UNITED REPUBLIC OF TANZANIA

VICE PRESIDENT'S OFFICE

NATIONAL ADAPTATION PLAN 2025 – 2035

November 2025

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FOREWORD

Climate change presents a profound and growing threat to Tanzania's economic progress, social well-being, and environmental sustainability. Our country is already experiencing the harsh impacts of a changing climate through increased frequency and severity of floods, prolonged droughts, temperature extremes, and rising sea levels. These impacts are disrupting agriculture, water supply, health systems, coastal infrastructure, and tourism sectors of our economy.

In response to these pressing challenges, the Government of Tanzania has taken decisive steps to mainstream climate action into our national development agenda. The National Climate Change Response Strategy (2021–2026) provides a comprehensive framework for enhancing resilience, reducing emissions, and guiding sectoral adaptation. Additionally, Tanzania's updated Nationally Determined Contribution (NDC) under the Paris Agreement highlights our ambition and commitment to implement.

To translate these commitments into action, the Government, through the Vice President's Office, in collaboration with the First Vice President's Office, has developed the National Adaptation Plan (NAP) 2025–2035. This Plan sets out our strategic approach to managing climate risks and building long-term resilience. The development of the NAP followed a rigorous and inclusive process, engaging stakeholders from across Government Ministries, Departments, and Agencies, Development Partners, the Private Sector, Civil Society, Academia, and Local Communities. While the NDC outlines our national adaptation and mitigation goals at the international level, the NAP offers a practical roadmap for implementation at home. It serves as a guide to integrate adaptation measures into planning, budgeting, and investments across all sectors and levels of government.

This Plan is a testament to our collective commitment to protecting people, economy, and the environment of Tanzania. I call upon all partners and stakeholders to support its implementation and ensure that together, we secure a climate-resilient and prosperous future for our nation.

.....

Eng. Hamad M. Y. Masauni (MP.)

MINISTER OF STATE,
VICE PRESIDENT'S OFFICE - UNION AND ENVIRONMENT

ACKNOWLEDGEMENT

On behalf of the Government of the United Republic of Tanzania, I extend my deepest gratitude to all stakeholders who contributed their expertise, time, and dedication to the development of the National Adaptation Plan (NAP) 2025–2035. This document presents a milestone in our collective efforts towards addressing climate change adaptation in various sectors in the country.

It was made possible through the tireless efforts and commitments from technical experts drawn from Government Ministries, Departments, and Agencies (MDAs), from Mainland Tanzania and Zanzibar, and Higher Learning institutions across the country.

Special appreciation goes to Prof. Peter L. Msoffe, Deputy Permanent Secretary; Ms. Maryam J. Sadala, Principal Secretary (FVPO); Ms. Kemilembe S. Mutasa, Director of Environment (VPO); and Ms. Farhat A. Mbarouk**,** Director of Environment (FVPO), for their outstanding leadership in coordinating the multi-stakeholder technical team throughout the NAP formulation process. Sincere thanks are also extended to the NAP Project Coordinator, Ms. Asia Akule**,**and Assistant Project Coordinator, Mr. Nassir Tahir**,** for their dedication in steering the process. The Technical Team played an instrumental role by conducting sectoral analyses, facilitating consultations, providing scientific and policy guidance, and ensuring the integration of adaptation priorities into a coherent and actionable plan.

On a special note, let me acknowledge the invaluable contribution from the United Nations Development Programme (UNDP), the Green Climate Fund (GCF) for their technical and financial support to facilitate the development of the NAP. Lastly, as we embark on the implementation phase, I call upon all stakeholders to sustain this spirit of collaboration and commitment to ensure the successful execution of the NAP to secure a climate-resilient future for all Tanzanians.

……..

Eng. Cyprian J. Luhemeja

PERMANENT SECRETARY

GLOSSARY

Adaptation Needs	The requirements or gaps that need to be addressed to reduce climate vulnerability or take advantage of climate-related opportunities.
Adaptation Options	The range of possible strategies and actions that can be implemented to address identified adaptation needs.
Adaptation Programmes	Structured set of adaptation intervention and supporting systems that a country commits to achieve resilience outcomes over time.
Adaptive capacity	The assets and abilities of the exposed element to address risk and vulnerability.
Adaptive Governance	A system of governance that is flexible, learning-oriented, and capable of adjusting to changing climatic conditions and new information.
Agro-climate Advisory Services	A specialized information service that translates climate and weather data into actionable advice for farmers and agricultural producers
Anticipatory Adaptation	Actions taken before impacts of climate change are fully observed, based on forecasts or projections of changing conditions
Biodiversity	The variability among living organisms from terrestrial, marine, and other ecosystems. Biodiversity includes variability at the genetic, species, and ecosystem levels
Biodiversity hotspot	Geographic areas that are exceptionally rich in species, ecologically distinct, and often contain geographically rare endemic species. They are thus priorities for nature conservation action.
Blue Economy	Sustainable use of ocean and freshwater resources for economic growth, improved livelihoods, and jobs while preserving the health of ocean ecosystems.
Carbon Sequestration	The process of capturing and storing atmospheric carbon dioxide to mitigate global warming.
Climate Adaptation	The process of adjusting to actual or expected climate and its effects, to moderate harm or exploit beneficial opportunities.
Climate Budget Tagging	A governance tool for tracking and aligning national public expenditures with climate change objectives
Climate Change	Long-term alteration of temperature and typical weather patterns in a place, largely driven by human activities such as burning fossil fuels.
Climate Finance	Financial resources allocated to support mitigation and adaptation actions that address climate change.
Climate Information Portal	A digital platform that provides access to climate data, projections, and adaptation resources.
Climate Proofing	The process of making infrastructure, systems, and communities resilient to the impacts of climate change.
Climate Resilience	The capacity of social, economic, and environmental systems to cope with hazardous climate events by responding or reorganizing in ways that maintain their essential function, identity, and structure.
Climate Risk	The potential for adverse consequences for human or ecological systems arising from the interaction of climate-related hazards, exposure, and vulnerability.
Climate Risk Screening	A systematic process to identify and provide an initial assessment of climate change risks to a project, plan, policy, or investment.
Climate Scenario	A coherent, internally consistent and plausible description of a possible future state of the climate system based on assumptions of greenhouse gas emissions.
Climate Services	The provision of climate information in a way that assists decision-making by individuals and organizations.
Climate Vulnerability	The degree to which a system is susceptible to, or unable to cope with, adverse effects of climate change.
Climate-Induced Migration	The movement of people driven primarily by the impacts of climate change, such as sea-level rise, extreme weather, or drought.

Climate-Resilient Health Systems	Health systems that possess the capacity to anticipate, respond to, cope with, recover from, and adapt to climate-related shocks and stresses.
Climate-Resilient Infrastructure	Infrastructure systems (e.g., energy, water, transport, communications) that are designed, constructed, operated, and maintained to anticipate, withstand, respond to, and recover from disruptions caused by climate change impacts.
Climate-Resilient Land Administration	An integrated approach to urban design and development that proactively incorporates climate change adaptation and mitigation measures into policies, plans, and projects.
Climate-Resilient Urban Planning	An integrated approach to urban design and development that proactively incorporates climate change adaptation and mitigation measures into policies, plans, and projects.
Climate-Resilient Water Safety Plans	A comprehensive risk assessment and management approach for a drinking water supply system that explicitly incorporates climate change impacts.
Climate-sensitive Planning	Planning processes that integrate climate risks and adaptation measures into development strategies and policies.
Climate-Smart Agriculture (CSA)	An integrated approach to managing landscapes cropland, livestock, forests, and fisheries that addresses the interlinked challenges of food security and climate change.
Climate-Smart Technologies	Technologies that are specifically designed or adapted to help communities, ecosystems, and sectors mitigate greenhouse gas emissions and/or adapt to the adverse effects of climate change.
Coral Bleaching	A stress response in which corals expel the millions of symbiotic, photosynthetic algae (called *zooxanthellae*) that live in their tissues. These algae give corals their vibrant color and provide up to 90% of their energy. Once expelled, the coral's white calcium carbonate skeleton becomes visible through its transparent tissue, making it appear "bleached.
Disaster Risk Management	The application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengthening of resilience and reduction of disaster losses.
Disaster Risk Reduction	Is aimed at preventing new and reducing existing disaster risk and managing residual risk, all of which contribute to strengthening resilience and therefore to the achievement of sustainable development.
Downscaling	The process of translating large-scale, low-resolution global climate model (GCM) projections to finer spatial and temporal resolutions that are relevant for regional or local impact assessments and adaptation planning.
Early Maturing Crop Varieties	Crop varieties that reach maturity in a shorter period, reducing exposure to climatic risks such as drought or flooding.
Early warning systems (EWS)	An integrated system of hazard monitoring, forecasting and prediction, disaster risk assessment, communication and preparedness activities systems and processes that enables individuals, communities, governments, businesses and others to take timely action to reduce disaster risks in advance of hazardous events.
Ecosystem Services	The multitude of benefits that humans receive freely from healthy, functioning natural ecosystems and biodiversity.
Ecosystem-Based Adaptation (EbA)	The use of biodiversity and ecosystem services as part of an overall adaptation strategy to help people adapt to the adverse effects of climate change.
Extreme Temperature	Periods of excessively high or low temperature that can pose threats to ecosystems, health, and infrastructure.
Gender-Responsive Adaptation	Adaptation planning and actions that actively identify and address the distinct needs, capacities, and priorities of women, men, and gender-diverse people to ensure equitable benefits and build social resilience.
Green Climate Fund (GCF)	A fund established within the framework of the UNFCCC to assist developing countries in adaptation and mitigation practices to counter climate change.

Hazard	A process, phenomenon or human activity that may cause loss of life, injury or other health impacts, property damage, social and economic disruption or environmental degradation.
Heat Wave	A prolonged period of excessively hot weather, often accompanied by high humidity, which can be hazardous to human health and ecosystems.
Institutional Capacity	The ability of institutions to plan, coordinate, and implement effective responses to climate change challenges.
Livelihood	The means of securing the necessities of life, which can be affected by climate change through impacts on agriculture, water, health.
Mainstreaming	The integration of climate change adaptation and mitigation into existing policies, planning, and development processes.
Nationally Determined Contribution (NDC)	A climate action plan to cut emissions and adapt to climate impacts submitted by each country under the Paris Agreement.
Nature-Based Solutions (NbS)	Actions to protect, sustainably manage, and restore natural or modified ecosystems that address societal challenges effectively and adaptively, simultaneously providing human well-being and biodiversity benefits.
Participatory Village Land Use Planning	A bottom-up process where local land users and stakeholders collaboratively identify, analyse, and plan land and water resources to ensure sustainable practices, improve livelihoods, and address community needs and conflicts.
Readiness Proposal	A funding request, often made to organizations like the Green Climate Fund (GCF) or the Adaptation Fund, for support in building national capacity to access climate finance and implement climate action
Resilience	The ability of a system, community, or society to withstand, recover, and adapt from climate-related shocks and stresses.
Risk	The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems
Risk Assessment	The process of evaluating the likelihood and consequences of climate-related hazards on vulnerable systems.
Sea Level Rise	The increase in the global average sea level due to melting glaciers and thermal expansion from climate change.
Shared Socio-economic Pathways (SSPs)	Narratives and quantitative projections describing plausible future societal trends, used in combination with climate scenarios for impact analysis.
Transformative Adaptation	Adaptation actions that fundamentally change the ecological, social, or economic attributes of a system in response to climate change and its impacts.
Vector-borne Diseases	Diseases transmitted to humans by organisms such as mosquitoes (e.g., malaria, dengue), whose distribution can be influenced by climate change.
Vulnerability	The conditions determined by physical, social, economic and environmental factors or processes which increase the susceptibility of an individual, a community, assets or systems to the impacts of hazards.
Vulnerability Assessment	The process of identifying, quantifying, and prioritizing the vulnerabilities of a system to climate change impacts.
Vulnerable Groups	Populations at greater risk from climate change impacts due to social, economic, or environmental disadvantages (e.g., women, elderly, poor communities).
Water-borne Diseases	Diseases caused by pathogenic microorganisms transmitted through contaminated water, often worsened by extreme weather events.

ABBREVIATIONS & ACRONYMS

APSIM:	Agricultural Production Systems Simulator Model
AR6:	Sixth Assessment Report
BMUs:	Beach Management Units
BTR:	Biennial Transparency Report
CA:	Conservation Agriculture
CAHW:	Community Animal Health Worker
CMIP6:	Coupled Model Inter comparison Project Phase 6
CREATE:	Climate-Resilient Tourism and Community Empowerment in Tanzania
CR-HEALTH:	Climate-Resilient Health Systems for Tanzania
CRU:	Climatic Research Unit
CR-WSPs:	Climate-Resilient Water Safety Plans
CSA:	Climate-Smart Agriculture
DDPs:	District Development Plans
DRM:	Disaster Risk Management
DRR:	Disaster Risk Reduction
DSSAT:	Decision Support System for Agro technology Transfer
DTCVs:	Drought-Tolerant and Early-Maturing Crop Varieties
DTR:	Diurnal Temperature Range
EbA:	Ecosystem-Based Adaptation
EMA:	Environmental Management Act
EWS	Early Warning Systems
FFS:	Farmer Field Schools
FVPO:	First Vice President's Office
GDP:	Gross Domestic Product
GGA:	Global Goal on Adaptation
GCMs:	Global Climate Models
GIS:	Geographic Information System
HNAP:	Health National Adaptation Plan
HWC:	Human-Wildlife Conflict
ICZM:	Integrated Coastal Zone Management
IPCC:	Intergovernmental Panel on Climate Change
ITCZ:	Inter-Tropical Convergence Zone
IUU:	Illegal, Unreported, and Unregulated
IWRMD:	Integrated Water Resources Management and Development
LDCs:	Least Developed Countries
LEG:	Least Developed Countries Expert Group
LGAs:	Local Government Authorities
LMMAs:	Locally Managed Marine Areas
MCS:	Monitoring, Control, and Surveillance
MDAs:	Ministries, Departments, and Agencies
MEL:	Monitoring, Evaluation, and Learning
NAP:	National Adaptation Plan
NAPAs:	National Adaptation Programmes of Action
NBS:	National Bureau of Statistics

NCCRS:	National Climate Change Response Strategy
NCCSC:	National Climate Change Steering Committee
NCCTC:	National Climate Change Technical Committee
NDC:	Nationally Determined Contribution
NWMAS:	National Wildlife Management Areas Strategy
PO-RALG:	President's Office – Regional Administration and Local Government
PPCPs:	Public-Private-Community Partnerships
RADIUS:	Building Resilient Infrastructure and Urban Settlements in Tanzania
REDD+:	Reducing Emissions from Deforestation and Forest Degradation
REMEs:	Regional Environmental Management Experts
RP-GCF:	Readiness Proposal to the Green Climate Fund
RVA:	Risk and Vulnerability Assessment
SDGs:	Sustainable Development Goals
SLR:	Sea Level Rise
SPAR-CC:	Strengthening Pastoralist and Agro-Pastoralist Resilience to Climate Change in Tanzania's Hotspots
SSP1-2.6:	Shared Socioeconomic Pathways - Low emissions scenario
SSP2-4.5:	Shared Socioeconomic Pathways - Intermediate emissions scenario
SSP5-8.5:	Shared Socioeconomic Pathways - High emissions scenario
SVPO:	Second Vice President's Office
TICGL:	Tanzania Investment Centre Guidance List
Tmax:	Maximum Temperature
Tmin:	Minimum Temperature
TMA:	Tanzania Meteorological Authority
TTB:	Tanzania Tourist Board
UNFCCC:	United Nations Framework Convention on Climate Change
URT:	United Republic of Tanzania
VLUP:	Village Land Use Planning
VNR:	Voluntary National Review
VPO:	Vice President's Office
WASH:	Water, Sanitation, and Hygiene
WIBI:	Weather-Index Based Crop Insurance
WPIS:	Wildlife Policy Implementation Strategy
WUAs:	Water User Association

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EXECUTIVE SUMMARY

The United Republic of Tanzania is highly vulnerable to climate change impacts, threatening the country's economic stability, social well-being, and environmental sustainability. The impacts include increased frequency and severity of floods, prolonged droughts, extreme temperatures, and sea-level rise. In response, the Government of Tanzania, through the Vice President's Office, has developed a ten-year NAP from 2025–2035. This plan provides a strategic framework to integrate climate adaptation into the national and local development planning to enhance resilience and reduce vulnerability across key sectors. The NAP is essential in achieving the Tanzania Development Vision 2050, the Zanzibar Development Vision 2050, and the Sustainable Development Goals (SDGs).

The NAP envisions building a climate-resilient Tanzania by 2035, where communities, ecosystems, and the economy can withstand, adapt to, and thrive against climate change impacts. The main objective of the NAP is to reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience and facilitating the integration of climate change adaptation into strategic social and economic development policies, strategies, plans, programmes, and budgets. The NAP specific objectives are to:

1) Enhance adaptive capacity of communities, ecosystems, and economic sectors to climate change impacts through targeted, inclusive, and locally led adaptation actions.

2) Integrate climate change adaptation into national, sectoral, and local development planning, policies, and budgeting processes.

3) Strengthen institutional and coordination mechanisms for climate adaptation.

4) Mobilize and allocate financial, technological, and capacity-building resources for the implementation of prioritized adaptation actions.

5) Reduce the adaptation deficit among vulnerable groups by systematically mainstreaming gender, disability, age, and social inclusion into all adaptation actions

Tanzania has made notable progress in mainstreaming climate change adaptation by integrating the NAP in national and sector policies and plans. As such, climate action is now part of key policies, strategies, and development programmes. As these frameworks are crucial in providing a country's roadmap on adaptation, the NAP provides a robust synthesis of Tanzania's existing environmental policy, legal and institutional frameworks. It provides a purview of national environmental and blue economy policies, acts and strategies and delving more on specific adaptation issues and gaps from the nine key sectors considered under NAP. The chapter on frameworks further gives a snapshot on the institutional framework for the NAP implementation.

The NAP also connects well with international, regional, and national development goals to ensure efforts are consistent at global and national level. Tanzania NAP envisions the integration in two ways, vertically, by linking national, regional, and local levels, and horizontally, by connecting different sectors. The integration goals enable climate issues to be incorporated in budgets, helping to secure funds and build stronger systems for long-term, resilient development.

The NAP is anchored on principles of gender responsiveness, inclusion of children and youth, vulnerable groups, and indigenous knowledge, and integration across sectors and governance levels. It prioritizes resource mobilization with financial accountability and promotes evidence-based planning that blends scientific data with local knowledge to deliver context-specific, equitable, and sustainable adaptation actions. Tanzania's vulnerability to climate change arises not only from its exposure to climatic hazards but also from systemic challenges, which amplifies risks and limit adaptive capacity. To address these factors and strengthen national resilience, the NAP prioritizes five cross-cutting issues, namely, gender and social inclusion, finance and investment, disaster risk management, capacity development, and technology and research.

The NAP is also built on a stark assessment of the hazards Tanzania face, including temperature rise, erratic rainfall, floods, drought, and saltwater intrusion. The Tanzania projected climate change scenario revealed temperature anomalies showing consistently an increase in warmer night-time conditions and more variable

daytime trends; projected temperature rise from 1.4–2.3°C by 2050; erratic and above-average rainfall patterns; frequent floods; longer dry spells and drought increase; and coastal erosion and saltwater intrusion. The pervasive and interconnected climate change impacts in Tanzania are expected to be rampant and exacerbate a decline in crop yields and fish stocks; damage infrastructure, increase climate-sensitive diseases outbreaks, and ultimately threaten health, water availability, agricultural productivity; endanger communities, and jeopardize the implementation of key national and international strategies.

The NAP further promotes the country's climate resilience and adaptation to climate change by providing a clear, actionable sectoral risks and vulnerability assessment on nine priority sectors critical to our nation's economy and food security. The sectors are Agriculture, Livestock, Fisheries, Water, Health, Tourism, Wildlife, Infrastructure and Human Settlements, and Coastal and Marine Resources. With respect to sectoral vulnerability, in the Agricultural sector, it is projected that there will be a decline in rainfall and dry spells in southern Tanzania and increased rainfall and flooding in northern Tanzania. Livestock sector projections reveal more frequent floods, prolonged droughts, and rising temperatures that exacerbate water and heat stress and expanded coastal saltwater intrusion. In the fisheries sector, evidence shows increased ocean warming and acidification, and more frequent storms, all of which disrupt fish distribution, damage coral reefs, mangroves, and seagrass beds, and endanger fishing operations. The water sector is predicted to suffer systemic vulnerability within the water-energy-food nexus as a result of frequent and intense droughts.

The health sector projections in Tanzania highlight an increase in climate-driven diseases, malnutrition and food insecurity, escalating water-borne diseases, increased disease burden, and overwhelmed health care services emanating from an increase in drought, heatwaves and floods. Tourism, a strategic sector to Tanzania's economy, is expected to be highly disrupted by ecosystem and marine habitat loss, endangered beaches, and coral bleaching resulting from increased flooding and temperature rise. NAP projections in the wildlife sector reveal loss in biodiversity, species extinctions, reduced ecotourism revenues, weakened ecosystem services, and increased human-wildlife conflicts. Infrastructure and human settlements will be affected by sea-level rise, floods, coastal erosion, and, more notably, frequent heavy rainfall events. These hazards threaten the existence of ports such as Malindi in Zanzibar and are expected to affect tourism, cultural heritage sites, and coastal livelihoods and essentially causing systemic disruptions. The coastal and marine sector is expected to be vulnerable to temperature rises, sea-level rise, shoreline erosion, and saltwater intrusion.

To build national climate resilience, the NAP prioritizes sector-specific interventions for the Mainland Tanzania and Zanzibar. In the Mainland Tanzania, the agricultural sector will focus on Climate-Smart Agriculture, small-scale irrigation, and drought-resistant crops. Livestock sector key interventions include water resource management, strengthening rangeland management, and veterinary services. Strategic interventions for water security include restoration and conservation of water sources, water harvesting, and resilient domestic water systems. The health sector intends to fortify disaster preparedness and response, particularly on health surveillance and early warning systems, health infrastructure, and water, sanitation, and hygiene systems. Coastal communities' interventions include integrated coastal management plans, restoration and conservation of the ecosystem, and institutional coordination.

The initiatives in the fisheries sector are supporting smart-fishing, institutional capacity for Beach Marine Units, and sustainable management of marine protected areas and locally managed marine areas. Wildlife sector measures include protecting wildlife corridors, restoration and conservation of biodiversity, forests, habitats and sustainable water sources. Additionally, NAP responses in the tourism sector entail promoting community-led tourism, diversification of tourism products and improving and developing tourism infrastructure. Moreover, NAP adaptation measures in the infrastructure and human settlements are establishing national building codes and standards, developing climate-proofing infrastructure and promoting a robust integrated land-use planning.

In Zanzibar, the NAP prioritizes a number of sector-specific options to adapt to climate change. The key adaptation options in the agriculture sector are embankments/seawalls for cropland areas in the coastal areas, promoting drought-tolerant crops, and developing irrigation systems. Livestock adaptation measures are enhancing disease surveillance and vaccination programs, promoting rainwater harvesting and solar boreholes in highly drought-prone areas, and drought-tolerant fodder and silage. NAP adaptation options in the water sector are initiating a climate adaptation fund for water infrastructure, establishing blended finance models for water resilience, and promoting disability-friendly water access points. Health sector adaptation options include developing climate-resilient health infrastructure, disaster preparedness and response, especially on health surveillance and early warning systems, and developing water, sanitation, and hygiene systems.

Coastal and marine sector key options entail marine spatial planning, restoration and conservation of the ecosystem, and strengthening institutional coordination. The highly rated adaptation options in the fisheries and aquaculture sectors are sustainable management of community-based marine protected areas, establishing integrated early warning systems and restoration of fish habitats and high commercial species. Adaptation strategies in the wildlife sectors are habitat restoration, human-wildlife conflict, species-specific conservation, while tourism sector adaptation options include coastal and cultural town infrastructure, coral reef restoration, and diversification of tourism products. In the Infrastructure and human settlements sector, climate-resilient drainage infrastructure, integrated waste management, and household rainwater harvesting were adaptation options highly ranked.

The National Adaptation Plan identifies gender and vulnerable groups, disaster risk management, technology and research, capacity building, and financing as five critical cross-cutting issues for consideration. Each of the five cross-cutting issues were further analysed with respect to the NAP prioritized sectors in the Mainland Tanzania and Zanzibar.

The URT proposes implementation of 36 key national adaptation programmes where 22 adaptation programmes are for the Mainland Tanzania,12 programmes as for Zanzibar and 2 programmes are for cross-cutting. The total cost for the adaptation projects are USD 37 billion with Mainland Tanzania being allocated USD 28 billion, USD 8.6 billion for Zanzibar and USD 0.8 billion for cross-cutting.

Four key adaptation programmes for the Mainland Tanzania jointly account for USD 16 billion, over 52% of the total budget. The programmes are Climate-Proofing of Critical Economic and Social Infrastructure, Agricultural Water Security and Irrigation Modernization, Climate-Resilient Water Supply and Sanitation Services, and Resilient Urban Planning and Informal Settlement Upgrading. Three key adaptation programmes with the largest investment for Zanzibar account for USD 8.6 billion. The critical programmes are Enhancing Zanzibar's Comprehensive Coastal Resilience, Climate-Resilient Urban, Port, and Transport Infrastructure, and Climate Adaptation for Cultural Heritage and Stone Town.

The NAP further identifies key stakeholders for implementation (such as Sector Ministries, Departments and Agencies – MDAs, Local Government Authorities - LGAs, Development Partners and Frameworks, Civil Societies - CSOs & NGOs, Research and Academic Institutions, private sector, communities, and media), narrating their key roles and responsibilities, and states institutions to implement the strategy. The NAP also explicitly presents an implementation plan that clearly strategizes Tanzania's adaptation roadmap. The NAP implementation plan further delineates the implementation arrangements and sources of funding for adaptation for the next ten years. The NAP strategy concludes by clearly drafting a plan for monitoring and evaluation, which develops strategic interventions for monitoring and evaluation, setting key performance indicators, and earmarking the targeted audience.

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1. INTRODUCTION

1.1 Background

Climate change (CC) poses a global challenge to sustainable development (SD), as its impacts are felt across ecosystems, economies, and communities worldwide. This highlights the need for coordinated adaptation efforts and strong frameworks to guide nations in building resilience to climate change. The Cancun Adaptation Framework (CAF) (2010) was established under the United Nations Framework Convention on Climate Change (UNFCCC), the foundation for global climate adaptation. This framework recognized the necessity of structured adaptation planning, particularly for Least Developed Countries (LDCs), urging countries to shift from short-term responses outlined in National Adaptation Programmes of Action (NAPA), to medium and long-term strategies. The CAF emphasized critical areas such as vulnerability assessments, institutional capacity-building, and resilience planning.

The CAF parties agreed to strengthen adaptation planning through establishing a structured process for addressing medium- and long-term adaptation needs. For that purpose, the framework established the National Adaptation Plans (NAPs), which include all developing countries, reinforcing their role in integrating climate adaptation into broader development planning. This commitment was further reinforced by the Paris Agreement (2015), which elevated adaptation as a global priority and called for enhanced adaptation action and support for developing countries. The United Republic of Tanzania is a Party to the Paris Agreement and is committed to advancing its national climate adaptation efforts in line with global goals.

1.2 Country Context

The United Republic of Tanzania (URT) is composed of Mainland Tanzania and Zanzibar and has a total area of 945,249 km^2. The URT borders eight other 8 countries, where in the north, it is bordering Kenya and Uganda, on the West it borders Rwanda, Burundi and the Democratic Republic of the Congo while on the south it borders Zambia, Malawi and Mozambique. The URT has an extensive coastline covering 1,424 km and encompassing the Zanzibar and Mafia islands.

