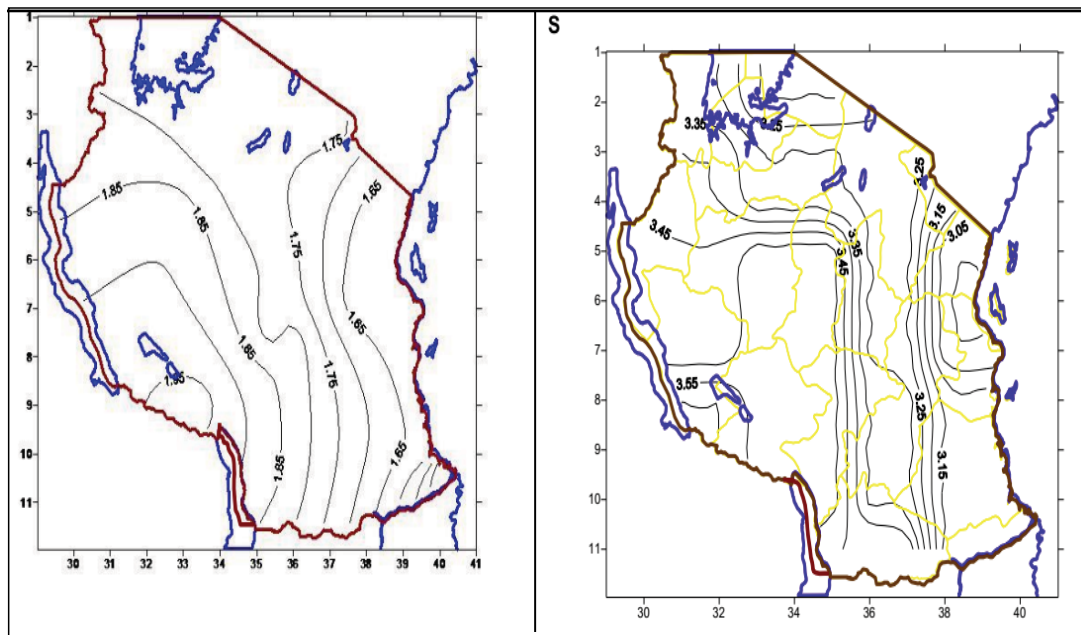


Figure 8: Projected change in mean annual temperature by 2050 and mean annual temperature by 2100

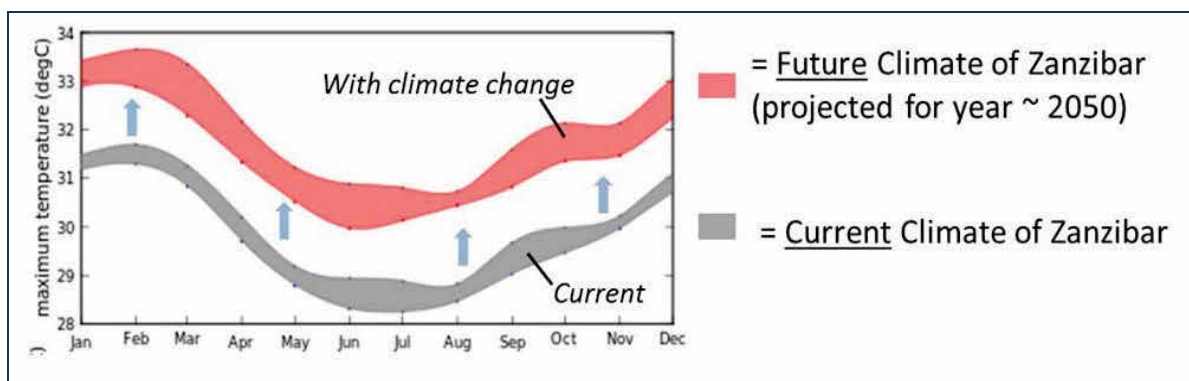


Figure 9: Future projections for monthly daily maximum temperature for 2040- 2060 for Zanzibar (Source: GCAP, 2012)

2.2.2 Sector Climate Change Impacts and Vulnerability

a) Agriculture

The Ministry of Agriculture’s annual budget speech (2020/2021) reported that agricultural sector makes up about 28.2 percent of GDP and employs about 58 per cent of Tanzanians. Most of the rural population directly rely on agriculture for their livelihoods^{2,3}. Above all, agriculture in Tanzania is dominated by smallholder farmers cultivating farms of less than three hectares and practicing rain-fed agriculture. About 70% of Tanzania’s crop area is cultivated by hand hoes, 20% by ox ploughs and 10% by tractors. Food crop production dominates the agricultural economy. In some areas, irrigated farms help to stabilize agricultural production, improve food security, increase farm productivity and income, and produce higher-value crops such as vegetables and flowers.

Maize is the country’s main staple food crop and is grown by more than 50% of farmers and is found in all regions of the country. Most of Tanzania is classified broadly as a ‘Maize-Mixed’ farming system with areas of root crop-based farming in the southern and north-western areas. Rice is the second most important staple in Tanzania. Rain-fed paddy rice production by smallholders is centred in Mbeya, Morogoro, Mwanza, Shinyanga, and Tabora. Other major food crops include sorghum, millet, wheat, pulses, cassava, potatoes, bananas, plantains, sugar, groundnuts, sesame, coconuts, and soybeans. Much of Tanzania’s sorghum and millet are produced in arid and semi-arid agro-ecological zones. Finger millet is popular in the country’s south-western regions.

Dependency on rain-fed agriculture makes it acutely vulnerable to weather changes (URT, 2014, 2015, 2017). Unreliable rainfall in terms of intensity and distribution is the most likely

² National Bureau of Statistics (2014). *Basic Demographic and Socio-Economic Profile*: National Bureau of Statistics (NBS), Dar es Salaam.

³ Joel Chongela (2015). *Contribution of agriculture sector to the Tanzanian economy*. American Journal of Research Communication, 2015, 3(7): 57-70}

and damaging production risk. Drought is also known to severely affect agriculture. Changing climate has already resulted in a general decline in agricultural productivity, including changes in agro-diversity and hence jeopardizing food security and nutrition.

Evidence of the impacts of climate variability on agriculture sector in Tanzania include shifting in agro-ecological zones, prolonged dry episodes, unpredictability in rainfall (URT, 2018b), uncertainty in cropping patterns, increased weed competition with crops for (moisture, nutrients and light) and ecological changes for pests and diseases. Shortening and/or change of the growing season, a trend that has already been observed in Tanzania is seen as a direct consequence of the warming up and changes in rainfall. Between 2015 and 2019 drought was most frequently reported in the northern regions (Arusha, Tanga, Manyara, Kilimanjaro, Simiyu and Mara), central regions (Dodoma and Morogoro), and south-eastern regions (Mtwara and Lindi). Photo 1 and 2 shows effects of drought induced by climate change leading to decrease in crop productivity because of crop pesticides and diseases.



Photo 1: Effect of drought on maize crop in Busega district, Simiyu Region, February, 2017



Photo 2: Effect of drought on maize crop harvest in Busega district, Simiyu, February, 2017.

On the other hand, the “increasingly bimodal” tendencies and rainfall patterns in the north correspond with this pattern.

National food production is projected to decrease by 8 –13 per cent by 2050 due to increased heat stress, drying, erosion and flood damage as well as post-harvest loss. Beans, sorghum and rice yield projections follow similar trends, with decreases of 5 - 9 per cent by 2050. Increasing heat stress and expansion of the coffee berry borer beetle are expected to decrease coffee productivity from 225 kg/ha currently to less than 100 kg/ha in 2060. Along the coast, cassava and rice crops are subject to salinization, water logging and inundation from sea level rise⁴. The value of loss of agriculture GDP from the impacts of climate change over the coming five decades is estimated at US\$ 27 billion (Tanzanian Shillings 43,200 trillion), which is an annual average of about US\$ 540 million (Tanzania Shillings 864,000 billion)⁵. With expected increase of incidence of disasters, early warning system in agricultural sector need to be strengthened through different strategies such as crop insurance scheme introduced in 2020.

b) Livestock

After crops, the livestock industry is the second biggest contributor to Tanzanian Agriculture representing 5.5% of the country’s household income and 30% of the Tanzania’s GDP^{6,7}. The livestock sector is ranked as one of the vital economic sectors in Tanzania that will be severely impacted by climate change if no serious actions are taken to respond to its adverse

⁴ USAID (2018). *Country Climate Profile, Tanzania*: Fact Sheet.

⁵ United Republic of Tanzania –URT (2014). State of the Environment Report, Vice President’ s Office, URT

⁶ SAGCOT, Tanzania Investment Opportunity, 2013

⁷ <http://www.tanzaniainvest.com/agriculture> (25th February 2016)

consequences⁸. The sector is central to the livelihood of rural Tanzanians, particularly pastoralists whose livelihoods are wholly or partially dependent on livestock⁸ for food, draught power, a mode of saving and social-cultural symbolism⁹.

Most of the livestock are concentrated in the semi-arid areas (including, Arusha, Dodoma, parts of Iringa, Kilimanjaro, Manyara, Shinyanga, Mwanza, Singida, Mara, Tabora, Songwe, Mbeya, Katavi and parts of Rukwa), which are more suitable for livestock than any other form of agriculture. These areas are characterized by relatively low mean annual rainfall with stronger spatial and temporal variability, and therefore not very reliable for production of food and cash crops. Concentration of ruminant livestock in these areas is also attributed to low prevalence of tsetse flies and less competition for arable land.

However, the sector is affected by various impacts of climate change, drought being the most serious effect. There has been livestock loss as a result of severe and recurrent droughts, particularly in the northern parts of the country. For example, following the drought and subsequent famine in northern Tanzania, in late 2009 to early 2010, about 700,000 livestock including 316,437 cattle, 236,359 goats and 92,640 sheep died in Arusha region¹⁰.

Although floods are usually less recurrent, their occurrences cause severe impacts while also affecting larger areas¹¹. For example, the FAO assessment (2011) on the impact of El-Nino indicated that floods caused the death of various types of animals across six (6) regions; namely, Arusha, Mara, Mwanza, Dodoma, Morogoro and Shinyanga. Overall frequency rate of animals lost due to floods per animal holding were chicken (35.3%), ducks (14.7%), goat (5.0%), pigs (2.7%), sheep (1.7%), and cattle (0.1%).

Changes in the mean temperature and rainfall, and the increased variability of rainfall have resulted into the prolonged length of dry seasons and increased severity of periodic droughts that reduce availability of water and pastures. It is also expected that they shrink the rangelands that are important for livestock keeping communities in Tanzania.

Shrinkage of rangelands, and pastoralists and agro-pastoralists migration are likely to exacerbate conflicts between livestock keepers, crop farmers and other resource users in many areas. On the other hand, warming is predicted to increase disease vectors which will consequently increase the incidences of vector-borne diseases of livestock, such as

⁸ MLDF (2015). *Tanzania Livestock Modernization Initiatives*. Ministry of Livestock and Fisheries and Development, Dar es Salaam.

⁹ MLDF (2011). *Livestock sector development Programme*: Ministry of Livestock and Fisheries Development, Dar es Salaam.

¹⁰ VPO (2013). *Report on Forests, Rangelands and Climate Change Adaptation in Tanzania*. Vice President's Office (VPO), Dar es Salaam.

¹¹ FAO (2016). *Rapid Agriculture Needs Assessment in response to the "El - Niño" effects in the United Republic of Tanzania*. Food and Agriculture Organization (FAO), Rome.

Trypanosomiasis, East Coast Fever, and Rift Valley Fever. This is expected to severely affect survival and production of livestock¹².

c) Fisheries

Fisheries are also an important sub-sector in Tanzania, providing about 35% of rural employment and ensuring complementary sources of protein for many rural communities. Fishing is a crucial source of livelihood for fisheries communities in the inland and coastal areas in Tanzania but severely threatened by climate change. As Lake and Ocean temperatures rise, many fish species are being driven into deeper waters¹³.

Fisheries sub-sector employs more than 177,527 people as artisan fishers who work directly in the sector and approximately 4,000,000 people engaged in fisheries related activities like fish processing and marketing, trade in fishing, boat building and maintenance⁹. The performance of the sector is influenced by climate change and environmental degradation, decrease in fish catches, over participation in fishing related activities, change of species distribution and abundances¹³. Therefore, its contribution to the country's economy has significantly impacted by the changing climate scenarios.

Climate change can affect fisheries through different ways such as coral reef bleaching that alters aquatic primary productivity from increased surface temperature, wind velocity, sea level increase and wave action, which can bring ecological and biological significant change to both fresh water and marine ecosystems. Tanzania is one of the Sub-Saharan countries projected to have more warming than the global average in the global south and the possibility of getting warmer in the future is high¹⁴. Climate change will further cause fish migration patterns thereby affecting fish recruitment and stocks in traditional fishing grounds, especially for artisanal fisher folks. Sedimentation in marine estuaries and freshwaters is negatively affecting fisheries in marine and freshwater bodies by smothering breeding and forage grounds. This problem is aggravated by sea level rise, increased water temperatures, wind speed and directions, changing of other water parameters including chlorophyll a (in algae) and sedimentation from inland run-off that all result from changing climate.

d) Forestry and Bee keeping

The 2015 Tanzania Forest Service (TFS) Forest Inventory established forests and wooded areas coverage in Tanzania to be over 48.1 million hectares of land. Forest ecosystems are important not only for supplying timber and other economically important products, but also for generating indirect benefits such as controlling soil erosion, supporting soil fertility, providing shade, and buffering hydrological cycles. Forests and woodlands are important to communities for many reasons including: i) sources of wood for construction and energy; ii)

¹² Magita, S.Y., and A.Z. Sangeda (2017). *Effects of climate stress to pastoral communities in Tanzania: A case of Mvomero District*. Livestock Research for Rural Development, 29

¹³ Hanifa et al. (2015). *Climate Change Impacts on Fishing in Coastal Rural of Tanzania*. Journal of Environment and Earth Science, 5-10

¹⁴ IPCC (2015). *Climate Change 2014 Synthesis Report*. Intergovernmental Panel on Climate Change.

provision of water retention capacities of catchment areas; iii) provision of a high biodiversity as well as forest products including Non-Wood Forest Products (NWFPs) such as thatch grass and forests; and iv) sources of food and income in times of scarcity.

Impacts of climate change on forest ecosystems and biodiversity vary depending on vegetation species. The common impacts to all forest's types include loss of biodiversity; disappearance of wildlife habitats, increased risk of bush fires, limited availability of forest products (timber and non-timber products) and ecosystem shift (for example, forest to woodlands, or woodlands to grasslands). Impacts of climate change in the forestry sector is also exacerbated by impacts in other sectors such as agriculture, livestock, energy and human settlement in terms of encroachment of forest areas for agricultural expansion, livestock grazing or expansion of human settlements.

It is estimated that 85% of the population in the country depend on wood and charcoal as a source of fuel for cooking. This has resulted in depletion of forest at a rate of 469,420 hectares per year¹⁵. Similarly, wildfires contribute to forest degradation and subsequently to greenhouse gases emissions. Studies based on satellite image data reveal that an average of 11 million ha burn annually in Tanzania¹⁶. The country with 48.1 million ha of forests has set a Forest Reference Emission Level (FREL) estimated to emit about 43,673,924 tCO₂e/year MNRT (2015) opt. for facilitating implementation of policy approaches and positive incentives for activities relating to reducing emissions from deforestation and forest degradation, and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks (REDD+); and alternative policy approaches, such as joint mitigation and adaptation approaches for the integral and sustainable management of forests as per Paris Agreement. Among the regions with severe deforestation include Dodoma, Singida, Manyara, Tabora, Shinyanga, Mwanza, Mara, and Simiyu¹⁵ (Figure 12). Furthermore, about 60% of the country is prone to land degradation and desertification^{17,18}. In addition to that, 16% of the country is severely degraded¹⁹. Some of the hotspots of land degradation include Shinyanga, Dodoma, Tabora, Manyara, Simiyu, Lindi, Arusha, Kilimanjaro, Morogoro and Ruvuma^{18,20} (Figure 13).

Species that are expected to be more vulnerable due to continuing climate change are those with limited geographical range and heat intolerant; low germination rates; low survival rate of

¹⁵ MNRT (2015). *National Forest Resources Monitoring and Assessment of Tanzania Mainland (NAFORMA): Main Results*. Ministry of Natural Resources and Tourism (MNRT), Dar es Salaam.

¹⁶ FAO (2013). *A Fire Baseline for Tanzania*,

¹⁷ Kirui O.K. (2016). *Economics of Land Degradation and Improvement in Tanzania and Malawi*. In: Nkonya E., Mirzabaev A., von Braun J. (eds) *Economics of Land Degradation and Improvement – A Global Assessment for Sustainable Development*. Springer

¹⁸ VPO (2020). *Land Degradation Neutrality (LDN) Target Setting in Tanzania*. Vice President's Office (VPO), Dodoma.

¹⁹ VPO (2019). *Seventh National Report on the Implementation of UNCCD: Narrative Report*. Vice President's Office (VPO), Dodoma.

²⁰ VPO (2014). *Tanzania Status of Land Degradation*. Vice President's Office (VPO), Dar es Salaam

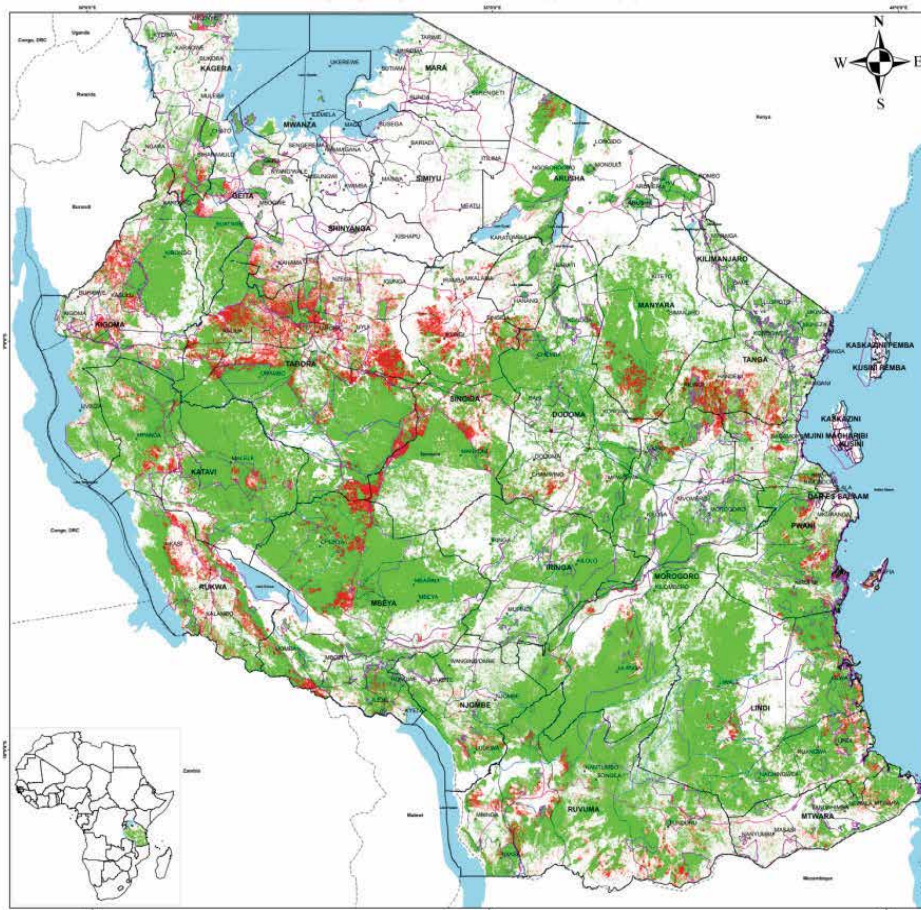
seedlings; and limited seed dispersal/migration capabilities. However, knowledge on the magnitude of effects on individual species is still limited.