1.2.1 Climate

The URT is predominantly a tropical country, influenced by its diverse topography, altitudinal gradients, and proximity to the Indian Ocean. The country is experiencing increasingly severe impacts from CC, including rising erratic rainfall, temperatures, extreme weather events, and sea-level rise. Rainfall patterns are primarily governed by the seasonal migration of the Inter-Tropical Convergence Zone (ITCZ), producing bimodal and unimodal distinct rainfall regimes. The northern and eastern regions primarily experience a bimodal rainfall pattern, including the Lake Victoria Basin, northern coast, and north-eastern highlands. The bimodal rainfall pattern is characterized by two rainy seasons, the short rains from October to December and the long rains from March to May. The unimodal regime, characterized by a single rainy season, dominant in the southern, central, and western regions, extending from November to April/May.

The country is marked by significant climatic contrasts, with total annual rainfall ranging from about 500 mm in semi-arid central zones to over 1,600 mm in the southern highlands. Temperature patterns reflect elevation, ranging from 15–20°C in the highlands, 20–28°C across the central plateau, and 25–31°C in coastal lowlands, with occasional peaks above 35°C. Long-term records indicate a warming trend of 0.5–1.0°C since 1960, while projections show increases of up to 2°C by 2050 and 4.5°C by 2090, amplifying the risks of heat stress, drought, and ecosystem degradation.

Of recent, the coastline has been experiencing continuous sea-level rise of approximately 6 mm per year. This trend drives coastal erosion, saline intrusion into freshwater aquifers, wetland loss, and heightens exposure to storm surges and tropical cyclones. Additionally, of late, temperatures have surpassed 35°C, rainfall patterns have become highly unpredictable, and events like floods, hailstorms, and droughts have caused major disruptions in the agriculture, health, infrastructure, and water supply sectors. In the Mainland Tanzania, areas influenced by unimodal and bimodal rainfall patterns have observed inconsistent precipitation trends, while

projections indicate significant rainfall variability, and temperature increases of up to 4.5°C by 2090. In Zanzibar, the impacts are even more acute due to low elevation and reliance on coastal resources manifestingin saltwater intrusion, contaminated freshwater sources, coastal erosion, and damage to infrastructure. Both regions are experiencing significant rainfall variability, and regions are seeing increased risks of disease outbreaks, livestock losses, degraded biodiversity (e.g., coral bleaching and forest decline), and declining tourism appeal due to natural resource loss.

1.2.2 Population dynamics

Like any other country in sub-Saharan Africa, the URT is challenged by its growing population coupled with low adaptation to CC, making it highly vulnerable to the impacts of a changing climate. According to the National Bureau of Statistics (NBS) Census, Tanzania's population is estimated at 61.7 million people in 2022, with Mainland Tanzania accounting for 59.85 million of which 39.2 million reside in rural areas and 20.6 million in urban centres. Of these, children under the age of 18 are 47% and youth population (under the age of 36) is 78%. Zanzibar hosts approximately 1.89 million people, with 71% living in Unguja Island, nearly half of whom are concentrated in Zanzibar City. Currently, 55% of Zanzibar's population is urbanized, and expected to rise to 63% by 2035 (National Strategy for the Development of Statistics {NSDS}, 2014). The annual population growth rate has also accelerated, from 2.7% in 2012 to 3.2% in 2022 on the mainland, while Zanzibar's population is growing even faster at 3.7% per year. If this trend continues, Tanzania's population is projected to double within the next two decades, adding further stress on land, water, and other critical natural resources.

1.2.3 Socio-economic

Tanzania's economy remains heavily reliant on climate-sensitive sectors. On the Mainland, agriculture employs about 65% of the population and contributes 26.7% to Gross Domestic Product (GDP). Fisheries and livestock account for 1.8% and 7.4% of GDP, respectively. In the year 2024, tourism contributed to 29.5% of the GDP in Zanzibar and generated about 80% of foreign exchange earnings, making the sector to be highly vulnerable to environmental disruptions. Zanzibar's fishing sector contributed 6.3% of GDP in 2023, anchoring its Blue Economy initiatives, which include aquaculture, seaweed farming, and marine conservation. Additionally, agriculture (including crops, livestock, forestry, and fisheries) contributed 27.1% to Zanzibar's GDP in 2021, supporting 70% of the population directly or indirectly, and accounting for 70% of merchandise export earnings.

However, despite the progress and GDP contribution in the economy, CC poses escalating risks to the aforementioned sectors. Changes in rainfall patterns, increased temperatures, and the rising frequency of extreme weather events such as droughts and floods especially during the growing seasons disrupts agricultural productivity. Strategic agricultural crops are being affected by lower yields and reduced quality, threatening food security and farmers' livelihoods. The livestock and fisheries sectors face parallel challenges of erratic rainfall and rising temperatures which compromise access to water resources and grazing lands, while warming sea surface temperatures and changing marine ecosystems affect fish breeding, diminishing fish catches, directly impacting artisanal fishers.

Furthermore, climate-induced vector-borne diseases, such as tick-borne infections and other parasitic diseases, are on the rise, undermining animal health and productivity. These intersecting pressures from CC threaten not only economic stability but also the livelihoods of millions of Tanzanians who depend on agriculture, livestock, and fisheries for their survival, particularly in rural and coastal communities.

1.2.4 Gender and Vulnerable Groups

Climate change impacts are unevenly distributed across society, with certain groups facing disproportionate risks. Social norms, cultural practices, and gender roles often intensify these inequalities, leaving women, children, youth, older persons, and people with disabilities are particularly vulnerable. In Tanzania, women form the backbone of the agricultural sector, yet their resilience is undermined by limited rights to land, restricted decision-making power, and reduced access to productive resources. Climate impacts during their childhood (such as the loss of access to adequate food, education, health services, as well as experiences of displacement) can have a lasting impact on children and youth, especially on their development and the opportunities they can access for the rest of their lives, as well as the wellbeing of the Tanzanian economy. These structural barriers heighten the impacts of climate-related challenges such as food insecurity, reduced livelihood options, and exposure to extreme events like floods and droughts, which in turn increase risks of

displacement, disease, and loss of household assets.

To address these disparities, the Government of Tanzania adopted the National Strategy for Mainstreaming Gender in Climate Change (2013). The strategy provides a framework for integrating gender-responsive approaches across six priority sectors: agriculture, water, health, energy, forestry, and coastal management. It emphasizes ensuring that women and men, including persons with disabilities, have equitable opportunities to participate in, contribute to, and benefit from climate adaptation and mitigation initiatives.

Tanzania's climate action plans also highlight the disproportionate health burdens borne by women as primary caregivers, especially with the growing prevalence of climate-related illnesses such as malaria and malnutrition. In response, the strategy promotes gender-sensitive health interventions and encourages the inclusion of climate and gender education in school curricula, equipping future generations with the knowledge and skills needed to manage these interconnected challenges.

Strengthening women's land rights, expanding access to credit, and scaling up clean energy solutions such as biogas and LPG are identified as critical measures for building adaptive capacity. These interventions not only enhance women's economic resilience but also reduce their exposure to harmful indoor air pollution caused by traditional biomass cooking methods.

Ultimately, integrating gender into climate change policies is more than a matter of equity and human rights. It is a strategic necessity for strengthening the effectiveness and sustainability of Tanzania's climate responses under the National Adaptation Plan (NAP). Addressing the disproportionate vulnerabilities of women and other marginalized groups is essential to achieving inclusive, resilient, and transformative climate action.

1.3 Rationale

The stocktaking process and a thorough review of strategic climate-related documents and policies informed the decision to focus on nine priority sectors for the development of the National Adaptation Plan (NAP). The sectors include agriculture, livestock, fisheries, coastal and marine, water, health, tourism, wildlife, and infrastructure including human settlements. The aforementioned priority sectors are aligned with national development goals and climate resilience priorities based on their sensitivity to CC, significance to livelihoods, ecosystems, and the national economy. Notwithstanding their foundational role to the Tanzania's socio-economic development, the key sectors are negatively affected by CC, making it vital and prudent to develop a comprehensive NAP to adapt to climate changes.

In response to climate-related challenges, Tanzania developed policies and regulatory frameworks to lessen CC adverse impacts. The frameworks include the National Environment Policy (2021), Zanzibar Environmental Policy (2013), National Environmental Master Plan for Strategic Interventions (2022–2032), National Climate Change Response Strategy (2021–2026), Zanzibar Climate Change Strategy (2014), Tanzania Agriculture Resilience Plan (2014-2019), Health National Adaptation Plan (2018-2023) and the Nationally Determined Contribution (2021). These frameworks emphasize on the urgent need for coordinated national adaptation measures to safeguard vulnerable communities, ecosystems, and economic sectors.

Tanzania's adaptation commitments are outlined in its Nationally Determined Contributions (NDCs) under the Paris Agreement. To fulfil these commitments, the country requires a nationwide approach that integrates adaptation into policies, planning, and budgeting, thereby ensuring coherent and sustainable resilience-building efforts. In response, Tanzania launched the National Adaptation Plan (NAP) as a mechanism to oversee this integration and align adaptation priorities with national development goals. The process has been guided by the Least Developed Countries Expert Group (LEG) technical guidelines (2012), which provide a structured framework for formulating and implementing NAPs.

The development of NAP plays a critical role in global climate governance, as emphasized in Article 7 of the Paris Agreement. The referred Paris Agreement, urges all Parties to formulate and implement NAPs to enhance adaptive capacity and build long-term resilience. The Agreement highlights the need for continuous adaptation planning, supported by adequate financial and technical resources, to ensure that climate adaptation is effectively integrated into national development policies and decision-making frameworks. Advancing a well-structured NAP is therefore essential for harmonizing adaptation efforts across sectors, fostering medium- and long-term climate resilience, and safeguarding economies, ecosystems, and communities from irreversible climate-related damage. The NAP therefore functions not only as a climate policy instrument but also as a strategic development mechanism that strengthens sustainable growth and resilience.

1.4 Scope

The National Adaptation Plan (NAP) for Tanzania covers the period 2025–2035, with a review planned after ten years. Its scope addresses nine priority sectors: agriculture, water, tourism, infrastructure and human settlement, health, livestock, coastal and marine systems, fisheries and wildlife. The plan seeks to integrate climate change adaptation into both national and local planning, ensuring coherence with development priorities and alignment with the Tanzania Development Vision 2050 and the Zanzibar Development Vision 2050.

Within this scope, the NAP pursues the following objectives: to enhance the adaptive capacity of communities, ecosystems, and economic sectors through inclusive, locally led adaptation actions; to integrate climate adaptation into national, sectoral, and local development policies, planning, and budgeting processes; to strengthen institutional and coordination mechanisms for climate adaptation; to mobilize financial, technological, and capacity-building resources for prioritized adaptation actions; and to reduce the adaptation deficit among vulnerable groups by mainstreaming gender, disability, and social inclusion in all adaptation interventions.

This National Adaptation Plan (NAP) provides sectoral adaptation programmes at the national level. However, it is recommended that each sector and Local Government Authority (LGA) develop comprehensive adaptation plans tailored to their specific contexts. These plans should clearly define priorities, strategies, and actions aimed at minimising the impacts of climate change and strengthening climate resilience within all levels of development planning. Furthermore, the sectoral and local adaptation plans will serve as essential tools for generating, consolidating, and disseminating evidence-based information to support informed decision-making and the effective implementation of adaptation programmes and projects.

1.5 Vision and Objectives

1.5.1 Vision

To build a climate-resilient Tanzania by 2035, where communities, ecosystems, and the economy can withstand, adapt to, and thrive in the face of climate change impacts.

1.5.2 Objectives

(i) Main objective

To reduce vulnerability to the impacts of climate change by building adaptive capacity and resilience, and to facilitate the integration of climate change adaptation into all relevant social and economic development policies, strategies, plans, programmes, and budgets at all levels.

(i) **Specific objectives**

(a) Enhance adaptive capacity of communities, ecosystems, and economic sectors to climate change impacts through targeted, inclusive, and locally led adaptation actions.

(b) Integrate climate change adaptation into national, sectoral, and local development planning, policies, and budgeting processes.

(c) Strengthen institutional and coordination mechanisms for climate adaptation.

(d) Mobilize and allocate financial, technological, and capacity-building resources for the implementation of prioritized adaptation actions.

(e) Reduce the adaptation deficit among vulnerable groups by systematically mainstreaming gender, disability, age, and social inclusion into all adaptation actions.

2. POLICY, LEGAL AND INSTITUTIONAL FRAMEWORK

2.1 Introduction

Through a growing constellation of national policies, legal frameworks, institutional mandates, and international commitments, including its Nationally Determined Contribution under the Paris Agreement and Sustainable Development Goal 13, Tanzania has made efforts to mainstream adaptation across sectors and governance levels. The success of this NAPB relies heavily on the robustness, coherence, and enforcement of its institutional and policy architecture to guide climate action inclusively and effectively.

2.2 Tanzania Development Vision 2050

The Tanzania Development Vision 2050 and the Zanzibar Development Vision 2050 outline the long-term aspirations for national development, placing increasing emphasis on sustainability and resilience. Environmental integrity and climate change adaptation are key priorities, addressed under Pillar Three of the Tanzania Development Vision 2050 and Pillar Four of the Zanzibar Development Vision 2050, respectively.

2.3 Policy Framework

Both Mainland Tanzania and Zanzibar have developed distinct yet complementary policy frameworks to enhance climate change adaptation, reflecting their unique governance structures and ecological contexts. These policy frameworks aim to build resilience, integrate climate considerations into development planning, and protect vulnerable communities and ecosystems. Key policies providing the foundation for adaptation action include:

2.3.1 Environmental Policies

The National Environmental Policy (2021) and Zanzibar Environmental Policy (2013) establish a strong foundation for climate-responsive environmental management by recognizing climate change as a critical cross-cutting issue. These policies provide the institutional mandate for integrating climate adaptation into sectoral planning, supporting the development and implementation of National Adaptation Plans (NAPs). Despite initial policy gaps, recent strategies like the National Climate Change Strategy (NCCRS, 2021–2026) and Zanzibar Climate Change Strategy (ZCCS, 2014) have strengthened climate adaptation through targeted reforms and integrated planning efforts across Mainland Tanzania and Zanzibar.

2.3.2 Blue Economy Policies

The Tanzania Blue Economy Policy (2024) and Zanzibar Blue Economy Policy (2022) are vital for climate adaptation, supporting the NAP by promoting sustainable marine and coastal resource management. However, some climate adaptation issues are only indirectly integrated, particularly sea-level rise impacts and addressing insufficient financing. These gaps are being addressed through complementary strategies such as the Zanzibar Blue Economy Strategy (2022-2026) and the Tanzania Blue Economy Strategy 2024–2034, which align economic development with climate-resilient marine management.

2.3.3 Water Policies

The National Water Policy 2002 Version 2025 and the Zanzibar Water and Sanitation Policy (2025) demonstrate increased recognition of climate change by emphasizing climate-resilient water resource planning, management, and infrastructure. These revised policies reinforce the National Adaptation Plan (NAP) by prioritizing resilient water management and equitable access, crucial for building community adaptive capacity. Despite improvements, challenges in institutional, technical, and financial capacities for on-the-ground implementation persist, which are being addressed by complementary strategies like the Water Resources Management Strategic Interventions and Action Plan for Climate Change Adaptation (2013).

2.3.4 Agriculture Policies

The National Agriculture Policy (2013), Agricultural Marketing Policy (2004), Zanzibar Agricultural Sector Policy (2003), Zanzibar Food Security and Nutrition Policy (April 2008), Zanzibar Agricultural Marketing Policy (20013) aim to modernize the sector and support the National Adaptation Plan (NAP) by promoting climate-smart agriculture and resilient food systems. However, effective implementation is hindered by outdated frameworks, weak extension services, fragmented coordination, inadequate data, limited financing, and insufficient investment in resilient infrastructure, particularly for vulnerable coastal and women farmers in Zanzibar. To address these challenges, complementary plans and strategies, such as the Tanzania Agriculture Master Plan 2050, Agenda 10/30 Investment Roadmap (2024), ASDP II, Agriculture Climate Resilience Plan (2014 - 2019), Climate Smart Agriculture (CSA) Programme (2015 - 2025), and the Agricultural Sector Environmental Action Plan (ASEAP 2012 - 2017), and Agricultural Transformation Framework (2025-2035) in Zanzibar have been formulated to bolster mitigation and adaptation efforts.

2.3.5 Livestock Policies

The National Livestock Policy (2006) and Zanzibar Livestock Policy (2011) play an indirect but vital role in addressing climate vulnerabilities in the livestock sector, especially for pastoralist communities. They support the National Adaptation Plan through sustainable rangeland management, early warning systems, and improved livestock infrastructure. However, challenges remain, including insecure land tenure, weak institutional coordination, and limited promotion of climate-resilient breeds, financial access, and indigenous knowledge. Several strategies have been implemented to address these challenges, including Tanzania Livestock Masterplan (2017/18 – 2021/2022), and the Livestock Sector Transformation Plan (2022/23 – 2026/27).

2.3.6 Tourism Policies

The Tanzania Tourism Policy (1999) and the Zanzibar Tourism Policy (2017) are vital for protecting the climate-vulnerable natural assets underpinning tourism, supporting the National Adaptation Plan by promoting sustainable and eco-conscious practices. However, significant gaps persist, including inadequate climate risk assessments, weak inter-sectoral coordination, and insufficient investment in resilient infrastructure and planning data. These shortcomings are actively being addressed through the National Climate Change Strategy (NCCRS, 2021–2026) and Zanzibar Climate Change Strategy (ZCCS, 2014), alongside efforts to promote resilient infrastructure, improve coordination, enhance data collection, and increase access to climate finance.

2.3.7 Fisheries Policies

The Tanzania National Fisheries Policy (2015) and the Zanzibar Fisheries Policy (2022) focus on sustainable management to build resilience against climate impacts, supporting the NAP by integrating adaptation objectives, protecting habitats, and fostering community participation. However, gaps remain due to outdated policies, limited inter-agency coordination, and insufficient funding, leaving vulnerable groups like artisanal fishers and women seaweed farmers at risk from sea-level rise and warming waters. These shortcomings are being addressed by the Fisheries Sector Master Plan (2021/22 - 2036/37), National Climate Change Strategy (NCCRS, 2021–2026), Zanzibar Fisheries Strategic Plan (2023 – 2028) and Zanzibar Climate Change Strategy (ZCCS, 2014), improved inter-agency collaboration, and targeted Blue Economy and climate finance initiatives.

2.3.8 Health Policies

The National Health Policy (2007) and Zanzibar Health Policy (2011) establish a framework for a health system to address climate-sensitive diseases, yet they inadequately integrate crucial adaptation issues like surveillance, resilient infrastructure, risk mapping, and dedicated financing. Consequently, many health facilities remain vulnerable to climate shocks, compounded by insufficient baseline data, health worker training, public awareness, and limited cross-sector collaboration. These gaps are being addressed through complementary strategies, plans, and technical guidelines, notably the Health National Adaptation Plan (HNAP) to Climate Change in Tanzania (2018–2023).

2.3.9 Infrastructure and Human Settlements Policies

The Human Settlements Development Policy (2000), Construction Industry Policy (2003), Zanzibar National Transport Policy (2007) and the Zanzibar National Housing Policy (2006) provide foundational support for NAP implementation by guiding sustainable planning and infrastructure crucial for reducing community vulnerability to climate hazards. However, these policies are outdated and exhibit significant gaps in fully integrating climate change, particularly in climate-resilient land use planning and construction standards. To

address these shortcomings, National Climate Change Strategy (NCCRS, 2021–2026) and Zanzibar Climate Change Strategy (ZCCS, 2014) updated regional strategies, and climate-resilient urban planning initiatives are being implemented, alongside efforts to improve secure land tenure, construction standards, data, and institutional coordination.

2.3.10 Land Policies

The National Land Policy of Tanzania (2023) and the National Land Policy of Zanzibar (2018) guide sustainable land governance, supporting the National Adaptation Plan (NAP) by integrating climate change considerations into land use and enhancing tenure security to build resilience. However, both policies currently lack comprehensive, actionable strategies for climate-resilient land development. These gaps are being addressed through National Climate Change Strategy (NCCRS, 2021–2026) and Zanzibar Climate Change Strategy (ZCCS, 2014) specific guidelines for climate-resilient planning, and strengthened community-based land management initiatives.

2.3.11 Wildlife Policies

The Wildlife Policy of Tanzania (1998, revised 2007) and National Forest Policy of Zanzibar (1995) establish a foundational framework for wildlife conservation, emphasizing sustainable use, community participation, and inter-sectoral collaboration, while promoting conservation areas and regulating wildlife trade and tourism. However, this policy notably lacks the integration of climate change issues. To address this critical gap, Tanzania has introduced the Wildlife Policy Implementation Strategy (WPIS 2023–2033) and the National Wildlife Management Areas Strategy (NWMAS 2023–2033), both of which now explicitly incorporate emerging cross-cutting issues, including climate resilience.

2.3.12 National Disaster Management Policy

The National Disaster Management Policy (2004) and the Zanzibar Disaster Management Policy (2011) establish a comprehensive framework for disaster management, emphasizing the growing threat of climate-induced disasters like droughts and floods. The policies mandate the integration of disaster risk reduction into sectoral planning and underscore the critical need for community-level preparedness.

2.3.13 Education and Training Policy

The Education and Training Policy (2014, version 2023) for Mainland Tanzania provides a critical framework for building a climate-resilient society. It explicitly mandates the integration of climate change education across all levels of learning, aiming to foster environmental stewardship and equip students with the knowledge and skills for climate adaptation and mitigation. This includes promoting sustainable practices, disaster risk reduction, and green innovation. In Zanzibar, while guided by its own context, the Zanzibar Education Policy (2006) principles support parallel efforts to embed climate change awareness into local curricula, ensuring a unified national approach to preparing the next generation for the challenges of a changing climate.

2.4 Legal Framework

The legal framework in Tanzania provides the necessary authority, structure, and enforcement mechanisms to translate environmental and adaptation policies into implementable actions. These legal instruments are crucial for regulating activities, assigning responsibilities, and ensuring compliance with environmental conservation and climate adaptation efforts. Key legal frameworks underpinning environmental conservation and adaptation efforts include:

2.4.1 Environmental Management Acts

The Environmental Management Act, Cap. 191, Conservation Management Act No.10 (1996) and Zanzibar's Environmental Management Act (2015) provide a strong legal foundation for NAP implementation by mandating climate change integration and empowering key institutions. However, these acts lack specific provisions for addressing detailed climate change risks, vulnerabilities, and comprehensive adaptation measures. This gap is effectively addressed by the overarching National Climate Change Response Strategy (NCCRS) 2021–2026 for Mainland Tanzania and the Zanzibar Climate Change Strategy (2014-2020) and Action Plan (2016-2021), which offer granular strategic guidance for adaptation efforts across sectors.

2.4.2 Water Acts

The Water Resources Management Act, Cap. 331 (Mainland Tanzania) and the Water Act, (No. 4 of 2006, Zanzibar) and Water Supply and Sanitation Act, Cap. 272 support the National Adaptation Plan (NAP) by providing the foundational legal framework for sustainable water resource management, integrated water resources management, and water supply and sanitation, which are all critical for building climate resilience. However, both Acts lack explicit provisions for climate change adaptation, offering no legal mandate for climate risk assessments or adaptive water planning, which has limited their effectiveness in addressing increasing climate-induced water challenges. To address these gaps, recent policy reforms, including the National Water Policy (2025 Mainland) and Zanzibar Water and Sanitation Policy (2025), now emphasize climate resilience, adaptive planning, and integration of climate risk and vulnerability assessments into water governance frameworks.

2.4.3 Irrigation Act

The National Irrigation Act, Cap. 447, supports the implementation of the NAP by promoting efficient, climate-resilient irrigation systems, enhancing adaptive capacity in agriculture, and enabling community participation, with climate considerations increasingly integrated through ongoing strategic reforms. However, due to its limited provisions on climate change adaptation, financing, and resilience-building, these gaps are being addressed through the National Irrigation Commission's strategic plans and integration of climate-smart irrigation approaches under the National Irrigation Master Plan (2025–2045) and related climate policies that prioritize adaptive and risk-informed irrigation systems

2.4.4 Disaster Management Acts

The Disaster Management Act, Cap. 174, Mainland and the Zanzibar Disaster Risk Reduction and Management Act of 2015, provide the legal framework for disaster risk governance, establishing institutions and committees that support integrating risk reduction into development planning, which aligns with the National Adaptation Plan (NAP) goals of building climate resilience. However, their limited provisions on early warning systems and emergency preparedness are being addressed through strengthened policies and strategies that enhance disaster risk management as a critical component of NAP implementation.

2.4.5 Public Health Acts

The Public Health Act, Cap. 356 (Mainland) and the Public Environmental Health Act No.11 of 2012 (Zanzibar) support the National Adaptation Plan (NAP) by providing the legal and institutional frameworks for disease surveillance, environmental health standards, emergency response, and inter-sectoral collaboration, all crucial for building a climate-resilient health system. However, both Acts lack explicit provisions on climate-related health vulnerabilities, risk assessments, and adaptation measures, gaps that are being addressed through integration of climate-sensitive health strategies to strengthen resilience and early warning systems in line with the NAP.

2.4.6 Land Acts

The implementation of Tanzania's National Adaptation Plan (NAP) is supported by the existing legal framework for land, comprising the Land Act, Cap. 113, the Village Land Act, Cap. 114 in Mainland Tanzania, Urban Planning Act, Cap. 355, Land Use Planning Act, Cap. 116, Grazing Land and Animal Feed Resources Act, Cap. 180, and the Land Tenure Act (1992) in Zanzibar. These acts promote sustainable land use, community-based resource management, and environmental safeguards. Nevertheless, their failure to explicitly integrate climate-related vulnerabilities and adaptation strategies constitutes a significant gap, which is now the focus of targeted policy reforms and the development of climate-informed land use planning.

2.4.7 Tourism Acts

The Tourism Act, Cap. 65 in Mainland Tanzania and the Zanzibar Tourism Act No. 6 of 2009 support NAP implementation by promoting eco-tourism, environmental assessments, and sustainable resource use, but have limited integration of climate change issues such as hazards, vulnerabilities, and adaptation measures. These gaps are being addressed through Tourism Master Plan (2022–2032) in Mainland and Zanzibar Tourism Master Plan (2021–2031), which emphasize climate resilience, green investment, and risk-informed tourism planning aligned with NAP goals.

2.4.8 Wildlife Acts

The Wildlife Conservation Act, Cap. 283 in Mainland Tanzania and the Forest Resources Management and Conservation Act No. 10 of 1996 in Zanzibar support NAP implementation by providing the legal basis for biodiversity conservation, wildlife habitat protection, and sustainable use of natural resources. These Acts contribute to ecosystem resilience, eco-tourism, and community-based natural resource management, all of which are vital for climate adaptation and sustainable livelihoods. Nevertheless, the Acts have limited integration of climate change risks, adaptation planning, and monitoring of climate-induced biodiversity threats. These gaps are being progressively addressed through the ecosystem restoration programs and integration of climate change considerations into wildlife and protected area management strategies, including National Human – Wildlife Management Strategy (2020 – 2024); National Elephant Management and Conservation Strategy 2023 – 2033; National Wildlife Corridor Restoration Strategy (2022 – 2026).

2.4.9 Tanzania Meteorological Authority Act

The Tanzania Meteorological Authority Act, Cap. 157 establishes TMA as the national institution responsible for providing accurate, timely, and reliable weather and climate services to support socio-economic development and disaster risk reduction. The Act empowers TMA to observe, collect, analyse, and disseminate meteorological, climatological, and hydrometeorological information, which is fundamental for early warning systems, risk and vulnerability assessments, and climate-informed decision-making. TMA plays a central role in supporting the National Adaptation Plan (NAP) by providing climate projections, scientific data, and risk analyses to guide sectoral adaptation planning, strengthen early warning systems, and integrate climate services into national and sectoral planning frameworks, including agriculture, fisheries, water, energy, and health. While the Act establishes the institutional mandate for climate services, continuous collaboration and capacity building at national and subnational levels are essential to ensure that adaptation planning remains evidence-based and aligned with international meteorological standards and obligations under the World Meteorological Organization (WMO) and the United Nations Framework Convention on Climate Change (UNFCCC).

2.5 Institutional Framework

As per EMA 2024 for the institutional arrangement for environment and climate change management. The Vice President's Office (VPO) through the Division of Environment (DoE) is responsible for all climate related activities. DoE is both the National Climate Change Focal Point and National Designated Authority (NDA) for Clean Development Mechanism under the Kyoto Protocol as well as Designated National Authority (DNA) for Article 6 Paris Agreement. On the other hand, the direct operational roles 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. Sector Environmental Sections in Sector Ministries are given responsibility handle environmental and climate change issues in respective sectors and to provide a link to the Ministry responsible for environment. Regional Environmental Management Experts (REMEs) are charged with the responsibility of advising and overseeing the implementation and enforcement of the Act at the regional level. Environmental Management Officers in LGAs (City, Municipal, District, Township) oversee implementation of EMA within their jurisdiction.

The overall responsibilities for coordination of environmental management including climate change issues in Zanzibar are mandated to the Department of Environment which is under the First Vice President's Office. The Department is tasked to develop national strategies and guidelines of management of environment; coordinate the implementation of national strategies and guidelines of management of environment; prepare and manage implementation of strategic environmental assessment; recommend environmental standards; coordinate the implementation of international environmental agreements; prepare and issue a report on the state of the environment for Zanzibar; coordinate implementation of the environmental policy; coordinate all matters related to climate change adaptation, and mitigation measures; promote environmental education to the society and other stakeholders; coordinate and promote environmental research.

Moreover, Zanzibar has set-up a climate change governance involving steering and technical committees with roles of advising the Minister responsible for the National Implementing Entity on all Climate Change matters for Zanzibar; recommending and providing guidance for Climate Change Policy and Strategy, the National Adaptation Plan of Action and other climate change related issues as defined under the United Nations Framework Convention on Climate Change and all its Protocols and Conventions from time to time; and evaluating the implementation of climate change policy, strategy, National Adaptation Plan of Action and other climate change programmes for Zanzibar. The governance structure, which is cross governmental and embraces a wide range of actors, has been used and guided development of the Zanzibar Climate Change Strategy and forms the basis for subsequent implementation. There are also established Climate Change Unit in each Ministry and Local Government Authority which are responsible for environmental and climate change

issues. The Unit are required to prepare and submit environmental and climate change biannual report to department responsible for planning of the respective Ministry or Local Government Authority.

3. INTEGRATION OF THE NAP WITH NATIONAL DEVELOPMENT AND SECTORAL PLANS

3.1 Introduction

This chapter describes the integration of the national adaptation plan with the national development plan and sectoral plans, including synergies. It covers the integration of the national adaptation plan into national development and sectoral plans and progress in the integration of climate change adaptation into development policies, plans, strategies, and programmes in Tanzania. It also synergizes with international, regional, and national development frameworks and mechanisms for integration. Additionally, it describes the mechanism for integration, both vertical and horizontal, and budgetary integration.

3.2 The Integration of the National Adaptation Plan into National Development and Sectoral Plans

The integration of the national adaptation plan (NAP) into the national development plan and sectoral plans is the process of considering climate change adaptation priorities in the development plans and sectoral plans for enhancing climate resilience and attracting economic resources to combat climate change. The process of integrating NAP into development plans and sectoral plans involves identifying the entry points at the national, sectoral, and local levels. It also assesses whether the development of national development plans and sectoral plans was informed by climate risk and vulnerability assessment. Moreover, the integration of national development plans and sectoral plans should also analyse adaptation options, monitoring, and review. The process of integration covers vertical integration (from national to local levels), horizontal integration (across government sectors), and budgetary integration (within public financial management.

3.3 Progress in the Integration of Climate Change Adaptation into Development Plans and Sectoral Plans

The government has made progress in integrating climate change adaptation into national plans. Guidelines have been adopted for Ministries, Departments, and Agencies (MDAs), Local Government Authorities (LGAs), and Non-State Actors to integrate climate change adaptation into sector policies, plans, and programmes, despite the inadequate integration of both direct and indirect indicators found in the plans review. This is because some of the sectoral development plans were developed without following the integration process, including vulnerability assessment. The NAP project's Policy Review for Mainland Tanzania and Zanzibar in sectors of agriculture, livestock, fisheries, water, health, tourism and wildlife, infrastructure, coastal and marine and land and human settlements revealed that there is direct and indirect integration of climate change adaptation into policies, plans, strategies and programmes providing potentials for mobilization of climate finance across multiple sources to implement the NAP in Tanzania. The NAP provides a framework for embedding climate adaptation plans into development plans and sectoral plans, while facilitating vulnerability assessments and capacity building. The National Climate Change Response Strategy (2021-2026) emphasizes adaptation measures in development planning and budgeting. Moreover, sectors, including agriculture, water, and health, have developed adaptation plans to address climate risks and vulnerability in their plans for reducing vulnerability and enhancing long-term resilience to the impacts of climate change.

3.4 Synergies with International, Regional, and National Development Frameworks

Promoting synergies between Tanzania's National Adaptation Plan (NAP) and other global, regional, and national agendas ensures more efficient use of resources, avoids duplication, and maximizes co-benefits across sectors. The global goal on adaptation (GGA) of enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal. The GGA provides for reducing climate risk, enhancing adaptive capacity, strengthening resilience, and enabling conditions for adaptation,

such as finance, technology, and capacity building.

The NAP is fundamentally aligned with international, regional, and national frameworks. The UN 17 Sustainable Development Goals (SDGs) 13 on Climate Action, including adaptation planning for reducing climate risks and enhancing resilience to climate change. The Convention on Biological Diversity promotes ecosystem-based adaptation (EbA) by emphasizing sustainable use, community participation, and ecosystem resilience, which are linked to the NAP that support adaptation and resilience. The Sendai Framework on Disaster Risk Reduction (2015 – 2030) articulates disaster risk assessments for adaptation to disaster risks associated to climate change. The New Urban Agenda (2017) promote resilient urban planning and climate-proofing urban infrastructure, such as drainage, housing, and transport systems, which are supported by this NAP. The United Nations Convention to Combat Desertification provides for ecosystem resilience, restoring degraded land, including conservation agriculture, which the NAP is among the adaptation priorities in relevant sectors.

The General Comment 26 on children's rights and the environment with a special focus on climate change emphasizes the urgent need to address the adverse effects of environmental degradation, with a special focus on climate change, on the enjoyment of children's rights, and clarifies the obligations of States to address environmental harm and climate change. Moreover, it explains how children's rights under the Convention on the Rights of the Child apply to environmental protection, and confirms that children have a right to a clean, healthy and sustainable environment.

The Tanzania Development Vision 2050 promotes environmental integrity and climate change resilience with an aspiration inter alia addressing climate change challenges, setting benchmarks for resilience, sustainability and adaptation.

3.5 Mechanisms for Integration of the NAP

A successful mainstreaming strategy requires more than just policy alignment; it demands clear, functional mechanisms that embed climate change considerations into the routine operations of government. The mechanism for integration focuses on vertical, horizontal and budgetary integration as highlighted as follows:

3.5.1 Vertical Integration: From National Policy to Local Action

Vertical integration ensures that the national-level strategic direction of the NAP is translated into concrete, context-specific actions at the local level, where climate impacts are most acutely felt by communities. This process will be guided by the institutional framework established in the Environmental Management Act (EMA), 2004, and its Amendment of 2018 and 2025, the National Climate Change Response Strategy 2021-2026, and Zanzibar Climate Change Strategy 2014 coordinated by the Vice President's Office and First Vice President's Office (FVPO) at the national levels and PO-RALG at the local levels.

The primary mechanisms for vertical integration are:

(i) Integration into Regional and Local Government Authority (LGA) Planning: The Vice President's Office (VPO) and First Vice President's Office (FVPO) will monitor the integration and coordination of the NAP at the national level, while the PO-RALG will jointly issue guidance for all LGAs to integrate the priorities of the NAP into their strategic plans and annual District Development Plans (DDPs). This will involve incorporating climate risk and vulnerability assessments and adaptation options into the local planning process and aligning local development projects outlined in Chapter 7.

(ii) Capacity Building for Local Actors: A sustained capacity-building programme will be rolled out for Regional Environmental Management Experts (REMEs) and Council Environmental Management Officers. This programme will equip them with the skills to conduct local vulnerability assessments, appraise adaptation options, and integrate climate resilience into project design and budgeting.

(iii) Bottom-Up Feedback Loop: Mechanisms will be established to ensure that local experiences, challenges, and indigenous knowledge are systematically collected and fed back up to the national level. This will be facilitated through annual regional-level climate change forums and will inform the iterative review and update of the NAP, ensuring it remains grounded in local realities.

3.5.2 Horizontal Integration: Cross-Sectoral Coordination

Climate change is a cross-cutting issue that cannot be managed in sectoral silos. Horizontal integration ensures a coherent and coordinated response across all relevant Ministries, Departments, and Agencies (MDAs).

The primary mechanisms for horizontal integration are:

(i) Mandate of National Climate Change Committees: The National Climate Change Steering Committee (NCCSC), chaired by the Permanent Secretary of the VPO, and the National Climate Change Technical Committee (NCCTC), chaired by the Director of Environment, will serve as the primary platforms for high-level policy and technical coordination. These committees will be responsible for:

(a) Reviewing major sectoral policies, strategies, and development projects to ensure they are aligned with the NAP.

(b) Resolving potential policy conflicts and promoting synergies between sectors (e.g., between water, energy, and agriculture).

(c) Overseeing the implementation of cross-sectoral adaptation programs.

(ii) Strengthening Sectoral Climate Change Focal Points: The environmental units/focal points within each line ministry will be strengthened with the mandate and capacity to lead the mainstreaming process within their respective sectors. They will be responsible for championing the integration of NAP priorities into their ministry's plans, budgets, and M&E frameworks.

(iii) Joint Sectoral Planning: The NAP coordination bodies will facilitate joint planning processes for adaptation programs that require multi-sectoral collaboration, such as integrated watershed management or coastal zone management, ensuring that roles and responsibilities are clearly defined and resources are pooled effectively.

3.5.3 Budgetary Integration: Financing Climate Resilience

Sustainable financing for adaptation requires integrating climate change into the national public financial management system. This ensures that adaptation is not solely reliant on external, project-based funding but is supported by predictable domestic resources.

The primary mechanisms for budgetary integration are:

(i) Integration into National Plan and Budget Guidelines: The VPO and FVPO will work directly with both the Ministry of Finance (Mainland Tanzania) and the Ministry of Finance and Planning (Zanzibar) to incorporate climate change considerations into the annual National Budget Guidelines that are issued to all MDAs and LGAs. This will require all public bodies to screen their proposed budgets for climate risks and to report on expenditures related to climate change adaptation.

(ii) Development of a Climate Budget Tagging System: A phased approach will be taken to develop and implement a climate budget tagging or coding system. This will enable the government to systematically track, monitor, and report on domestic public expenditure on climate change adaptation, providing a clear picture of national investment and identifying funding gaps.

(iii) Climate-Informed Project Appraisal: The criteria used for appraising public investment projects will be updated to include a mandatory climate risk screening. This will ensure that all new public infrastructure and development projects are resilient to the future impacts of climate change, preventing the creation of new vulnerabilities.

In summary, the integration of the National Adaptation Plan into the development plans and sectoral plans is a foundation of the nation's strategy for a prosperous and climate-resilient future. This chapter has demonstrated that the NAP is not a standalone climate change adaptation plan but is strategically and inextricably linked to the international, regional, and national development aspirations of both Mainland Tanzania and Zanzibar. The successful integration is not merely a bureaucratic exercise; it is a fundamental prerequisite for achieving sustainable economic development. Whether the goal is fostering a competitive, industrialized economy on the mainland or cultivating an inclusive and resilient Blue Economy in Zanzibar, building adaptive capacity is essential to safeguarding progress against the escalating impacts of climate change. By establishing clear and robust mechanisms for vertical, horizontal, and budgetary integration, carefully tailored to the unique governance structures of the Union, while ensuring harmonization at the national level. This NAP provides a solid foundation for a coordinated, effective, and truly unified response to the challenges ahead. This

integrated approach will unlock synergies, enhance resource efficiency, and ultimately build a more resilient and sustainable future for all Tanzanians.

4. NATIONAL ADAPTATION FRAMEWORK

4.1 Approach and Guiding Principles for Developing the NAP

4.1.1 The Approach

The approach to developing the NAP process followed the essential elements outlined in the UNFCCC Technical Guidelines[1]. These included laying the groundwork and addressing gaps; preparatory elements; implementation strategies; and reporting, monitoring, and review. The country's NAP process began by the establishment of an administrative structure through the establishment of a Sectoral NAP focal point and NAP technical committee. Following the laid ground, the process was supported by a comprehensive stocktaking and gap analysis. This process identified gaps, needs, and opportunities. The findings informed the development of a Readiness Proposal to the Green Climate Fund (RP-GCF), which was approved in 2022 and set the stage for subsequent NAP activities and the creation of the National Adaptation Plan (NAP) Framework.

The NAP framework provided the necessary information for preparing the primary document towards the formulation of the NAP process. These included: Climate Change Information and Knowledge Management Portal, Sectoral Climate Change Vulnerability Assessments, National Climate Financing Mechanism, Monitoring and Evaluation Framework, Review of Policy and Regulatory Frameworks of the country, and Climate Change Adaptation Training Manual. Tanzania is well-positioned to ensure that its NAP process remains transparent, adaptive, and responsive to evolving climate challenges. Regular progress reports will be disseminated nationally and internationally, and lessons learned will be used iteratively to update the NAP.

The framework emphasizes flexibility and iterative improvements, allowing the process to adapt to new climate data, shifting development priorities, and stakeholder feedback. It relies on evidence and risk-informed planning. The NAP process will support the development of indicators and targets to monitor progress and identify adaptation priorities. Sustainability and resource efficiency will be guided by the NAP process to ensure effective use of resources, alignment with national development plans, and the long-term viability of adaptation efforts. The climate change finance mechanism will focus on the ability to attract both domestic and international funding sources. This mechanism will operate under Tanzania's financial laws and regulations to ensure transparency, effective use of resources, and integrity in financial management.

Recognizing that timely and accurate information is vital to successful adaptation, the NAP includes a robust implementation plan aimed at reaching diverse stakeholders with appropriate, clear, and actionable messages. A climate information portal will facilitate the sharing of best practices, climate data, and lessons learned. The implementation plan will also incorporate feedback mechanisms to allow stakeholders to provide input and suggest improvements, ensuring the NAP remains responsive and adaptive over time.

4.1.2 The Guiding Principles

(i) Gender Responsiveness in the NAP Process

The Tanzania National Adaptation Plan (NAP) process demonstrates a strong commitment to gender responsiveness by acknowledging that climate change impacts affect different groups in society in diverse ways, depending on their social roles, responsibilities, and access to resources. The NAP approach is grounded in a gender-responsive, bottom-up, and inclusive strategy that emphasizes the meaningful participation of women, men, persons with disabilities, the elderly, and youth. It highlights the importance of using age and sex-disaggregated data and conducting gender-sensitive climate vulnerability assessments to ensure that planning processes reflect the different needs and experiences of women and men.

1 UNFCCC; The NAP Technical Guidelines: Updated technical guidelines for the process to formulate and implement national adaptation plans, August 2025

Furthermore, the NAP process calls for separate evaluations of the impact of adaptation actions on both genders to identify disparities and develop tailored interventions. It also promotes the integration of gender equality as a core criterion in prioritizing adaptation actions, thereby ensuring that both vulnerable women and men can access the resources and opportunities necessary for effective adaptation. A key element of inclusivity in the process is the disability-inclusive approach, which emphasizes the protection of the rights of persons with disabilities and their empowerment as active contributors to climate solutions. This will be achieved through support and involvement of persons with disabilities and their representative organizations in all stages of adaptation planning and implementation.

(ii) Local communities knowledge systems

The Tanzania NAP process places significant value on the role and knowledge of local communities in shaping effective climate adaptation strategies. It recognizes that local communities have for generations relied on community knowledge systems to cope with climate variability and environmental changes. community knowledge is considered an essential resource for understanding local climate dynamics and informing context-specific adaptation measures. Consequently, the NAP process aims to deliberately identify, adopt, and support viable local knowledge and practices that are cost-effective, environmentally appropriate, and capable of sustaining ecological balance. These communities will also be actively involved in planning and decision-making through vertical integration mechanisms that connect national strategies with local government authorities, community-based organizations (CBOs), and civil society actors.

(iii) Children, Youth, and Vulnerable Groups Inclusion

The NAP process outlines the inclusion of youth and other vulnerable groups as a key priority in its implementation strategy. With youth comprising approximately 34% of Tanzania's population, their engagement is seen as crucial to driving innovation and sustaining climate action over the long term. The NAP approach promotes the active involvement of young people in all stages of the adaptation process through participatory forums designed to capture their concerns, insights, and contributions. Children views and youth will be provided with opportunities to participate in decision-making on climate-related issues at both local and national levels. In addition to children and youth, the NAP process also emphasizes the inclusion of other vulnerable groups such as the, elderly, and persons with disabilities. The inclusive approach adopted in the NAP process is intended to promote equitable access to adaptation resources, foster resilience among all population segments, and build a more just and sustainable future for all. To ensure inclusive participation in adaptation to climate change, NAP will involve education and capacity building for children, youth, and vulnerable groups.

Beyond gender, youth, and local inclusion, the NAP process integrates multi-level coordination for aligning policies and interventions across the country. The NAP principles involve horizontal and vertical integration, which ensures coordination across sectors and levels of government. The NAP Horizontal integration facilitates collaboration among Ministries, Departments, and Agencies (MDAs) to address cross-cutting issues and establish institutional linkages. Vertical integration enables the flow of information and engagement between the national government and stakeholders at regional and local levels, including academic institutions, private sector actors, NGOs, CSOs, and community-based organizations.

Another critical principle is resource mobilization and financial accountability. The government intends to establish a climate change finance mechanism to attract both domestic and international funding sources. This mechanism will operate under Tanzania's financial laws and regulations to ensure transparency, effective use of resources, and integrity in financial management.

The principle of evidence-based planning and local knowledge management is also emphasized. The NAP process will rely on data generated through vulnerability assessments, scientific research, and community experiences. It will support the development of indicators and targets to monitor progress and identify adaptation priorities. Baseline studies, analytical research, and contributions from universities, research institutions, and civil society will be instrumental in shaping informed decision-making.

4.2 Alignment of Adaptation Options to Global Goal on Adaptation (GGA)

The adaptation actions at the national level have been framed according to the themes of the Global Goal on Adaptation (GGA) (Table 4.1). The GGA, as articulated under the Paris Agreement and further elaborated through the Global Stocktake process, provides a structured thematic framework to guide countries in planning and implementing adaptation actions. Tanzania's NAP is strategically framed along these themes to ensure coherence, effectiveness, and alignment with global climate goals. Table 4.1 aligns the nine priority sectors identified in Tanzania's National Adaptation Plan (2025-2035) with the seven thematic targets of the Global Goal on Adaptation (GGA) as outlined in the UNFCCC's technical guidelines. The justification for each alignment is based on the components of the GGA targets and the cross-cutting nature of Tanzania's key

economic and environmental sectors.

This matrix aligns the nine priority sectors identified in Tanzania's National Adaptation Plan (2025-2035) with the seven thematic targets of the Global Goal on Adaptation (GGA) as outlined in the UNFCCC's technical guidelines. The justification for each alignment is based on the components of the GGA targets and the cross-cutting nature of Tanzania's key economic and environmental sectors.

Table 4.1: Alignment of Tanzania's NAP Sectors with the Global Goal on Adaptation (GGA)

Global Goal on Adaptation (GGA) Thematic Target	Matching Tanzania NAP Sector(s)	Justification for Alignment
A. Climate-Resilient Water and Sanitation Security for All	Water	The GGA target's components, reducing climate-induced water scarcity, ensuring a climate-resilient water supply, and providing access to safe and affordable potable water, are the central objectives of Tanzania's Water sector adaptation strategy.
B. Sustainable Food and Nutrition Security for All	Agriculture, Livestock, Fisheries	These three sectors form the foundation of Tanzania's food systems. The GGA target components achieving climate-resilient food production, ensuring resilient supply and distribution, and promoting equitable access to nutrition directly correspond to the adaptation priorities for agriculture, livestock, and fisheries.
C. Climate-Resilient Health Systems and Services	Health	The GGA target focuses on building resilience against climate-related health impacts, promoting climate-resilient health services, and reducing morbidity and mortality in vulnerable communities, which are the core adaptation goals for Tanzania's Health sector.
D. Healthy Ecosystems and Biodiversity	Coastal and Marine, Wildlife	These sectors are fundamentally cantered on ecosystem management. The GGA target's components reducing climate impacts on ecosystems and biodiversity, accelerating ecosystem-based adaptation, and protecting terrestrial, marine, and coastal ecosystems directly match the mandates of these two sectors.
E. Climate-Resilient Infrastructure and Human Settlements for All	Infrastructure and Human Settlements	The GGA target's focus on increasing the resilience of infrastructure and human settlements to ensure continuous essential services for all directly reflects the adaptation goals of this crucial sector in Tanzania.
F. Climate-Proof Poverty Reduction and Livelihoods	Agriculture, Livestock, Fisheries, Tourism	This GGA target is cross-cutting. Agriculture, livestock, and fisheries are the primary livelihoods for the majority of Tanzanians. The Tourism sector is a significant source of employment and economic stability. Protecting these sectors from climate impacts directly contributes to climate-proof poverty eradication and livelihood resilience for all.
G. Climate-Proof Cultural Heritage	Tourism, Wildlife	Following the guideline to map cross-cutting sectors, Tourism and Wildlife are strongly linked to this GGA. Tanzania's tourism industry relies heavily on both natural and cultural heritage sites (e.g., historical sites, protected areas with cultural significance). The GGA's objective to protect cultural heritage from climate risks by preserving sites and practices is essential for the long-term sustainability of these sectors.

5. CLIMATE CHANGE SCENARIOS FOR TANZANIA

5.1 Introduction

This chapter presents climate change scenarios relevant to Tanzania, highlighting key trends, uncertainties, and implications for adaptation planning across sectors and regions. It draws on outputs from global and regional climate models, focusing on projections most applicable to the Tanzanian context. The scenarios examine changes in average temperature, rainfall patterns, and the frequency and intensity of extreme weather events, including droughts, floods, and tropical cyclones, while acknowledging that impacts are not uniform. Some areas, such as coastal zones, semi-arid regions, and highland ecosystems, are particularly vulnerable.

By presenting these scenarios, the chapter provides a foundation for assessing sector-specific risks and identifying priority areas for adaptation, including climate-resilient infrastructure, sustainable land and water management, and community-based strategies. The scenarios also emphasize the need for flexible, adaptive approaches that can evolve as new scientific information emerges. Integrating these projections into the National Adaptation Plan (NAP) ensures that Tanzania's development pathways remain resilient, equitable, and responsive to a changing climate.

5.2 Data and Methods

The scenarios and projections presented in this chapter are based on analyses of data obtained from the Tanzania Meteorological Authority (TMA, 2024), using both historical observations and advanced climate modelling techniques. Historical climate data spanning 1961–2023 were obtained from TMA's network of synoptic, agro-meteorological, and rainfall stations across the country. Rigorous quality control and homogenization procedures were applied to ensure accuracy and consistency.

Future climate projections were developed using an ensemble of Coupled Model Intercomparison Project Phase 6 (CMIP6) global climate models, dynamically downscaled through CORDEX-Africa (SMHI, 2021) to a spatial resolution of approximately 25 km. The projections were bias-corrected against the observed climatology for the 1991–2020 baseline period to enhance local relevance and reliability. Model uncertainty was minimised by using a multi-model ensemble mean, while recognising the inherent variability among individual model outputs. Uncertainties in projections arise from differences among models, emission pathways, and internal climate variability. These were addressed by applying ensemble averaging and cross-validating model outputs against observed data. Results should therefore be interpreted as indicative of directional trends rather than absolute values. Two emission scenarios, or Shared Socioeconomic Pathways (SSPs), were applied: SSP2-4.5, representing a medium-stabilisation pathway, and SSP5-8.5, representing a high-emission, business-as-usual pathway. These are consistent with the Intergovernmental Panel on Climate Change (IPCC AR6) framework.

Analyses focused on three time slices: near term (2021–2040), mid-century (2041–2060), and end-century (2081–2100) to capture both immediate and long-term changes. Key indices used include the Warm Spell Duration Index (WSDI) for heat extremes, R75p and R99p for heavy and very wet rainfall days, and Consecutive Dry Days (CDD) for drought characterisation (WMO, 2024). Together, these datasets provide the most comprehensive and nationally validated climate information available for Tanzania. They form the scientific foundation for the risk and vulnerability assessments and for the prioritisation of adaptation actions described in subsequent chapters of this NAP.

All analyses were performed using standard climate diagnostics and visualisation tools, including Python-based climate data operators and GIS for spatial mapping. The resulting projections provide critical input for assessing sectoral vulnerabilities and guiding evidence-based adaptation planning at both national and local levels.

5.3 Historical Climate Trends and Future Climate Projection

5.3.1 Observed Temperature Trends (1991-2020)

According to the World Meteorological Organisation (WMO, 2024) State of the Climate in Africa, the continent continues to warm at a rate faster than the global average, with East Africa experiencing increasingly frequent heat extremes, prolonged warm spells, and persistent shifts in seasonal rainfall patterns. These regional trends mirror the national climate signals observed by the Tanzania Meteorological Authority (TMA, 2025),

which confirm an unmistakable warming trend and rising temperature variability across the United Republic of Tanzania (URT). TMA's recent analyses (2023/2024) reveal consistent increases in both minimum and maximum temperatures, a narrowing diurnal range, and recurrent record-breaking heat events—providing a critical baseline for understanding and responding to ongoing climatic changes.

Historical climate records from the Tanzania Meteorological Authority and global datasets, including the Climatic Research Unit (CRU) of the University of East Anglia, confirm a consistent and statistically significant warming trend across the Mainland Tanzania (Figure 5.1). Between 1961 and 2024, the mean annual temperature increased by approximately 0.69 °C, with minimum temperatures rising faster than maximum temperatures (TMA, 2025). This asymmetry highlights a narrowing diurnal temperature range, with warmer nights becoming increasingly common, as reported by TMA (2025).

The frequency of warm days and warm nights in both mainland Tanzania and Zanzibar have also increased sharply, by 9.37% and 12.05% respectively, underscoring more frequent and prolonged heat stress events, according to TMA (2025). Comparable patterns are observed in Zanzibar, where minimum temperatures have similarly risen more quickly, reinforcing the nationwide signal of accelerated warming (Chang'a et al., 2017).

The TMA Climate Statement (2025) reports record-breaking extremes, with a maximum of 38.4 °C at Ilonga (29 November) and a minimum of 29.1 °C at Pemba (5 March). Recent studies (Kebacho et al., 2024; TMA, 2025) show a significant and uneven rise in surface air temperatures, with central and western regions, Dodoma, Singida, Tabora, and Shinyanga, regularly exceeding 35 °C during October–April, highlighting urgent adaptation needs in health, agriculture, and water sectors. These trends reflect intensifying daytime heat and rising nighttime temperatures, with projections under RCP4.5 indicating further increases in warm days and nights and more frequent, intense rainfall along coastal areas (Luhunga, 2025).The impacts of this warming are already evident in Tanzania's ecosystems and livelihoods. One of the most visible indicators is the rapid retreat of the Kibo Glacier on Mount Kilimanjaro, which lost nearly 85% of its ice cover between 1912 and 2009. Rising temperatures have also contributed to shifts in hydrological systems, increased evapotranspiration, reduced water availability, and heightened risks to agriculture, fisheries, and human health. These observed changes provide compelling evidence that climate change is no longer a distant threat but an ongoing reality, necessitating urgent adaptation measures to safeguard communities, ecosystems, and key economic sectors.