Furthermore, Tanzania has set aside and managing 506 natural forest reserves for beekeeping. The Ministry of Natural Resources and Tourism (MNRT), through TFS has protected a total of 69,613 ha as National Bee Reserves. It is noteworthy that beekeeping is mainly a traditional and rural-based activity by local communities hence considered as an income generating activity while conserving the environment.

It is estimated that about 138,000 tons of honey and 92,000 tons of bee wax are produced per annum from about 9.2 million honey bee colonies. The actual harvest is 48,000 tons of honey and 324 tons of wax per year. The sector generates about US\$ 19 million per annum, employs some 2 million people and helps in biodiversity and in increasing agricultural production through pollination. Beekeeping is carried out using traditional methods; using logs and barks hives, apiaries are in the forest areas – far from residential areas and it is largely a man's business²¹.

Climate change and climate variability have negative impacts on the productivity of honeybees, by altering flowering time, increasing water stress during drought thus reducing pollen and nectar availability, limiting bees' movement and communication. Continued climate change is expected to impact this sector and in turn affecting livelihoods and the potential investment along the value chain.

²¹ International Trade Centre (2014). Honey Sector Synthesis Report & Development Road Map. ITC, Geneva, Switzerland



Legend

- District name
- Capital city
- River
- International boundary
- Reserved area
- Water body
- Regional boundary
- District boundary
- Road
- Forest
- Deforestation

0 25 50 100 150
KM

	Total deforestation (ha)	Annual deforestation (ha/yr)
Main land	5,159,000	465,000
Zanzibar	25,190	3,149

Reserved areas	Total Deforestation (ha)	Annual Deforestation (ha/yr)
Mainland	1,068,116	97,101
Zanzibar	1,877	371

Deforestation estimates period: 2002-2014
Data used: Landsat 7 ETM+ (Mainland), Landsat 5 TM (Zanzibar),
Mapbox and OpenStreetMap contributors
Projections: Europe (EPSG: 31466) Mainland, UTM (EPSG: 31466) Zanzibar

Figure 10: Deforestation map of Tanzania, 2002-2013 (Source: MNRT, 2015)

f) Water Resources

Water resources have a great role to play in socio-economic transformation of the country. Sectors such as agriculture, industry, tourism, fisheries, and energy among others, are highly dependent on availability of water resources. However, this important resource is increasingly facing threats, including climate change. Increasing rainfall variability and prolonged droughts cause serious pressure in the country's available water resources. Severe and recurrent droughts in the past decade triggered a decrease in water flows in rivers, hence shrinkage of receiving lakes, declines of water levels in satellite lakes and hydropower dams.

Furthermore, some of the perennial rivers have changed to seasonal rivers and some wetlands have dried up. Thus, since water is a finite resource, it is under pressure because of increasing climate change and variability, degradation due to pollution, over-abstraction, and encroachment of water catchments for various land uses (e.g., agriculture, urbanization and industrial development). The scarcity and vulnerability have negative impacts on important watershed and recharge areas, as well as wetlands.

The Water Sector Development Programme (2006 – 2025) emphasizes on registration and licensing of water use activities and polluting enterprises as well as monitoring of pollution, development of and implementation of comprehensive water quality monitoring and pollution control programme, permanent water quality standards, and protection of important water sources as a way of enhancing water and environmental conservation. Thus, adequate implementation of objectives of WSDP (2006 – 2025) can foster resilient water sector to climate change adverse impacts. The hydrological monitoring network has improved in the Rufiji and Pangani basins owing to support availed from different initiatives. However, many flow monitoring stations in other basins are inoperative and there are insufficient resources to allow regular reading of operational stations. Groundwater monitoring is only carried out in a few selected areas. Water quality sampling and analysis is also hampered through limited funding and inadequately equipped analytical laboratories. The major water sources (catchments, groundwater recharge areas, and wetlands) have not been properly delineated and are not monitored or protected; they face constant threats. The absence of systematic monitoring precludes knowledge on the severity and extent of the problem arising from adverse impacts of climate change.

Moreover, according to Pant *et al.*, 2003²², wetlands produce about 40% of the global methane emissions, but they have the highest carbon density and relatively greater carbon sequester capacity. Wetlands sequester carbon from the atmosphere through plant photosynthesis and by acting as sediment traps for runoff and CO₂ held in the living vegetation as well as in litter, peats, organic soils, and sediments that have built up, in some instances, over thousands of years. However, many wetlands are facing increasing challenges of climate change, particularly frequent droughts.

²² Pant, H.K, J.E. Rechcigl and M. B. Adjei (2003). Carbon sequestration in wetlands: Concept and estimation. Food, Agriculture & Environment Vol.1(2) :308-313. 2003

With increasing evapo-transpiration due to increased temperature and changed rainfall regime, wetland water characteristics will change with adverse consequences for the biodiversity within. For example, an increase of pH levels in Lake Natron is affecting the breeding sites of flamingos.

On the other hand, following unusual heavy rainfall coupled with flooding in 2019/2020 has led to highest increase of water levels of main water basins in the country. For instance, Lake Tanganyika has recorded highest water levels by almost 3 meters (from 772.85 m in 2006 to 776.04 m in June, 2020); and Lake Victoria by 0.53 m (from 1134.27 m in 1965 to 1134.8 m in June, 2020).

Continued adverse impacts of climate change threaten ecosystem services of the Tanzania's nine major river basins that are vital water catchment areas. Although, projected river flows will be highly influenced by non-climate factors such as changes in land use, climate projections indicate increased runoff for the Pangani and Rufiji basins, which will increase risk of flooding and sedimentation; and decreased runoff for Wami/Ruvu basin, which will increase water stress in Dar es Salaam, Morogoro, Kibaha and Dodoma (with a combined population of more than 6 million). Water availability will also depend on the development of rivers upstream by neighbouring countries, as 13 percent of Tanzania's renewable water resources are transboundary.

Generally, all water basins are faced with water demand stress from different uses, such as irrigation, hydroelectric power, domestic, industry, tourism, etc. Such stress creates a drastic impact to the downstream users especially the national hydropower plants of Nyumba ya Mungu constructed in early 1969 with installed capacity of 8MW, Hale with 21MW (1964), Old Pangani with 17.5 MW (1934) and New Pangani falls constructed in 1995 with installed capacity of 68 MW and Julius Nyerere Hydropower dam (under construction), with expected installed capacity of 2115MW. Prolonged drought, floods, coupled with human water demanding activities will further worsen the already precarious situation. This calls for harmonized and inclusive Strategy that will lead to water resilience.

Furthermore, impacts of climate change are more projected to affect the availability and access of quality freshwater resources especially among communities. The required investments are projected to be costly and overwhelming on government budgets. Abnormal rains are projected to lead into destruction of water systems and infrastructure. Both surface and ground water sources (such as springs, wells, boreholes, dams) and systems are likely to be contaminated and/or declined. This situation has increasingly led into water access challenges accompanied with health risks. Communities and areas using pit latrines are the most vulnerable due to water contamination after heavy rains. The rural open water sources that are near farms that are using chemical fertilizers and farm wastes are affected. Places experiencing prolonged and severe droughts are forcing communities to move to other areas looking for clean water. On the coastal areas, the rise of sea level has led to saltwater intrusion affecting coastal communities and their livelihoods.

g) Energy

Energy sector plays an important role in the socio-economic development of any country. In this context, the Government of Tanzania is committed to accelerating the level of connection for its population with electricity supply in the country by connecting 50% of the households to electricity network by 2025. The National Energy Policy and the Tanzania Rural Electrification Expansion Program (TREEP) serve as a guide to the levels of rural electrification in the country. In this respect, the Government has five-year electrification program whereby the target is to connect 290,000 new customers per annum from 2020 to 2025.

Tanzania is well endowed with enormous and diversified potential energy resources which include hydropower, natural gas, solar, wind, biogas, uranium, coal reserves, biofuel, tidal and waves, biomass, and geothermal. According to the Tanzania Energy Policy of 2015 (URT, 2015; URT, 2012), the primary energy supply includes biomass (85.7%), petroleum products (9.3%), electricity (4.5%) and the remaining (1.2%) is contributed by coal and other renewable energy sources.

More than 80 percent of energy delivered from biomass is consumed in rural areas; heavy dependence on biomass as the main energy source contributes to deforestation, while the importation of oil costs about 25 to 35% of the nation's foreign currency earnings.

In 2018, analysis of electricity generated from national grid sources showed that 2,234.43GWh was generated through hydropower; 4,788.08GWh through natural gas and 35.58GWh through Heavy Furnace Oil (HFO) and diesel. Natural gas production in Songo Songo and Mnazi Bay fields was 59,142.0 million cubic feet in 2018 compared to 47,456.9 million cubic feet in 2017, equivalent to an increase of 24.6%.

The volume of oil imported for domestic consumption increased to 3,267.0 million cubic litres in 2018 from 3,193.2 million cubic litres in 2017. In 2018, solar power generated through solar mini grid in off grid areas was 7MW compared to 5MW generated in 2017. The use of solar energy generated through home solar systems was 18MW in 2018 compared to 15MW in 2017, equivalent to an increase of 20.0%. Power generation from hydro power plants is expected to increase after completion of Julius Nyerere Hydropower project that will generate 2115MW.

Both rainfall and temperature anomalies are expected to affect energy generation and distribution from different sources. Currently, about 40% of Tanzania's limited electricity supply comes from hydropower sources. In the last 40 years Tanzania had experienced severe and recurring droughts with devastating effects to agriculture, water and energy sectors. Available records indicate that from 1957 to 2020 there have been fluctuations of water in Mtera Hydroelectric power dam due to increased siltation and drought.

For a period between 2005 and 2016), rainfall trends have been fluctuating, reaching very low in 2006 and 2013 that compelled the HEP to operate at a minimum water levels in those years

(Figure 14). A prolonged dry spell in October 2015 led to a near cessation of the dam that affected generation capacities of other hydropower plants across the country.

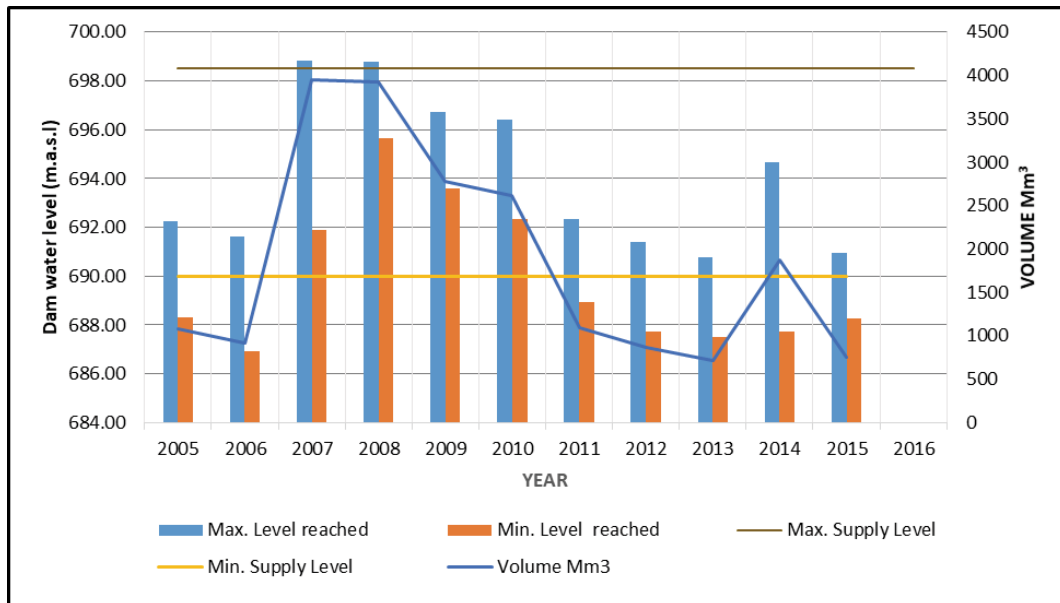


Figure 12: Rainfall trends and minimum water levels at Mtera Dam

On the other hand, heavy rains experienced between 2017 and 2020 in many parts of the country threatened the structures of some dams due to water levels reaching unprecedented maximum levels. For example, Mtera hydropower dam recorded an inflow of 3300m³/s in 2020, which is the highest water inflow ever recorded since 1954 (Figure15).

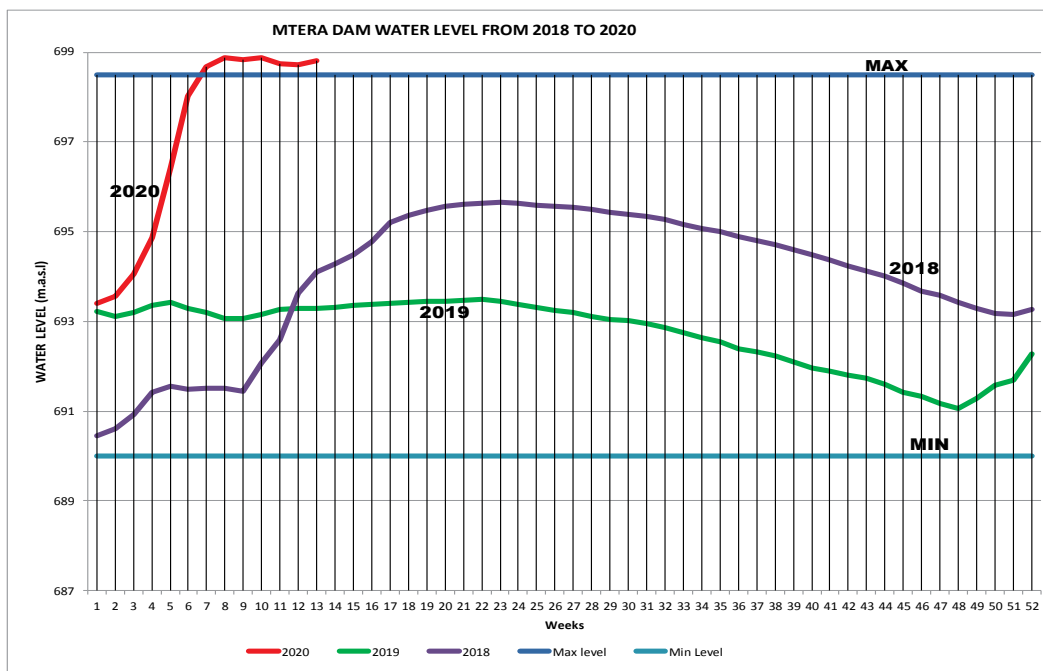


Figure 13: Trends in water levels at Mtera Dam from 2018 to 2020

While future rainfall and water flows may increase in main rivers in the country particularly the Pangani and Rufiji basins that are both important for hydropower, increasing evaporation and siltation can constrain Tanzania's inadequate electric supply.

According to the PSMP, 2020, the current contribution of liquid fuels in power generation is about 5.67%. However, the government's plan is to phase out the diesel/HFO from the National Grid system by 2021 and retained as reserve capacity in the range of 15 – 20% for emergency throughout the planning period. Successful implementation of the plan will contribute to the reduction of GHG emissions and enhance the use of the renewable energy sources in the national grid.

Additionally, power loss from both transmission and distribution lines has been the biggest challenge facing TANESCO and it enhances vulnerability of energy utility. The level of power loss in 2019 was 16.19%, split as 5.88% and 10.31% for transmission and distribution losses (technical and non-technical), respectively. However, TANESCO has already started implementing strategies of reducing power losses through different initiatives such as increasing in the rate of inspecting customers and replacements of conventional electricity meters to smart meters (LUKU) and construction of high voltage transmission lines (400 kV) to connect significant power loads. Through such efforts, the amount of power losses is planned to be reduced to as low as 12% by 2026.

Moreover, based on the Power Supply Master Plan, TANESCO plans to increase power interconnection with the neighbouring countries within EAC and SADC regions so as to address vulnerability of the energy sector. Based on the PSMP 2020, the power interconnection with five neighbouring countries is set to be achieved by 2025. Therefore, energy diversification is deemed essential for ensuring energy security in the country.

h) Industry

Most of the industries concentrate in manufacturing of simple consumer goods including food, beverages, tobacco, textiles and furniture, as well as wood and allied products of which they depend much on agro-products. In 2019, production of selected industrial products continued to increase due to high demand in the domestic and global markets. Production increased in the following products; cement (36.7%), paints (21.1%), tin (20.0%), sisal ropes (14.0%), wood clusters (12.5%), fishing nets (11.4%), konyagi (10.3%), biscuits and spaghetti (7.1%), cigarettes (5.7%), batteries (4.4%), pyrethrum products (4.3%) and wheat flour (2.6%) (The Economic Survey 2019).

The Tanzania's Integrated Industrial Development Strategy (IIDS) 2025 reflects growing Micro Manufacturing Enterprises (MMEs), which are scattered and, in most cases, operating informally. The large dependence on agricultural raw materials means that the industrial sector is vulnerable to the impacts of climate change.

Despite the agro-based nature of most of these industries, power supply is mainly from hydro sources, which are vulnerable to climate change, particularly drought. Therefore, climate change adversely affects the sector and people's wellbeing at large. The effects include: -

- a) Decrease in industrial production due to unstable power supply, water supply, low or inadequate supply of agricultural raw materials, damage of infrastructure, which mean limited inflow of foreign currency;
- b) Increase of industrial production costs due to imported materials and technology, which would mean more capital flight;
- c) Increased occupational health risk due to high temperatures and inadequate water for sanitary activities; and
- d) Increase in unemployment rate due to decreased industrial investment and production.

Tanzania is now a lower middle-income country. In this context, the government is promoting further industrial development. Recent development has been observed in light manufacturing industries and/or agro-processing plants and mills. Most of these are located mainly in urban centres. Industrial development in the face of climate change poses great challenges towards these targets. Impacts of climate change in other sectors such as infrastructure, agriculture, and livestock will also affect supply of raw material for agro-industry.

i) Health

Climate variability is associated with the geographical distribution and reproduction of vectors responsible for a number of diseases. Outbreaks of vector borne diseases that are known to be influenced by climate variability include malaria, dengue, rift valley fever, yellow fever and trypanosomiasis.

Malaria is the most important public health concern in Tanzania, especially in children under five years of age and among pregnant women (four times more likely to suffer from malaria than the average population). The disease accounts for 16.7% of all reported deaths and is one of the leading causes of morbidity, ranging from 24.4% in Rukwa region to 48.9% in Dar es Salaam^{23,24}. In the past 10 years there are already reported incidences of epidemic malaria especially in highland areas that were traditionally free from mosquitoes and malaria such Tanga, Kilimanjaro, Iringa, Kagera and Mbeya, among others, where it was not prevalent before.