Figure 5.1 shows monthly temperature anomalies for mean (green), maximum (red), and minimum (blue) temperatures throughout the year. A temperature anomaly indicates how much warmer or cooler a month was compared to the long-term average. Most months show positive anomalies, meaning they were warmer than average. Notably, minimum temperature anomalies (Tmin) are consistently above zero across nearly all months, indicating persistently warmer-than-normal nights. Maximum temperature anomalies (Tmax), on the other hand, exhibit greater variability, with colder-than-average daytime temperatures in January, April, and December, but strong warming in the summer months, particularly in July.

Generally, Figure 5.1 indicates a general warming pattern with a distinct separation between daytime and nighttime temperatures. Nights are warming more consistently and strongly compared to daytime temperatures, which sometimes dip below average. This indicates a reduced difference between day and night temperatures; a pattern often linked to broader climate change effects. The persistence of higher Tmin anomalies indicates that warmer nights are a significant contributor to the overall warming trend.

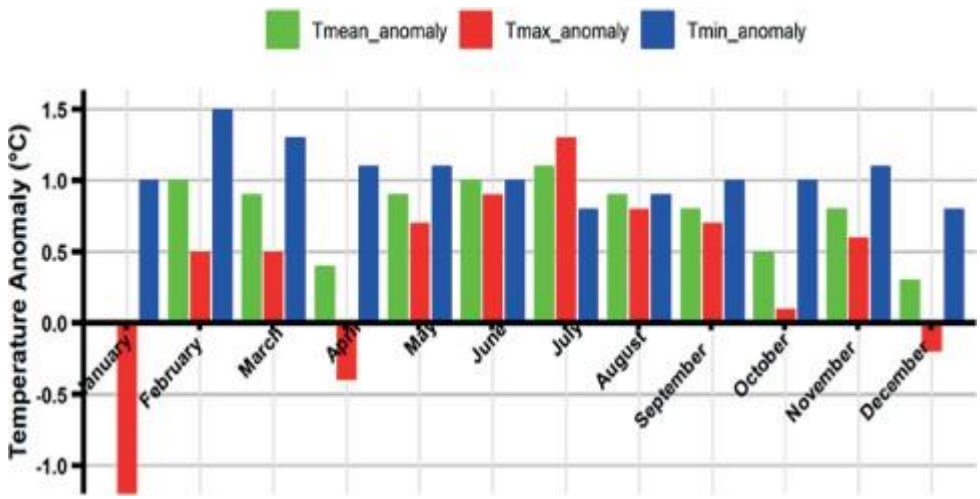

Figure 5.1: Observed monthly anomaly of mean (Tmean), maximum (Tmax) and minimum (Tmin) temperature (ºC) for Tanzania relative to 1991-2020 (Source: TMA, 2025)

5.3.2 Observed Rainfall Trends

Based on historical observations, rainfall in Tanzania exhibits high spatial and temporal variability, which is a defining feature of the country's climate (Figure 5.2). While total annual rainfall at a national scale has remained relatively stable since the mid-1980s, its distribution has become increasingly uneven. The long rainy season (Masika, March–May), which is critical for agriculture and water resources, has notably declined in duration and reliability across all regions. Concurrently, the frequency and intensity of extreme rainfall events have increased (Borhara et al., 2020, Chang'a et al 2020). Changa et al. (2020) highlight that extreme rainfall events, such as those in October 2019 over East Africa, have significant socio-economic impacts, including damage to infrastructure, disruption of livelihoods, and agricultural losses, emphasizing the urgent need for multi-sectoral adaptation measures. This dual pattern has produced concentrated heavy downpours interspersed with longer dry periods, contributing to heightened hydrological volatility and greater risks of both droughts and floods (Figure 5.2). These shifts in rainfall patterns are strongly influenced by the seasonal migration of the Inter-Tropical Convergence Zone (ITCZ), which creates a bimodal pattern in northern and eastern regions (including Pemba and Unguja islands) and a unimodal pattern in central and southern regions.

The islands (Zanzibar, Mafia and Kilwa) and coastal areas face particularly heightened climate risks. While Mafia Island receives the highest annual rainfall among some coastal stations, observational data from Unguja and Pemba show fluctuating seasonal rainfall with declining trends along their eastern coasts. Historical records indicate that the most recent extreme rainfall and wind events on record, including those associated with Tropical Cyclone Hidaya, have occurred within the last 10-15 years, signalling an acceleration of climate variability and extremes. These changes are compounded by an increase in storm surges and coastal erosion, which have adversely affected coastal infrastructure and livelihoods. Overall, these observations underscore the urgent need for a multi-sectoral approach to climate adaptation in Tanzania.

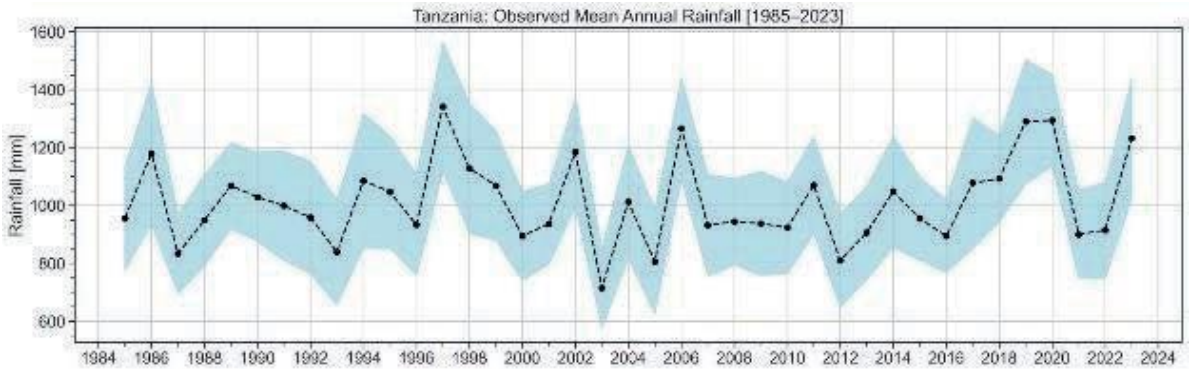

Figure 5.2: Observed annual total rainfall in Tanzania from 1985 to 2023 (mm)

(Data Source: TMA)

Figure 5.2 illustrates the observed mean annual rainfall in Tanzania between 1985 and 2023, highlighting considerable year-to-year variability with no discernible long-term trend. Rainfall fluctuates widely, ranging from around 700 mm in drier years (e.g., the early 1990s, 2003, and 2011) to over 1,400 mm in wetter years (e.g., 1997, 2006, and 2019). The shaded blue area represents variability or uncertainty around the mean values, indicating significant interannual differences. Despite this variability, the recent period (post-2015) shows slightly more frequent above-average rainfall years compared to earlier decades, consistent with reports of increasing rainfall extremes in parts of Tanzania. Overall, the data suggest that while average annual rainfall has not shown a simple linear trend, climate variability and extreme wet years have become more prominent.

5.4 Future Climate Projections

Future climate projections for Tanzania are derived from an ensemble of downscaled Global Climate Models (GCMs) from the Coupled Model Inter comparison Project Phase 6 (CMIP6), which serves as the scientific basis for the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6). To provide a range of plausible futures for robust planning, projections are presented for two Shared Socioeconomic Pathways (SSPs).

(i) SSP2-4.5: An intermediate emissions scenario where global CO2 emissions hover around current levels before starting to decline mid-century, roughly aligning with the upper end of aggregate Nationally Determined Contribution (NDC) emission levels by 2030.

(ii) SSP5-8.5: A high-emissions, fossil-fuel-intensive scenario often referred to as 'business-as-usual', representing a future with no additional climate policy.

5.4.1 Temperature Projections

A continued and significant increase in temperature is projected across all regions of Tanzania with high confidence. On the mainland, the mean annual temperature is projected to increase by 1.4 to 2.3 degrees Celsius by the 2050s, relative to the 1995-2014 baseline. By the end of the century, under a high emissions scenario (SSP5-8.5), this warming could reach up to a devastating temperature of 5 degrees Celsius. The most significant warming is projected for the western and south-western parts of the country. A substantial increase in extreme heat events is expected to accompany this rise in average temperature.

The annual number of very hot days (days with a maximum temperature above 35 degrees Celsius is projected to increase significantly, particularly in eastern Tanzania, with a median projection of 22 more very hot days per year by 2080 compared to 2000 under a medium/high emissions scenario (Figure 5.3). For Zanzibar, projections for Unguja and Pemba indicate significant increases in both maximum (Tmax) and minimum (Tmin) temperatures through 2080. By the far future (2051-2080), the rise in Tmax could range from 1.5 to 2.0 degrees Celsius, with similar increases projected for Tmin (Figure 5.4). This indicates a future with not only hotter days but also warmer nights, reducing the potential for nocturnal recovery from heat stress for ecosystems and human populations. It illustrates how shifts in the diurnal temperature range can intensify heat stress, aggravating the impacts of climate change across various sectors.

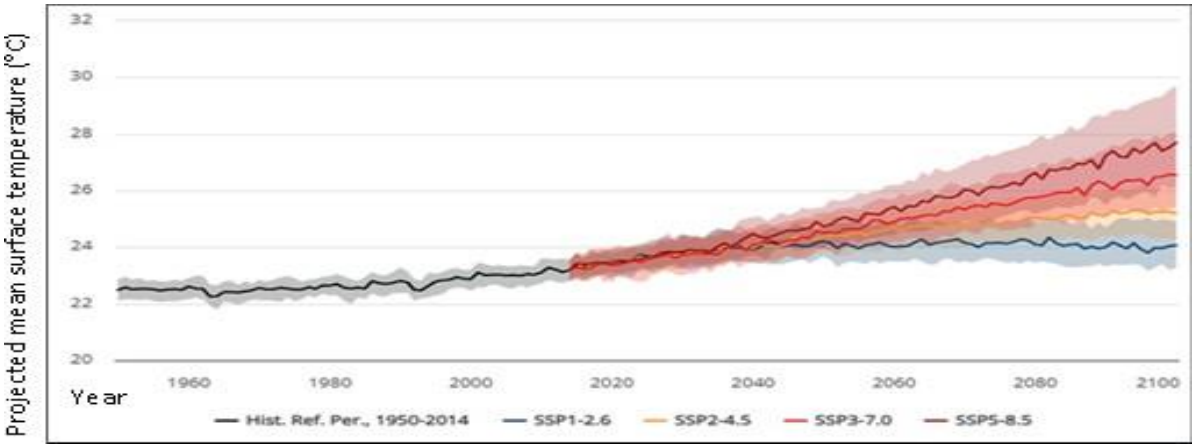

Figure 5.3: Projected mean surface temperature across Tanzania for the near, mid, and far future under three emission scenarios: SSP1-2.6 (low), SSP2-4.5 (moderate), and SSP5-8.5 (high)

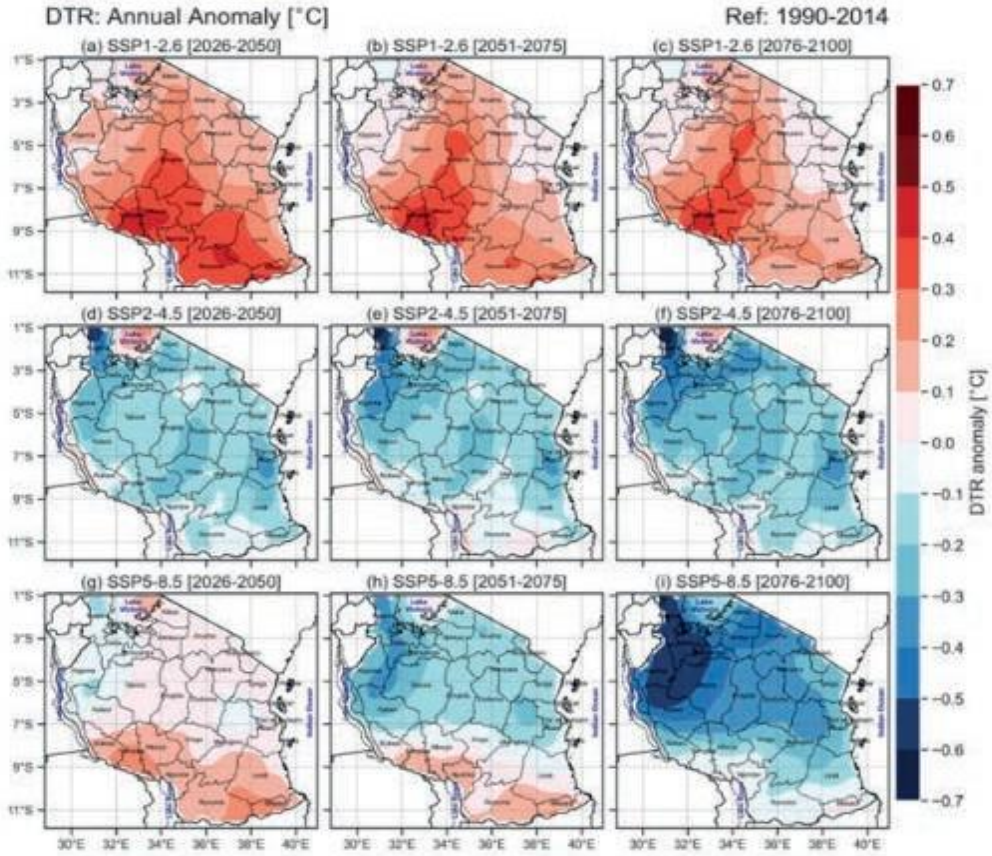

Figure 5.4: Projected changes in Diurnal Temperature Range (DTR) across Tanzania under SSP2-4.5 and SSP5-8.5 for the near (2021–2040), mid (2041–2060), and far future (2081–2100), compared to the 1995–2014 baseline.

The Warm Spell Duration Index (WSDI) measures how long periods of unusually high temperatures. It is a key indicator of heatwaves, with rising values signalling higher risks for ecosystems, agriculture, health, and infrastructure. In addition to analysing projected temperatures, including maximum and minimum values, the study presented the projected change in the warm spell duration index for the near and mid-future under SSP 4.5 scenarios (Figure 5.5).

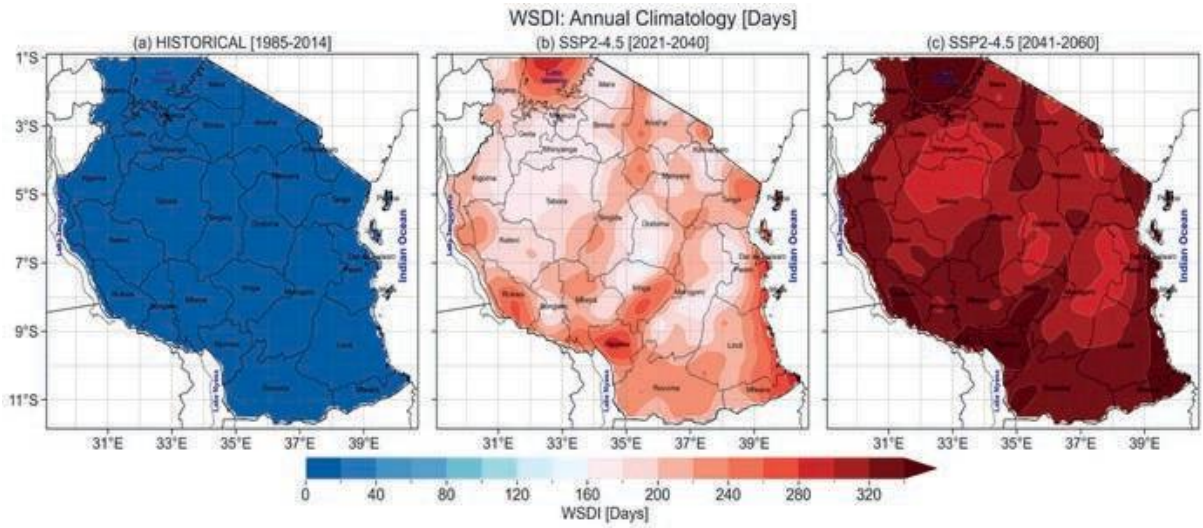

Figure 5.5: Historical and projected trends of extreme heat in Tanzania, expressed as Warm Spell Duration Index (WSDI) under SSP4.5 (in days).

Figure 5.5. presents the projected changes in the Warm Spell Duration Index (WSDI), measured in days, across Tanzania over three different time periods. Panel (a) shows the historical baseline (1985–2014), where most regions experienced very few or no extended warm spells, indicated by the uniform dark blue shading. Panel (b) depicts the near-future projection (2021–2040) under the SSP2-4.5 climate scenario, showing a substantial increase in warm spell durations across the country, with most areas projected to experience between 160 and 240 days of prolonged heat annually, particularly concentrated in southern and central regions. Panel (c) illustrates the mid-century projection (2041–2060), where nearly the entire country is projected to experience extreme increases in WSDI, with values exceeding 300 days in many regions, represented by the dark red shading. This progression highlights a stark and widespread intensification of heat extremes in Tanzania, indicating significant climate change impacts that could affect agriculture, water resources, and public health if adaptation measures are not implemented.

The projected rise in temperature across Tanzania, up to 2.3°C by mid-century and potentially 5°C by 2100, poses severe risks across the country's nine critical sectors. Agriculture and livestock will face reduced productivity due to heat stress, crop failures, and water scarcity. At the same time, fisheries and marine ecosystems will decline as warm waters and coral bleaching disrupt food sources and the livelihoods. Heat-related illnesses, malnutrition, and the broader spread of vector-borne diseases will pose significant threats to human health. At the same time, wildlife will suffer from habitat loss and biodiversity decline, which will undermine tourism revenue. Coastal zones, including Zanzibar, are at risk of sea level rise and degradation of their marine ecosystems, while infrastructure and human settlements will face heat damage, urban stress, and increased migration pressures. Water resources will be depleted more rapidly through evaporation and reduced recharge, fuelling increased competition and conflict. Collectively, these impacts threaten food security and nutrition, water sanitation and hygiene, economic stability, public health, education, and biodiversity, making climate adaptation urgent across all sectors.

5.4.2 Rainfall Projection

Future precipitation trends are characterized by high uncertainty among climate models, particularly concerning changes in annual mean rainfall. However, there is greater agreement on changes in rainfall patterns and extremes. For the mainland, while projections for average yearly rainfall range from a 3% decrease to a 9% increase by the 2050s, there is a stronger consensus that rainfall will become more erratic. The key projected changes include an increase in the intensity of heavy rainfall events (by 7-40%) and an increase in the duration of dry spells (by up to 7 days). Some regional patterns are emerging, with models suggesting a potential increase in mean annual rainfall over the Lake Victoria Basin and the North-Eastern Highlands, while other areas may experience decreases.

Projections for Zanzibar are spatially divergent, underscoring the need for island-specific analysis. Under both medium and high emissions scenarios, Unguja is generally projected to experience a decline in rainfall (a deficit of 25-50 mm), while Pemba may see an increase in rainfall intensity (0-25 mm). This contrasting projection has significant implications for water resource management and agriculture on each island.

The divergence in precipitation projections underscores a critical point for national adaptation planning. While average temperature projections provide a clear signal of a warmer future, the uncertainty in average rainfall shifts the focus of concern towards managing heightened variability. The most robust signal across models is not a simple trend towards a "wetter" or "drier" Tanzania, but a future characterised by more extreme and volatile weather patterns. For a nation where over 80% of agriculture is rain-fed, the timing, distribution, and intensity of rainfall are far more critical than the annual total.

An increase in annual rainfall, characterized by fewer, more intense storm events, punctuated by longer dry spells, represents a dual threat (Figure 5.6). The fierce downpours lead to destructive floods, soil erosion, and rapid runoff that does not adequately recharge soil moisture. In contrast, the extended dry spells lead to agricultural drought and crop failure. This creates a complex challenge of managing both too much and too little water, often within the same season, demanding a paradigm shift in adaptation planning away from linear trends and towards building systemic resilience to volatility (Figure 5.6). Higher emissions scenarios show more frequent heavy rain events, especially in the late century.

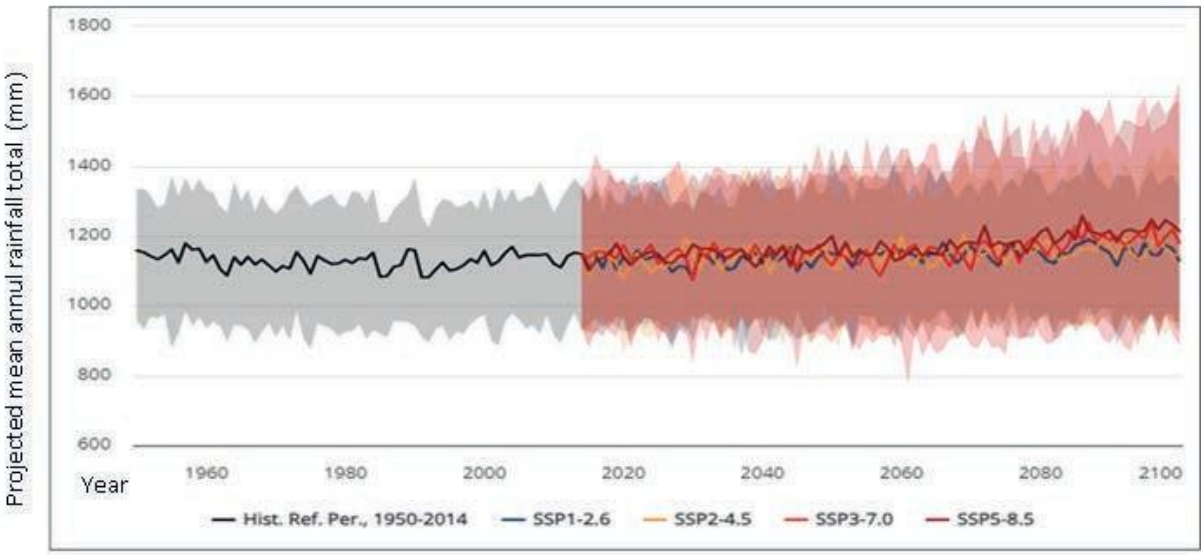

Figure 5.6: Projected mean annual rainfall across Tanzania for the near, mid, and far future under three emission pathways: SSP1-2.6 (low), SSP2-4.5 (moderate), and SSP5-8.5 (high).

On the other hand, Figure 5.7 shows the projected increase in heavy rainfall days (R75p) across Tanzania under future climate scenarios, SSP1-2.6, SSP2-4.5, and SSP5-8.5, compared to the period 1990–2014. Projections indicate that heavy rainfall is likely to increase in the near, mid, and far future, particularly in the northern highlands, coastal regions, and islands (including the islands of Zanzibar, Mafia, and Kilwa), with more substantial rises under the moderate and high emission scenarios. The highest increases occur under SSP5-8.5, affecting coastal areas (e.g., Dar es Salaam, Kilombero, Kagera), the northern highlands (e.g., Hanang), which are prone to landslide risks, and cyclone-prone regions such as Mafia and Kilwa. These trends point to heightened risks of flooding, landslides, and cyclone-related impacts, highlighting the urgent need for targeted adaptation measures in Tanzania's NAP.

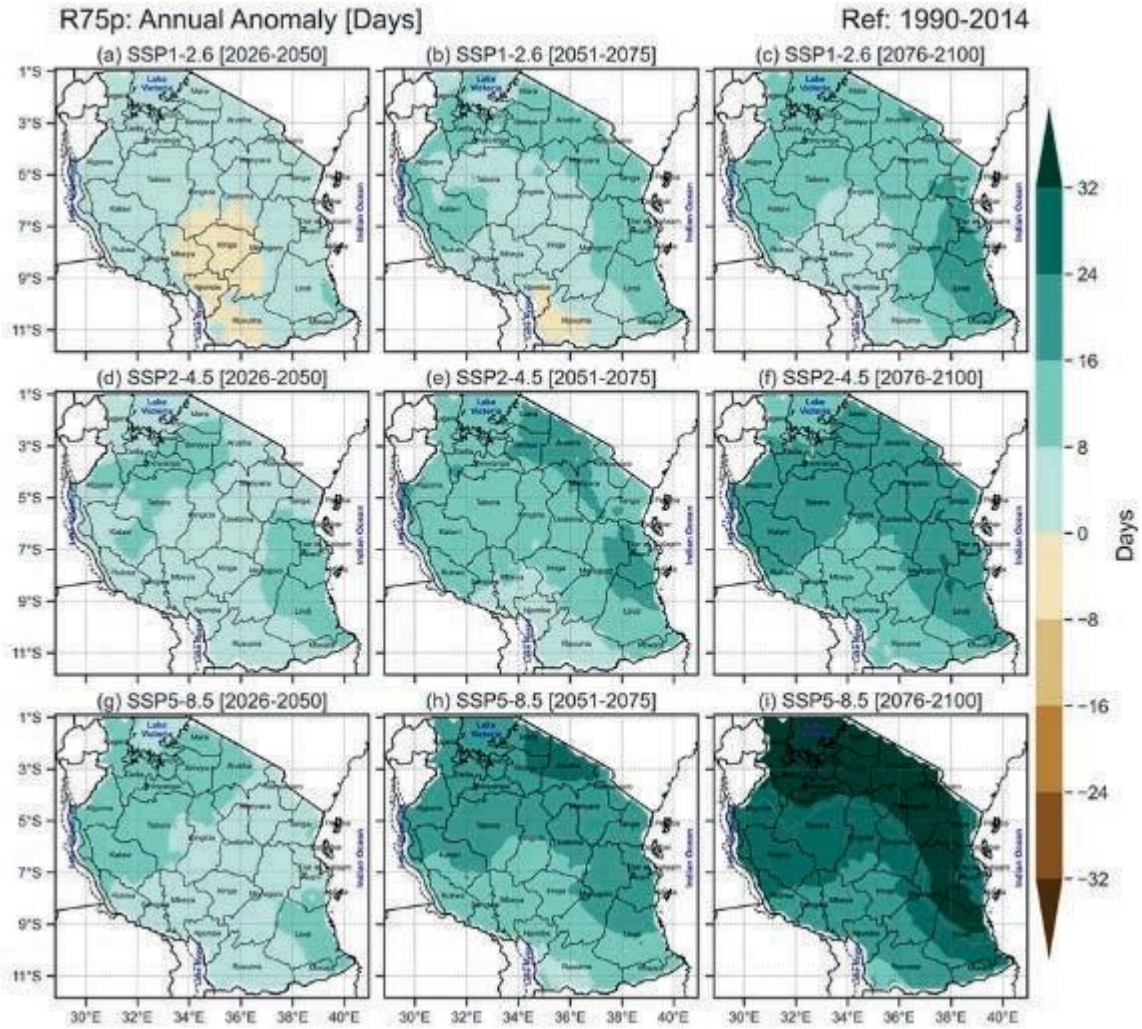

Figure 5.7: Projected increase in heavy rainfall days (R75p) across Tanzania under SSP1-2.6, SSP2-4.5, and SSP5-8.5 for future periods relative to 1990–2014

After examining the Diurnal Temperature Range (DTR), the Warm Spell and Dry Spell Duration (WSDI/ CDD) indices are also examined, as these capture the persistence of extreme heat and drought conditions. Their interaction with DTR highlights how extended periods of warmth and dryness can exacerbate daily temperature variability, resulting in increased stress on ecosystems, agriculture, and water resources.

Table 5.1summarises projected climate changes for Mainland Tanzania and Zanzibar under intermediate (SSP2-4.5) and high (SSP5-8.5) emission scenarios. Temperatures are expected to rise by 1.4°C to 5.1°C, with an increase in extreme heat days, particularly in eastern regions. Rainfall projections are uncertain but suggest heavier rains in some areas and decreases in others, while sea levels may rise 21– 41 cm by century's end. These changes increase risks of heat stress, flooding, landslides, and coastal impacts, underlining the need for urgent adaptation measures in Tanzania's NAP.

Table 5.1: Summary of projected Climate Change for Mainland Tanzania and Zanzibar (Mid- and End-Century)

Climate Parameter	Region	Time Horizon	SSP2-4.5 (Intermediate Emissions)	SSP5-8.5 (High Emissions)
Mean Annual Temp. Anomaly (ºC)	Mainland	2050s	+1.4 to +1.8	+1.9 to +2.3
		2080s	+2.0 to +2.5	+3.5 to +5.0
Mean Annual Temp. Anomaly (ºC)	Zanzibar	2050s	+1.5 to +1.9	+2.0 to +2.4
		2080s	+2.1 to +2.6	+3.6 to +5.1
Annual Precipitation Anomaly (%)	Mainland	2050s	-3 to +9 (High Uncertainty)	-5 to +15 (High Uncertainty)
		2080s	-4 to +11 (High Uncertainty)	-10 to +30 (High Uncertainty)
Annual Precipitation Anomaly (%)	Zanzibar (Unguja)		+1 to +5	-10 to -15
Extreme Heat Days Anomaly (Days >35 ºC)	Zanzibar	2050s		+2 to +8
Extreme Heat Days Anomaly (Days >35 oC)	Mainland (East)	2080s	+15 days	+22 days
Sea Level Rise (cm)	National Coastline	2050	~21 cm	~25 cm
		2080	~35 cm	~41 cm

5.5 Frequency and Intensity of Extreme Weather Events

5.5.1 Drought Assessment

The Consecutive Dry Days (CDD) index represents the longest stretch within a year without significant rainfall and is a key indicator of meteorological drought. Projections indicate that rising CDD values will result in longer dry spells, exacerbate water scarcity, reduce agricultural productivity, stress ecosystems, and threaten livelihoods across Tanzania.

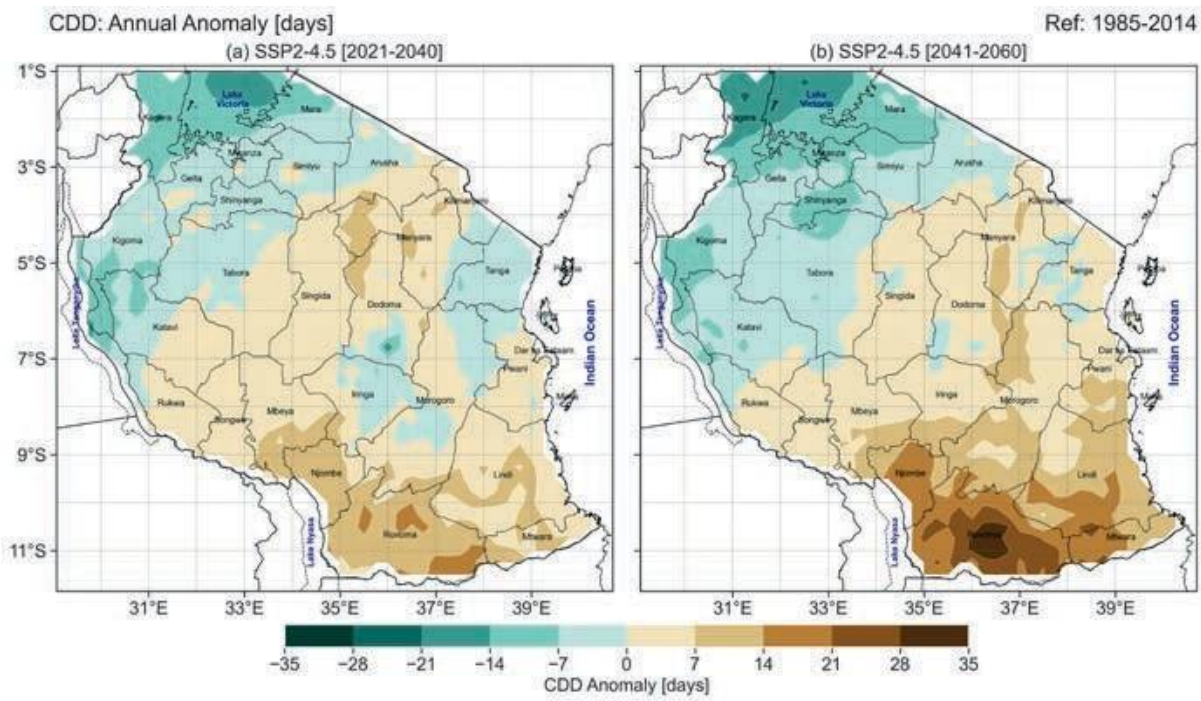

Figure 5.8: Projected drought impacts in Tanzania, expressed as the percentage change in consecutive dry days under the SSP2-4.5 scenario for the near future (2021–2040) and mid-future (2041–2060) periods.

Figure 5.8 presents projected changes in consecutive dry days (CDD), a key indicator of drought. Results show shorter dry spells in the near term (2021–2040) across much of northern and central Tanzania, which could temporarily benefit rain-fed agriculture and freshwater fisheries. However, by mid-century (2041– 2060), a strong regional divide emerges: the southern regions are projected to experience a sharp rise in CDD, heightening risks of prolonged drought, crop failure, water scarcity, and livestock stress, while the north may benefit from fewer dry spells but face challenges from heavy rainfall and water level fluctuations. These divergent trends signal significant sectoral implications, particularly for agriculture, livestock, water, and fisheries, and the provision of basic services like water, health, education, social protection and nutrition underscoring the urgency of region-specific adaptation planning in Tanzania's NAP.

5.5.2 Flood Assessment

Figure 5.9 shows projected changes in extreme rainfall events (R99p: the annual anomaly in the percentage of rainfall coming from very wet days, i.e., the 99th percentile) across Tanzania, compared to a baseline reference period (1985–2014) (Figure 5.9). The two panels represent different time periods under the climate scenario SSP2-4.5 (a moderate emission pathway): the left panel shows projections for the period 2021–2040, while the right panel shows projections for the period 2041–2060. The colours indicate the percentage anomaly, where brown shades represent a decrease in extreme rainfall (fewer intense wet days). In contrast, green/ blue shades indicate an increase in extreme rain (more frequent or intense wet days). Overall, many regions, particularly central and eastern Tanzania, are expected to experience increases in extreme rainfall by mid-century. However, some areas (such as western and northern zones) show decreases or mixed trends.

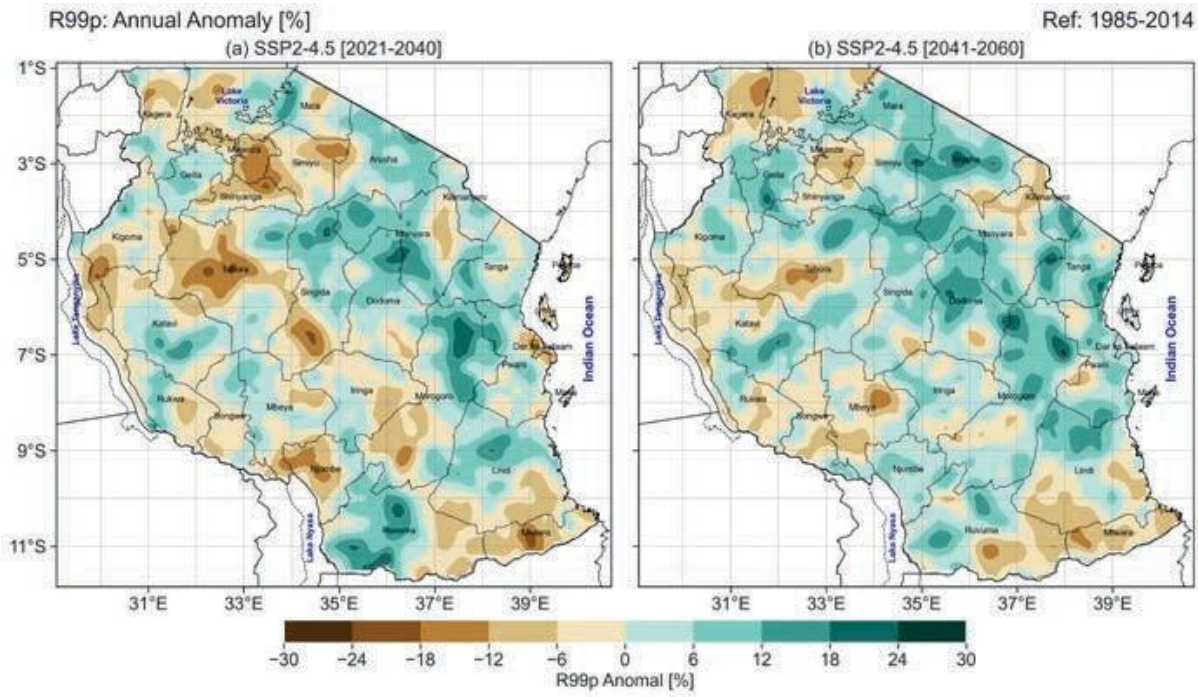

Figure 5.9: Projected anomalies in annual extreme rainfall (R99p) over Tanzania under SSP2-4.5 for 2021–2040 (a) and 2041–2060 (b), relative to 1985–2014.

The implications of these projected changes are significant for both the environment and socio-economic sectors. Increased extreme rainfall is expected to lead to more frequent flooding, soil erosion, and landslides, threatening infrastructure, agriculture, and settlements—particularly in flood-prone areas such as the Rufiji and Pangani river basins. For agriculture, which remains largely rain-fed in Tanzania, heavier rainfall events could damage crops, reduce yields, and disrupt planting cycles due to waterlogging, thereby exacerbating poverty and food insecurity.

Moreover, flooding may disrupt energy systems, trigger disease outbreaks and health emergencies, and limit access to health and education services. Conversely, decreases in extreme rainfall in some regions are likely to heighten drought risks, stressing water resources, livestock, and food production. From an environmental perspective, these shifts may alter ecosystems and biodiversity, particularly in wetlands and freshwater systems. Sectors such as energy (hydropower), health (waterborne diseases), and urban planning will need to strengthen adaptive measures to cope with increasingly variable and intense rainfall patterns.

These projections provide the baseline for assessing exposure and sensitivity of key sectors in Chapter 6.

6. CLIMATE CHANGE VULNERABILITY AND RISK ASSESSMENT

6.1 Introduction

This chapter presents a comprehensive assessment of Tanzania's climate-related vulnerabilities and risks across key socio-economic and environmental systems. It analyses major hazards, including prolonged droughts (IPCC, 2022) and increasing rainfall variability (World Bank, 2021) on the Mainland Tanzania, alongside saltwater intrusion and sea-level rise in Zanzibar (WWF, 2020), all of which pose significant threats to national stability and sustainable development. Through an evaluation of system sensitivity, adaptive capacity, and overall risk levels, the chapter quantifies the escalating threats to livelihoods, food security (World Bank, 2021), and economic growth, while highlighting the disproportionate impacts on marginalised and climate-vulnerable communities and underscoring the urgent need for targeted, evidence-based adaptation strategies. This assessment draws upon the sectoral Climate Change Risk and Vulnerability Assessment for Mainland Tanzania and Zanzibar (URT, 2024) and the Community-level Climate Change Vulnerability and Risk Assessment (URT, 2025) for both Mainland Tanzania and Zanzibar, thereby ensuring a coherent and consistent evidence base across spatial and institutional scales and reinforcing the analytical rigour and policy relevance of the findings.

Although the RVA and CCVRA provided sufficient evidence to underpin the formulation of the NAP, sustained and sector specific analyses remain essential. Each sector should periodically conduct detailed vulnerability and risk assessments using a comprehensive framework that integrate social economic and environmental dimensions of climate risk.

For analytical consistency, conceptual clarity, and logical coherence, the sectors under consideration are systematically classified into three broad categories:

i) Primary Production Systems comprise agriculture, livestock, and fisheries.

ii) Natural Systems and Resources, encompassing water resources, coastal and marine sectors, and wildlife.

iii) Economic and Social Infrastructure, including physical infrastructure, human settlements, health, and tourism.

This categorisation allows for a targeted analysis of vulnerabilities, ensuring that adaptation strategies are tailored to each system's unique dynamics.

6.2 Primary Production Systems

6.2.1 Agriculture

Agriculture is central to Tanzania's economy, supporting nearly 65% of the population and contributing about 28% to the national GDP. The sector provides over 95% of the country's food supply. It underpins major export crops such as coffee, tea, rice, and sorghum, cultivated across diverse agro-ecological zones ranging from fertile highlands to semi-arid and coastal regions. However, increasing climate variability, including prolonged droughts, erratic rainfall, and flooding, has posed significant threats to agricultural productivity, food security, and rural livelihoods. A Climate Change Vulnerability and Risk Assessment was conducted for the sector to understand these challenges better and guide adaptation planning. The assessment identified the most climate-sensitive regions and farming systems, evaluated their exposure and adaptive capacity, and provided insights for targeted interventions to enhance resilience and ensure sustainable agricultural development amid escalating climate risks.

i) Current Status

Hazards: Tanzania's agricultural sector (FAO, 2019) is presently exposed to a multitude of climate-related hazards. On the Mainland Tanzania, community-level data from Singida, Arusha, and Mbeya confirm that farmers identify highly variable rainfall (World Bank, 2021) and prolonged drought (IPCC, 2022) as the most significant and frequently experienced threats, leading to widespread crop destruction. The community perceptions observed in this study are consistent with the findings reported by the World Bank (2021) and the

Intergovernmental Panel on Climate Change (IPCC, 2022). In Zanzibar, the primary hazards identified by farmers are saltwater inundation, ranked highest at 27% and strong winds (22%), which are particularly acute in the low-lying coastal farming systems of Pemba. Other significant hazards across the country include extreme heat and intense flooding. These shifting climatic conditions have also facilitated the spread of crop pests and diseases, such as the Fall Armyworm. In Zanzibar specifically, seaweed farming is threatened by rising sea surface temperatures, while fluctuations in rainfall and temperature impact clove production.

Vulnerabilities: The sector's primary vulnerability is its overwhelming reliance on rain-fed production, which constitutes over 80% of agricultural output, combined with limited irrigation infrastructure (Mdemu, 2021). The low adoption of climate-resilient technologies compounds this issue. Household surveys on the Mainland Tanzania reveal a significant adaptation gap. The most effective measures, such as improved irrigation and climate-resilient crop varieties, are the least accessible; for instance, only 19% of surveyed farming households reported having access to improved irrigation technologies.

These farmers often lack access to critical resources, such as improved seeds, fertilisers, credit, and timely climate information. This is exacerbated by profound socio-economic constraints, including a high household dependency ratio (0.94) on the Mainland Tanzania, which severely limits funds for investment in adaptive practices. A further vulnerability lies in the widespread cultivation of maize, a crop particularly susceptible to the effects of climate change (URT, 2021). In Zanzibar, the vulnerability is amplified by the dominance of specific farming systems, with perennial farming (cassava and banana) and rice farming being the most widespread and directly exposed to hazards such as saltwater intrusion and erratic rainfall.

Systemic and institutional barriers further compound these challenges. On the Mainland Tanzania, poor integration of climate science into agricultural planning and under-resourced extension services have left most farmers without adequate support. Indeed, most respondents (over 70% of surveyed households) reported being unaware of government programmes designed to help them adapt. Likewise, only a small proportion reported regular contact with extension officers, underscoring the weakness of this critical support system.

In Zanzibar, a similar pattern emerges. Institutional support remains limited despite the high exposure of dominant farming systems, particularly rice and perennial crops (such as cassava and banana), to climate hazards such as saltwater intrusion and erratic rainfall. Survey findings reveal that more than two-thirds of respondents reported not receiving any form of agricultural advisory support in the past year, while a majority also indicated reliance on traditional knowledge rather than official climate information services. This lack of coordinated adaptation strategies and constrained extension services leaves farmers in Zanzibar particularly vulnerable to systemic risks.

Risks: The convergence of these hazards and vulnerabilities has created immediate and substantial risks. The household-level risk assessment on the Mainland Tanzania confirms quantitatively that water-related hazards, drought and variable rainfall pose the highest overall risk to agricultural livelihoods. Frequent droughts have led to significant crop failures, with maize, sunflower, and rice yields falling by over 20% in some districts, triggering food shortages (URT, 2021). Further effects include higher rates of poverty (and linked increases in violence and gender-based violence, increased school dropouts, malnutrition, wasting and stunting.

Plate 6.1: impacts of drought on sunflower farming in Singida region

Flooding in areas such as Mbeya Town, Kilombero and Ulanga has destroyed farmland and caused topsoil erosion. Saltwater intrusion in coastal regions, including Zanzibar's Pemba Island (specifically the Wete, Chake Chake, and Micheweni districts) has rendered productive rice fields unusable, resulting in immediate crop losses and a long-term reduction in arable land.

Plate 6.2: Effects of heavy rain on maize cultivation in Mbeya region

These risks are not borne equally. Women, who are central to the agricultural workforce, are more severely affected. Findings from the Mainland Tanzania substantiate this, that households represented by women exhibit a markedly lower Adaptive Capacity Index (0.33 vs. 0.45 for male-led households), driven by lower access to credit and institutional support, which directly translates into higher vulnerability and risk.

ii) Future Projections

Hazards: Analysis of the climate change scenarios for Tanzania, as presented in Chapter Five, indicates that climate change is projected to intensify the hazards facing the country's agricultural sector. On the Mainland Tanzania, climate projections indicate a clear regional divergence: by mid-century (2041-2060), southern regions are expected to face a continued and intensified decrease in rainfall and longer dry spells, whereas northern regions around the Lake Victoria basin are projected to receive significantly more annual rainfall, thereby increasing flood risk. Scientific models (e.g., APSIM, DSSAT) forecast greater yield variability and declines for key crops, with some cultivars expected to experience reductions of up to 13% (Kahimba et al., 2012). Prolonged dry spells may potentially lead to devastating yield losses of 40–100% (Mdemu, 2021). For Zanzibar, the threat of rising sea levels and saltwater intrusion is projected to worsen, alongside rising sea surface temperatures that harm the vital seaweed farming industry (WWF, 2020).

Vulnerabilities: Existing vulnerabilities are expected to deepen as climate change progresses. The continued dependence on rain-fed agriculture will keep the sector highly exposed. Smallholder farmers will likely continue to face barriers, such as inadequate access to credit, improved seeds, and climate information, that prevent adopting resilient practices. The effectiveness of under-resourced extension services will remain a significant obstacle. In Zanzibar, the combination of rising sea levels and over-extraction of groundwater will heighten the vulnerability of coastal farmland to saltwater intrusion, jeopardising rice and other essential crops, particularly in the highly exposed districts of Pemba (WWF, 2020).

Risks: Looking ahead, the agriculture sector faces severe and wide-ranging risks that threaten national food security and rural livelihoods (Behr *et al.*, 2024). The projected declines in staple crop production could lead to chronic food shortages. The distinct regional risk profiles identified on the Mainland Tanzania, with Singida facing the highest risk from drought and Mbeya facing high risk from intense rainfall, highlight that these shortages could become acute and localised. In Zanzibar, the ongoing saltwater intrusion, already documented at over 150 sites, risks making rice cultivation unsustainable and increasing the islands' dependence on food imports. The cumulative impacts of soil degradation, pest outbreaks, and insufficient adaptation will place communities, especially women and Children, at a heightened risk of food insecurity, malnutrition, and economic hardship, potentially leading to developmental impairments and the collapse of traditional rural livelihoods in the most affected areas.

6.2.2 Livestock

The livestock sector is a vital pillar of Tanzania's economy and rural livelihoods, providing essential nutrition, income, and draught power for a large portion of the population. It contributes significantly to the agricultural GDP and serves as an important source of foreign exchange through the export of live animals, meat, and hides. Livestock production is predominantly practised in pastoral and agro-pastoral systems spread across the country's diverse agro-ecological zones, from the arid and semi-arid lowlands to the cooler highlands. Consequently, the sector's productivity and sustainability are highly influenced by climatic conditions and natural resources such as water and pasture availability. Given this strong dependence on climate and natural

ecosystems, a climate change vulnerability and risk assessment was conducted to evaluate Tanzania's livestock sector's vulnerability to climate change by examining its exposure, sensitivity, and adaptive capacity. It sought to identify the most at-risk areas and communities and to provide recommendations for strengthening resilience and ensuring sustainable livestock-based livelihoods.

iii) Current Status

Hazards: Pastoralist and agro-pastoralist communities across Tanzania are primarily threatened by climate-induced hazards. On the Mainland Tanzania, household surveys confirm that farmers frequently experience water shortages, extreme heat, and drought, significantly impacting animal health (World Bank, 2021) and feed availability. In Zanzibar, the key hazards are similar, with intensified heat stress, droughts, and saline intrusion degrading grazing land. Across both the Mainland Tanzania and Zanzibar, most farmers (over 87% on the Mainland Tanzania) perceive that climate events have increased the frequency of disease outbreaks, highlighting a widespread and critical concern. Climate-induced floods and the broader impacts of climate variability also pose significant threats to communities. In coastal regions, including Zanzibar, the combination of flooding and sea-level rise creates an additional hazard of saltwater intrusion, contaminating freshwater and grazing land.

Vulnerabilities: The primary vulnerability for these communities is their deep dependence on pasture and water resources (World Bank, 2021), which are already under stress. This is compounded by pre-existing issues, such as overgrazing and rangeland degradation, as exemplified by the Mvomero District, where pastureland shrank from 82% of the area in 1985 to just 5% in 2015. Household-level assessments reveal specific sub-sector vulnerabilities; on the Mainland Tanzania, key livestock (URT, 2025) subsectors like beef and dairy cattle exhibit a slight overall vulnerability, indicating that their adaptive capacities are insufficient to offset climate impacts. In Zanzibar, the vulnerability is more pronounced, with local chicken showing the highest vulnerability index (0.358) due to its high sensitivity to health impacts (World Bank, 2021) and low adaptive capacity. Further vulnerabilities include insecure land tenure, limited access to alternative feed and water, and insufficient veterinary support, all leaving livestock (URT, 2021) herds highly exposed to climate shocks.

Risks: These factors pose significant risks to the livestock sector (URT, 2021). Floods destroy grazing land (Plate 6.4), contaminate water sources, and force the displacement of herds. The resulting overcrowding, combined with warm, humid conditions, increases the risk of disease outbreaks, such as Foot-and-Mouth Disease. Quantitative analysis from the Mainland Tanzania confirms a moderate overall climate risk for all primary livestock subsectors (beef, dairy, poultry) (URT, 2021), driven by their high exposure and sensitivity to hazards. In Zanzibar, climate risks directly translate into reduced productivity, with heat stress leading to lower milk yields in dairy cattle and slower growth rates in poultry. Forced migration often leads to resource-based conflicts between pastoralists and farmers, particularly in regions such as Morogoro, Arusha, the Coast, and Mbeya. Cumulatively, these shocks risk eroding household assets, reducing milk and meat production, and potentially forcing families to abandon pastoralism.

For instance, the smallholder farmers who are practicing traditional poultry-rearing under a flooded environment are exposed to disease, predation, and feed shortages. When combined with limited access to veterinary services, inadequate housing, and unreliable feed supplies, these challenges heighten the vulnerability of livestock keepers. As a result, the health and productivity of poultry are compromised, directly endangering household food security, nutrition, and income.

Plate 6.3: Floods devastate grazing land and pollute water sources

iv) Future Projections

Hazards: Climate projections indicate that hazards are expected to intensify. The livestock sector (URT, 2021) is expected to face more frequent and intense floods and prolonged and severe droughts. Climate models project a widespread increase in mean annual temperature across the country, which is expected to exacerbate water and heat stress on livestock (URT, 2021). Projections also indicate a clear regional divergence in rainfall, with the southern and central regions expected to experience intensified rainfall decreases by mid-century. In contrast, the northern regions may see increased rainfall, potentially leading to higher drought and flood risks, depending on the location. This combination will accelerate pasture degradation and expand the areas affected by saltwater intrusion in coastal zones, including Zanzibar, thereby challenging the long-term viability of livestock-based livelihoods (URT, 2021).

Vulnerabilities: Without adaptive measures, current vulnerabilities are projected to deepen. Continued reliance on shrinking pastureland and weak land tenure systems will heighten exposure. The limited development of alternative feed sources and low adoption of key adaptive measures will further undermine the sector's resilience. For instance, household surveys on the Mainland Tanzania show that cattle keepers adopt low amounts of rainwater harvesting and heat-tolerant breeding. Similarly, the overall adaptive capacity in Zanzibar is low, with the adoption rate for practices like climate-smart breeding and improved water management below 25%. This is compounded by insufficient investment in veterinary infrastructure and the poor integration of climate information into livestock management (URT, 2021).

Risks: The convergence of intensified hazards and worsening vulnerabilities indicates considerable future risks. More extreme floods and droughts could lead to further loss of grazing land, declining livestock health (URT, 2021), and reduced productivity (World Bank, 2021). This is likely to fuel escalating conflicts over access to land and water. Over time, these persistent pressures risk the widespread erosion of household assets. They could lead to a large-scale abandonment of pastoralism, which would fundamentally threaten the livelihoods of millions who depend on livestock (URT, 2021) and alter the social fabric of these communities.

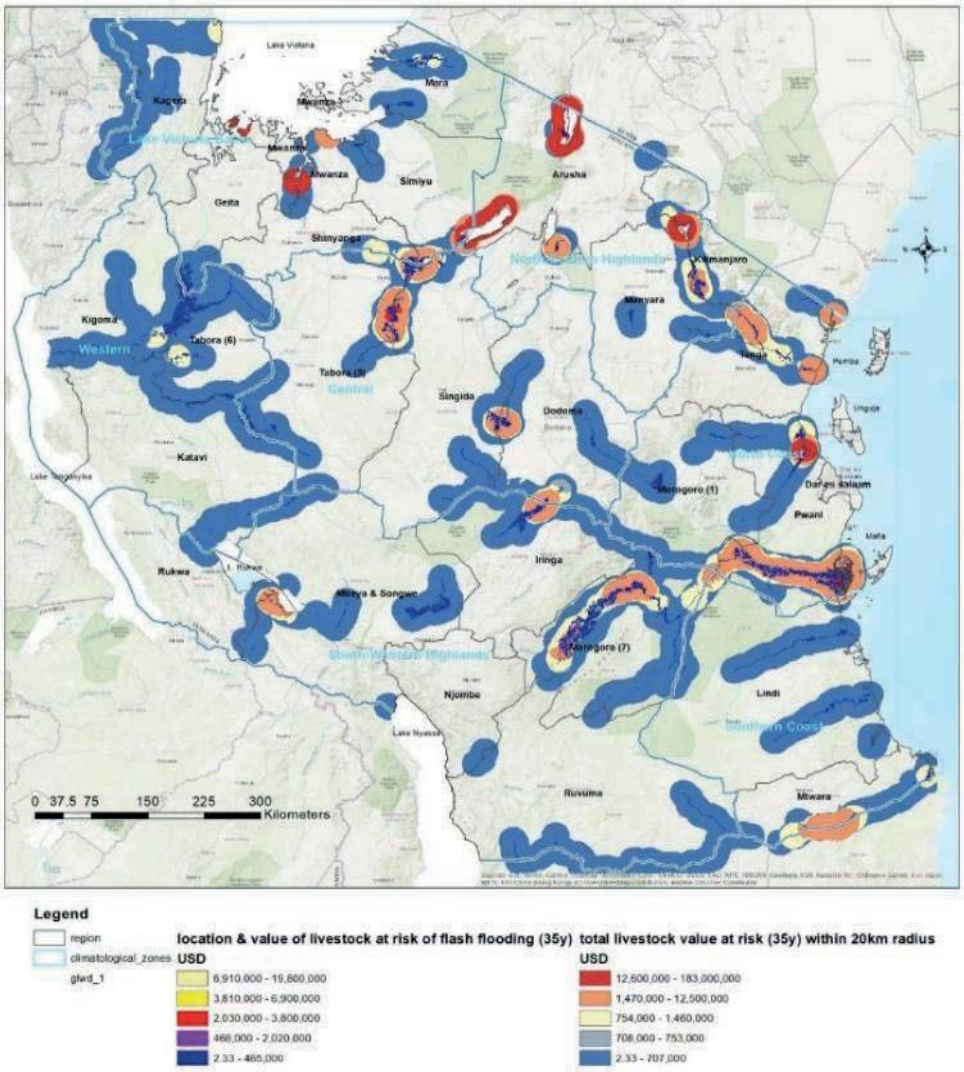

Figure 6.1: Projected impacts of flash floods on livestock in Tanzania (Source: URT 2024)

Figure 6.1 illustrates the projected loss of livestock in Tanzania resulting from flash flooding. It highlights areas most at risk, particularly within a 20 km buffer zone, which is expected to face more frequent and severe floods over the next 35 years. Within this zone, estimated livestock losses are mapped to identify locations where flooding impacts are likely to be greatest. This visualisation provides a detailed spatial overview of high-risk regions across Tanzania, offering valuable insights to guide targeted interventions and long-term strategies for flood resilience in livestock management.