On the other hand, warmer climate, frequency of flooding and drought would increase water borne diseases like typhoid and cholera. The spread and outbreak of cholera are concomitant with the climate prediction in the country. Studies show significant relationship between temperature and the incidence of cholera in the country.

²³ MoH (2016). *Demographic Health Survey 2010 and 2015*. Ministry of Health, Community Development, Gender, Elderly and Children. Dar es Salaam.

²⁴ MoH (2018). *Tanzania Malaria Indicator Survey 2017*. Ministry of Health, Community Development, Gender, Elderly and Children. Dodoma.

It is predicted that for a 1-degree Celsius temperature increase the initial relative risk of cholera increases by 15 to 29%. The total costs of cholera attributable to climate change are shown to be in the range of 0.32 to 1.4% of Tanzanian GDP in 2030. Moreover, it is projected the number and costs of additional cases of cholera that can be attributed to climate change by 2030 in Tanzania for a 1-2⁰C increase in temperatures accordingly.

Heat strain or stress including heat exhaustion, heat stroke, and dehydration are putting people at greater health risk. Symptoms of heat stress include difficulty in concentrating, confusion, dizziness, headache, muscle cramps, heat rash, fatigue, fainting and nausea. In the most serious cases, heat stroke can happen and may lead to unconsciousness and death. Existing studies indicate that by 2040, Dar es Salaam will have hotter days in a year (50-180 days), and hotter nights compared to the historical average of 36 days. This is expected to increase cases of heat stress related illnesses in the region and other parts of the country.

Despite the presence of linkage between climate change and climate sensitive diseases in the country, there is no system to track down prevalence of such diseases despite the presence of health information management system. In addition, there is inadequate utilization of information released by TMA regarding weather changes such as excessive rains and diseases preparedness and response. Development of health-related early warning system could help to alert about the disease incidences and outbreaks and thus planning to respond timely.

The number of healthcare facilities has increased in the country, both public and private. In addition, there is an expansion of service delivery in the hospitals. For example, based on the GAZETTE, issued on November 05, 2010, regional hospitals and three municipal hospitals in Dar es Salaam were upgraded to become “Regional Referral Hospitals”.

Additionally, 10 hospitals owned by Faith Based Organizations were also officially recognized as “Referral Hospitals at regional level”. This means that more services are delivered in these hospitals compared to the past. The increase in the number of hospitals and expansion of service delivery are associated with increase in the use of resources such as water and energy. In addition, the generation of healthcare waste is also on increase.

It is estimated that healthcare waste generation ranges from 0.5 to 2.5 kg per bed per day. The quantity of healthcare waste is estimated at 60 - 70 tons per day. Management of these wastes remains to be a challenge in the country. Incineration is the recommended method of treatment. However, only less than 10 hospitals have proper functioning incinerators. The rest of the incinerators do not meet temperature requirements as per national healthcare waste management guidelines. Due to incomplete combustion caused by the use of such incinerators, generation of gases such as carbon dioxide which are culprits of climate change are on increase. These challenges call for several transformations in hospitals such as the use of non-incineration technologies in the treatment of wastes and use of clean energy sources so as to minimize emissions of greenhouse gases that contribute to climate change.

The feasibility study conducted on HCW generation in Dar es Salaam in 2012 estimated that the generation of healthcare waste in the city with more than 650 Healthcare facilities was

2,592 tons per year out of which 1,898 tons, which is equivalent to 73% of the total wastes generated, needs to be incinerated according to International practice.

Based on these trends, the Ministry of Health, Community Development, Women, Elderly and Children developed the Health Sector National Adaptation Plan (HNAP) to mobilise resources to address observed and projected impacts of climate change in the health sector. However, this Strategy is yet to be effectively used to bring intended contributions in the sector and hence deliberate efforts are needed to operationalize it.

j) Coastal and Marine Environment

Coastal and marine ecosystems directly support the livelihoods of many Tanzanians. Human activities coupled with the impacts of climate change have resulted into deterioration of these ecological systems; thereby decreasing their capacity to deliver the expected benefits. Evidence of major climate change related impacts in Tanzania include destruction of coral reefs, coastal erosion, submergence of small islands, destruction of coastal infrastructures and human settlement, intrusion of sea water into freshwater wells, and degradation of mangrove and coral reefs.

Mangrove and coral reefs protect the shoreline and coastal land against ocean waves or surge effects. Mangroves and coral reefs contribute greatly in the maintenance of biodiversity and genetic library in whole coastal ecosystem. Mangroves and coral reefs are used as feeding, nursery and/or spawning areas by transient species, thereby providing important biological support or links for many mobile organisms from different coastal habitats. Coral reefs directly support pelagic food webs through export of organic production to the adjacent ocean.

The socio-economic values of coral reefs are realized mainly through coastal fisheries and coastal tourism. Coral reefs and associated ecosystems provide more than 70% of all artisanal fish production²⁵. Despite their values, about 80% of coral reefs in Tanzania are threatened by human activities, including overfishing, use of dragnets, blast fishing, spear/gun fishing, and use of poisons.

Degradation of reefs not only results in tremendous losses of biodiversity but also leads to declining fisheries and tourism and, consequently, increased poverty to coastal communities. Global threats to this ecosystem include over-fishing, destructive fishing practices, habitat destruction, pollution, ocean acidification, global warming, eutrophication, diseases, damage from anchors and watercrafts. Photos 3 and 4 shows healthy and unhealth corals due to effects of coral bleaching caused by ocean acidification as a result of decrease in the amount of carbonate, a key building block in sea water which makes more difficulty for marine organisms including coral and some plankton to form their shells and skeletons and existing shells may begin to dissolve.

²⁵ Hamad et al. (2019). *Climate Change Increasing Threats on Non-Conserved Mangroves Forests of Micheweni, Zanzibar–Tanzania*. Tanzania Journal of Science 45(3): 527-538.



Photo 3: Appearance of healthy corals



Photo 4: Appearance of unhealthy corals (coral bleaching)

The loss of coral reefs is likely to continue having impacts on the marine and coastal resources, particularly fisheries that depend on coral reef ecosystem as breeding, nursery and feeding habitat. Sea level rise impacts are increasingly manifested by accelerated coastal erosion.

k) Blue Economy

Even though Blue economy²⁶ is not one sector, the concept of *Blue economy*²⁷ refers to *marine-based sustainable economic development* that leads to improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities. Thus, the ‘Blue Economy’ or ‘Ocean Economy’ is an emerging global concept that encourages better stewardship of our ocean resources. Similar to the ‘Green Economy’, the concept of “Blue Economy” seeks to promote economic growth, social inclusion, and the preservation or improvement of livelihoods while at the same time ensuring environmental sustainability of the oceans and coastal areas.

Blue economy also reflects in the Goal 14 of the UN’s Sustainable Development Goals (SDGs), which states: “Conserve and sustainably use the oceans, seas and marine resources for sustainable development”. Currently the Blue Economy is at the centre of the AU’s Agenda 2063: The Africa’s Integrated Maritime (AIM) Strategy (2050) that recognizes that Africa’s inland waters, oceans and seas have vast potential for wealth creation.

The blue economy has diverse components, including established traditional ocean industries such as fisheries, tourism, and maritime transport, but also new and emerging activities (such as offshore renewable energy, aquaculture, seabed extractive activities, and marine biotechnology and bioprospecting). Other services provided by ocean ecosystems include carbon sequestration, coastal protection, waste disposal and the existence of biodiversity.

Tanzania is endowed with a long and rich coastline of about 1,450 kilometres long and Exclusive Economic Zone (EEZ) with pristine biodiversity domains comprising of great ecosystems of corals reefs, diverse species of fish and other aquatic organisms. However, the concept of blue economy in the country focuses beyond ocean and its related resources and relevant activities.

Existence of major lakes and rivers, ports and harbour as well as clean and beautiful beaches provides an opportunity for the country to reactivate and give added momentum towards promoting the concept of a blue economy in practical and tangible terms. This can be best achieved through holistic multi-sector planning, judicious investment, effective engagement of the private sector, and involvement of key players and stakeholders.

Blue Economy offers a number of opportunities for sustainable, clean, equitable blue growth in both traditional and emerging sectors in Tanzania such as fisheries, aquaculture, marine tourism, energy, port, shipping and port facilities, marine biotechnology and bioprospecting. Rising of temperature and rainfall anomalies will accelerate sea-level rise, modify ocean circulation and change marine ecosystems, with considerable socio-economic consequences

²⁶<https://www.gktoday.in/gk/blue-economy-concept-elements-and-evolution/#:~:text=%20Blue%20Economy%3A%2>

²⁷[https://www.gktoday.in/gk/blue-economy-concept-elements-and-evolution/#:~:text=%20Blue%20Economy%3A%](https://www.gktoday.in/gk/blue-economy-concept-elements-and-evolution/#:~:text=%20Blue%20Economy%3A%2)

(IPCC, 2007)²⁸. The warming will further cause expansion of ocean waters and melting of glaciers and ice caps in the polar countries. Some deleterious effects associated with sea-level rise in Tanzania have been pinpointed as the likelihood of inundation of low-lying coastal areas, accelerated coastal erosion, changes in sediment budgets, rising water tables, saline intrusion, damage to coastal structure and loss of coastal ecosystems.

In addition, other sectors in the blue economy need to be exploited to create opportunities in the context of climate change. Government initiatives is to promote linkage between blue economy and existing conservation initiatives such as restoration of coral reef, eco-tourism, climate proof infrastructure, green harnessing of marine and fresh water resources, conservation of mangroves, promoting efficient transports enhances adaptation and resilient of the marine and fresh water ecosystems.

I) Transport and Infrastructure

Tanzania's transport infrastructure is under growing pressure. The country's high economic growth over last decades (6 - 7%) has increased the usage of transport network that has been facing various challenges. These challenges include floods and overflowing rivers that disrupt trade flow and transportation of goods and passengers. These risks are expected to further increase with climate change. The floods and overflowing of rivers caused severe damages on infrastructure including buildings, roads, airdromes, railways and human settlements.

Additionally, landslides have continuously affected buildings and road infrastructures in Same and Moshi districts. For instance, from 2014 to 2019, floods affected critical infrastructures from the coast to the highlands, destroying roads, bridges and public and private buildings. Implications of severe weather and extreme events in 2016 included loss of lives, property and severe damages on infrastructures. Heavy rains in Morogoro region destroyed road networks that connect Kilombero and Ulanga districts. Likewise, there was a shutdown of public transport in Dar es Salaam (Jangwani) because of flooded Msimbazi River.

In 2018, Natural Gas Pipeline in Mnazi Bay Mtwara was affected by heavy rains that eroded soil covering section of the pipeline located close to Mnazi Gas Processing plant. This situation necessitated for mitigation measures that were costly to TPDC. Similarly, in 2019 the heavy rain caused economic activities like transportation, communication, buildings and power services to a standstill. Up to 15 bridges of the roads managed by the Tanzania Rural and Urban Roads Agency (TARURA) in Handeni district were damaged. The situation was equally felt by the highways operated by the Tanzania National Roads Agency (TANROADS), which include a portion of the Dar es Salaam-Arusha road, Korogwe-Handeni-Mkata section, Mandera Bridge between Korogwe and Segerera. In 2020 impacts of extreme rainfall events destroyed the Kiyegeya Bridge connecting Dodoma and Morogoro regions.

With regard to railway transport, flooding events due to extreme rainfall have periodically affected the central railway line. The recent flood on 4th January 2021 swept away part of

²⁸ IPCC, 2007 IPCC, 2007: Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change

railway line at Makutupora area in Dodoma leading to hundreds of passengers stranded after TRC suspended services. It was estimated that TRC had lost 150 million shillings per month after the suspension of services.

Additionally, repeated flooding at Mwanza Airport affected aviation, whereby planes failed to land a couple of times. Between 2019 and 2020 extreme wind and wave currents disrupted marine transportation between Dar and Zanzibar, Dar and Mafia, Pemba and Unguja islands. Photos 5 and 6 shows the effects of flooding on infrastructures and housing in Tanga, Dar es Salaam and Lindi Regions in 2020.



Photo 5: Effects of floods on road infrastructures in Handeni, Tanga Region



Photo 6: Effects of flooding on road infrastructures, public transport and housing in Dar es Salaam city

These effects of extreme weather events are expected to further impact the transport sector. Hence there is need to put in place intervention measures to ensure the sustainable contribution of the sector to the national economy.

It is important to ensure that all infrastructures are climate resilient so as to reduce losses and disruptions. The plan, design and construction of new infrastructures need to prioritise and mainstream climate change. Existing infrastructures will need to be continuously enhanced and or retrofitted under a given climate change. Other infrastructures such as sea walls need to be up scaled so that the coastal areas are resilient to climate change. Awareness creation on climate change adaptation infrastructures has to be emphasised across sectors. It is important to monitor guidelines and benchmarks to strengthen accountability on climate change adaptation through infrastructure development across sectors.

m) Tourism

The tourism sector plays a significant role in the Tanzanian economy. According to the National Five-Year Development Plan (NFYDP) 2016/21, from 2012 tourism has been the leading sector in terms of foreign exchange earnings and is the third largest recipient of foreign direct investments (FDIs) after mining and manufacturing. According to the Bank of Tanzania Monthly Economic Review (MER) report (2018), the tourism industry was the main source of foreign exchange receipts by Tanzania in 2018. The MER report for the year ending December 2018, the earnings reached US\$2.44 billion from US\$2.25 billion for the same period in 2017. The tourism sector is an ideal vehicle for economic growth and poverty reduction.

Climate change affects a wide range of environmental resources that are critical for tourists' attractions, such as wildlife, biodiversity, and water levels and quality. It also has an important influence on environmental conditions and incidents that can deter tourists, such as high temperatures, extreme precipitation, infectious disease, wildfires, increased wildlife mortality, and insects and waterborne pests.

The ecosystem services are threatened by climate variability and change, natural and societal factors. The Serengeti, for example, has lost 40% of its original area since 1910; the Mara River has lost 50% of its water flow since 1970, while Kilimanjaro has lost 82% of its ice cap in the last 90 years (Kilungu et al., 2016). Damage to infrastructure due to extreme rainfall and flooding, such as roads and buildings, can limit access to tourist attractions and increase of operating costs. These events are expected to increase as climate change affects precipitation patterns, landscape features, ice-melting rates and animal migration patterns. Therefore, severe seasonal rainfall is an important factor shaping tourism seasonality in national parks including the famous Serengeti National Park (SENAPA).

n) Human Settlements

According to Tanzania National Population Projections of 2020, the population of Tanzania in 2020 was estimated to be 57.6 million people URT (2018). Population of Tanzania mainland

was about 52.6 million people, growing at a rate of 2.7% per annum²⁹. Tanzania has a total of 12,678 recognized human settlements out of which 12,545 are villages and 133 are urban centres. The urban centres are composed of 6 cities, 20 municipals, 33 towns and 74 townships. Tanzania has a high urban population growth rate at 5% per annum.

Currently, majority of urban populations are associated with urban informality indicated by informal/unplanned settlements with limited or no basic services including physical infrastructures and socioeconomic services such as roads, water and sanitation and storm water drainage systems. Unplanned settlements have been increasing and some of them are located in hazard-prone lands including steep slopes, flood plains, river valleys, and near dump sites.

The provision of basic services in human settlements in terms of infrastructure and socio-economic services is inadequate. However, it is important to note that in the recent years the infrastructures and basic services have been improved to large extent. The rapid population growth has led, in some cases, to the misuse of natural resources, which in turn has contributed to factors leading to climate change. Photos 7 and 8 shows the effects of climate change induced flooding on human settlements in Lindi Region in January 2020.



Photo 7: Incidents of floods in Lindi, January 2020

²⁹ NBS (2019). National Climate Change Statistics Report, National Bureau of Statistics, Dodoma.



Photo 8: Effects of climate change induced flooding in Lindi Region, January, 2020

Furthermore, as projected for other African countries, 50% of the population is poised to live in urban areas by 2050. While positive from the economic development perspectives, urbanization is likely to pose significant challenges that could aggravate climate change if not well managed especially given the already inadequate capacity of infrastructures.

Key challenges associated with urbanization that may exacerbate climate change include poor waste management, increased demand for resources such as water, energy, sanitation and hygiene (WASH) services; increased slums and improper land use plans, air pollution-transport due to dust and waste, heat island effect due to enlarged built environment, increased floods due to poor waste management and improper land use planning.

On the other hand, Tanzania is on the way to become middle income country by 2025, having achieved the lower middle-income status earlier than planned in 2020. Like urbanization, industrialization will exert more pressure on the environment and climate change through an increased waste generation, resource demand and pollution.

In view of the above, there is an urgent need to develop green/low carbon urbanization and industrialization plans that promote green space, land use plans and nature-based adaptation; enhancing green cities by promoting green buildings, transport, energy and infrastructures; promote eco-smart villages programme by enhancing retrofitting for resilient on affordable and sustainable households; enforce environmental impact assessment and audit (EIA/EA) and strategic environmental assessment (SEA) for industrialization including zonation, promote integrated sustainable transport systems, dedicate dumpsite playground and promote discussion and practices on circular economy notably recycling and re-use of waste products.

o) Waste management

Waste management refers to activities involved in identifying materials that are no longer usable and are either gathered for systematic disposal or thrown away. In general, there are three main types of wastes: namely, solid, liquid and gaseous wastes. These wastes are generated from different sources including residential houses, industries, solid waste disposal sites, farms, livestock keeping and many other human activities.

It is estimated that the quantity of municipal solid waste generated countrywide is 10,000 tonnes per day. The indicative generation rate ranges from 0.1 - 1.0 kg/cap/day. It is estimated that as much as 80 – 90% of solid wastes generated in urban areas are not collected for safe disposal. In addition, most of the domestic wastes, which accounts for about 60% of the total solid waste generated daily, are disposed by burning or burying. Solid wastes in urban areas are managed by urban authorities in collaboration with private sector.

In terms of liquid waste there are several types which can be categorized into hazardous and non-hazardous. The main sources are residential houses, industries, laboratories, commercial centres and many more human activities. In Tanzania domestic liquid wastes are mainly contributed by faecal disposal systems and kitchen waste due to the fact that majority of population both in urban and rural areas use onsite disposal systems for faecal disposal. According to URT - TNBS (2018) by 2016, only 10 towns/cities in Tanzania had central sewerage systems, which covered only 20% of total urban population.

The Urban Water and Sewerage Authorities (UWASAs) are responsible for managing liquid wastes in the urban areas. In rural areas, management of wastewater is left to households and is mainly onsite. The proper management of wastes has become one of the most pressing and challenging issues especially in urban areas. This is due to the fact that mismanagement of waste in one way or the other contributes to the factors leading to climate change or exacerbates the impacts of climate change through greenhouse gases emission. According to NDC report (2019), contribution of wastes in GHG emission was 19,962kt for carbon dioxide gas.

p) Disaster risk management

Disaster risk management play significant role in addressing climate change adaptation measures. Measures to address climate related disaster have been hampered by severe and extreme weather events resulted from climate variability and change have been a main threat to communities' resilience. Weather related events in recent years have resulted in extensive disaster risks in many parts of the country due to socioeconomic condition of majority of rural and unprivileged urban communities. For instance, in the past five years the country has experienced various weather disasters with significant humanitarian and economic consequences. The country has experienced floods in different Districts from 2015 to 2020 which cumulatively killed 307 people, affected 317,907 people and destroyed 50,588 houses. The Regions which are frequently affected by floods include Dar es Salaam, Tanga, Mwanza, Morogoro, Lindi, Mtwara, Iringa, Dodoma, Kigoma, Rukwa, Pwani and Kilimanjaro. Rainstorm killed 47 people, affected 3,500 people and destroyed 634 houses in Kahama district

in 2015. In 2015/16 El Niño directly affected 84,643 people and destroyed 1,006 houses and 11,167.4 hectares of food crops, destroyed schools, health facilities, roads, bridges and other public and private infrastructures in Mwanza (Ilemela), Mtwara (Mtwara mikindani and council), Pwani (Rufiji) and Iringa (Iringa municipal).

2.3 Cross-Cutting Issues

These are cross-cutting themes that are of relevance to climate change mitigation, adaptation and policy measures as elaborated hereunder.

2.3.1 Climate Financing

a) National Experience in Accessing Climate Finance

According to Climate Policy Initiative's report, while climate finance has reached record levels, action still falls far short of what is needed under 1.5°C scenario and IPCC special reports. Estimates of the investment required to achieve the low-carbon transition globally range from USD1.6 trillion to USD3.8 trillion annually between 2016 and 2050 for supply-side energy system investments alone (IPCC 2018), while the Global Commission on Adaptation (GCA, 2019) estimates adaptation costs of USD 180 billion annually from 2020 to 2030.

Tanzania is highly vulnerable to the adverse impacts of climate change, which include seasonal variations, frequent and prolonged droughts, frequent floods, strong winds, and sea level rise associated with saltwater intrusion. According to NCCS (2012), costs associated with climate change impacts in the country make up about 1-2% of GDP per year. Furthermore, the study undertaken by the Stockholm Environment Institute in 2010 estimates that the cost of building adaptive capacity and enhancing resilience against future climate change in Tanzania is USD100 to 150 million per year. In addition, the cost of implementing Tanzania NDCs is estimated to be USD 14 billion.

Tanzania is an eligible country for most of the available international climate funds; mostly receiving climate finance from multilateral funds including Global Environment Facility (GEF), Adaptation Fund, Least Developed Countries Fund (LDCF) and Green Climate Fund (GCF). Although global climate financing seems to have substantial increase, there is a significant shortfall in accessing those funds, thus lagging behind in supporting the needed programmes and projects geared to climate change adaptation and exploiting existing mitigation potentials in various sectors.

Since the establishment of GEF in 1991 as the financial mechanism for a number of MEAs, the United Republic of Tanzania has received non-repayable financial support approximately worth US\$1,096 million and US\$7,987 million in co-financing for 108 projects, focusing on seven GEF focal areas, including 10 climate change related projects. Other GEF focal areas include: biodiversity, international waters, land degradation (desertification and deforestation), chemical pollution, sustainable forest management and cross-cutting capacity development.

Moreover, the United Republic of Tanzania also participated in 73 regional and global projects funded by GEF totalling to US\$ 988.3 million, with US\$7,485 million allocated as co-financing, including the development of the Intended Nationally Determined Contribution to the Paris Agreement under the UNFCCC.

Additionally, the United Republic of Tanzania also participates in the Small Grants Program (SGP) promoted by the GEF since 1996. The focal areas that received support under the SGP are biodiversity, chemicals, climate change mitigation, community-based adaptation, international waters and land degradation. During this period, Tanzania participated in a total of 363 projects worth US\$10.71 million, with US\$ 2.3 million allocated as in-kind co-financing.

Further, Tanzania participated in four national projects funded by LDCF totalling to US\$ 15.1 million, with US\$ 111.7 million allocated as co-financing). The output and outcomes of the projects facilitated improvement of biodiversity conservation, alleviating adverse effects of climate change, fostering sustainable land management as well as addressing some challenges of pollutions and enhancing technical and institutional capacities to address environmental issues. Reports on success of the projects and programmes undertaken in this context are available on the GEF website.

At local level, Tanzania has launched the Local Climate Finance Initiative (LCFI), which allows local government authorities across the country to access and use climate finance effectively for building verifiable climate-resilient local economies and communities. These climate initiatives contribute to ensuring climate change resilient communities and local economies by using a country-based mechanism to channel climate finance (from various sources) to local government authorities. The initiative responds to the Paris Agreement and its associated Nationally Determined Contributions (NDCs), and contributes to the achievement of climate related SDGs– with concrete action at the local level, working closely with local governments and communities to help them access the climate finance and support what they need to respond and adapt to climate change.

Under the LCFI, it is envisaged that technical assistance is envisaged for Tanzania to gain direct access to the Green Climate Fund and for Community-led adaptation planning.

In general, even though climate finance exists at global and through bilateral sources³⁰, the climate finance gap has continued to widen and coupled with increases of impacts of climate change in Tanzania. The seemingly substantial amount of climate financial resources existing in global climate funds and development partners flow through different actors and channels through both state and non-state actors.

However, access to available global funding has been limited in Tanzania and these funds seem to be insufficient for the future climate change financing. In addition, financial flow from private sectors and other economic investments remains unnoticed in the current climate

³⁰ Norrinton G. and Thornton D.N. (2011). Climate Change Financing and Aid Effectives. Tanzania, Case Study, pp 40

financial landscape in the country. This may be partly due to low engagement and inadequate awareness of the private sector on issues related to climate change. In addition, prioritization of climate finances from different sources has remained a big challenge and thus affecting effectiveness of received finances from both global and bilateral sources.

Thus, there is need for enhanced coordination and tracking of all funds flowing into the country so as to effectively address climate change challenges. The National Five-Year Development Plan 2015/16 – 2020/201 envisaged for development of a national climate change financing mechanism to be able to track the flow of all climate finances in the country.

b) Challenges

Some of the challenges experienced by the country, over the years, with regard to climate financing include:

- i) The long-term trend shows that funding climate change response actions in the country has grown notably and will continue growing; however, Tanzania has managed to access limited amount of climate finance from a number of bilateral and multilateral climate funds.
- ii) While there have been numerous efforts towards capacity building on climate change issues, there is still a massive gap. The current capacity of climate change focal points/desks within sector ministries is inadequately compounded by the limited financial resources available.
- iii) There is inadequate framework and mechanisms to finance climate change thus creating no sustainability in financing of climate change initiatives. It has been more of project rather than program based.
- iv) Sector ministries have established ‘desks’ to coordinate and mainstream climate change in their respective sectors. However, the current capacity of these climate change desks is inadequate due to limited knowledge on climate change, compounded by the limited financial resources available.
- v) The private sector has not been adequately engaged in climate change activities in Tanzania through independent activities (such as in renewable energy and forestry activities), as well as through PPPs.
- vi) Accessing climate finance particularly from international financing mechanisms is rather cumbersome and takes long which is exacerbated by inadequate capacity among stakeholders to prepare bankable proposals.
- vii) Regular and predictable Local Governments’ access to climate finances is limited to project-based approach or via ad hoc call for application. It is paramount to devise mechanisms and processes that enhance the effectiveness of adaptation finance, including strengthening transparency and responsiveness of donor funding,

increase ownership and participation of local communities, build the capacity of local stakeholders and of local financial structures to better manage finance and deliver adaptation results, while addressing asymmetries, in particular the gender dimension, and that ultimately empower local governments in contributing towards NDC implementation

2.3.2 Capacity Building

The need for capacity building is enshrined in Article 9 (d) of the UNFCCC, which calls for the Subsidiary Body for Scientific and Technological Advice (SBSTA) – the body created under Article 9 of the Convention – to provide ‘ways and means of supporting endogenous capacity-building in developing countries.

Tanzania is facing inadequate capacity to address climate change challenges at all levels, including in the Ministry Responsible for Environment, Regional Administration and Local Governments, and Sector Ministries; Climate Observation and Monitoring Institutions; carbon monitoring institutions; and Research and Academic Institutions, building contractors and architectures.

Capacity building, particularly training to technical staff on climate change adaptation at national and sub-national levels has mainly been undertaken in patches through projects, programs and plans. Example of such project is Developing Core Capacity to Address Climate Change in Productive Coastal Areas project which was implemented in Pangani (Tanga), Rufiji and Bagamoyo districts (Coast), and Zanzibar in 2013-2019; Implementation of Concrete Adaptation Measures to Reduce Vulnerability of Livelihoods and Economy of Coastal Communities of Tanzania project which was implemented in Dar es Salaam from 2013 - 2019; and strengthening climate information and early warning systems in Tanzania for climate resilient development and adaptation to climate change project which was implemented at national level through Department of Disaster Management in the Prime Minister’s Office from 2013 - 2017 focusing on installation of hydrological and weather stations.

It is also important to sensitize and build capacities of communities to understand climate change adaptation strategies based on their context and needs, as well to enhance their participation and governance of adaptation finance. Through ongoing initiatives, both local governments and community awareness and capacities to respond to climate impacts at the local level will be enhanced and climate change adaptation will be mainstreamed into local government planning and budgeting systems in a participatory and gender-responsive manner. By doing so, capacity building initiatives and support are expected to support Tanzania in strengthening local and national governance capacities, building stronger decentralisation and delivering on its Nationally Determined Contributions (NDCs, National Adaptation Plan (NAP), Five-Year Development Plan (FYDP III) and Vision 2025.

In view of the risks and opportunities presented by climate change, comprehensive capacity assessment and capacity building is required to strengthen continuous capability of the country. Currently, most technocrats and decision makers do not have sufficient capacity on adaptation

and exploitation mitigation opportunities geared towards addressing climate change. Therefore, it is important to put in place a targeted strategic intervention to address climate change capacity challenges at all levels in the country.

2.3.3 Research and Systematic Observation

Research and Systematic Observation (RSO) is a key to an informed development climate change policy, strategies, programmes and plans. Climate change research provides assistance to policy makers for strategic planning in the wake of climate change in areas of focus such as climate scenarios, impacts on water resources, impacts on food security and adaptation measures.

In view of this, the government has undertaken different initiatives in research and systematic observation through projects such as Strengthening Climate Information and Early Warning Systems in Tanzania. The initiative was geared to help Tanzania adopt new technologies to reinforce capacity of the national early warning network to better anticipate and respond to extreme climate events. Furthermore, the initiative facilitated installation of Automatic Weather Stations, installation of the fibre optical network stations, training of Tanzania Meteorological Authority technical staff, Installation of hydrological stations and installation of rainfall stations.

At present, climate research activities are dispersed within universities and other research institutions. Capacity for climate-related research in most of these institutions is limited. To facilitate effective adaptation to climate change impacts in economic sectors, there is a need for increased and continuous research and development because of the high unpredictability of climate variability and the need for continuous learning from future occurrences. There is a need to establish and support platforms for climate-related research institutions to coordinate their activities to achieve synergies and avoid duplications as much as possible. The current strategy will seek to enhance the capacity of research institutions to increase their research and development activities aimed at addressing current and future climatic effects and their impacts on important sectors.

2.3.4 Technology Development and Transfer

In the context of climate change, technology transfer is defined as “a broad set of processes covering the flows of know-how, experience and equipment for mitigating and adapting to climate change amongst different stakeholders such as governments, private sector entities, financial institutions, non-governmental organizations and research/education institutions”. It has been one of the topics that have continuously generated much debate in the international climate change negotiation processes.

Technology transfer is one of the ‘building blocks’ of the Bali Action Plan (BAP), which calls for enhanced action on technology development and transfer to support action on mitigation and adaptation, including, inter alia, consideration of effective mechanisms and enhanced means for the removal of obstacles, and provision of financial and other incentives for scaling

up of the development and transfer of technology to developing country Parties, to promote access to affordable environmentally sound technologies, ways to accelerate deployment, diffusion and transfer of affordable environmentally sound technologies, cooperation on research and development of current, new and innovative technology that facilitate win-win solutions and the effectiveness of mechanisms and tools for technology cooperation in specific sectors.

2.3.5 Communication, Education and Awareness

In many developing countries including Tanzania, there is a critical dearth of knowledge and skills in areas related to climate change science and policy. This is partly due to the fact that climate change is relatively new subject in many of these countries and is therefore not mainstreamed as part of their schools' and colleges' curricula. As results, little information and knowledge is communicated to the public at large.

In this context, it not uncommon to find that most climate change initiatives at sector and local level are coordinated by staff who do not have formal training or awareness on climate change³¹. This calls for effective training and communication across all levels of the government, non-state actors, business communities and private sector.

Besides, climate change has both direct and indirect impacts on education³². The primary impacts of climate change on education arise from the effects of extreme weather events, such as heavy rains accompanied by flash floods, strong winds and hailstorms with short and long-term consequences. Drought and increasing temperatures lead to poor harvests and food scarcity which have negative impacts on educational attainment amongst poor communities due to truancy, absenteeism and children dropping from school.

Likewise, drought reduce the availability of safe drinking water, compromise sanitation and increase the incidences of water borne diseases such as diarrhoea and cholera that lead into truancy for school children. According to Study International report (2019³³), school hours are forced to be reduced as a result of negative effects of climate change such as heat waves and floods. In Tanzania, recent floods in February 2020 in Kilwa district led to school closure for almost one month. Moreover, floods in Mtwara in January 2021 compelled schools to close for more than two weeks, affecting school attendance and teaching calendar. Both school infrastructures (building classroom) and transport to schools were affected by adverse impacts of climate change.

On the other hand, education sector offers an important opportunity for tackling climate change. According to Study International Report (2019), students are increasingly becoming

³¹ Norrington G and Thornton D. N. (2011). Climate Change Financing and Said Effectiveness. Tanzania case study

³² Zimbabwe Human Development Report 2017 - Human Development: Towards Building a Climate Resilient Nation Climate Change and Education

³³ Study International Staff, 19 August 2019. How to implement climate change education in schools

part of the effort to find solutions for climate change if given proper training and skills in their school curriculum. The training imparts relevant knowledge and skills to a wide range of stakeholders (i.e., formal and informal) for addressing climate change as well as through implementation of actions that would reduce the impacts of climate change including adoption of energy and water use efficiency technologies for buildings as well as switching cooking energy from firewood to environmentally friendly cooking solutions (e.g. LPG and biogas).

Through proper training and skills, students acquire academic reasoning and structure that can help them to contextualise and take actions to address climate change and perspectives. Some students³⁴ launched global movements that seem to change the world and attract action-based support to address climate change. In order to foster informed climate change campaign both direct and indirect impacts of climate change on education as well as proper skills need to be addressed and imparted at all levels of education in the country.

Cognizant of the serious threats posed by climate change to the development process, the government has initiated efforts of promoting climate change education. For example, the University of Dar es Salaam established the Centre for Climate Change Studies (CCCS), a semi-autonomous institution within the University of Dar es Salaam that deals with climate change research, training and education. Similarly, other universities such as Ardhi University, University of Dodoma and Sokoine University of Agriculture have mainstreamed climate change issues in their curricula.

Furthermore, the government of Tanzania promotes initiatives of different stakeholders and forum, including state and non-state climate communication networks. However, there is currently no systematic platform for bringing together key stakeholders and actors (both state and non-state) on annual basis to share their experiences, challenges, solutions and opportunities on addressing climate change from different perspectives and levels in view of supporting implementation of the Strategy and other climate change initiatives. This gap needs to be addressed as it limits opportunities for taking stock of progress on implementation of the Strategy and galvanise climate action based on new solutions and technologies requiring scale up, replication as well as strengthening partnership between government, private sector and CSOs.

2.3.6 Gender Mainstreaming

The climate change affects men and women differently due the existing gender roles as shaped by norms, cultures and traditions. Given the predominance of women engagement in climate sensitive sectors including water, agriculture and energy, the gender impacts of climate change are already apparent and reported in many different parts of the country. The most reported incidences include increased women burden on household chores such as walking longer distances to fetch water due to drying of shallow wells and seasonal rivers/springs, increased farming tasks due to frequent droughts, and family health care due to increased diseases from climate related extreme weather events. These have been reported to have increased health

³⁴ Study International Staff, 19 August 2019. How to implement climate change education in schools

risks and affected welfare of women due to walking long distances to unsafe places to fetch water, increased duties for family care owing to men's migration to urban areas in search of new jobs and income generating opportunities after abandoning traditional activities such as farming, fishing and livestock keeping. This is in turn contributing to growing incidences of Gender Based Violence (GBV).

The Government has been making efforts in mainstreaming of gender issues into national policies, plans and strategies. The promotion of gender equality in the country is guided mainly by the Convention on the Elimination of all forms of Discrimination Against Women (CEDAW), The AU Charter on Human and Peoples Rights, which is reinforced by the Protocol of the African Charter on Human and Peoples' Rights on the Rights of Women in Africa, the AU Gender and Climate Change Policy (2009); and the Southern African Development Community (SADC) Declaration on Gender and Development (1998). Tanzania has also signed other related international agreements such as the Declaration of Human Rights (1948), the Convention for the Rights of Children (1989) and the ILO Convention for the Elimination for the Worst Forms of Child Labour (1999).

Tanzania's National Vision 2025 as a long-term policy contemplates gender equity/equality as underlying principles: "In particular by the year 2025, racial and gender imbalances will have been redressed such that economic activities will not be identified by gender or race. All social relations and processes that manifest and breed inequality in all aspects of the society (i.e., politics, employment, education, and culture) will have been reformed".

The Government has put in place National Strategy for Mainstreaming Gender in Climate Change (2013) with the overall objective of ensuring that gender considerations are mainstreamed into national policies, programs and strategies related to climate change. The strategies will ensure both women and men, including people with disabilities, have access to, participate in, contribute to, and hence benefit from climate change initiatives. The Strategy provides a framework for gender considerations into six priority sectors that include agriculture, water, health, energy, forests and coastal management. Implementation of National Strategy for Mainstreaming Gender in Climate Change (2013) helped to strengthen the engagement of various actors in across sectors and at all levels.

Despite significant progress from the above efforts by the government and other stakeholders, there remain needs for increased mainstreaming of gender at all levels of climate change interventions including in policy, programs, strategies and activities using appropriate gender lens and mainstreaming instruments. Approaches such as gender analysis, gender audit and gender budgeting using gender disaggregated data in M+E and reporting on all climate change responses should be enhanced. This Strategy will seek to address these gaps through adoption of gender sensitive approaches and activities.

2.3.7 Financial Sector

Addressing climate change is crucial for the financial sector, and it is equally important for this sector to be aware of the challenges that climate change can pose. The financial sector is expected to play an important role in facilitating not only for the economic growth, but also an

important player for the climate finance mobilization to address climate action. Climate change will increase costs to financial sector if no action is taken due to its negative implications. Banks and investors, in particular, need a clear regulatory framework on climate policy which they can adapt and base their investment and lending decisions on, while insurers face the prospect of heavy losses due to climate change adverse impacts.

Integrated financial organisations need to be aware that climate change could result in a compounding risk across the entire business spectrum, diluting some of the benefits of diversification. This requires the financial sector to be capable of consistently designing and delivering appropriate, high-quality financial products and services to address challenges that climate change can bring.

These are the following challenges:

- (i) Inadequate regulatory framework related to green financing;
- (ii) Financial system vulnerability;
- (iii) Limited capacity building and use of practices/ technologies in green financing; and
- (iii) Uncoordinated knowledge sharing among green financing stakeholders.