6.2.3 Fisheries

Fisheries are a critical source of protein, employment, and government revenue for Tanzania, supporting the livelihoods of millions in coastal and lakeside communities. The sector draws on vast marine resources from the Indian Ocean and major freshwater bodies, including Lake Victoria, Lake Tanganyika, and Lake Nyasa. These aquatic ecosystems are fundamental to national food security and constitute a key pillar of the export economy, with Nile perch, tuna, and prawns among the most valuable commodities. However, the health and productivity of these fisheries are increasingly threatened by rising water temperatures, changing precipitation patterns, and habitat degradation driven by climate change. A Climate Change Vulnerability and Risk Assessment was conducted for the fisheries sector to address these emerging challenges. The assessment identified the most vulnerable aquatic ecosystems and fishing-dependent communities, evaluated their exposure and adaptive capacity, and provided a basis for developing targeted adaptation strategies to enhance resilience, safeguard livelihoods, and sustain the long-term productivity of Tanzania's fisheries.

v) Current Status

Hazards: Tanzania's fisheries are exposed to numerous climate-related hazards, a reality confirmed by community-level assessments. For inland freshwater fisheries (Lakes Victoria, Tanganyika, and Nyasa), the primary hazards identified by fishing communities are rising water temperatures, which alter breeding cycles, and changes in rainfall, leading to floods and droughts. For marine fisheries on both the Mainland Tanzania

and in Zanzibar, the key hazards perceived by fishers are rising sea surface temperatures and an increased frequency and intensity of extreme weather events, such as strong winds and storms. These are followed by threats from ocean acidification, which causes coral bleaching (WWF, 2020), shoreline erosion, and saltwater intrusion.

Vulnerabilities: The fisheries sector is highly vulnerable due to its composition of small-scale, artisanal fishers heavily dependent on stable ecosystems. This is compounded by poor infrastructure and a significant financial-institutional gap, as identified in community assessments on the Mainland Tanzania. Fishers report that limited access to financial resources and a lack of robust institutional support are critical barriers that constrain their adaptive capacity.

In Zanzibar, seaweed farming, a vital livelihood for coastal women (Plate 6.4), is particularly vulnerable to rising water temperatures that reduce yields. The overall adaptive capacity of fishing communities in Zanzibar is exceptionally low (mean ACI of 0.29), driven by severe financial constraints and weak institutional support, making them acutely sensitive to environmental shifts.

Plate 6.4: Women participating in seaweed farming in Pwani Mchagani, Unguja, Zanzibar

Risks: These factors translate into significant, quantifiable risks. Community risk assessments from both the Mainland Tanzania and Zanzibar identify increased sea/lake temperatures and extreme weather events as the highest-risk hazards. In inland fisheries, unpredictable weather reduces the number of safe fishing days and alters fish migration, resulting in decreased catches. In Zanzibar's marine sector, coral bleaching events (WWF, 2020) pose a significant risk to a sharp decline in fish populations, which in turn impacts 45% of fishing activities linked to reefs. Seaweed farming has already experienced production declines, which reduces a key source of income for women. Increased storms and erosion risk damage to infrastructure, threatening household livelihoods and the broader blue economy (Mohammed, 2019).

vi) Future Projections

Hazards: The hazards facing the fisheries sector are projected to intensify. These include continued ocean warming, which will disrupt the distribution and health (World Bank, 2021) of fish species, and worsening ocean acidification, which threatens to weaken the shells and skeletons of marine organisms. More frequent and intense storms will pose a direct threat to fishing operations and cause further damage to critical breeding habitats, such as coral reefs, mangroves, and seagrass beds, a concern strongly emphasised by fishing communities, who prioritise ecosystem restoration as a key adaptation strategy.

Evidence gathered during household field data collection further supports these perceptions. Communities highlighted rising sea and lake temperatures, alongside more frequent and intense extreme weather events (such as strong winds and storms), as the most significant hazards, reflected in their highest composite scores. These insights align with broader regional and global observations of shifting climate patterns and their direct, adverse impacts on fisheries-dependent livelihoods.

Plate 6.5: Community engagement during field data collection in a coastal village in Mtwara, Tanzania.

Vulnerabilities: Without proactive adaptation, the vulnerabilities of fishing-dependent communities will deepen. An ongoing reliance on a limited number of at-risk fish species and a lack of economic diversification will expose communities to greater shocks. Degraded habitats and weak enforcement of fishing regulations will hinder the recovery of fish populations. These challenges will be felt most acutely by women and small-scale fishers, who often have the fewest resources to adapt, a vulnerability confirmed by gender analysis in the community assessments.

Risks: The convergence of these future hazards and vulnerabilities poses severe risks. Reduced fish catches will likely worsen food and nutrition insecurity and deepen poverty. A potential collapse of key fish stocks could trigger widespread economic instability. Community-driven adaptation priorities highlight the urgent need for investment in resilient gear, reliable early warning systems, and restoring critical habitats to mitigate these risks. Ultimately, without effective management and support, these communities' social and economic fabric is at risk.

6.3 Natural Systems and Resources

6.3.1 Water

Water is an indispensable resource that underpins Tanzania's socioeconomic development, supporting agriculture, industry, domestic needs, and ecosystem balance. However, the country's water systems, rivers, lakes, wetlands, and aquifers are increasingly strained by rising demand and the impacts of climate variability. Shifts in rainfall patterns, prolonged droughts, and flooding episodes already affect water availability and quality, posing significant implications for food security, health, and sustainable growth. The climate change vulnerability and risk assessment was conducted to evaluate how future climatic conditions may affect Tanzania's water resources and to identify the most vulnerable areas and communities. Its findings provided evidence to guide sustainable water management, strengthen governance, and enhance resilience to anticipated climate-related risks. They served as a precursor to developing the National Adaptation Plan (NAP) document.

i) Current Status

Hazards: Tanzania's water resources (World Bank, 2021) are increasingly threatened by climate-related hazards, including rising temperatures and increasing variability in rainfall patterns. Rising temperatures intensify evapotranspiration, which can reduce stream flow even when rainfall increases, creating an "evapotranspiration trap." Community-level assessments across Mainland Tanzania confirm that the most significant perceived threats are the hydrological extremes of Floods and Droughts. These hazards pose a profound dual threat to water security, underscored by their high frequency and significant impact on local water sources and infrastructure. In Zanzibar, the primary hazards are sea-level rise and erratic rainfall, which threaten its fragile groundwater supply. Household surveys confirm that drought and saltwater intrusion are the most frequently experienced hazards, directly impacting both the availability and quality of fresh water. This is exacerbated by high temperatures, which increase evaporation and water demand.

Vulnerabilities: The nation's water sector is vulnerable due to population growth and rising demand for water across agriculture, energy, and industry. This has significantly stressed major river basins, such as the Rufiji, Pangani, and Wami-Ruvu. A critical vulnerability identified at the stakeholder level on the Mainland Tanzania is a significant "finance-technology gap." While there is a foundational level of human capacity and governance, the ability to adapt is severely constrained by inadequate funding and limited access to modern, climate-resilient technologies. This gap prevents the effective implementation of on-the-ground solutions. In Zanzibar, vulnerability is particularly high due to a heavy reliance on fragile freshwater lenses (thin groundwater layers) that are easily contaminated by saltwater intrusion. This is compounded by inadequate sanitation infrastructure, which increases the risk of water pollution and water-borne disease outbreaks, especially during floods. The most critical finding from the household assessment is a severely low adaptive capacity, with a deficit of over 80%. This is driven by a fundamental lack of financial resources, resilient infrastructure, and practical strategies to cope with climate shocks, making it the primary driver of the island's high vulnerability.

Risks: These conditions create significant risks. The Great Ruaha River now experiences periods with no flow, while the Pangani River Basin faces severe water shortages (Kashaigili *et al.*, 2007). The high exposure of water supply, quality, and sanitation systems to the dual threat of floods and droughts results in a high risk of infrastructure damage and contamination on the Mainland Tanzania. For Zanzibar, the risks are acute, as saltwater intrusion poses a significant threat to the entire freshwater supply. The combination of high hazard exposure and critically low adaptive capacity places districts like Kusini Unguja at the highest risk. Furthermore, flooding events increase the risk of waterborne disease outbreaks, such as cholera, due to the contamination of wells in areas with poor sanitation. This risk is amplified by the proximity of sanitation systems to groundwater sources.

ii) Future Projections

Hazards: The primary future hazard is the projected increase in the frequency and intensity of droughts. An overwhelming majority of households (85.2% in Zanzibar) perceive that the magnitude of climate hazards is increasing, confirming that this is not just a future projection but a present and worsening reality for communities. This will place extreme stress on the entire water system and the sectors that depend on it.

Vulnerabilities: The key future vulnerability lies within the tightly interconnected water-energy-food system. The heavy reliance of hydropower, irrigated agriculture, and domestic supply on the same diminishing water sources makes the entire system susceptible to shocks. The Rufiji River Basin, with its concentration of critical infrastructure, is a hotspot for this systemic vulnerability. This is compounded by the identified constraints in financial and technological capacity, which will inhibit the sector's ability to adapt to escalating climate pressures.

Risks: The convergence of future hazards and vulnerabilities creates a high risk of acute competition for diminishing water resources (World Bank, 2021). A severe hydrological drought could trigger cascading crises across the energy and food sectors, leading to systemic failures and widespread socio-economic disruption. Pangani River Basin faces severe water shortages, with projections indicating demand could exceed supply by over 50% by 2060 (Ndomba *et al*., 2018). In the Rufiji River Basin, stream flow is projected to decline by 13% by the end of the century (Siderius et al., n.d.). Without addressing the critical gaps in adaptive capacity at the community level, these systemic risks will be significantly magnified, leading to more severe local impacts on livelihoods and public health (World Bank, 2021). Water shortages often have gendered and age-differentiated effects, as girls and women are primarily responsible for water collection. With increased water shortages, they have to travel longer routes to fetch water, limiting their ability to participate in education and exposing them to higher risks of violence along the way.

6.3.2 Coastal and Marine

Tanzania's coastal and marine sector is a key driver of the national economy, encompassing vital assets such as the port of Dar es Salaam, a vibrant tourism industry centred on pristine beaches and coral reefs, and productive fisheries that provide food and employment for millions. The coastal zone, which supports a rapidly growing population and critical infrastructure, faces increasing threats from sea-level rise, coastal erosion, saltwater intrusion, and extreme weather events. Recognising these anticipated climate-related pressures, the climate change vulnerability and risk assessment was undertaken to evaluate the extent of these risks, identify the most vulnerable areas and communities, and assess the capacity for adaptation and sustainable management. The assessment's findings are crucial for guiding interventions that protect coastal livelihoods, preserve ecosystems, and strengthen resilience as part of Tanzania's broader climate adaptation and planning efforts.

i) Current Status

Hazards: Tanzania's extensive coastline is currently exposed to several climate-related hazards. Community-level assessments across both the Mainland Tanzania and Zanzibar confirm that increased coastal erosion (WWF, 2020), sea-level rise and coastal inundation, and increased air temperature and marine heatwaves are perceived as the most significant and highest-risk climate hazards. A significant hazard to marine ecosystems is the warming of waters, which leads to coral bleaching (WWF, 2020) and alters fish habitats, a phenomenon directly observed and understood by coastal communities. These environmental threats are particularly acute in low-lying coastal areas.

Vulnerabilities: The primary vulnerability of the coastal zone is its low-lying geography, with nearly 8% of Dar es Salaam's area situated in this high-risk zone (Kebede et al., 2012). This is severely compounded by rapid, unplanned urbanisation in hazard-prone areas. Ecologically, both inland and marine fisheries are vulnerable to environmental pressures, as evidenced by the declining fish stocks in Lake Victoria and coastal areas such as Bagamoyo. In Zanzibar, coral reefs are acutely vulnerable to rising sea temperatures, which have already caused mass bleaching events. Household surveys also identify seagrass beds as the most sensitive ecosystem.

Significant social vulnerabilities exacerbate these environmental issues. While communities possess substantial social capital and a culture of collective action, household surveys reveal their capacity to adapt is severely constrained by a finance-institutional gap. This is characterised by limited access to income opportunities, a lack of financial tools for adaptation, and a perception of weak institutional support. This gap is a critical barrier preventing communities from translating local knowledge into effective resilience measures. This is compounded by insecure land tenure (with 80% of households lacking title deeds), low education levels, and limited access to credit. In Zanzibar, the overwhelming dependence on climate-sensitive livelihoods, such as fishing and farming (which account for over 73% of households), creates an acute nexus between livelihood vulnerability and climate shocks, where any disruption to the marine ecosystem immediately translates into reduced income and food insecurity.

Risks: These vulnerabilities pose significant risks to both infrastructure and livelihoods, with community assessments ranking coastal erosion (WWF, 2020) as the highest-risk hazard. Critical infrastructure, such as ports, roads, and homes in low-lying areas, is increasingly threatened by coastal flooding and erosion. A 100-year flood event in Dar es Salaam, which once exposed 30,000 people, could affect over 210,000 people and US$10 billion in assets by 2070 under a high sea-level rise scenario (Kebede et al., 2012). For fisheries, the decline in fish stocks has led to sharp increases in local fish prices, undermining food security (World Bank, 2021). In Bagamoyo, catches per fisherman have dropped by over 70% in the past decade. In Zanzibar, coral bleaching (WWF, 2020) and beach erosion pose a systemic threat to its Blue Economy, undermining the vital tourism (URT, 2021) and fishing sectors, which support up to 70% of the artisanal fishing community and the broader coastal economy. A crucial finding from the community assessments is the interconnected nature of these top-ranked risks: the degradation of natural sea defences, such as coral reefs and mangroves, driven by marine heat waves, removes the first line of defence against wave action, leaving the coastline more exposed and amplifying the impacts of sea-level rise and storm surges.

ii) Future Projections

Hazards: In the future, coastal hazards are expected to intensify significantly. Sea-level rise is projected to accelerate, leading to more frequent and severe coastal flooding. Coastal erosion is expected to intensify, and marine heatwaves will likely become more frequent. This will also increase the threat of saltwater intrusion into freshwater sources. Additionally, the potential for stronger tropical storms and hurricanes will raise the likelihood of devastating storm surges.

Vulnerabilities: Without enhanced coastal management, the vulnerability of settlements and infrastructure will increase. This is exacerbated by the continued decline of protective ecosystems, such as mangroves and coral reefs, which serve as natural buffers. The "finance-institutional gap" identified at the community level will become a more critical barrier to adaptation as the scale of climate challenges grows. Rapid population growth in coastal zones and continued investment in high-risk properties will expose more people and assets to these hazards, complicating evacuation and relocation efforts and limiting adaptive options for communities dependent on coastal resources.

Risks: If not addressed, the convergence of these future hazards and vulnerabilities will lead to severe and far-reaching risks. This includes the permanent loss of land and infrastructure, which could render some coastal regions uninhabitable and cause large-scale displacement of communities (climate migration). The loss of biodiversity, especially in critical habitats, would have long-term adverse effects on food security (World Bank, 2021) and ecosystem services. Ultimately, the most vulnerable populations, including low-income groups and households constrained by a lack of financial capital and institutional support, will face the most significant risks and bear a disproportionate share of the burden as climate impacts intensify.

Figure 6.2 highlights the regions in Tanzania where freshwater and marine environments are most susceptible to climate-related hazards. Areas marked in red represent the zones at highest risk, primarily along the coast and near major inland water bodies. This increased vulnerability is strongly linked to anticipated temperature rises, threatening coastal and inland ecosystems. In coastal areas, rising temperatures are expected to worsen shoreline erosion and saltwater intrusion, which can disrupt natural habitats and impact the livelihoods of local communities that rely on these environments.

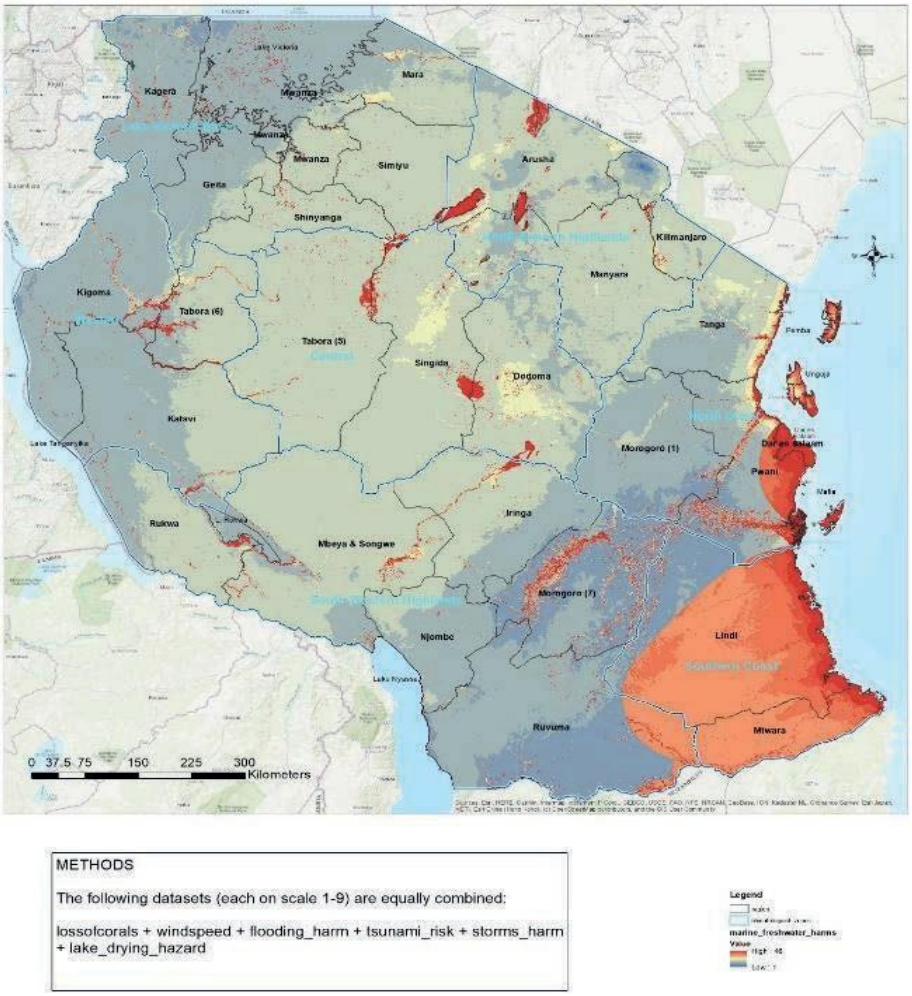

Figure 6.2: Impacts of Climate Change on Tanzania's Coastal and Marine Environment

Additionally, Plate 6.6 highlights the severe extent of coastal erosion in Zanzibar, a challenge that has intensified under the influence of rising sea levels. This phenomenon has become a pressing and escalating environmental issue, with profound consequences for natural ecosystems and human societies. The steady increase in sea levels, driven mainly by global warming, has led to the gradual yet relentless loss of coastal land. As a result, vital infrastructure, human settlements, and the tourism sector face growing threats, while marine ecosystems and the livelihoods of local communities are being increasingly disrupted. Coastal populations remain highly vulnerable, enduring continuous risks to their homes, agricultural practices, and primary sources of income as the sea steadily encroaches upon their land. While the left image depicts natural erosion accompanied by community-led efforts to stabilise the shoreline through vegetation, the right image illustrates an engineered intervention—a sea wall constructed to protect coastal infrastructure from further erosion.

Plate 6.6: The impact of sea-level rise on coastal erosion in Michamvi and Nungwi, Zanzibar

6.3.3 Wildlife

Tanzania's wildlife resources are of global significance, boasting a network of renowned national parks, game reserves, and conservation areas that form the backbone of its tourism industry. This rich biodiversity, including iconic species such as elephants, lions, and rhinos, is a significant source of foreign revenue and a key contributor to the national economy. The conservation of these natural habitats and the species they support is acutely sensitive to climate variability, which affects water availability, forage quality, and ecosystem balance. Understanding how these climatic shifts affect ecosystems and wildlife populations was central to conducting the climate change vulnerability and risk assessment. The assessment provided critical insights into areas and species most at risk, highlighting the need for adaptive conservation measures and climate-informed management practices to ensure the long-term sustainability of Tanzania's wildlife heritage.

i) Current Status

Hazards: Tanzania's ecosystems are currently threatened by direct climate impacts, primarily changes in temperature and rainfall patterns. Community-level assessments from Mainland Tanzania confirm that drought, human-wildlife (IPCC, 2022) conflicts (HWC), and wildfire are perceived by local communities as the most significant and highest-risk climate hazards. The risk from these hazards is a function of their frequent and severe occurrence, the high exposure of habitats, and significant underlying vulnerabilities. In Zanzibar, community surveys similarly rank drought, HWC, water scarcity, and rapid sea-level rise as the most significant hazards, with the latter posing a specific and acute threat to coastal ecosystems, such as mangroves. These climate hazards are compounded by indirect, human-driven pressures such as land-use change and agricultural expansion. A critical finding from both assessments is the reframing of HWC not merely as a conservation issue but as a critical, climate-induced hazard, amplified by resource scarcity.

Vulnerabilities: The nation's key ecosystems are highly vulnerable. The Eastern Arc Mountains, a global biodiversity hotspot, are particularly vulnerable to shifting temperature and moisture regimes. Similarly, the vast Miombo woodlands are vulnerable to contraction due to climate shifts. In Zanzibar, mangrove forests are vulnerable to being overwhelmed by sea-level rise. In contrast, terrestrial forests, such as those in Jozani, are exposed to changing rainfall patterns with limited potential for species migration.

These vulnerabilities are deepened by low adaptive capacity at the community level. On the Mainland Tanzania, a notable education-finance gap exists, where communities possess foundational knowledge about climate risks but lack the financial resources to implement practical solutions. In Zanzibar, a paradox exists regarding capacity building. At the same time, training is the most common intervention. However, it is often perceived as highly ineffective because it lacks the necessary financial and technological support to translate knowledge into action. The sensitivity of wildlife (IPCC, 2022) varies by type:

(i) Terrestrial Wildlife: Perceived as highly sensitive to drought and the resultant increase in HWC as animals seek scarce resources in human-dominated landscapes.

(ii) Aquatic Species: Acutely vulnerable to both drought and flooding events that degrade their habitats.

(iii) Avian Populations: Notably susceptible to strong winds and altered rainfall patterns that disrupt breeding and foraging.

Risks: These vulnerabilities create significant ecological and socio-economic risks. The potential loss of nearly half the forest cover in the Eastern Arc Mountains by 2085 threatens thousands of endemic species with extinction (Hall et al., 2009). It jeopardises the nation's water security, as these mountains supply water for over 60% of the urban population and 90% of its hydropower. The economic value of these services is estimated at US$8.2 billion over 20 years; however, an imbalance exists where local communities bear the conservation costs while global communities reap the benefits, creating an incentive for unsustainable land conversion. In Zanzibar, the degradation of mangroves increases coastal vulnerability to erosion and storm surges while harming fisheries and local livelihoods. The community assessments quantify these risks, identifying drought as the highest-risk hazard on the Mainland Tanzania (Risk Score: 0.79) and a top-tier threat in Zanzibar, driven by its high perceived frequency, severe impact, and the ecosystem's sensitivity to water scarcity.

ii) Future Projections

Hazards: Climate projections indicate an intensification of hazards, including increased drought frequency and duration, as well as more frequent and intense wildfires, with rising temperatures. This aligns with community perceptions, where hazards like drought are already experienced as chronic, pervasive stressors that continually degrade the resource base. Concurrently, increasing rainfall variability, characterised by longer dry spells and short, intense rainstorms, will create conditions ripe for both water scarcity and fire risk.

Vulnerabilities: Wildlife populations are particularly vulnerable to these future hazards due to the widespread fragmentation and degradation of wildlife corridors (IPCC, 2022). These corridors, which are essential for migration and genetic exchange, have already shrunk dramatically (e.g., the Kitenden pathway by 70%) due to climate stress and human activity. This leaves species with limited mobility or narrow habitat needs, such as water-dependent grazers, increasingly isolated as water and forage become scarce. Community reports confirm this is already happening, with resource scarcity forcing wildlife (IPCC, 2022) to venture beyond traditional habitats and into human-dominated landscapes.

Risks: The combination of these future hazards and vulnerabilities poses escalating risks. Heightened resource scarcity is likely to drive animals into human-dominated areas, thereby increasing the frequency of human-wildlife conflicts (IPCC, 2022). The community-level data strongly support this projection, identifying HWC as the second-highest climate risk on the Mainland Tanzania (Risk Score: 0.77) and a top-tier risk in Zanzibar today, driven directly by climate-induced resource scarcity. The growing isolation of wildlife (IPCC, 2022) populations elevates the risk of local extinctions, especially for specialist species. This decline in biodiversity directly threatens ecotourism revenues (URT, 2021), erodes cultural values, and undermines the essential ecosystem services that local communities rely on.

6.4 Economic and Social Infrastructure

6.4.1 Infrastructure and Human Settlements

Infrastructure and human settlements are the bedrock of Tanzania's development, enabling economic activity, providing essential services, and housing the majority of the population. Key assets such as transportation networks, energy grids, water supply systems, and urban centres are increasingly exposed to climate hazards, including flooding, extreme heat, and landslides. Understanding the extent to which these climate hazards threaten critical infrastructure and settlements was a key motivation for conducting the climate change vulnerability and risk assessment. The assessment provided crucial insights into exposure levels, adaptive capacity, and potential impacts, informing climate-resilient planning and guiding investment decisions that align with Tanzania's sustainable development goals. Building resilience within this sector remains vital to safeguarding economic progress, protecting vulnerable communities, and ensuring long-term national stability and security.

i) Current Status

Hazards: Tanzania's infrastructure and human settlements are presently exposed to a range of climate-related hazards, with significant geographical variation in their type and intensity. These include increasingly erratic rainfall patterns, which lead to more frequent and severe droughts as well as intense flooding. For instance, household surveys reveal that communities in Bahi and Ifakara perceive floods and droughts as highly significant due to their experiences with flash floods and river overflows. In urban areas like Nyamagana (Mwanza), lakeside flooding is the most pressing hazard, while coastal centres such as Tanga Town identify extreme heat and strong winds as dominant concerns.