The financial industry has a two-fold responsibility. On one hand, it needs to prepare itself to adapt for the negative effects that climate change may have on its business and on its customers. On the other hand, it can significantly partner with the public sector to help mitigate the economic risks and engage in financing of mitigation/ adaptation initiatives by providing appropriate products and services that are climate friendly in nature. Business models of financial sector need to be informed by both risks and vulnerabilities associated with climate change.

2.3.8 Public Private Partnerships for Climate Change Financing

The Paris Agreement stresses on enhancing both public and private sector participation in the implementation of nationally determined contributions. Implementation of Paris Agreement and country transition to a low emission economy require strategies for mobilizing adequate financial resources from various sources. The key role of public finance needs to be emphasised, whereas private finance initiatives develop and implement new and innovative solutions to climate adaptation and mitigation.

Tanzania has a well-established institutional and legal framework for public private partnership. Small and Medium Enterprises are important components of the PPP that are quite active in the country as regulated by the SMEs policy of 2002. The private sector through the PPP arrangement presents important opportunities for both adaptation and mitigation through the types of business and technologies adopted for acquisition of raw materials, processing and distribution of products and management of wastes generated.

Moreover, businesses have wealth of knowledge, skills and innovations, networks and financial resources that could facilitate adoption of clean technologies to reduce greenhouse emission and promote sustainable business. At the same time, there is already growing window of green financing from business and other commercial institutions such as CRDB that has been accredited by the GCF and is preparing project piles to be financed under the green finance window.

Telecommunication service providers in Tanzania, such as Tigo (Tigo Green) and Vodacom as well as corporate companies, e.g., Coca Cola Kwanza, have been supporting government's efforts in making sure that people understand the importance of living in a clean environment and promoting tourism. With that understanding they will be expanding their green programs as part of their corporate sustainability initiatives in response to the UN call for business to accelerate their corporate sustainability and responsible business practice in line with the UN 2030 Agenda and other global climate frameworks.

There is therefore an urgent need to strengthen engagement of private sector in addressing climate change and promote PPP arrangements for implementation of this Strategy through enhanced linkages and engagement with the private sector actors who are champions of green and sustainable businesses.

Engagement and commitment for developing financial instruments and structures that scale up investments in climate change is very important for the implementation of this Strategy. For example, the public private partnerships (PPPs) play a key role in scaling up sustainable climate finance. However, there are challenges for climate finance; namely:

1. Low participation of public financial institutions supports in risk taking initiatives to design PPPs climate change bankable projects; and
2. Inadequate framework and capacity for local public and private stakeholders and financial institutions in the design and implementation of PPP projects that address climate change.

STRATEGIC INTERVENTIONS AND ACTION PLAN

This NCCRS covers broader strategic objectives and actions that indicate strategic actionable objectives to be implemented. The broader strategic areas are related to adaptation, mitigation and cross-cutting issues. For implementation purposes, this Strategy includes coordination, resource mobilization and implementation plan.

3.1 Strategies

Adaptation remains a highest priority for Tanzania. This Strategy provides basis for identifying short, medium-and long-term adaptation activities designed to address existing and emerging threats of climate change. Thus, various adaptation strategies in each sector are identified as shown in Section 3. The adaptation strategies identified in this section are built on and extend beyond the National Adaptation Programme of Action (NAPA), envisioned in National Adaptation Plans (NAPs) and Nationally Determined Contributions (NDCs) which identify medium-and long-term adaptation actions.

On the other hand, the United Republic of Tanzania participates in mitigation measures/activities in order to achieve economic development while contributing to reduction of greenhouse gas emissions. Owing to the objectives of mitigating emissions reflected in the Nationally Determined Contributions (NDC), National Climate Change Strategy (2012-2018) and other inventory reports, different sources of emissions have been considered in formulating the proposed climate change mitigation action/intervention.

Tables 3.2, 3.3 and 3.4 reflect strategic objectives, strategies, targets and indicators, indicative budgets and means of verifications and responsible institutions for each respective sector identified in this Strategy in the auspice of adaption and mitigation priorities. It is important to note that the strategic objectives and associated strategies are derived from baseline information set and described in chapter three, section 3.2, from which targets and indicators are set.

The basis for indicative budgets is attributed to NDC envisaged implementation costs and economic studies reports which provide conservative needed costs. However, the actual budget costs for each strategic objective will be determined during development of the full proposal documents by respective sectors and institutions. In addition, the details about the sources of fund for these activities are explained in section 4.5 of Chapter Four.

3.2 Climate Change Adaptation

Objective	Strategies	Targets	Indicators	Indicative budget (TZS Billions)	Timeframe	Means of Verification	Responsible Institutions
1. Freshwater Resources							
To ensure sustainable management and resilience of water resources under the changing climate	1.1 Promote water resilience in all basins.	<ul style="list-style-type: none"> Installation of integrated water resources management (IWRM) tools in all 9 basins Operation of water flow monitoring stations and demarcation of water sources in all 9 basins 	<ul style="list-style-type: none"> Number of water flow monitoring stations installed and demarcated water sources in basins Type of IWRM adopted 	1	2021-2026	Reports	Ministry responsible for Water, work and Communication, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
	1.2 Demarcation of water sources in the 9 water basins to support conservation and protections.	At least 60% of water sources in 9 water basins demarcated to enhance protection and conservation by 2026	Percent of water basins and catchments conserved and demarcated water sources	5	2021-2026	Reports	Ministry responsible for Water, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
	1.3 Promote flood control in the water basins	At least 50% of water basins have constructed flood control systems by 2026.	Percent of flood control systems constructed in all water basins.	3	2021-2026	Reports	Ministry responsible for Water, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs

	1.4 Promote rainwater harvesting technologies.	At least 10% of rainwater harvesting technologies adopted and implemented by 2026	Percent of rainwater harvesting technologies and structures initiated along 9 water basins	3	2021 - 2026	Reports and technologies in place	Ministry responsible for Water, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
	1.5 Develop sustainable exploitation of groundwater resources	At least 30% of available ground water resources are sustainably exploited	Groundwater resources exploitation technologies in place	4	2021-2026	Reports	Ministry responsible for Water, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
Promote climate resilience of WASH systems to provide sustainable service delivery, both now and into the future	1.6 Water resources are monitored and managed considering climate risks to WASH services and infrastructure	At least 1 monitoring for climate risks to WASH services and infrastructure conducted per year	<ul style="list-style-type: none"> Percent of water resources that are monitored and managed for climate shocks and stresses Percent of water sources with a monitoring system in place, to understand how they are being affected by climate change 	2	2021-2026	Monitoring reports	Ministry responsible for Water, Health, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
	1.7 Access to climate resilient WASH infrastructure and services	<ul style="list-style-type: none"> At least 60% of the population with access to water points that provide at least a 12-hour daily service all year round by 2026 At least 60% of the population with access to springs that provide a 	<ul style="list-style-type: none"> Percent of population with access to water points that provide at least a 12-hour daily service all year round Percent of population with access to springs that provide a continuous water supply during a 	3	2021-2026	Monitoring reports	Ministry responsible for Water, Health, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs

		<p>continuous water supply during a drought by 2026</p> <ul style="list-style-type: none"> At least 70% of the population with access to soap and water at a hand washing facility during a drought period or following a flood by 2026 At least 80% of the households with access to a resilient latrine that does not flood during the wet season by 2026 	<p>drought</p> <ul style="list-style-type: none"> Percent of population with access to soap and water at a hand washing facility during a drought period or following a flood Percent of households with access to a resilient latrine that does not flood during the wet season 	2	2021-2026	Reports	Ministry responsible for Water, Health, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
1.8	Strengthening climate resilient behavioural change and governance at community and local level	<ul style="list-style-type: none"> At least 80% of the population using sanitation and hand washing facilities following a flood and drought by 2025 At least 90% of the community with adequate understanding of WASH climate resilience are reached by 2026 	<ul style="list-style-type: none"> Percent of population using sanitation and hand washing facilities following a flood, drought Perceived adequacy of action at community and local level for WASH climate resilience 	2	2021 - 2026	Reports	Ministry responsible for Water, Health, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
1.9	Building enabling environment conducive to climate resilient WASH services and communities	At least 80% of the community with adequate understanding of enabling environment for climate resilient WASH services by 2025	Perceived adequacy of the enabling environment for climate resilient WASH services and communities	2	2021 - 2026	Reports	Ministry responsible for Water, Health, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs

2. Coastal and Marine Environment		Sub Total (7)		24			
Build adaptive capacity of a coastal and marine ecosystems	2.1 Strengthen management of coastal and marine resources	At least 60% of coastal and marine managements systems with climate informed plans by 2026	<ul style="list-style-type: none"> Number of Management systems developed and supported Percent of coastal communities informed on climate-smart management. 	2	2021-2026	Report	Ministry responsible for Water, Land, Fisheries, Environment, Local Government Authorities, Research and Academia, CSOs, Private Sector and DPs
	2.2 Promote sustainable livelihood diversification for coastal communities	At least 3 to 4 sustainable livelihood options introduced to coastal communities by 2026	<ul style="list-style-type: none"> Number of sustainable livelihoods options Percent of coastal communities adopting diversified livelihoods options 	2	2021-2026	Reports	Ministry responsible for Water, Land, Fisheries, Environment, Local Government Authorities, Research and Academia, CSOs, Private Sector and DPs
	2.3 Improve monitoring and early warning systems	<ul style="list-style-type: none"> At least 2 monitoring and surveillance systems installed by 2026 At least 70% of coastal community with timely access to accurate and reliable climate services by 2026 	<ul style="list-style-type: none"> Number of monitoring and surveillance systems installed Percent of coastal communities with timely access to accurate and reliable climate services. 	3	2021-2026	Reports	Ministry responsible for Water, Tanzania Meteorological Authority, Land, Fisheries, Environment, Local Government Authorities, Research and Academia, CSOs, Private Sector and DPs
	2.4 Strengthen and promote development and management of aquaculture	<ul style="list-style-type: none"> At least 80% aquaculture farmers have access to reliable and quality aquaculture extension services by 2026 	<ul style="list-style-type: none"> Percent of farmers with access to aquaculture extension services Percent of farmers with access to climate-smart aquaculture technologies 	3	2021-2026	Reports	Ministry responsible for Water, Land, Fisheries, Environment, Local Government Authorities, Research and Academia, CSOs, Private Sector and

			<ul style="list-style-type: none"> At least 80% of aquaculture farmers have access to climate smart aquaculture technologies by 2026 At least 70% of aquaculture farmers have access to climate-resilient breeds by 2026 	<ul style="list-style-type: none"> Percent of aquaculture farmers accessing climate-resilient breeds 				DPs
Sub Total (8)								
3. Forest and Bee Keeping								
To enhance climate change resilience of forests and non-timber products.	3.1	Promote adoption of climate-smart forest management practices	<ul style="list-style-type: none"> At least 3 million ha of degraded forest land restored by 2026 At least 70% of village forest reserves adopt climate-smart management plans by 2026 	<ul style="list-style-type: none"> Percent of community implementing nature-based solution initiatives Percent of communities directly benefiting from village forest 	3	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, LGAs, MDAs, Research and Academia, DPs
	3.2	Promote alternative livelihood to forest dependent communities	At least 50% of forest dependent communities engaged in alternative livelihoods by 2026	<ul style="list-style-type: none"> Percent of forest dependent communities engaged in alternative livelihood options Percentage of income accruing from alternative livelihoods 	1.5	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, LGAs, MDAs, Research and Academia, DPs
	3.3	Promote use of non-timber forest products	At least 20% increase in the use of non-timber forest products by 2026	<ul style="list-style-type: none"> Percent of community opting of non- timber forest products Percent of community income contribution accruing from non-timber forests products 	1	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, LGAs, MDAs, Research and Academia, DPs

	3.4 Promote nationwide tree planting programs and initiatives	At least 2 million trees planted under national tree planting program per year.	<ul style="list-style-type: none"> Number of trees planted under national tree planting program per year 	2	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, LGAs, MDAs, Research and Academia, DPs
	3.5 Enhancing sustainable bee keeping initiatives and technologies	<ul style="list-style-type: none"> Bee keeping contribution to at least 2% of the national GDP by 2026 At least 30% of the community adjacent to forests are engaged in bee keeping initiatives 	<ul style="list-style-type: none"> Percent of bee keeping contribution in the national GDP per year Tone of honey and wax produced per year Percent of communities earning accruing from bee keeping 	3	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, LGAs, MDAs, Research and Academia, DPs
Sub Total (9)							
4. Wildlife							
To enhance climate change Resilience of key ecosystems	4.1 Promote climate-smart wildlife management practices in protected areas and habitats.	<ul style="list-style-type: none"> At least 80% of PAs develop and implement climate-informed management plans by 2026 At least 60% of key habitats are freely connected by 2026 At least 10 rainwater harvesting retention storage facilities are constructed by 2026 	<ul style="list-style-type: none"> Number of practices PAs with climate-smart management plans Number of key habitats freely connected Number of rainwater harvesting retention storage facilities. 	3	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, Fisheries, LGAs, MDAs, Research and Academia, DPs
	4.2 Create a network of protected conservation corridors and improve	<ul style="list-style-type: none"> At least 50% of key wildlife habitats/ ecosystems restores and connected by 2026 	<ul style="list-style-type: none"> Number of key migratory corridors freely connected Hectare of land secured for corridor and dispersal area 	2	2021-2026	Reports	Ministry responsible for Natural resources, Fisheries, Land, Environment, LGAs, MDAs, Research and Academia, DPs

	protection for climate refugia and catchment areas	<ul style="list-style-type: none"> At least 60% of key wildlife buffer zones are under effective management plans by 2026 At least 50% of participating WMAs benefits by 2026 Reduce HWCs incidences by 60% from the 2020 baseline by 2026 	<ul style="list-style-type: none"> Hectare of land secured for corridor and dispersal area Number of wildlife populations passing through corridors/dispersal areas Number of people benefitting from wildlife resources 	3	2021-2026	Report	Ministry responsible for Natural resources, Fisheries, Land, Environment, LGAs, MDAs, Research and Academia, DPs
	4.3 Enforce buffer zones and develop spatial land-use plans for areas surrounding conservation areas (PAs)						
	4.4 Support establishment wildlife climate change related monitoring and information management systems	Establish at least one wildlife climate change related monitoring and information management systems by 2026	Number of wildlife climate change related monitoring and information management systems	1	2021-2026	Reports	Ministry responsible for Natural resources, Land, Environment, LGAs, MDAs, Research and Academia, DPs
Sub Total (10)				9			
5. Agriculture Crop Sub Sector							
To enhance resilience of agriculture sector to climate change for sustainable Livelihoods	5.1 Review existing agro-ecological zones.	Number of new agro-ecological zones demarcated and established by 2026	Number of new agro-ecological zones established	2	2021-2026	Reports documenting agro-ecological zones	Ministry responsible for Agriculture, Water, Land, Natural resources Environment, Local Government, TMA, Research and Academia, DPs

<p>2. Identify and promote use of suitable crops for new agro-ecological zones</p>	<ul style="list-style-type: none"> • 20% increase of suitable crops introduced for new agro-ecological zone by 2026 • Number of new agro-ecological zones adopt suitable crops by 2026 	<ul style="list-style-type: none"> • Percentage increase of suitable crops in new agro-ecological zones • Number of new agro-ecological zones adopted suitable crops 	1	2021-2026	Reports	Ministry responsible for Agriculture, Water, Land, Natural resources Environment, Local Government, TMA, Research and Academia, DPs
<p>5.1 Promote climate-smart practices for management of agricultural land and efficiency water use for agriculture</p>	<p>At least 50% of the community practicing climate smart for agricultural land management by 2026</p>	<ul style="list-style-type: none"> • Improved number of ha of agricultural land • Percent of community with access to water use efficiency technologies 	2	2021-2026	Reports	Ministry responsible for Agriculture, Water, Land, Natural resources Environment, Local Government, TMA, Research and Academia, DPs
<p>5.2 Promote and enhance the production, dissemination and use of conventional and indigenous knowledge on climate services</p>	<ul style="list-style-type: none"> • At least 70% of conventional climate services and weather forecasts disseminated are downsealed to at least at district level by 2026 • At least 80% of smallholders have timely access to reliable and accurate climate services by 2026. • At least 30% of the conventional weather forecasts and that of indigenous knowledge inform each other by 2026 	<ul style="list-style-type: none"> • Percent of downsealed climate services and weather forecasts • Percent of smallholder with access and use of climate services • Percent of smallholders with climate services-informed livelihoods. • Percentage of Tanzanians trusting and utilizing tradition weather and climate services • Percentage of disseminated weather forecast that are 	3	2021-2026	Reports	Ministry responsible for Agriculture, Water, Land, Natural resources Environment, Local Government, TMA, Research and Academia, DPs

	6.3 Strengthen emergency response to climate change impacts.	At least 70% of referral and 40% of district hospitals have advanced response to climate change impacts by 2026.	Percent of response to climate impacts from referral and district hospitals.	4	2021-2016	Reports,	Ministry responsible for Health, Environment, LGAs; NIMR; TMA, Research and Academic Institutions; DPs
	6.4 Undertake health-climate change related risks and vulnerability assessment.	At least 2 to 3 health-climate change related risk and vulnerability assessments are undertaken by 2026	<ul style="list-style-type: none"> Number of health climate change related risks and vulnerable assessments undertaken Potential health-climate change risks and vulnerabilities are documented 	4	2021-2026	Assessment reports	Ministry responsible for Health, Environment, LGAs; NIMR; TMA, Research and Academic Institutions; DPs
	6.5 Building and strengthening climate smart health facility delivery systems	At least 60% of regional health facility systems with climate smart infrastructures/ technologies by 2026	Number/percent of regional health facilities with climate smart systems	2	2021-2016	Reports, plants, training schedules, list of participants	Ministry responsible for Health, Water, Land, Environment, Local Government; NIMR; TMA, Research and Academic Institutions; CSOs; and Private Sector
Promote Capacity building on climate change in the health sector	6.6 Strengthen community awareness on climate change related diseases and adaptation mechanisms.	At least 70% of the community are aware of climate change related diseases by 2026	Percent of communities aware of climate change related diseases	3	2021-2026	Reports, training materials and workshop attendance lists	Ministry responsible for Health, Water, Land, Environment, Local Government; NIMR; TMA, Research and Academic Institutions; CSOs; and Private Sector
	6.7 Improve knowledge to health personnel on climate change related health risks	At least 80% of the health personnel have Knowledge on climate change related health risks across regions and districts by 2026	Number/percent of health personnel trained on climate change related health risks	2	2021-2026	Reports, training materials and workshop attendance lists	Ministry responsible for Health, Water, Land, Environment, Local Government; NIMR; TMA, Research and Academic Institutions;

									CSOs; and Private Sector
	6.8 Integrate and strengthen climate change into health training and research institutions	At least 60% of health training and research institution have integrated climate change issues by 2026.	<ul style="list-style-type: none"> Number/percent of health training and research institutions adopted climate change issues Number/percent of health training institutions curriculum with integrated climate change issues. 	2	2021-2016	Research projects reports and curriculum	MUHAS, Health training and research institution		
Subtotal (12)									23
7. Tourism									
To build resilience and adaptive capacity of the tourism industry to climate change	7.1 Promote diversified tourism products including cultural and nature-based tourism	<ul style="list-style-type: none"> At least 20% increased new innovative tourism products by 2026 Nature-based tourism/new innovative tourism products contributing to at least 30% of tourism sector revenue by 2026 	<ul style="list-style-type: none"> Number and type of new cultural and nature-based/ new innovative tourism products Number of tourists using/ visiting new tourism products/year Percentage of revenue accrued from nature-based/ new innovative tourism products 	2	2021-2026	New cultural and nature – based tourism products. Reports	Ministry responsible for Natural Resources, Environment, Culture, Fisheries, Local Government, Education; TTB, TANAPA, TAWA, TAWIRI, TFS, COSOTA, BASATA, Research and Academic Institutions; DPs		
	7.2 Promote restoration of degraded tourist sites	At least 50% of degraded tourist sites restored by 2026	<ul style="list-style-type: none"> Number of tourist sites restore/year 	2	2021-2026	<ul style="list-style-type: none"> Restored sites Reports 	Ministry responsible for Natural Resources, Environment, Culture, Fisheries, Communication, Local Government, Education; TTB, TANAPA, TAWA, TAWIRI, TFS, COSOTA, BASATA, Research and		

									Academic Institutions; CSOs; and Private Sector
7.3	Promote development of climate resilient tourist infrastructures	<ul style="list-style-type: none"> At least 70% of transport, accommodation, communication and entertainment facilities connecting, and or within key tourist sites are all weather roads by 2026 Accessible and reliable communication network within tourist sites by 2026 	<ul style="list-style-type: none"> Percentage of reliable transport, accommodation, communication and entertainment facilities in key tourist sites Percentage of tourist sites with reliable/accessible network facilities 	3	2021-2026	<ul style="list-style-type: none"> Constructed infrastructure Reports 	Ministry responsible for Natural Resources, Environment, Culture, Fisheries, Communication, Local Government, Education, Works, Transport; TTB, TANAPA, TAWA, TAWIRI, TFS, COSOTA, BASATA, TANROADS, TARURA, Research and Academic Institutions; CSOs; and Private Sector		
7.4	Enhance and strengthen community-based conservation areas	<ul style="list-style-type: none"> Increased 10% of the existing Wildlife management areas (MWAs) and alike. 	<ul style="list-style-type: none"> Number and types of WMAs increased. Percentage of income increased for communities owning WMAs. Reduced poaching activities (forest and wildlife products) 	2	2012-2026	<ul style="list-style-type: none"> Reports Established WMAs and or similar conservation areas. 	Ministry responsible for Natural Resources , Environment, Culture, Fisheries, Local Government, Education, Works, Transport; TTB , TANAPA , TAWA , TAWIRI , TFS, Research and Academic Institutions; CSOs; and Private Sector		
Sub Total (13)									
8. Energy									
	To develop a less carbon-intensive and climate change-resilient energy infrastructures.								
8.1	Increase the resilience of the energy system to climate change impact.	At least 60% Increased resilient energy system by 2026	<ul style="list-style-type: none"> Percent increase of energy resilience system Number and gender-lens of energy end-users 	10	2021-2026	<ul style="list-style-type: none"> New energy systems Reports 	Ministry responsible for Energy, Natural Resources, Environment, Local Government; TPDC, EWURA,		

									TANESCO, TFS, TMA, Research and Academic Institutions; CSOs; and Private Sector
	8.2 Enhance integrated basin catchment and upstream land management for hydropower sources	At least 60% Improved integrated basin catchment management by 2026	<ul style="list-style-type: none"> Percent of basins and land size managed Number of land use plan developed 	5	2021-2026	<ul style="list-style-type: none"> Improved basin sites Reports 		Ministry responsible for Energy, Land, Water, Natural Resources, Agriculture, Environment, Local Government; Research and Academic Institutions; CSOs; and Private Sector	
	8.3 Promote efficient firewood cooking stoves, solar and LPG uses	At least 60% increased use of energy efficient technologies by 2026	<ul style="list-style-type: none"> Percent and types of energy efficient technologies adopted by end users Budget code targeting renewables and efficient technologies for poor households 	10	2021 - 2026	New energy systems Reports		Ministry responsible for Energy, Land, Water, Natural Resources, Finance and Planning, Local Government; Research and Academic Institutions; CSOs; and Private Sector	
Subtotal (14)				25					
9. Industry									
To build a diversified and resilient Industrial sector.	9.1 Promote alternative and renewable energy sources	At least 50% of alternative and renewable energy sources increased by 2026	<ul style="list-style-type: none"> Percent of energy generated from alternative energy sources Number and types of industrial end-users using renewable energy 	5	2021-2026	Reports		Ministry responsible for Energy, Industry, Natural Resources, Environment, Local Government; TPDC, EWURA, TANESCO, TFS, TIRDO, TMA, Research and Academic Institutions; CSOs; and Private Sector	

	9.2 Promote adoption of energy efficient technologies	At least 20% increase of energy efficient technologies adopted by 2026	<ul style="list-style-type: none"> Percent and types of energy efficient technologies adopted Number and types of industrial end-users using energy efficient technologies 	3	2021-2026	<ul style="list-style-type: none"> Technologies Reports 	Ministry responsible for Energy, Industry, Natural Resources, Environment, Local Government; TIRDO, TPDC, EWURA, TANESCO, TFS, TMA, Research and Academic Institutions; CSOs; and Private Sector
	9.3 Enhance climate-related assessments for industrial development	At least 60% of industry with improved climate resilient and adaptive capacity by 2026	<ul style="list-style-type: none"> Percent and types of industries with climate resilience 	2	2021-2026	<ul style="list-style-type: none"> Industries Reports 	Ministry responsible for Health, Industry, Environment, Local Government; VPO, NEMC, TIRDO, CPCT, Research and Academic Institutions; DPs
Subtotal (15)				10			
10. Livestock							
To enhance resilience of livestock sector development to climate change impacts	10.1 Enhance development of livestock infrastructures and services	At least 80% of livestock infrastructure and services are climate-informed by 2026.	<ul style="list-style-type: none"> Number and types of climate-smart livestock infrastructures and services in place 	2.5	2021-2026	<ul style="list-style-type: none"> Livestock infrastructures Reports 	Ministry responsible for Livestock, Industry, Environment, Local Government; TALIRA, Research and Academic Institutions; DPs
	10.2 Promote and strengthen climate-informed technologies for livestock production	At least 60% of livestock production and services are adopting climate-informed technologies by 2026	<ul style="list-style-type: none"> Percent of adopted climate-informed technologies for livestock production and services Percent farmers adopting climate-informed technologies 	3	2021-2026	<ul style="list-style-type: none"> Livestock production climate-informed technologies Reports 	Ministry responsible for Livestock, Industry, Environment, Local Government; TALIRA, Research and Academic Institutions; DPs

10.3 Promote and enhance provision of climate services	<ul style="list-style-type: none"> At least 70% of conventional climate services and weather forecasts disseminated are downscaled by 2026 At least 80% of smallholder farmers have timely access to reliable and accurate climate services by 2026. 	<ul style="list-style-type: none"> Percent of downscaled conventional climate services and weather forecasts Percent of smallholder with access and use of climate services Percent of smallholders with climate services-informed livestock rearing. 	4	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Livestock, Agriculture, Water, Land, Natural resources Environment, Local Government, TMA, Research and Academia, DPs
10.3 Promote livelihood diversification initiatives for livestock keepers	<ul style="list-style-type: none"> At least 60% of pastoralists adopting livelihood diversification initiatives by 2026. At least 40% of livelihood diversifications for livestock keepers are gender-lens by 2026 	<ul style="list-style-type: none"> Percent of pastoralists adopting livelihood diversification initiatives. Percent of livelihood diversification for livestock keepers with gender-lens 	1.5	2021-2026	<ul style="list-style-type: none"> Diversified livelihoods Reports 	Ministry responsible for Livestock, Industry, Environment, Local Government; TALIRI, National Economic Empowerment Council (NEEC), Research and Academic Institutions; CSOs; and Private Sector
10.4 Promote development of livestock insurance schemes	<ul style="list-style-type: none"> Livestock insurance schemes developed by 2026 At least 60% of livestock keepers are adopting livestock insurance by 2026. 	<ul style="list-style-type: none"> Number and types of livestock insurance schemes Percent of livestock keepers adopted livestock insurance. 	2	2021-2016	<ul style="list-style-type: none"> Livestock insurance schemes Reports 	Ministry responsible for Livestock, Environment, LGAs; TALIRI, National Economic Empowerment Council (NEEC), NIC, Financial Institutions, Insurance Institutions, TIRA, Research and Academic Institutions; DPs
10.5 Promote integrated rangeland	<ul style="list-style-type: none"> At least 5 new rangeland management initiated for livestock 	<ul style="list-style-type: none"> Number of new initiated rangeland management Percent of rehabilitated 	3	2021-2026	<ul style="list-style-type: none"> Rangelands Reports 	Ministry responsible for Livestock, Industry, Environment, Local

	management for livestock	<ul style="list-style-type: none"> by 2026 At least 70% of rehabilitated degraded rangelands by 2026. Number of community-based rangeland initiated by 2026 	<ul style="list-style-type: none"> Number of community-based initiated rangeland 	2	2021-2026	<ul style="list-style-type: none"> Improved breeds Reports 	Government; TALIRA, National Economic Empowerment Council (NEEC), TIRA, Research and Academic Institutions; DPs
	10.6 Promote use of improved livestock breeds	<ul style="list-style-type: none"> At least 60% of livestock adopting for improved animal breeds and increase productivity by 2026. At least 60% of improved animals breeds are climate-informed by 2026 	<ul style="list-style-type: none"> Percent of livestock keepers adopted for improved animal breeds. Percent of climate-informed improved animal breeds. 				Ministry responsible for Livestock, Environment, Local Government; TALIRI, Land, Research and Academic Institutions; DPs
	10.7 Enhanced Animal health services to control pests and diseases	<ul style="list-style-type: none"> At least 80% of wards and villages have access to extension services by 2026 At least 60% of livestock keepers have access to improved animal health services by 2026. 	<ul style="list-style-type: none"> Percent of wards and villages with access to extension services Percent of livestock keepers with access to improved animal health services 	4	2021-2026	<ul style="list-style-type: none"> Animal health services Reports 	Ministry responsible for Livestock, Environment, Local Government; TALIRI, Land, Research and Academic Institutions; CSOs; and Private Sector
Subtotal (16)				28			
11. Fisheries							
To enhance resilience of fisheries resources	11.1 Promote and strengthen conservation of fisheries resources	<ul style="list-style-type: none"> At least 50% fisheries conserved by 2026. At least 70% of fisheries management plans are climate-informed by 2026. 	<ul style="list-style-type: none"> Percent of conserved fisheries resources Percent of climate-informed fisheries management plans. Percent of fisheries 	3	2021-2026	<ul style="list-style-type: none"> Conserved aquatic ecosystems Reports 	Ministry responsible for Fisheries, Water, Natural Resources, Agriculture, Environment, Local Government; MPRU, LVBC, TAFIRI, LTMA,

									Research and Academic Institutions; DPs
	<ul style="list-style-type: none"> At least 60% of fisheries communities are engaged into community-based conservation of fisheries resources 	<ul style="list-style-type: none"> At least 70% of fish folks adopt and use of climate-informed fisheries technologies and practices by 2026. At 50% of fisheries post-harvesting loss are reduced by 2026 	<ul style="list-style-type: none"> Percent of fisheries communities adopting climate-informed fisheries technologies Percentage increase of fish catch from adopted climate-informed fisheries technologies Percent of reduced fisheries post-harvesting losses 	3	2021-2026	<ul style="list-style-type: none"> Technologies Reports 	Ministry responsible for Fisheries, Water, Natural Resources, Agriculture, Environment, Local Government; TMPRA, LVBC, TAFIRI, LTMA, Research and Academic Institutions; DPs		
	<ul style="list-style-type: none"> At least 50% of fish folks engaged in diversified livelihoods by 2026 At least 50% of fisheries products are subjected to value addition for extended markets. 	<ul style="list-style-type: none"> At least 50% of fish folks engaged in diversified livelihoods by 2026 At least 50% of fisheries products are subjected to value addition for extended markets. 	<ul style="list-style-type: none"> Percent of fish folks engaged into a diversified livelihood Percent of fisheries product subjected to value addition systems 	4	2021-2026	<ul style="list-style-type: none"> Alternative income generating activities Reports 	Ministry responsible for Fisheries, Water, Natural Resources, Agriculture, Environment, Local Government; TMPRA, LVBC, TAFIRI, LTMA, Research and Academic Institutions; CSOs; and Private Sector		
	<ul style="list-style-type: none"> At least 60% of aquaculture farming adopting climate-informed technologies by 2026 At least 70% increased aquaculture initiatives 	<ul style="list-style-type: none"> At least 60% of aquaculture farming adopting climate-informed technologies by 2026 At least 70% increased aquaculture initiatives 	<ul style="list-style-type: none"> Percent of adopted climate-informed aquaculture technologies Percent of increased fish production by tonnage as of adopted climate-informed 	3	2021-2026	<ul style="list-style-type: none"> Technologies Reports 	Ministry responsible for Fisheries, Water, Natural Resources, Agriculture, Environment, Local Government; MPRU, LVBC, TAFIRI, LTMA, Research and Academic		

			by 2026	<ul style="list-style-type: none"> Strengthen weather forecast and climate services At least 70% of conventional climate services and weather forecasts disseminated are downscaled by 2026 At least 80% of smallholder farmers have timely access to reliable and accurate climate services by 2026. 	<ul style="list-style-type: none"> aquaculture technologies. Percent of increased aquaculture initiatives Percent of downscaled climate services and weather forecasts Percent of smallholder with access and use of climate services 	3	2021-2026	<ul style="list-style-type: none"> Alerts Reports 	Institutions; CSOs; and Private Sector
Sub Total (17)									
12. Infrastructure									
To promote climate proof infrastructure systems	12.1	Mainstream climate change adaptation targets into infrastructure designing and development across sectors	<ul style="list-style-type: none"> At least 80% of the sectors mainstream climate change adaptation targets and measures into infrastructure designing and development by 2026 At least 40% of new buildings and infrastructure have adopted green technologies by 2026. National building standards and code of practices developed by 2026 	<ul style="list-style-type: none"> Percent/number of sectors mainstreamed climate change adaptation targets and measures Number of sector guidelines and regulations reviewed/developed Percent/number of green technologies adopted Number of building standards and code of practice developed 	9	2021-2026	<ul style="list-style-type: none"> Site visits Reports 	Ministry responsible for Works, Land, Transport, Natural Resources, Agriculture, Environment, Local Government; TARURA, TBA, TANROADS, Research and Academic Institutions; CSOs; and Private Sector	

	12.2 Strengthen capacity of infrastructure sectors to undertake periodic climate change risks and vulnerability assessment in infrastructure systems.	At least one climate change risks and vulnerability assessment in the infrastructure sector are undertaken by 2026.	<ul style="list-style-type: none"> Number of most vulnerable infrastructure system. Number/percent of infrastructure designing, and development subjected to climate change risks and vulnerability assessment reports Percent of infrastructure systems with climate change adaptive capacity. 	5			
Sub Total (18)							
13. Human Settlements							
To have human settlements that are resilient to climate change	13.1 Mainstream climate change issues into policies, programs, plans and guidelines	National policies, programs, plans and guidelines on human settlement incorporate climate change issues by 2026	Number and types of policies, programs, plans and guidelines incorporated with climate change issues	2	2021-2016	Policies, strategies, plans and guidelines	Ministry responsible for Human Settlements, Finance and planning Land, Transport, Natural Resources, Environment, Local Government; TARURA, TBA, TMA, National Land Use Commission, National Housing and Building Research MLHSD, Agency (NHBRA), Research and Academic Institutions; CSOs; and Private Sectors
		<ul style="list-style-type: none"> Development of climate change sensitive 	Climate change sensitive building standards and code document.	2	2021-2016	Reports	

	13.3 Conduct risk and vulnerability assessments.	All cities and municipalities conduct climate risk and vulnerability assessment by 2026	<ul style="list-style-type: none"> Risk and vulnerability reports 	4	2021-2016	Reports	Ministry responsible for Human Settlements, Human resources, Finance and planning Land, Transport, Natural Resources, Environment, Local Government; TARURA, TBA, TMA, National Land Use Commission, National Housing and Building Research Agency (NHBRA), Research and Academic Institutions; CSOs; and Private Sectors
13.4 Improve preparedness and response systems		30 districts have effective disaster preparedness and response plan by 2026	District with disaster preparedness and response plans	4	2021-2026	Reports and plans	Ministry responsible for Human Settlements, Human resources, Finance and planning Land, Transport, Natural Resources, Environment, Local Government; TARURA, TBA, TMA, National Land Use Commission, National Housing and Building Research Agency (NHBRA), Research and Academic Institutions; CSOs; and Private Sectors
Sub Total (19)				22			
14. Land Use							

To have resilient land use planning and management for sustainable development	14.1 Mainstream climate change issues into land use planning and management	Climate change issues mainstreamed into land use planning and management by 2026	<ul style="list-style-type: none"> Number and types of land use plans integrating climate change adaptation 	3	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; National Land Use Planning Commission; Research and Academic Institutions; CSOs; and Private Sector
	14.2 Enhance compliance of land use plans at all levels	Increased compliance to Land use plans at all levels by 2026	<ul style="list-style-type: none"> Number and types of land use plans in use 	2	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; National Land Use Planning Commission; Research and Academic Institutions; CSOs; and Private Sector
Sub Total (20)				5			

3.3 Climate Change Mitigation

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
1. Energy To achieve sustainable and industrial development through promotion of low intensive carbon technologies	1.1 Explore and invest in renewable energy to ensure overall energy security for social and economic development through enhanced availability and affordability	At least 3 clean, reliable and accessible energy sources by 2025	<ul style="list-style-type: none"> Percentage of Renewable energy produced from renewable energy sources Number of energy end-users Rate of diffusion of energy technologies Percentage of individuals depending on biomass energy 	5	2021-2026	Reports	Ministry responsible for Energy, Environment, Natural Resources and Transport; CSOs and Private Sector
		At least 1000 MW power generated from Renewable energy sources by 2026.	<ul style="list-style-type: none"> Amount of energy produced from clean sources Numbers of substations constructed for power evacuations Percentages of increased installed power capacity for power export through the interconnector 	10	2021-2026	Reports	Ministry responsible for Energy, Environment, Natural Resources and Transport; CSOs and Private Sector
	1.2 Explore options for improved power interconnection with neighbouring countries	Improved power interconnection to at least 5 neighbouring countries by 2025	<ul style="list-style-type: none"> Number and types of 	2	2021-2026	Reports	Ministry responsible for
	1.3 Promote of	Increased use of energy					

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	efficient energy technologies.	efficient technologies by 2025. Reduced energy loss to 12 percent by 2026	<ul style="list-style-type: none"> energy efficient technologies Number of efficient energy end-users Percentages of change in energy loss Percentage of individuals depending on biomass 				Energy, Environment, Natural Resources and Transport; CSOs and Private Sector
	1.4 Enhance supply and access of renewable energy from all sources.	Increased generation by 25% of renewable energy sources by 2025.	<ul style="list-style-type: none"> Percent of population with access to renewable energy. Percentage of renewable energy end-users 	2.5	2021-2026	Reports	Ministry responsible for Energy, Environment, Natural Resources and Transport; CSOs and Private Sector
	1.2 Promote climate-smart rural electrification through development of renewable micro and min-grid energy sources.	Increased rate of climate smart rural electrification by 2025 At least 20 rural renewable energy min-grids developed in rural areas,	<ul style="list-style-type: none"> Percentage of rural population connected to renewable micro/minigrids At least 20 rural minigrids developed in rural areas, Number and types of renewable energy technologies Type of renewable energy technologies. 	2	2021-2026	Reports	Ministry responsible for Energy, Environment, Natural Resources and Transport; CSOs and Private Sector