Coastal areas, especially regions like Zanzibar, are threatened by sea-level rise (Plate 6.7), coastal erosion (WWF, 2020), and saltwater intrusion. In Mjini Magharibi, for example, the dense population and critical infrastructure, such as Malindi Port, are severely exposed to flooding, a risk exacerbated by drainage and sewerage deficiencies. Inland, heavy rainfall causes riverine and flash floods that disrupt critical systems. Furthermore, extreme weather events such as strong winds and storms pose a direct threat to the stability of the built environment across the country, impacting ports, fisheries, and heritage sites like Stone Town.

Plate 6.7: Impacts of sea level rise on human settlements in Tumbatu island in the Zanzibar Archipelago

Vulnerability: The nation's vulnerability is amplified by several social, economic, and environmental factors. Rapid, unplanned urbanization has resulted in the growth of informal settlements, many of which are built without adequate drainage, sanitation, or resilient construction standards. Socio-economic profiles from districts like Bahi show that large household sizes (average of 5.8 people) and a heavy reliance on climate-sensitive agriculture heighten sensitivity to shocks. In contrast, the occupational diversity in Nyamagana and Tanga Town, with more employment in government and private sectors, reduces direct climate sensitivity.

Key infrastructure, including roads, bridges, and utility networks for water and electricity, is often located in low-lying, flood-prone areas. In Zanzibar, for example, nearly half of the residents live more than two kilometres from a tarmacked road. In regions like North Unguja, 78% of roads are earthen, which amplifies the risks of accidents and high maintenance costs—a lack of building codes and limited enforcement of the Urban Planning Act. CAP 355 and inadequate land-use planning worsen this situation. In coastal zones, the absence of robust coastal management strategies leaves settlements and infrastructure highly susceptible to erosion and saltwater intrusion, with key ports in South Pemba (Kusini Pemba) (Wete and Mkoani) located in flood-prone areas.

Risks: The combination of these hazards and vulnerabilities creates significant risks, with household and community infrastructure consistently emerging as the most at-risk category. Flooding and coastal erosion (WWF, 2020) regularly damage essential structures, such as homes, schools, centres (World Bank, 2021), and roads (World Bank, 2021), leading to expensive repairs and disrupting access to vital services. In Bahi, for instance, communities and households face a flood risk index of 0.786, while roads and drainage systems are also highly vulnerable (0.655 and 0.603, respectively). This indicates a high probability of community isolation and delayed emergency response during flood events.

In urban centres, inadequate drainage systems result in waterlogging, which contributes to the spread of waterborne diseases; in Mjini Magharibi, 61% of residents report frequent sewerage leaks and blockages. The integrity of freshwater supplies is compromised by saltwater intrusion. Damage from storms and floods can isolate entire communities, hinder economic activity, and disproportionately affect residents of informal settlements, who face a heightened risk of property loss and displacement.

ii) Future Projections

Hazards: Climate models projecting through mid-century and beyond indicate an escalation of climate hazards. Under emissions scenarios like RCP 6.0, sea levels (WWF, 2020) are anticipated to rise by approximately 11 cm by 2030, 21 cm by 2050, and up to 41 cm by 2080. This trend will substantially increase the threat of coastal inundation and shoreline erosion, particularly for critical infrastructure like Malindi Port and the Stone Town heritage zone in Zanzibar, which are already at significant risk. Simultaneously, Tanzania is expected to face more frequent and intense heavy rainfall events, particularly along the coast, which will heighten flood hazards in urban centres and along transportation corridors.

Vulnerability: Projected climate changes will magnify existing vulnerabilities. A significant portion of Tanzania's infrastructure was constructed based on outdated climate standards, making it increasingly prone to failure under more volatile weather conditions. This will lead to more frequent service breakdowns and higher maintenance costs. In cities like Dar es Salaam, where many residents live in unplanned, flood-prone informal settlements, factors such as poor sanitation, blocked drainage, and substandard housing severely undermine resilience. This mirrors findings from Nyamagana, where informal urban settlements face high exposure due to poor-quality housing in flood-prone areas. The ongoing pressures of rapid urbanisation, high-density growth, and weak enforcement of planning regulations further diminish the capacity of these communities to withstand and recover from climate shocks.

Risks: These amplified vulnerabilities are expected to fuel escalating systemic risks. The economic cost of flooding and extreme weather is projected to increase substantially, leading to supply chain disruptions, trade delays, and substantial economic losses. Damage to critical lifeline systems, such as roads, rail, energy, and water infrastructure, could trigger cascading failures across industries and urban services. For example, coastal erosion (WWF, 2020) and sea-level rise threaten not only transportation and utilities but also vital sectors such as tourism (URT, 2021), cultural heritage sites, and the socio-economic stability of coastal communities, as illustrated by the vulnerability of Zanzibar's ports. The energy sector, particularly hydropower and the national grid, faces potential instability from both prolonged drought (IPCC, 2022) and intense flooding, which could lead to outages and weaken the delivery of services essential for all settlements and economic activities.

6.4.2 Health

Public health in Tanzania is deeply interconnected with environmental and climatic conditions, which influence the prevalence and distribution of infectious diseases, nutritional status, and the capacity of healthcare delivery systems. Climate-sensitive health risks include the spread of vector-borne diseases like malaria and dengue, water-borne diseases such as cholera, and health impacts from heat stress and food insecurity. In addition, climate change is likely to increase the prevalence of respiratory illnesses in urban areas, especially in informal settlements with poor air quality and inadequate shelter. Mental health impacts, including anxiety and depression linked to climate shocks and livelihood losses, are also expected to rise.

The resilience of the health sector is therefore critical to protecting human capital and maintaining national productivity in the face of a changing climate. Variations in climatic conditions such as temperature, rainfall, and extreme weather events increasingly affect disease transmission, nutrition, and healthcare delivery in Tanzania. To better understand these impacts, the climate change vulnerability and risk assessment identified regions and populations most at risk and evaluated the health system's capacity to manage climate-related challenges. The findings inform strategies to strengthen public health resilience and guide national adaptation and planning efforts.

i) Current Status

Hazards: Climate change is currently acting as a threat multiplier for public health in Tanzania (World Bank, 2021). The primary hazards include a warming climate, which intensifies existing health challenges (World Bank, 2021), and climate shocks such as floods and droughts. These events have a direct impact on disease patterns and essential services. Evidence from community surveys confirms that floods and drought are the most widely recognized climate hazards across the country. On the Mainland Tanzania, 68.6% and 65.0% of households identified floods and drought, respectively, as their primary concerns. In Zanzibar, communities perceive sea-level rise and drought as the most frequent hazards, directly threatening coastal livelihoods and freshwater supplies.

Vulnerability: The country's key vulnerabilities lie in its public health (World Bank, 2021), infrastructure and specific population demographics.

(a) Disease Vectors*:* The warming climate is expanding the geographic range of disease vectors, making highland areas, which were previously unaffected, newly susceptible to malaria and other vector-borne diseases. Household surveys from the Mainland Tanzania provide clear evidence of this link; in flood-prone districts like Bagamoyo and Bariadi, 73.9% and 95.7% of households, respectively, reported an

increase in vector-borne diseases like malaria and dengue following flood events.

(b) Water and Sanitation: Tanzania's water and sanitation infrastructure is highly susceptible to climate shocks. Both floods and droughts compromise the supply of safe water, a vulnerability that is especially pronounced in densely populated informal settlements where infrastructure is already inadequate. In the coastal district of Bagamoyo, recurrent flooding leads to widespread contamination of water sources, with 44.6% of households reporting waterborne illnesses after such events. Similarly, in the semi-arid Kongwa district, prolonged drought (IPCC, 2022) compromises hygiene and sanitation, increasing the risk of diseases like diarrhoea and typhoid. In Zanzibar, a majority of residents (56.5%) believe that waterborne diseases are impacted "to a large extent" or "to a considerable extent" by climate hazards.

(c) Population: Vulnerable populations in these settlements face elevated health risks (World Bank, 2021) due to their limited capacity to respond to climate-related hazards. Furthermore, populations in newly affected regions are immunologically naive to emerging disease threats. Socioeconomic factors shape the vulnerability; for instance, in Mainland Tanzania regions like Kongwa and Bariadi, over 80% of households depend on farming, making them highly sensitive to drought-induced food and income loss. In Zanzibar, districts such as Wete, which heavily rely on fishing, are highly vulnerable to coastal hazards. The RVA for Zanzibar also highlighted that a higher percentage of females (33.3%) reported suffering from chronic diseases compared to males (9.7%), indicating that women often bear a disproportionate health burden (World Bank URT, 2021).

Risks: These hazards and vulnerabilities pose substantial health threats (World Bank, 2021).

(a) Disease Outbreaks: Rising temperatures and changing rainfall patterns are increasing the incidence and geographic spread of malaria and dengue fever. Floods frequently contaminate water sources, leading to outbreaks of cholera and other diarrheal diseases. For instance, in Dar es Salaam, an additional week of heavy rainfall can increase weekly cholera cases by over 20%, with the impact being most severe in flood-prone wards. This is corroborated by community data from Bariadi, the highest-risk district on the Mainland Tanzania, where 86.1% of households reported waterborne diseases following floods.

(b) Food Insecurity: Drought-induced crop failures worsen food insecurity and malnutrition, particularly for children. In the semi-arid Kongwa district, households reported a direct link between drought and child malnutrition, scoring the impact at 4.23 out of 5. Global projections suggest climate change could cause an estimated 95,000 additional deaths annually from childhood under nutrition between 2030 and 2050.

(c) Economic Burden: The economic impact is substantial. As noted in the Zanzibar RVA, drought directly affects household income from farming, which in turn impacts the ability to afford health care (World Bank, 2021). Climate change-attributable cholera alone is projected to cost Tanzania 0.68% to 1.40% of its GDP by 2030 under a 2°C warming scenario, highlighting the need for investment in climate-resilient health and WASH systems (World Bank, 2021 and Hutton et al., 2011).

ii) Future Projections

Hazards: Climate change is projected to introduce a range of escalating hazards that directly threaten public health (World Bank, 2021). Climate projections for Tanzania indicate a significant increase in Consecutive Dry Days (CDD) in the southern and eastern coastal zones, signalling more prolonged droughts (IPCC, 2022). At the same time, the northern and central regions are projected to experience more intense rainfall, thereby increasing flood risk. The Warm Spell Duration Index (WSDI) indicates a widespread and significant increase in the number of hot days nationwide, resulting in more frequent and intense heat waves. Together, these hazards will create more opportunities for the spread of infectious diseases.

Vulnerability: The ability of communities to cope with future health threats (World Bank, 2021) is tied to several socioeconomic factors.

(a) Health Systems: If health (World Bank, 2021) systems and infrastructure are not improved and made more resilient, many areas will struggle to manage a rising number of health (World Bank, 2021) crises. The RVA reports identified significant gaps in institutional preparedness. In Zanzibar, a large number of respondents disagreed that local health authorities have adequate emergency response plans (World Bank, 2021). On the Mainland Tanzania, access to health care facilities (World Bank, 2021) was reported to be severely hindered during floods in Bagamoyo (score of 3.45 out of 5) and during landslides in Bariadi (score of 3.59 out of 5).

(b) Urbanization and Poverty: Rapid urbanization, particularly the growth of informal settlements, can lead to crowded living conditions and inadequate sanitation, increasing the risk of rapid epidemic spread. Persistent poverty exacerbates this vulnerability, as low-income families often have limited access to

essential services, including healthcare, clean water, and nutrition (World Bank, 2021). Urban populations are additionally vulnerable to heat stress and heat-related illnesses due to high population density, poor housing, and limited access to cooling infrastructure. The RVA for Mainland Tanzania identified Bariadi as the district with the highest overall risk, characterized by high hazard exposure, high sensitivity, and large household sizes (42.8% of households have 10 or more members), which strains resources.

(c) Food Systems: Worsening food insecurity and malnutrition from climate-related agricultural disruptions can weaken immune systems, making people more susceptible to illness. The RVAs revealed that communities have limited adaptive capacity in this area; for instance, adaptive food practices during droughts scored a very low 1.61 out of 5, indicating a high risk of future food insecurity.

Risks: Without proper adaptation measures, the health risks and impacts (World Bank, 2021) are projected to become more severe and long-lasting.

(a) Disease Burden: Communities may face a higher overall burden of disease, with more frequent and widespread outbreaks. Children and the elderly are likely to see increased rates of illness and mortality. The RVA reports identified specific high-risk zones, such as Bariadi District on the Mainland Tanzania (Risk Index: 0.470) and Wete District in Zanzibar (Risk Score: 1.0), which are projected to face the most severe impacts due to a combination of high hazard exposure and low adaptive capacity.

(b) Healthcare Strain: Healthcare services, already strained, could become overwhelmed by the demand for treatment during emergencies, reducing their capacity to provide care. The very low adaptive capacity scores for health systems in districts such as Bagamoyo (World Bank, 2021) suggest that future, more intense climate events will place an unsustainable burden on local clinics and hospitals.

(c) Economic and Social Impacts: Workforce productivity may suffer as people miss work due to illness. Chronic health problems (World Bank, 2021) and climate-driven disease outbreaks can trap families and communities into cycles of poverty, making it harder for them to recover and adapt to ongoing changes. This is particularly true for communities highly dependent on climate-sensitive sectors, such as agriculture and fishing, where a single extreme weather event can wipe out a family's entire livelihood.

6.4.3 Tourism

Tourism is a leading economic sector in Tanzania, serving as a major source of foreign exchange earnings and employment. The industry thrives on the country's exceptional natural attractions, including the Serengeti, Mount Kilimanjaro, and the Zanzibar Archipelago, which draw millions of visitors each year. The sustainability of this vital sector is intrinsically linked to the health and stability of these climate-sensitive ecosystems, making adaptation critical to preserving the nation's premier economic assets and the livelihoods they sustain. It was therefore essential to conduct climate change vulnerability and risk assessment to evaluate how climate variability and extreme events could affect tourism infrastructure, natural attractions, and visitor patterns. The evaluation provided a foundation for identifying risks and prioritising adaptation measures, serving as an essential input to the development of Tanzania's National Adaptation Plan (NAP) by ensuring that tourism resilience is embedded within national climate policy and long-term economic planning.

i) Current Status

Hazards: Tanzania's tourism sector is currently facing several direct climate-related threats, substantiated by the lived experiences of its communities (URT, 2021). On the Mainland Tanzania, community-level surveys confirm that the most significant and highest-risk hazards are drought, flood, human-wildlife conflicts, and extreme temperatures. These are not abstract threats, but are perceived as frequent and severe, directly impacting local ecosystems and tourism operations (URT, 2021). This is compounded by disrupted rainfall patterns that alter wildlife migration cycles in the Serengeti (IPCC, 2022). In the northern region, the retreat of glaciers and snow on Mount Kilimanjaro poses a significant threat to one of the nation's most iconic landmarks. Along the coast and in Zanzibar, communities perceive hazards like extreme heat, strong winds, and water scarcity as high-frequency, chronic stressors that occur almost annually. These are coupled with the more visible impacts of beach erosion, coral bleaching (WWF, 2020), and sea-level rise, which are actively degrading the marine and coastal environments essential to tourism (URT, 2021).

Plate 6.8: Flooding disrupts tourist activities in Ruaha National Park (2023-2024 rainy season)

Vulnerability: The sector's vulnerability is heightened by its heavy reliance on climate-sensitive natural assets. This is compounded by the high concentration of tourism (URT, 2021). Many hotels, resorts, and access roads are situated near shorelines, making them highly susceptible to flooding and erosion. This physical vulnerability is amplified by a critical socio-economic factor identified on the Mainland Tanzania: an "education-finance gap." While communities possess knowledge and awareness of climate risks (human capital), their capacity to adapt is severely constrained by limited access to credit and financial resources.

In Zanzibar, this is further complicated by a "dual vulnerability," where a single climate event can cripple a household's two primary income streams simultaneously. Many households rely on both tourism (URT, 2021) and traditional, climate-sensitive livelihoods, such as fishing or farming, for their income. A storm that prevents fishing and also damages a hotel creates a severe double economic shock. The vulnerability of accommodation infrastructure is particularly acute; tourist facilities in Zanzibar can consume up to 20 times more water per capita than local residents, drastically amplifying water stress and creating potential for social conflict during droughts. Furthermore, the country's established "bush and beach" tourism (URT, 2021) model creates a structural vulnerability, as it limits the ability to diversify attractions in response to environmental degradation.

Risks: The convergence of these hazards and vulnerabilities creates immediate and quantifiable risks. On the Mainland Tanzania, the primary risks identified by communities include water shortages at lodges, degraded landscapes that reduce wildlife sightings (IPCC, 2022), and direct physical damage to infrastructure, such as roads and lodges, from wildfires and floods. In the Serengeti, disruptions to wildlife (IPCC, 2022) migrations risk diminishing the area's global appeal. The loss of glaciers on Mount Kilimanjaro could lead to reduced visitor numbers.

On the coast, the risks are systemic. The Zanzibar assessment identifies three high-priority risks:

(a) Chronic Coastal Degradation: Driven by relentless sea-level rise and strong winds, leading to progressive erosion that undermines the foundational tourism (URT, 2021) product.

(b) Acute Water & Energy Crises: Driven by frequent droughts and heat waves acting on the high water and energy demands of hotels, risking operational shutdowns and reputational damage.

(c) Catastrophic Disruption from Extreme Weather: The failure of a single piece of critical infrastructure, like a coastal access road washing out, can trigger a cascading failure, isolate entire tourism zones (URT, 2021), and cause widespread economic losses across the entire value chain.

ii) Future Projection

Hazards: Climate projections indicate an intensification of the hazards already being experienced. The frequency and severity of droughts are expected to increase, further disrupting the rainfall patterns that sustain the Serengeti ecosystem. Continued sea-level rise threatens to cause more extensive coastal flooding and permanent beach loss in Zanzibar. Concurrently, rising sea temperatures are projected to exacerbate coral bleaching events (WWF, 2020), resulting in more severe degradation of marine habitats. There is also an increased likelihood of more extreme weather events, which could damage both natural attractions and tourism infrastructure (URT, 2021).

Vulnerability: In the future, the sector's vulnerability will be amplified if current weaknesses are not addressed. The continued dependence on sensitive natural assets without significant diversification will leave the industry increasingly exposed. This is exacerbated by the "implementation gap" identified in Zanzibar, where climate adaptation policies and plans exist at a strategic level but often fail to translate into tangible, on-the-ground action due to a lack of dedicated financing. The underlying socio-economic vulnerabilities, particularly the lack of financial capacity within communities, will heighten the sector's sensitivity to future climate shocks. Expanding tourism development (URT, 2021) into vulnerable coastal or ecological areas without proper planning will also exacerbate these future vulnerabilities.

Risks: If projected hazards and vulnerabilities are not managed, Tanzania faces the risk of substantial and potentially irreversible damage to its tourism sector (URT, 2021). This includes significant financial losses, with estimates projecting a loss of up to US$40 million in domestic tourism revenue by 2030 (URT, 2021). The future risks go beyond simple financial accounting; they involve the potential for cascading system failures, where the loss of a key attraction or critical infrastructure failure could erode Tanzania's international tourism competitiveness (URT, 2021). This would also create a high risk of widespread job losses and economic hardship for the many communities whose livelihoods are tied to the industry, threatening the long-term viability of this critical economic sector.

6.5 Projected Economic Costs of Inaction and the Need for Adaptation

The extensive risks and vulnerabilities detailed throughout this chapter culminate in a stark economic forecast if proactive adaptation measures are not implemented. Macroeconomic modelling indicates that without significant investment, the cumulative impacts of climate change could reduce Tanzania's GDP by 1-2% annually by 2030, a figure projected to accelerate to as much as 4% by 2050 (Watkiss et al., 2011). The agricultural sector (FAO, 2019), the backbone of the nation's economy and the most exposed to climate shocks, faces catastrophic long-term risks. Projections indicate that economic damages to this sector alone could reduce national GDP by up to 68 % by 2085 (Bezabih et al., 2010).

This comprehensive assessment of hazards, from devastating floods to chronic coastal erosion (WWF, 2020), and deep-seated vulnerabilities, such as the reliance on rain-fed agriculture and institutional finance gaps, serves as a critical foundation for action. The analysis confirms that inaction is not a viable option. Therefore, these findings serve as a direct precursor to identifying Tanzania's climate adaptation needs and options, which are discussed in detail in Chapter Seven. This systematic approach ensures that future interventions are strategically aligned to address the most pressing priorities, enabling Tanzania to make informed decisions that safeguard its people, economy, and environment from the escalating climate crisis.

6.6 Transboundary Climate Risks and Resilience

Climate change impacts transcend national borders, rendering isolated national adaptation efforts inadequate. Tanzania's vulnerability is closely tied to its shared ecosystems and fifteen transboundary river basins with eight neighbouring countries within the Southern African Development Community (SADC). Uncoordinated actions, such as upstream water infrastructure projects, can undermine downstream resilience and threaten regional stability. Consequently, in line with frameworks such as the African Union's Climate Change and Resilient Development Strategy (2022–2032), Tanzania prioritises regional cooperation to strengthen collective climate resilience and mitigate shared environmental and socio-economic risks (African Union, 2022).

Tanzania's water security is deeply interconnected with transboundary systems, as approximately 13% of its renewable water resources originate beyond its borders (World Bank, 2022). Climate change intensifies stress on shared basins such as the Mara River and the Great Lakes, Victoria, Tanganyika, and Nyasa, which support millions through fisheries, agriculture, and hydropower. These systems face mounting threats from shifting rainfall patterns, declining water quality, and unsustainable extraction. Addressing these challenges demands harmonised, climate-informed governance through regional basin authorities and collaborative management mechanisms (WWF, 2021; UNEP, 2020).

Furthermore, Serengeti-Masai Mara ecosystem exemplifies the critical need for coordinated transboundary management. Changing rainfall patterns and resource scarcity are pushing wildlife beyond protected areas, heightening Human-Wildlife Conflict (HWC) in border communities (Homewood et al., 2021; UNEP, 2020). An integrated, ecosystem-scale strategy that links land-use planning, conservation, and benefit-sharing across borders is essential to maintaining ecological balance and strengthening community resilience. Reinforcing bilateral frameworks beyond anti-poaching and research cooperation will be crucial to achieving sustainable coexistence and long-term environmental stability (Veldhuis et al., 2019; UNEP, 2020).

6.7 Climate change vulnerability Cross-Cutting Issues

Tanzania's vulnerability to climate change is defined not only by its exposure to climatic hazards but also by deep-rooted, systemic challenges. These issues amplify risk and constrain adaptation across all sectors. This section synthesizes empirical evidence from the national assessment to analyse the five core cross-cutting issues that must be addressed to build a resilient Tanzania: Gender and Vulnerable Groups, Financing, Disaster Management, Capacity Building, and Technology and Research.

6.7.1 Gender and Vulnerable Groups

Field evidence consistently shows that climate impacts are not socially neutral but are disproportionately borne by women, youth, children, the elderly, and people with disabilities due to pre-existing socio-economic inequalities. As primary managers of household resources, women face increased labour burdens. Assessments reveal that during droughts, women and girls spend significantly more time, often hours each day, travelling longer distances to fetch water, directly curtailing their engagement in education and income-generating activities (Sectoral Assessments, 2023). This is compounded by their role as primary caregivers during climate-linked disease outbreaks.

Data from the agricultural sector shows that female-headed households have a markedly lower Adaptive Capacity Index (ACI) than male-headed households, directly correlating to higher risk scores for hazards like drought (Agriculture Sector Report). This is driven by significantly less access to agricultural extension services (with >60% less contact reported), credit, and secure land tenure. Field data points to high household dependency ratios, often nearly 1:1 (one working adult to one dependent) in agricultural communities, which severely strains financial resources and limits the capacity to save or invest in adaptive measures like resilient seeds or reinforced homes. Field evidence suggests that high-impact interventions include supporting Village Savings and Loan Associations (VSLAs), which are more accessible to women, deploying female extension officers to bridge the advisory gap, and ensuring women's leadership in community adaptation committees.

6.7.2 Financing

Field assessments identify the severe lack of accessible finance as the most frequently cited and pervasive barrier to adaptation at all levels, creating a critical "adaptation finance gap". Over 80% of surveyed farmers across multiple regions in Tanzania cited a lack of access to credit as the primary barrier preventing them from investing in irrigation, resilient seeds, or other known technologies (Agriculture Sector Report). This is echoed in the water sector, described as a "finance-technology gap," where authorities report insufficient capital for maintaining resilient infrastructure. This gap creates a tangible "awareness-adoption gap." For instance, in coastal communities of Tanzania, 98% of fishers identified safer boats and modern gear as their top adaptation need, but over 90% could not access the capital to acquire them, forcing continued use of precarious vessels (Fisheries Sector Report). This gap forces maladaptive coping strategies, which are often a short-term survival strategy that degrades the natural capital base. For example, during the 2022 drought in the Bahi district, field reports noted a 40% increase in deforestation for charcoal production.

Field evidence supports the need for a portfolio of solutions such as the establishment of microfinance products tailored for smallholders (e.g., loans for drip irrigation kits), weather-indexed insurance piloted in drought-prone regions, and public-private partnerships (PPPs) for larger-scale infrastructure like climate-resilient water systems, as well as the operationalisation of the National Climate Finance Mechanism (NCFM), which is a critical response structure in the NAP.

6.7.3 Disaster Management

Weak disaster risk management systems are a critical vulnerability, leaving communities exposed and reactive to climate impacts. For example, the TMA's SMS-based alert system for farmers and fishers, a key early warning tool, is insufficient on its own. This indicates the lack of preparedness against climate hazards and highlights the acute need for proactive systems. The absence of robust systems has direct consequences. For instance, during recent floods in the Dar es Salaam region, over 60% of health facilities surveyed were inaccessible or non-operational, severely delaying emergency services and outbreak response (Health Sector Report).

The lack of Early Warning Systems (EWS) in districts like Bahi and Ifakara has resulted in predictable losses, such as annual flash floods which destroy standing crops and assets that could be safeguarded with timely alerts.

Sector-specific needs for adaptation based on the field evidence include;

(a) Fisheries: Over 70% of fishers in Lake Victoria and the coast report receiving no formal storm warnings, directly endangering their lives (Fisheries Sector Report).

(b) Wildlife: Park rangers report a 300% increase in wildfire incidents over the past five years in dry seasons due to a lack of equipment and coordinated plans for effective fire management.

(c) Health: Less than 15% of health facilities have contingency plans for climate-related disasters.

(d) Agriculture: Field trials show that automated SMS alerts to farmer mobile phones can reduce crop losses from false starts of rain by up to 25%.

Therefore, there is a need to invest in a national multi-hazard Early Warning System (EWS). Furthermore, community-based disaster preparedness plans, developed and tested through simulation exercises, are proven to enhance rapid response and save lives.

6.7.4 Capacity Building

A systemic deficit in capacity has resulted in a notable "awareness-adoption gap," where general knowledge fails to translate into practical action at the local level. While over 75% of farmers are aware of climate-smart practices like conservation agriculture, adoption rates remain below 25% (URT, 2025). The primary reason cited is not awareness, but a lack of practical, hands-on training and ongoing support.

The agricultural extension system, which should bridge this gap, is currently not efficient; only 20% of female farmers report any contact with an extension officer in the past year. Field evidence demonstrates that participatory video and community radio programs that integrate Indigenous Knowledge (IK), such as local indicators for rainfall prediction, with scientific forecasts have higher trust and uptake than top-down information campaigns. Assessments of local government authorities reveal that over 80% of planning officers have received no formal training in integrating climate risk into development plans, leading to "climate-blind" investments. To close this gap, a revitalised and inclusive extension system is required, with successful models that include farmer field schools that demonstrate technologies in situ and training-of-trainer programs for local government staff on practical skills like climate risk mapping and accessing climate finance.