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	1.3 Promote sustainable production and use of biomass energy.	Biomass consumption reduction by 10% from the current consumption in the energy mix by 2025.	<ul style="list-style-type: none"> Percent of biomass consumption percentage of population using efficient biomass energy technologies 	5.2	2021-2026	Reports	Ministry responsible for Energy, Environment, Natural Resources and Transport; CSOs and Private Sector
	1.4 Develop and adopt national emission factor for energy sector	Emission factor developed and adopted by 2025	<ul style="list-style-type: none"> Number and types of emission factors 	3	2021-2026	Reports	Ministry responsible for Energy, Environment, Natural Resources and Transport; CSOs and Private Sector
	1.5 Increase national energy planning and budget for promoted investments on renewable energy and energy efficiency technologies.	Enhanced budget code for renewable energy and energy efficiency technologies National energy budget increased by 25% for enhanced renewable energy and energy efficiency technologies	<ul style="list-style-type: none"> Availability of the budget code for Renewable energy and energy efficiency technologies Percentage of costs increased for Renewable energy and energy efficiency technologies 	2	2021-2026	Reports	Ministry responsible for Energy, Natural Resources, Environment, Local Government; TPDC, EWURA, TANESCO, TFS, TMA, Research and Academic Institutions; CSOs; and Private Sector
Sub Total (1)				31.7			
2. Forest and Mangroves							

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
Enhance the contribution of forest sector to national sustainable development through exploitation of global GHG Mitigation potentials.	2.1 Promote and enhance forest landscape restoration (afforestation and reforestation)	Reduce deforestation/forest degradation rate by 20% from the current rate set by FREL (i.e., 469,420 ha/year) by 2026) Restore at least 2 million hectares by 2026 At least 25% of the degraded dry-land forests restored.	<ul style="list-style-type: none"> Number of trees planted Forest area change (ha) (density, stems) Area of restored forest land (ha) Forest canopy cover (%) (Shades) Areas of restored mangroves (%) 	10	2021-2026	Reports	Ministry responsible for Agriculture, Natural Resources, Land, Environment, and Local Government; NCMC Land Use Commission, TFS; CSOs and Private Sector
	2.2 Promote and enhance forest mangroves restoration in degraded areas.	Reduce deforestation/forest degradation rate by 20% from the current rate set by FREL (i.e., 469,420 ha/year) by 2026) Restore at least 2 million hectares by 2026 At least 25% of the degraded dry-land forests restored Restore at least 3000 hectares of degraded mangroves by	<ul style="list-style-type: none"> Number of REDD+ activities implemented MtCO₂eq reduced or reduced. 	15	2021 -2026	Relevant Project Reports	Ministry responsible for Natural Resources, TFS, Land, Environment, and Local Governments; NCMC Land Use Commission, TFS; CSOs and Private Sector

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	2.3 Promote implementation of National REDD+ Strategy	Reduce GHGs emission by 30% of 2020 emission level in the forest sector by 2026	Number of REDD+ activities implemented MtCO2eq reduced or avoided.	15	2021-2026	Reports	Ministry responsible for Agriculture, Natural Resources, Land, Environment, and Local Government; Land Use Commission; TFS; CSOs; and Private Sector
	2.4 Promote sustainable biomass energy production.	National biomass legal framework for effective biomass production developed by 2026.	<ul style="list-style-type: none"> Number of regulations & guidelines Type of efficient kilns technologies. Share of sustainably produced charcoal (%) 	40	2021 -2026	Reports National biomass legal framework	MNRT, TFS, ME, MoF, TBS, VPO, Land use Commission, CSO, DP & Private sector
Sub Total (2)				80			
3. Industry							
Promote the use of sustainable energy in the industry sector.	3.1 Diversification of clean energy sources.	Enhanced diversification of at least 7 affordable energy sources by 2025. At least 3 environmental-friendly energy technologies adopted in the industry sector.	<ul style="list-style-type: none"> Number of environmental-friendly adopted technologies. Number of industries that have adopted sustainable energy technologies. Number of industries with energy co-generation technologies 	2	2021 - 2026	Reports	Ministries responsible for Industry, Energy, Environment, Local Government, Natural Resources; TIRDO, COSTECH, CPCT, TPDC, TANESCO, Research and Academic Institution and CSOs, DP, Private Sector

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	3.2 Adoption of energy efficient technologies	Increased use of energy efficient technologies by industries Reduced energy loss to 12 percent by 2026 Increased number of industries that has adopted energy efficient technologies	<ul style="list-style-type: none"> Number and types of energy efficient technologies Number of energy efficient industrial end users. 	2	2021-2026	Reports	Ministries responsible for Industry, energy, Environment, Local Government, Natural Resources; TIRDO, COSTECH, CPCT, TPDC, TANESCO, Research and Academic Institutions, CSOs, DPs, Private Sector
	3.3 Encouraging establishment of energy efficient policies under various institution level.	Increased institutions relying on energy efficient related policies and guidelines by 2026	<ul style="list-style-type: none"> Number and type of energy efficient guidelines and policies. Number of industries adopted and using energy efficient related policies. 	1	2021-2026	Reports	Ministries responsible for Industry, energy, Environment, Local Government, Natural Resources; and CSOs, DP, Private Sector
	3.4 Promote change of standards in production and facilities management. Revised standards to foster energy efficient production and facilities management	Energy efficient standards in production and facilities' management improved by 2026	<ul style="list-style-type: none"> Number of improved energy efficient standards Number of industrial and management facilities that has adopted and using improved standards. 	1	2021-2026	Reports	Ministries responsible for Industry, energy, Environment, Local Government, Natural Resources, TBS, TMDA; and CSOs, DP, Private Sector
Sub Total (3)				6			

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
4. Transport							
Promote an efficient transport system with minimum GHG emissions.	4.1 Promotion of low cost and low carbon mass transport modes such as BRT and other means of mass transport	At least 2 new low emission transport systems adopted by 2026	<ul style="list-style-type: none"> Number and type of transportation systems with low emissions Number of mass and bulk transport end – users using efficient transport systems 	2.3	2021 -2026	Reports	Ministry responsible for Transport, Industry, Environment, LGAs; CSOs, Private Sector, DPs
	4.2 Promote non-motorized modes and means of transport by creating cycling and pedestrian walkways	Increased non-motorized transport system by 2026	<ul style="list-style-type: none"> Number and type of non-motorized transport systems 	1	2021 -2026	Reports	Ministry responsible for Transport, Land, Industry, Environment, LGAs; CSOs, Private Sector, DPs and LATRA
	4.3 Promote importation and manufacturing of new transportation technologies like gas/cable/electric al transport facilities in urban areas	Transportation facilities diversified by 2026	<ul style="list-style-type: none"> Percentage of individuals using gas/cable transport facilities 	2		Reports	Ministry responsible for Transport , Land, Industry, Environment, LGAs; CSOs, Private Sector, DPs and LATRA

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	4.4 Create transport demanding management measures that favour public transport and Non-Motorised transport	New road networks constructed and improved in urban areas by 2026	<ul style="list-style-type: none"> Number of new roads constructed 	2		Report	Ministry responsible for Transport , Land, Industry, Environment, TRC, LGAs; CSOs, Private Sector, DPs and LATRA
	4.5 Improve the country railway network to facilitate low cost and low emission long distance transportation of cargo and passengers	Railway network for long domestic goods and passengers run by efficient energy by 2026	<ul style="list-style-type: none"> Time per trip Length of the improved railway network Type of energy source used to run 	2	2021-2026	Reports	Ministry responsible for Transport , Land, Industry, Environment, TRC, LGAs; CSOs, Private Sector, DPs and LATRA
	4.6 Promote integrated urban transport planning to facilitate efficient and low emission	At least one city has an integrated low emission transport system by 2026	<ul style="list-style-type: none"> Operational integrated transport system 	4	2021-2026	Reports	Ministry responsible for Transport , Land, Industry, Environment, TRC, LGAs; TRC, CSOs, Private Sector, DPs and LATRA
Sub Total (4)				11.3			
5. Waste management							

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
To enhance contribution of environmentally sound waste management Systems.	5.1 Promote effective solid waste management by enhancing reduction, reuse, recycle and least disposal of waste.	Improved solid waste minimization, collection, transportation and disposal systems in all cities and municipalities by 2026.	<ul style="list-style-type: none"> Percentage of reduced waste generation in cities and municipalities Number of cities and municipalities with effective and modern waste management systems Number and type of effective sustainable waste management plans in cities and municipalities 	1	2021 - 2026	Solid waste management reports and new/improved systems	PORALG, Ministry of Industry, Ministry of Finance and planning, Environment, NEMC, TIRDO, CSOs, Academic institutions, Private and DPs
	5.2 Promote waste to energy generation systems	Effective recycling and compost systems in all cities and municipal councils by 2026	<ul style="list-style-type: none"> Cities and municipal councils with functional waste -to-energy generation systems Percent of individuals and entities that practice waste -to-energy systems 	1	2021 - 2026	Solid waste management reports and new/improved systems	PORALG, Ministry of Finance and planning, Environment, Local Government; NEMC, TIRDO, CSOs, Academic institutions, Private and DPs
	5.2 Promote waste to energy generation systems by 2026.	At least 10% increase of waste to energy generation systems by 2026.					

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	5.3 Promote environmentally sound wastewater management systems	60% of Cities and Municipal councils to have effective wastewater management systems by 2026.	<ul style="list-style-type: none"> Number and types of wastewater management systems. existence of waste management guidelines and plans. 	3	2021-2026	Reports and plants.	PORALG, Ministry of Finance and planning, Environment, Local Government; NEMC, TIRDO, CSOs, Academic institutions, Private and DPs
	5.4 Enforcement of environmentally sound Hazardous wastes management systems	Promote non-incineration technologies	<ul style="list-style-type: none"> Percentage of hospital and industries using non-incineration technologies Percentage of hazardous wastes generated to the environment. 	2	2021-2026	Enforcement of environmental auditing report	PORALG, Ministry of Finance and planning, Environment, Local Government; NEMC, TIRDO, CSOs, Academic institutions, Private and DPs
Sub Total (5)							
6. Livestock							
To enhance Productivity and reduction of greenhouse gas/methane emission and improving efficiency.	6.1 Promote appropriate livestock management practices	Enhanced livestock management practice by 2026 National livestock management plan (LMP) developed by 2026	<ul style="list-style-type: none"> Number and types of practices Number of livestock units Percent of pastoral communities adopting livestock management practices Percent of pastoral communities with community pastureland co-management plans 	1	2021 - 2026	Reports	Ministry responsible for Water, Local Government, Livestock, Environment, Natural Resources; TAFORI, TAWA, TALIRA, NARCO and TAWIRI; CSOs, Private and DPs

Strategic Objective	Strategies	Targets	Indicators	Indicative Budget (TZS billion)	Timeframe	Means of Verification	Responsible Institutions
	6.2 Promote use of improved animal feed stuffs.	Increased use of improved animal feeds stuff by 2026 At least 50% of the pastoral community using improved feed stuff by 2026	<ul style="list-style-type: none"> Number and types of animal feed stuff Percent of pastoral communities using improved feed stuff 	1	2021 - 2026	Reports	Ministry responsible for Water, Local Government, Livestock, Environment, Natural Resources; TAFORI, TAWA, TALIRA, NARCO, TAWIRI; CSOs, Private and DPs
	6.3 Increase grazing land productivity and nutrient management	Grazing land productivity increased by 2026 At least 40% of pastoral communities with pastureland co-management plans by 2026	<ul style="list-style-type: none"> Grazing land size Amount of fodder Percent of pastoral communities/ villages adopting sustainable community pastureland co-management plans Percent of pastoral community villages with sustainable land use plans 	1	2021 - 2026	Reports	Ministry responsible for Water, Local Government, Livestock, Environment, Natural Resources; TAFORI, TAWA, TALIRA, NARCO and TAWIRI; CSOs, Private and DPs
	6.4 Enhance restoration of degraded lands,	Degraded land restored by 2026	<ul style="list-style-type: none"> Land size Number and type of restoration techniques 	1	2021 - 2026	Reports	Ministry responsible for Water, Local Government, Livestock, Environment, Natural Resources; TAFORI, TAWA, TALIRA, NARCO and TAWIRI; CSOs, Private and DPs
Subtotal (6)				4			
TOTAL				141			

3.4 Cross-Cutting Issues

Objective	Strategies	Targets	Indicators	Indicative Budget (USD TZS Billion)	Timeframe	Means of Verification	Responsible Institutions
1. Capacity Building, Education and Awareness							
To enhance capacity at all levels to design and implement climate change adaptation and mitigation interventions and improve the level of education, training and awareness	1.1 Establish national climate change knowledge platform to assist in collecting and disseminating relevant climate change adaptation and mitigation knowledge and information	National climate change knowledge platform established by 2024	<ul style="list-style-type: none"> Platform in place and operational Number and types of information and data Number and types of users 	1	2021-2024	<ul style="list-style-type: none"> Reports 	Ministry responsible for Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	1.2 Promote use of local and community level knowledge (including traditional knowledge) on adaptation and mitigation of	Use of local and community level knowledge enhanced by 2026	<ul style="list-style-type: none"> Number and types of educational materials Number and types of knowledge dissemination pathways Number and gender of beneficiaries 	3	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector

Objective	Strategies	Targets	Indicators	Indicative Budget (USD TZS Billion)	Timeframe	Means of Verification	Responsible Institutions
	1.3 Integrate and promote teaching and learning of climate change issues in formal and non-formal education systems	Teaching and learning of climate change issues promoted by 2026	<ul style="list-style-type: none"> Number and levels of Institutions teaching climate change issues 	2	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	1.4 Increase public awareness and understanding on climate change related issues	Awareness and understanding of climate change increased by 2026 Undertake Annual National Climate Change Conference	<ul style="list-style-type: none"> Number and type of awareness materials Number and types of awareness campaigns / programmes Number of gender beneficiaries Number of national climate change conferences held Number of participants from communities 	5	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
Sub Total (21)				11			

2. Research, Vulnerability Assessment, Systematic Observation and Impact Monitoring							
To ensure effective and integrated programme of climate change research development, systematic observation and monitoring	2.1 Support research on vulnerability impact, and climate change adaptation	Research on vulnerability, impacts and climate change adaptation undertaken by 2026	<ul style="list-style-type: none"> number and areas of research number and types of publications 	3	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	2.2 Identify and promote Climate change mitigation interventions	Climate change mitigation interventions identified by 2026	<ul style="list-style-type: none"> number and areas of research number and types of publications 	2	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	2.3 Enhanced capacity in climate change modelling	Climate change models developed by 2026	<ul style="list-style-type: none"> Number of climate change models 	1	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources;

								Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
2.4	Improve understanding of climate knowledge by downscaling global and regional models to the national and local circumstances	Understanding of climate knowledge improved by 2026	<ul style="list-style-type: none"> number and types of climate models adopted 	2	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector	
2.5	Upgrade national meteorological services and its national networks and infrastructure for provision of essential data for climate service and early warning systems	national meteorological services and infrastructure upgraded by 2026	<ul style="list-style-type: none"> number and types of meteorological services number and types of meteorological infrastructure 	10	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Works, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector	
Sub Total (22)				18				
3. Technology Development and Transfer								
To promote appropriate technologies for	3.1 Enhance, strengthen and disseminate	Endogenous climate smart technologies promoted and adopted	<ul style="list-style-type: none"> number and types of endogenous climate smart technologies 	3	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment,	

adaptation and mitigation actions	endogenous climate smart technologies	by 2026	<ul style="list-style-type: none"> number and type of endogenous climate smart technology users 				Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	3.2 Provide incentives to enhance private sector investment in climate smart technologies	Incentives for private sector provided by 2026	<ul style="list-style-type: none"> number and types of incentives number and types of beneficiaries 	1	2021-2024	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	3.3 Support technology innovation among schools, universities and informal sector	Climate smart technologies innovation promoted by 2026	<ul style="list-style-type: none"> number and types of climate smart technologies promoted number of beneficiaries 	2	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Science and Technology, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
Sub Total (23)				6			

4. Climate Financing						
To strengthen national capacity to mobilize additional and appropriate financial resources at both national and international level.	4.1 Establish a database of all climate change actors and initiatives in the country	A database of climate change actors and initiatives established by 2024	<ul style="list-style-type: none"> Reports with data of actors and initiatives 	3	2021-2024	Reports Ministry responsible for Finance, Environment, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	4.2 Undertake resource needs assessment for climate change interventions	Resource needs established	<ul style="list-style-type: none"> Needs assessment report 	2	2021-2024	Reports Ministry responsible for Finance, Environment, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
	4.3 Institute tracking system for domestic and international climate finance flows	Tracking system for domestic and international climate finance flows established by 2024	<ul style="list-style-type: none"> climate finance flow data and information 	3	2021-2024	- Regulation s, policies, strategies, plans and guidelines -Reports Ministry responsible for Finance, Environment, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and

									Academic Institutions; CSOs; and Private Sector
4.4	Enhance the capacity of sectors ministries, local government authorities, private sector and civil society organizations, to develop fundable projects	Capacity of sectors ministries, LGAs, private sector and civil society organizations to develop fundable projects improved by 2026	<ul style="list-style-type: none"> number of training sessions number of trainees number of new bankable fundable project 	3	2021-2026	Reports	Ministry responsible for Finance, Environment, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector		
4.5	Undertake Climate Change Public Expenditure and Budget Review	Climate Public Expenditure and Budget Review undertaken by 2026	<ul style="list-style-type: none"> number of climate public expenditure reviews 	1	2021-2026	Reports	Ministry responsible for Finance, Environment, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector		

	4.6 Safeguarding the stability of the financial system	Enhance financial capacity to handle green finance mobilization	<ul style="list-style-type: none"> Regulatory framework related to green financing. 	2	2021-2026	Reports Policies, strategies and guidelines.	Ministry responsible for Finance , Bank of Tanzania, Environment, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
Sub Total (24)							
5. Gender Mainstreaming							
To enhance gender equity in climate change adaptation and mitigation actions	5.1 Promote mainstreaming of gender in planning and implementation of climate change adaptation and mitigation interventions	Gender mainstreamed in climate change adaptation and mitigation interventions by 2026	<ul style="list-style-type: none"> Number and types of interventions Number and gender of beneficiaries 	3	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Gender, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy, Mining, Natural Resources; Environment; NEMC; TMA, Research and Academic Institutions; CSOs; and Private Sector
5.2 Collect, collate and disseminate information on the differential vulnerability and impact of climate	Assessment of climate change impacts across gender, including people with disabilities undertaken and disseminated by 2026	Assessment of climate change impacts across gender, including people with disabilities undertaken and disseminated by 2026	<ul style="list-style-type: none"> number and types of assessment reports 	2	2021-2026	<ul style="list-style-type: none"> Reports 	Ministry responsible for Gender, Education, Environment, Land, Local Government, Livestock, Agriculture, Transport, Fisheries, Water, Energy,

3.2 Climate Change Adaptation

Objective	Strategies	Targets	Indicators	Indicative budget (TZS Billions)	Timeframe	Means of Verification	Responsible Institutions
1. Freshwater Resources							
To ensure sustainable management and resilience of water resources under the changing climate	1.1 Promote water resilience in all basins.	<ul style="list-style-type: none"> Installation of integrated water resources management (IWRM) tools in all 9 basins Operation of water flow monitoring stations and demarcation of water sources in all 9 basins 	<ul style="list-style-type: none"> Number of water flow monitoring stations installed and demarcated water sources in basins Type of IWRM adopted 	1	2021-2026	Reports	Ministry responsible for Water, work and Communication, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
	1.2 Demarcation of water sources in the 9 water basins to support conservation and protections.	At least 60% of water sources in 9 water basins demarcated to enhance protection and conservation by 2026	Percent of water basins and catchments conserved and demarcated water sources	5	2021-2026	Reports	Ministry responsible for Water, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs
	1.3 Promote flood control in the water basins	At least 50% of water basins have constructed flood control systems by 2026.	Percent of flood control systems constructed in all water basins.	3	2021-2026	Reports	Ministry responsible for Water, Land, Local Government Authority, Environment, Natural Resources; academia and research institutions, CSOs, Private and DPs

IMPLEMENTATION ARRANGEMENT

4.1 Institutional Arrangement

The implementation of the climate change issues in Tanzania is undertaken within the context of the National Environmental Policy (1997), the Environmental Management Act (EMA) 2004, and the related sector policies and legislations. At the national level, the VPO, Division of Environment (DoE) is responsible for all climate related activities. DoE is both the National Climate Change Focal Point for UNFCCC and Designated National Authority (DNA) for Clean Development Mechanism under the Kyoto Protocol.

The Act provides for the institutional framework for environmental management in the country (Figure 16). It confers the task of overall coordination and policy articulation of the environmental management in the country and provision of the central support functions to the ministry responsible for environment, which is the Vice President's Office. The direct operational role on management of specific natural resources or environmental services, such as agriculture, fisheries, forestry, wildlife, mining, water, and waste management is conferred to sector Ministries and Local Government Authorities.

The Act also establishes the National Environmental Advisory Committee (NEAC) with the role of advising the minister responsible for environment. It confers the role of enforcement to the National Environment Management Council (NEMC). The Act further establishes Sector Environmental Sections in sector ministries and confers the environmental management role on the relevant sectors and with a view to provide a link to the Ministry responsible for environment. Finally, the Act gives power to the Regional Secretariats to designate Regional Environmental Management Experts (REMEs) charged with the responsibility to advise and oversee the implementation and enforcement of the Act.

So far, since its enactment, Sector Environmental sections/units have been established in all ministries, and Sector Environmental Coordinators have either been designated or appointed. Furthermore, the Act empowers LGAs (City, Municipal, District, Township) to designate or appoint Environmental Management Officers to oversee implementation of EMA 2004 in their respective levels. In addition, the Act establishes Environmental Committees at different LGAs levels to advise and oversee the implementation of EMA 2004 within their jurisdiction. Climate change issues are addressed using the same institutional framework.

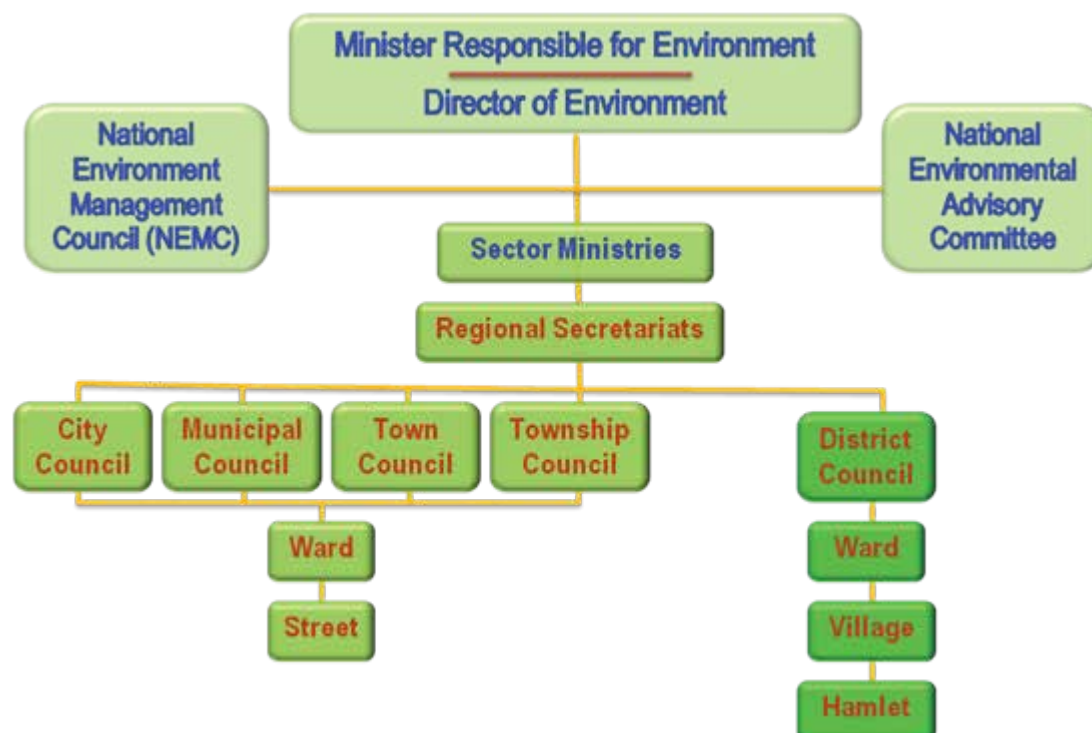


Figure 14: Institutional arrangement for environmental management in Tanzania (Source, URT 2013)

Furthermore, the Government has established two committees to facilitate articulation, policy guidance and coordination of climate change issues in the country: namely, National Climate Change Steering Committee (NCCSC) and National Climate Change Technical Committee (NCCTC). The National Climate Change Steering Committee (NCCSC) has been established and is chaired by the Permanent Secretary - Vice President's Office. The Committee provides policy guidance to ensure coordinated actions and participation within various sectors and institutions. In addition to that, the National Climate Change Technical Committee (NCCTC) has been established, chaired by the Director of Environment, with the role of providing technical advice, stimulate more coordinated actions of actors and broaden the participation of various actors in addressing climate change.

Moreover, the National Carbon Monitoring Centre (NCMC), which is hosted by the Sokoine University of Agriculture (SUA), was established in 2016. The main objective of the Centre is to build national capacity to measure, verify and report adequately on sector carbon emissions at national and international levels. The centre manages the National Greenhouse Gas Inventory System, which is a portal established to ensure effective management of sector GHG emission data as per the United Nations Framework Convention on Climate Change (UNFCCC) guidelines.

The general implementation of this Strategy will be guided at the sector level by the sector policies, strategies, guidelines and plans, which will be the responsibility of the relevant Government Departments and Agencies. The President's Office-Regional Administration and Local Government (PO-RALG) will coordinate and work closely with Local Government

Authorities (LGAs) through their various departments in collaboration with line sector ministries to implement this Strategy at the local level. The sector ministries and LGAs are to be capacitated and supported by VPO and other partners to mainstream this Strategy into their planning processes to ensure proper resource allocation and effective implementation.

The development partners (DPs) through their bilateral and multilateral arrangements are encouraged to support the government in implementing this Strategy by providing technical and financial support, as well as facilitating resource mobilization. They are also encouraged to provide capacity building and facilitate technology development and transfer to various stakeholders in implementing this Strategy.

The civil society organizations (CSOs) are encouraged to cooperate with the Government in implementing the Strategy through various initiatives at various levels. Apart from CSOs, also private sector is encouraged to implement innovative initiatives to address climate change in supporting the implementation of this Strategy by collaborating with the Government under public private partnership (PPP) arrangement, Corporate Social Responsibility (CSR) or through various resource mobilization mechanisms (such as resources mobilized under the GCF accreditation or through various carbon markets).

4.2 Coordination

Implementation of this Strategy will follow the institutional arrangement as provided by the EMA 2004. In that context, the Strategy will be coordinated by the Vice President's Office, which is responsible for coordination of environmental management in the country. The National Climate Change Technical Committee (NCCTC) and National Climate Change Steering Committee (NCCSC) will guide the implementation of this Strategy. The NCCTC shall provide technical advice to the NCCFP, while the NCCSC shall provide policy guidance as well as ensuring coordinated action and participation within relevant sectors.

Moreover, implementation of specific strategic interventions and activities will be done in the respective MDAs; and LGAs according to their roles and responsibilities under EMA 2004. NGOs, civil society organizations, religious organizations, educational institutions, and other stakeholders are encouraged to participate by facilitating the implementation of specific adaptation and mitigation initiatives at the community level.

Resource mobilization, financial management and reporting shall be undertaken pursuant to the government's financial management guidelines and systems established under the Ministry of Finance. However, special arrangements will be made in cooperation with the Ministry of Finance to enhance existing resource mobilization and financial management systems to cope with increasing demand in financial support for addressing climate change;

this will include the strengthening of the Environment Trust Fund and the establishment of the National Climate Change Financing Mechanism.

The VPO will coordinate the annual National Climate Change Forum (ANCCF) to bring together a range of different stakeholders and actors (both state and non-state) to share experiences, challenges, solutions and opportunities on addressing climate change. The forum will also set a platform for leveraging resources, mobilizing and recognizing efforts taken by the government through sector ministries, local government authorities, development partners, civil society organizations, and private sector to address climate change and support implementation of this Strategy. This Forum shall be a national multi-stakeholder platform to assess the progress in the implementation of this Strategy and provide national position that will inform national and international discourse on climate change.

4.3 Information and Communication Arrangement

The implementation of this Strategy requires commitment and involvement of different organizations and individuals at all levels. The Vice President's Office has the overall mandate of overseeing the implementation of the Strategy that is consistent with the Government's communication procedures and the requirements under the EMA 2004 and UNFCCC.

While the Strategy provides key strategic information, responsible actors will develop and communicate specific sector information relevant to their mandate focussing on creating a sense of urgency in addressing challenges of climate change; linking climate change to sustainable development goals; promoting and demonstrating best practices; ensuring information reaches key decision-makers; enhancing knowledge of the media on climate change; and promoting awareness and public participation.

Whereas different actors or implementers of the Strategy have specific roles, it is expected that different audience segments would provide feedback to each other through various channels to facilitate smooth communication flow in the implementation of the Strategy as summarized in Figure 17.

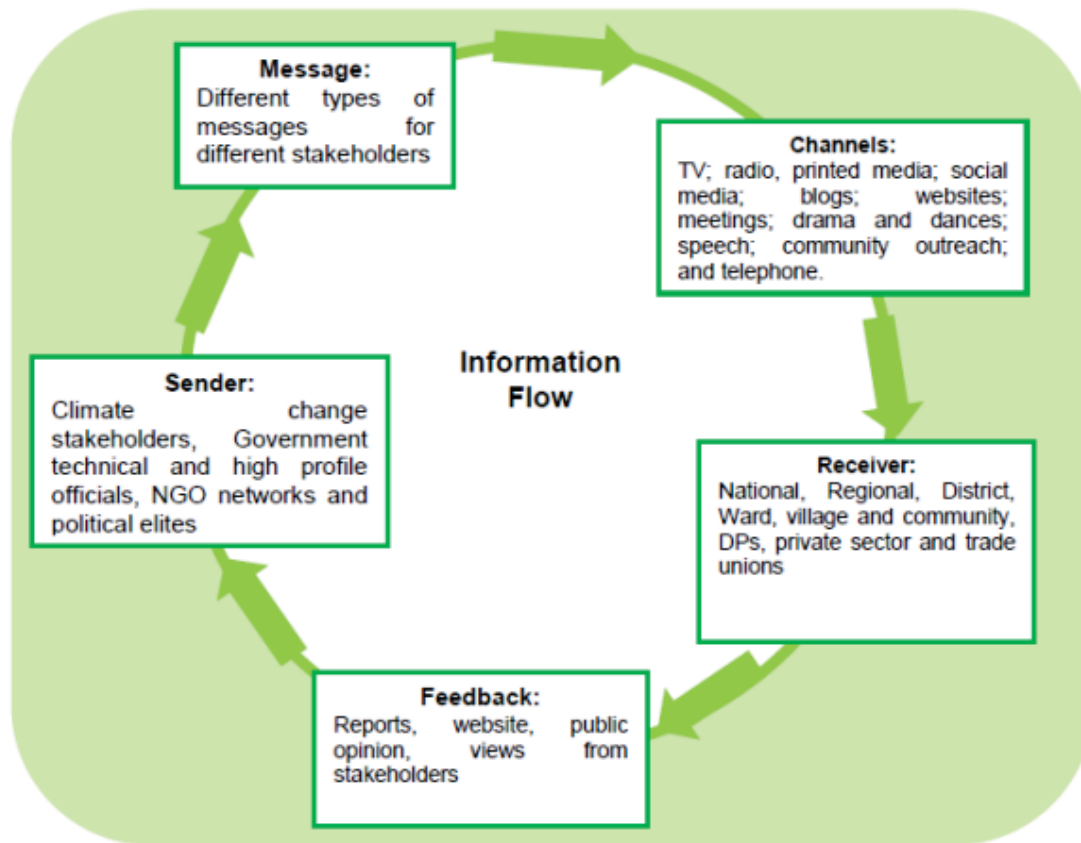


Figure 17: Information flow in the National Climate Change Strategy (URT, 2012)

4.4 Reporting Arrangements

The reporting arrangement in the implementation of this Strategy will follow the established government reporting system, as well as reporting system provided in EMA 2004. MDAs and LGAs are expected to inform the VPO about the climate change initiatives that are implemented by DPs, CSOs, and private sector within their areas of operation. The Annual National Climate Change Forum will be used to share experiences, challenges, solutions, innovation and opportunities on addressing climate change. The forum shall have different themes that will be determined each year and communicated to the public accordingly.

In addition, EMA 2004 requires Sector Environmental Coordinators and District, Council, and Town Environmental Management Officers to report on implementation of their Environmental Action Plans that include climate change issues. Since MDAs and LGAs are expected to integrate relevant strategic interventions in their respective plans, their quarterly and annual reports are expected to capture information on the implementation of the Strategy.

4.5 Resource Mobilization

Addressing climate change in Tanzania will largely depend on availability and accessibility of sustainable climate financing from both international and domestic sources. Available international climate financing mechanisms include multilateral sources such as Green Climate Fund (GCF), Global Environment Facility (GEF), Adaptation Fund, Least Developed Countries Fund (LDCF), NAMAs Facility, Special Climate Change Fund (SCF), Clean Technology Fund, Global Energy Efficiency and Renewable Energy Fund, established corporate approaches under UNFCCC, as well as bilateral institutions including development partners (DPs) and international private companies. Training and capacity building on project proposal development will be emphasized in order to enhance Tanzania's accessibility to various funding sources and opportunities.

The domestic climate financing may be accessed from government budget, private sector, CSOs, as well as individual contributions through various mechanisms including crowd funding. The financial sector such as banks and social protection funds will be encouraged to play an important role in facilitating mobilization of financing for the implementation of this Strategy. In view of this, an integrated approach and coordinated working system is highly required to ensure that funds to address climate change are effectively mobilized, allocated, and tracked to achieve the objectives presented in this Strategy.

Moreover, in order to ensure resources availability, the Strategy proposes the establishment and operationalization of the Climate Change Budget Code or objectives and National Climate Change Financing Mechanism. The accreditation of the local institutions to international climate financing facilities such as GCF will be prioritized. The preparation of climate change proposals by various accredited institutions will be coordinated and guided by the VPO in order to have proper consideration of key government priorities as outlined in this Strategy and other development frameworks.

A balance of financing in both adaptation and mitigation will be emphasized based on the priorities of the national climate change plans including NDCs and NAP. Such balance is also important in financing other areas such as capacity building, research, and development (R&D), technology development and transfer as well as awareness creation.

Generally, it is envisaged that, international communities will honour their commitments and responsibilities in view of addressing global climate change challenges by providing the required support. The envisaged financial support from foreign sources in most cases will be in terms of grants. Such supports shall adhere to the national/ local rules and regulations specific to the Loans, Guarantee and Grant Acts, CAP 134, VAT Act 2014 in Tanzania. However, if support from the international communities will not be availed timely, national efforts to address climate change are likely to be hampered and this will affect both national

and global targets set in the Nationally Determined Contributions by the United Republic of Tanzania. Further, mobilization of this funds will be undertaken pursuant to the requirements of the specific sources of funds as explained in chapter 4, section 4.1.

4.6 Monitoring and Evaluation (M&E) Arrangement

The Vice President's Office prepared a Monitoring and Evaluation Framework for climate change adaptation in Tanzania³⁵ in 2012. In addition, the Vice President's Office developed a Monitoring and Evaluation (M&E) Guidelines. Thus, this Strategy will follow Government standard monitoring and evaluation framework for climate change adaptation and M&E Guidelines to be adopted by the Vice President's Office.

Monitoring and Evaluation (M&E) will be done at all levels through different approaches outlining milestones and key performance indicators under each strategic interventions and objective. The implementation of this Strategy and its achievement will be monitored and evaluated throughout the implementation timeframe. The overall responsibility of monitoring and evaluation is vested to the Vice President's Office. VPO will play key role in coordination, implementation, monitoring and evaluation of this Strategy.

A monitoring and evaluation system will be developed as part of Implementation Strategy. This will involve collection, compilation, synthesis, analysis and evaluation of information related to the implementation of the Strategy. The information will be processed so as to compare the various baselines with actual implementation and findings will be disseminated to stakeholders. The effective monitoring will need a coordinated effort and close cooperation from all key players.

Monitoring will be done by VPO in accordance with institutional arrangement provided by EMA 2004. In that context, the VPO will monitor the implementation of the Strategy through Sector Environmental Sections and Units, the Regional Environmental Experts, and the Environmental Management Officers from sector ministries and LGAs. The Environmental Management Officers from each respective sectors and institutions are expected to submit annual implementation reports to VPO-DoE as per the EMA 2004. As appropriate, the reports will cover both physical and financial aspects taking into account indicators and key deliverables outlined in the key intervention of the Strategy. Reports from non-state actors will be captured through respective reports of their government partners or collaborators.

The information obtained from various stakeholders will be compiled in various periodical monitoring reports and made available to various stakeholders through quarter and annual

³⁵ United Republic of Tanzania. Vice President's Office. Monitoring and Evaluation Framework for Climate Change Adaptation in Tanzania. November, 2012, pp. 29.

reports, budget speeches and relevant reports. They will also be presented during the Annual National Climate Change Forum.

Mid-term evaluation will be undertaken after two and half years to measure the extent to which the strategic interventions and actions undertaken. This evaluation will be conducted to provide an overview of the achievements of the objectives, technical approach, and implementation framework towards the desired results. The information obtained will provide an avenue to make adjustments or amendments to the implementation plan (if necessary). This will help to assess progress of the implementation of strategic intervention and transparency on climate finance.

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