6.7.5 Technology and Research

A significant gap exists between the existence of adaptive technologies and their adoption, coupled with a disconnect between national research and local needs. For example, drought-tolerant maize varieties can yield up to 30% more under stress conditions, yet adoption rates are below 15% in the most vulnerable semi-arid zones due to high cost and limited availability in local markets (Research from TARI). Similarly, over 85% of fishers identified improved gear as a priority but could not afford it.

Research often fails to address critical local questions and needs. Field assessments highlight significant knowledge gaps, such as the specific health impacts of saltwater intrusion in coastal communities or the socio-economic dynamics of migration from climate-affected areas. This leaves district planners without the data needed for evidence-based decision-making. Integrating technology with financial gain, such as subsidising resilient seed packages or offering lease-to-own schemes for solar pumps, has proven effective in pilot areas. Furthermore, promoting participatory action research, where scientists collaborate with communities to co-develop solutions (such as co-designing water harvesting structures), ensures that innovations are context-specific and locally owned.

7. ADAPTATION PROGRAMMES

7.1 Introduction

This chapter presents a comprehensive framework of Tanzania's national climate adaptation programmes, providing a purview that shows a shift from adaptation assessments to actions. The chapter frames adaptation programmes as a proactive, strategic process of building climate resilience against the identified climate risks and vulnerabilities across priority sectors. It is informed by an evidence-based response to Tanzania's systemic climate risks and vulnerabilities established in chapter six. It comprehensively translates potential climate risks and vulnerabilities identified in Chapter 6 into a coherent and well-structured set of adaptation programmes.

The chapter presents a set of adaptation programmes for the nine priority sectors identified for the NAP for the period of ten years (2025-2035). Each programme has a clear objective and a defined set of interventions or climate adaptation actions. Additionally, within each priority sector, the adaptation options that are linked have been classified into programmes of adaptation to inform specific sectoral programmes. These sectoral adaptation programmes provide a strategic direction for national policy, sectoral planning, and sustainable development while drawing inspiration from international best practices in national adaptation planning.

7.2 Sectoral Adaptation Programmes

Adaptation programmes for each of the nine key sectors were developed based on key climate hazards, elements at risk, and impacts to the sector as analysed in the climate Risk and Vulnerability Assessment Reports for Mainland Tanzania and Zanzibar.

7.2.1 Mainland Tanzania

The prioritized adaptation programmes for each of the sectors for Mainland Tanzania are as follows:

(a) Agriculture

The primary adaptation need is to enhance the climate resilience of the agriculture sector against key climate hazards, including drought, erratic rainfall, flooding, and soil degradation. The sector highlights several priority adaptation options to address such climate challenges. The most important is the adoption of Climate-Smart Agriculture practices to manage drought, soil degradation, and floods. Small-scale irrigation is ranked next, helping farmers cope with drought and water shortages. The introduction of drought-tolerant and early-maturing crop varieties is also a priority to deal with changing rainfall patterns. Strengthening climate information services is needed to fill knowledge gaps and improve institutional support. Weather-index based crop insurance is recommended to reduce economic risks from climate shocks, both before and after disasters. Lastly, large-scale irrigation systems, such as dam and canal projects, are also identified as an option for tackling water scarcity and drought. Mainland Tanzania identifies three prioritised adaptation programmes to enhance climate resilience in the agriculture sector as follows.

Programme AG-M1: Climate-Resilient Agriculture through Knowledge, Innovation, and Governance	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly targets reduced crop productivity associated with drought, erratic rainfall, soil degradation, flooding, and increased pest and disease outbreaks. It addresses the core vulnerability of over 80% of agriculture being rain-fed and the limited adoption of climate-resilient technologies by smallholders, which is exacerbated by under-resourced extension services.	
Objective	**Expected Outcomes**
(i) To strengthen the national agricultural knowledge and innovation system for climate resilience.	(i) A revitalized and well-equipped national agricultural extension service capable of delivering timely, location-specific advice on CSA and climate risk management.
(i) To achieve widespread adoption of CSA practices and climate-resilient crop varieties.	(ii) Widespread adoption of CSA practices and drought-tolerant/early-maturing crop varieties (DTCVs) across key agro-ecological zones.
(ii) To embed CSA principles into local government planning and ensure inclusive delivery.	(iii) CSA priorities and budgeting are integrated into District Agricultural Development Plans, with gender-responsive mechanisms ensuring equitable access for women, youth, and vulnerable groups.
Summary of Action: 1. Strengthen the National Agricultural Knowledge and Innovation System. 2. Scale Up Adoption of Climate-Smart Agriculture (CSA) Practices. 3. Develop and Disseminate Climate-Resilient Crop Varieties. 4. Embed CSA into Local Government Planning and Budgeting.	
Scope	Capacity Building, Technology Development and Transfer, Climate Information Services, Institutional Strengthening, Gender Mainstreaming
Geographic Coverage	Tanzania Mainland, with a focus on drought-prone central regions and flood-prone riverine zones.
Duration	10 years (2025 – 2035)
Total Indicative Cost	USD 1,605,129,750
Targeted Beneficiaries	Smallholder farmers, agricultural extension officers, rural communities, farmer cooperatives, women and youth groups.
Lead Institution(s)	Ministry of Agriculture
Supporting Agency/Institutions	Tanzania Meteorological Authority (TMA), Ministry of Water, President's Office – Regional Administration and Local Government (PO-RALG), Tanzania Agricultural Research Institute (TARI).

Programme AG-M2: Enhancing climate resilience in irrigated agricultural systems	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly addresses the primary climate risks of drought, water scarcity, and rainfall volatility that cripple rain-fed agriculture. It tackles the systemic vulnerability of limited irrigation infrastructure, which currently serves a small fraction of the nation's arable land, and the financial barriers preventing smallholders from adopting efficient water technologies.	
Objective	**Expected Outcomes**
(i) To expand access to reliable water for agriculture at a national scale.	(i) National water storage and conveyance capacity significantly increased through the development and rehabilitation of large-scale irrigation infrastructure.
(ii) To improve water-use efficiency and access at the farm level.	(ii) Widespread adoption of efficient small-scale irrigation systems (e.g., drip, sprinkler, solar-powered pumps) and rainwater harvesting by smallholder farmers.
(iii) To strengthen governance and financial access for sustainable water management.	(iii) Empowered Water User Associations (WUAs) sustainably managing irrigation schemes, and accessible financing mechanisms enabling smallholder investment in water technologies.
Summary of Actions 1. Develop and Rehabilitate Strategic Large-Scale Irrigation Infrastructure. 2. Promote and Scale Up Efficient Small-Scale and On-Farm Water Management 3. Strengthen Governance and Institutional Capacity for Water Management.	
Scope	Physical Infrastructure, Technology Development and Transfer, Institutional Capacity Building, Financial Mechanisms
Geographic Coverage	Tanzania Mainland, focusing on high-potential agricultural basins and drought-prone regions.
Duration	10 years (2025 – 2035)
Total Indicative Cost	USD 3,993,806,250
Targeted Beneficiaries	Smallholder and commercial farmers, Water User Associations (WUAs), agribusinesses, MFIs and SACCOs.
Lead Institution(s)	Ministry of Agriculture, Ministry of Water
Supporting Agency/Institutions	National Irrigation Commission, Ministries of Energy and Infrastructure, PO-RALG.

Programme AG-M3: Agricultural Risk Management and Financial Inclusion	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme directly addresses the economic risks of climate-related crop failure and post-harvest losses due to extreme weather events. It tackles the vulnerability of smallholders who lack access to insurance and formal financial services, which traps them in a cycle of low investment and high risk.	
Objective	**Expected Outcomes**
(i) To reduce financial losses from climate-related crop failure.	(i) Accessible and affordable weather-index based crop insurance (WIBI) schemes scaled up to cover a significant portion of smallholder farmers in high-risk regions.
(ii) To enhance market stability and farmer incomes.	(ii) Post-harvest losses significantly reduced through improved storage, processing, and market access infrastructure.
Summary of action 1. Establish and scale up accessible and affordable weather-index-based crop insurance (WIBI) schemes for smallholder farmers in partnership with the private sector. 2. Improve post-harvest management systems, including the construction of climate-resilient storage facilities and the promotion of value-addition processing technologies. 3. Strengthen market access and integration for smallholder farmers into formal, climate-resilient value chains.	
Scope	Financial Services, Physical Infrastructure, Market Development, Public-Private Partnerships
Geographic Coverage	Tanzania Mainland, with initial pilots in regions highly exposed to drought and flood risks.
Duration	10 years (2025 – 2035)
Total Indicative Cost	USD 500,810,625
Targeted Beneficiaries	Smallholder farmers, farmer cooperatives, private insurance companies, financial institutions.
Lead Institution(s)	Ministry of Agriculture
Supporting Agency/Institutions	Ministry of Finance, Bank of Tanzania, Tanzania Insurance Regulatory Authority (TIRA).

(b) Livestock

The primary adaptation need for the livestock sector is to strengthen climate resilience in livestock-based livelihoods. The livestock sector outlines several priority adaptation options to reduce the impacts of climate change to enhance climate resilience across pastoral and agro-pastoralist livelihood systems. The most important one is sustainable rangeland and water management to deal with drought, degraded pasture, and water scarcity. Improving veterinary services is also key to protect animals from new diseases caused by changing temperatures and rainfall. Building climate-resilient livestock infrastructure helps protect animals from drought, floods, and extreme heat. Early warning systems that combine local and modern knowledge can support timely responses while better animal health practices reduce risks from diseases. Adding value to livestock products and improving market access will strengthen resilience to

climate change. Management of wildlife–livestock conflict can help prevent competition over scarce resources. Weather-indexed insurance could protect farmers against climate shocks while reviewing the National Livestock Policy and strengthening research and extension services would provide long-term support for adaptation. Mainland Tanzania outlines two priority adaptation programmes anticipated to strengthen climate resilience in livestock-based livelihoods as follows:

Programme LS-M1: Sustainable Rangeland and Water Resource Management	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly addresses the climate risks of drought, pasture degradation, and water scarcity. It tackles the vulnerability of pastoralist communities who depend on increasingly scarce and degraded natural resources, leading to heightened competition and conflict with other land users.	
Objective	**Expected Outcomes**
(i) To secure and sustain feed and water resources for livestock.	(i) Degraded rangelands restored, and community-based sustainable pasture management practices widely adopted.
(ii) To reduce resource-based conflicts.	(ii) Effective and institutionalized conflict resolution mechanisms established and operational in key hotspot areas.
Summary of actions 1. Implement community-based sustainable rangeland and pasture management practices, including rotational grazing, reseeding with drought-tolerant forage, and invasive species control 2. Develop and rehabilitate climate-resilient water sources dedicated to livestock, such as boreholes, charco dams, and pipelines, with equitable access protocols 3. Establish and strengthen multi-stakeholder conflict resolution mechanisms to address competition over water and grazing land between farmers, pastoralists, and wildlife	
Scope	Natural Resource Management, Community Governance, Conflict Resolution, Physical Infrastructure
Geographic Coverage	Tanzania Mainland, focusing on semi-arid and arid regions with significant pastoralist populations.
Total Indicative Cost	USD 1,198,141,875
Targeted Beneficiaries	Pastoralist and agro-pastoralist communities, local government authorities, traditional leaders.
Lead Institution(s)	Ministry of Livestock and Fisheries, Ministry of Water
Supporting Agency/Institutions	PO-RALG, Ministry of Lands, Housing and Human Settlements Development, National Land Use Planning Commission.

Programme LS-M2: Climate-Resilient Livestock Health and Production Systems	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme targets the increased prevalence of climate-sensitive animal diseases (e.g., vector-borne diseases) and heat stress due to rising temperatures. It addresses the vulnerability of livestock keepers who lack access to quality veterinary services and timely information on impending climate hazards.	
Objective	**Expected Outcomes**
(i) To reduce climate-related livestock disease and mortality.	(i) Strengthened national and sub-national veterinary disease surveillance systems capable of monitoring and controlling climate-sensitive animal diseases.
(ii) To enhance the adaptive capacity of livestock keepers.	(ii) A functional early warning system providing livestock keepers with timely alerts on drought, forage availability, and disease outbreaks.
Summary of actions: 1. Strengthen veterinary services and disease surveillance systems to monitor and control climate-sensitive animal diseases, adopting a One Health approach for zoonotic threats. 2. Construct and rehabilitate climate-resilient livestock infrastructure, including improved animal shelters, dips, and quarantine facilities. 3. Develop and disseminate early warning systems for drought, forage availability, and disease outbreaks, integrating indigenous knowledge with scientific forecasts. 4. Promote research and adoption of climate-resilient livestock breeds and improved animal husbandry practices. 5. Promote value addition and market access for livestock products to enhance economic resilience. 6. Establish weather-indexed insurance schemes to provide financial protection against climate-related livestock losses.	
Scope	Animal Health Services, Physical Infrastructure, Climate Information Services, Research and Development, Financial Services
Geographic Coverage	Tanzania Mainland, with nationwide coverage for disease surveillance and targeted infrastructure in high-risk zones.
Total Indicative Cost	USD 789,252,188
Targeted Beneficiaries	Livestock keepers, Community Animal Health Workers (CAHWs), veterinary professionals, research institutions.
Lead Institution(s)	Ministry of Livestock and Fisheries, Ministry of Health
Supporting Agency/Institutions	Tanzania Veterinary Laboratory Agency (TVLA), Tanzania Meteorological Authority (TMA).

(c) Fisheries

The primary adaptation need for the fisheries sector in Mainland Tanzania is to build climate resilience in fisheries. The fisheries sector has several key adaptation options to cope with the impacts of climate change. Climate-smart fishing is a top priority to reduce post-harvest losses and improve resilience. Institutional capacity for Beach Management Units improves local governance and ensures sustainable resource management. Sustainable management of MPAs and LMMAs while enhancing practices that promote climate-resilience in aquaculture and mariculture would help to address the declining fish stocks caused by warming and ocean

acidification. In addition, reviewing the Fisheries Act, enhancing extension services, and building knowledge and capacity are all essential for long-term resilience. Mainland Tanzania has prioritized two adaptation programmes that build climate resilience in the Fisheries sector as follows:

Programme FI-M1: Community-Led Climate-Resilient Fisheries Management	
Climate Risks and Vulnerabilities Addressed: This programme addresses the risks of declining fish stocks due to rising water temperatures, habitat degradation, and altered hydrological cycles. It tackles the vulnerability of artisanal fishers who have limited capacity to adapt to shifting resource availability and are impacted by illegal fishing activities.	
Objective	**Expected Outcomes**
(i) To strengthen local fisheries governance and management capacity.	(i) Enhanced capacity and legal mandate of Beach Management Units (BMUs) for participatory resource management, data collection, and enforcement of local by- laws.
(ii) To reduce illegal fishing and improve resource sustainability.	(ii) A significant reduction in illegal, unreported, and unregulated (IUU) fishing through improved Monitoring, Control, and Surveillance (MCS) systems.
Summary of Adaptation Actions: 1. Enhance the capacity and mandate of Beach Management Units (BMUs) for participatory resource management, data collection, and enforcement of local by-laws. 2. Improve Monitoring, Control, and Surveillance (MCS) systems to combat illegal, unreported, and unregulated (IUU) fishing, including community-based monitoring. 3. Promote the adoption of sustainable and climate-smart fishing gear and practices to reduce pressure on vulnerable stocks and ecosystems. 4. Support the establishment and management of Locally Managed Marine Areas (LMMAs) to protect critical breeding and nursery grounds.	
Scope	Community Governance, Institutional Strengthening, Regulatory Enforcement, Capacity Building
Geographic Coverage	Coastal and lakeside communities across Tanzania Mainland.
Total Indicative Cost	USD 500,810,625
Targeted Beneficiaries	Artisanal fishers, Beach Management Units (BMUs), local communities, fisheries officers.
Lead Institution(s)	Ministry of Livestock and Fisheries
Supporting Agency/Institutions	PO-RALG

Programme FI-M2: Community Resilience through Sustainable Aquaculture Diversification	
Climate Risks and Vulnerabilities Addressed: The programme addresses the risk of declining capture fisheries by providing an alternative source of fish production. It tackles the economic vulnerability of fishing communities by offering diversified livelihood options that are less directly exposed to the climate-driven variability of wild fish stocks.	
Objective	**Expected Outcomes**
(i) To develop a climate-resilient and sustainable aquaculture sector.	(i) A significant increase in national aquaculture production through the promotion and scaling up of sustainable and climate-resilient practices.
(ii) To enhance the capacity of small-scale fish farmers.	(ii) A robust network of extension services providing small-scale fish farmers with training on best practices, disease management, and business skills.
Summary of Adaptation Actions: 1. Promote and scale up sustainable and climate-resilient aquaculture and mariculture practices, including species diversification (e.g., seaweed, sea cucumber) and integrated multi-trophic aquaculture systems. 2. Strengthen extension services and capacity-building programmes for small-scale fish farmers on best practices, climate-resilient pond design, disease management, and business skills. 3. Establish and support hatcheries for the production of quality, climate-resilient fish fingerlings and seed. 4. Develop market linkages and value chains for aquaculture products.	
Scope	Livelihood Diversification, Technology Transfer, Capacity Building, Market Development
Geographic Coverage	High-potential freshwater and marine areas across Tanzania Mainland.
Total Indicative Cost	USD 300,804,344
Targeted Beneficiaries	Small-scale fish farmers, youth and women's groups, private sector investors in aquaculture.
Lead Institution(s)	Ministry of Livestock and Fisheries
Supporting Agency/Institutions	Tanzania Fisheries Research Institute

(d) Water

The primary adaptation need for the water sector in Mainland Tanzania is to enhance climate resilience for water resources. Achieving this, requires a multi-pronged approach that addresses a number of adaptation options within and across the sector. There are two priority adaptation programmes to enhance climate resilience in the water sector. Restoration and conservation of water sources is the foremost among the adaptation actions to address the impacts of drought and water scarcity. Complementary measures include strengthening domestic water supply systems, enforcing the Water Resources Management Act, and empowering local water user associations to improve governance. Ensuring safe and reliable water supplies requires climate-resilient safety plans, the integration of efficient water harvesting and water use technologies, and enhanced monitoring of water quality. Institutional capacity building, particularly for water

utilities, is also essential for effective service delivery under changing climatic conditions. Furthermore, sustainable wastewater management and improved hygiene practices play a crucial role in reducing pollution and safeguarding public health. These adaptation programmes are designed to respond to, and recover from the challenges posed by climate hazards such as droughts, floods, and others climate-related pressures across the water sector.

Programme WA-M1: Integrated Watershed and Water Source Protection	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme addresses the long-term risks of declining water availability due to drought, changing rainfall patterns, and increased evaporation. It tackles the vulnerability of degraded watersheds that have lost their capacity to regulate water flow, store water, and recharge groundwater, resulting to amplifying floods and droughts impacts.	
Objectives	**Expected Outcomes**
(i) Safeguard national water sources and enhance water retention capacity.	(i) Large-scale restoration and conservation of critical water sources, wetlands, and catchment forests.
(ii) Strengthen local water governance and management.	(ii) Empowered and capacitated Water User Associations (WUAs).
Summary of Adaptation Actions: 1. Implement large-scale restoration and conservation of water sources, wetlands, and catchment forests to improve water retention, regulate flow, and enhance groundwater recharge. 2. Strengthen the enforcement of the Water Resources Management Act to prevent encroachment, deforestation, and pollution of water sources and buffer zones. 3. Build the capacity and empower Water User Associations (WUAs) to play a central role in local water resource management, allocation, and conflict resolution. 4. Develop and implement integrated water resource management and development (IWRMD) plans for all major river basins. 5. Engage in and support bilateral and multilateral negotiations and for the sustainable and equitable management of shared watercourses. 6. Establish a formal transboundary management framework for the Serengeti-Mara ecosystem.	
Scope	Natural Resource Management, Ecosystem-based Adaptation, Community Governance, Policy Enforcement
Geographic Coverage	All major river basins and water catchments in Tanzania Mainland.
Total Indicative Cost	USD 2,510,392,500
Targeted Beneficiaries	Water User Associations (WUAs), basin water boards, rural communities, downstream water users (cities, industries, farms).
Lead Institution(s)	Ministry of Water
Supporting Agency/Institutions	Ministry of Natural Resources and Tourism, Vice President's Office (Environment), PO-RALG.

Programme WA-M2: Climate-Resilient Water Supply and Sanitation Services	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme addresses the dual risks of water shortages during droughts and infrastructure damage and contamination during floods. It responds to the vulnerability of aging water supply systems and the lack of sanitation infrastructure, which pose notable public health risks in a changing climate.	
Objectives	**Expected Outcomes**
(i) Increase water availability and reliability for end-users.	(i) Rainwater harvesting and storage systems significantly scaled up at domestic, institutional, and community levels.
(ii) Ensure water safety and protect public health.	(ii) Climate-Resilient Water Safety Plans developed and implemented for all major water supply systems.
Summary of Adaptation Actions: 1. Strengthen and scale up rainwater harvesting and storage systems at domestic, institutional, and community levels. 2. Promote the adoption of efficient water use technologies in urban water utilities and industries to reduce losses and manage demand. 3. Develop and implement Climate-Resilient Water Safety Plans for all major water supply systems to manage risks from source to tap. 4. Invest in sustainable wastewater management and climate-resilient sanitation infrastructure to prevent pollution and reduce waterborne disease risks, particularly in flood-prone areas. 5. Strengthen the institutional capacity of urban water utilities to manage climate risks and ensure service continuity.	
Scope	Physical Infrastructure, Technology Transfer, Public Health, Institutional Capacity Building
Geographic Coverage	Urban and rural communities across Tanzania Mainland.
Total Indicative Cost	USD 3,486,656,250
Targeted Beneficiaries	Households, urban water utilities, schools, health facilities, industries.
Lead Institution(s)	Ministry of Water, Ministry of Health
Supporting Agency/Institutions	PO-RALG, Urban Water Supply and Sanitation Authorities (UWSAs).

(e) Coastal and Marine

The primary adaptation need for the coastal and marine sector is to strengthen coastal and marine climate resilience against key climate hazards such as sea-level rise, coastal erosion, storm surges, and coral bleaching. Mainland Tanzania highlights three prioritized adaptation programmes aimed at strengthening resilience in the coastal and marine sector. Foremost is the integration of coastal zone management plans to ensure sustainable and well-coordinated use of coastal resources. Equally critical is the restoration and conservation of the ecosystem, which serve as natural barriers against erosion and storm surges. Equally critical is the restoration and conservation of mangroves, which serve as natural barriers against erosion and storm surges. Capacity building in institutional coordination across ministries is essential to overcome

fragmented governance while conservation and restoration of coral reefs are vital to counteract bleaching driven by rising sea temperatures. Investment in real-time early warning systems will bolster preparedness for coastal hazards such as flooding and storm surges. Furthermore, reinforcing policy and regulatory frameworks, alongside marine spatial planning and enhancement of extension services would strengthen community knowledge and adaptive governance in response to climate-related impacts on the Coastal and Marine sector.

Programme CM-M1: Building Community and Ecosystem Resilience in Small Islands of Marine and Terrestrial Waters	
Climate Risks and Vulnerabilities Addressed: The programme targets the acute risks faced by small islands, including rising water levels, extreme weather, shoreline erosion, declining natural resources, and salinization of freshwater sources. It addresses the high vulnerability of isolated communities with limited access to resources and alternative income pathways.	
Objective	**Expected Outcomes**
(i) To strengthen local capacity to plan and implement adaptation using Nature-based Solutions (NbS).	(i) Local climate adaptation plans developed and integrated into the district planning frameworks of at least 10 Local Government Authorities (LGAs).
(ii) To implement large-scale, community-led ecosystem restoration and risk reduction.	(ii) Approximately 4,000 hectares of critical ecosystems, including mangroves, wetlands, and vegetative buffers, restored and protected.
(iii) To diversify and strengthen climate-resilient livelihoods.	(iii) Over 50% of households in target communities adopt alternative, climate-resilient income-generating activities.
Summary of Adaptation Actions: 1. Build the technical and institutional capacity of local governments and communities to plan and implement climate adaptation using nature-based solutions (NbS). 2. Conduct community-driven risk and vulnerability assessments to inform the development of local adaptation plans. 3. Implement large-scale, community-led NbS interventions, including mangrove reforestation, wetland restoration, and the development of vegetative buffers to control flooding and erosion. 4. Diversify and strengthen climate-resilient livelihoods through activities such as small-scale aquaculture, eco-tourism, agroforestry, and value-addition in fisheries.	
Scope	Institutional Capacity Building, Nature-based Solutions, Livelihood Diversification, Green Infrastructure
Geographic Coverage	Small islands in Tanzania Mainland, including those on the Indian Ocean (e.g., Mafia, Maziwi, Jibondo, Chole, Songo Songo) and the Great Lakes (e.g., Ukerewe, Ukara, Saanane, Rubondo).
Total Indicative Cost	USD 1,001,621,250
Targeted Beneficiaries	Approximately 200,000 people in small island communities, with a focus on women, youth, and marginalized groups.
Lead Institution(s)	Vice President's Office (as NDA), PO-RALG

Supporting Agency/Institutions	Ministries responsible for Fisheries, Tourism, Water, Infrastructure.

Programme CM-M2: Economic Benefits of Blue Carbon Resources	
Climate Risks and Vulnerabilities Addressed: The programme addresses the risk of continued degradation of blue carbon ecosystems due to a lack of sustainable financing for their management. It tackles the vulnerability of coastal communities by creating economic incentives for conservation, which in turn enhances the natural coastal protection services provided by these ecosystems.	
Objective	**Expected Outcomes**
(i) To strengthen capacity for inclusive blue carbon management.	(i) Enhanced technical expertise of national agencies, LGAs, and community-based organizations in blue carbon accounting, MRV, and project development.
(ii) To establish and operationalize blue carbon trading and investment mechanisms.	(ii) At least three blue carbon trading pilots designed and implemented on the Mainland Tanzania, generating verified carbon credits for voluntary and/or compliance markets.
(iii) To integrate blue carbon into national planning and policy.	(iii) Blue carbon data and considerations fully integrated into national GHG inventories, NDC reporting, and sectoral development plans.
Summary of Adaptation Actions: 1. Strengthen institutional, technical, and community capacity for blue carbon management, including carbon accounting and monitoring, reporting, and verification (MRV). 2. Establish and operationalize blue carbon trading and investment mechanisms, including piloting community-led carbon credit projects in high-potential areas. 3. Implement large-scale restoration and protection of degraded blue carbon ecosystems (mangroves, seagrasses, wetlands) as part of carbon projects. 4. Integrate blue carbon knowledge, data, and monitoring into national planning, GHG inventories, and NDC reporting systems.	
Scope	Innovative Finance, Carbon Markets, Ecosystem Restoration, Institutional Capacity Building, Policy Integration
Geographic Coverage	Coastal and freshwater ecosystems across Tanzania Mainland with high blue carbon potential (e.g., Rufiji Delta).
Total Indicative Cost	USD 600,000,000
Targeted Beneficiaries	Coastal communities, CBOs, national and local government agencies, private sector investors.
Lead Institution(s)	Vice President's Office (as NDA) and Ministry of Finance
Supporting Agency/Institutions	Ministry of Natural Resources and Tourism, Ministry of Livestock and Fisheries, Tanzania Forest Services Agency (TFS).

Programme CM-M3: Integrated Coastal Zone Management and Governance	
Climate Risks and Vulnerabilities Addressed: This programme addresses the risks of maladaptation and increased vulnerability arising from unplanned and uncoordinated development in hazard-prone coastal areas. It tackles the institutional vulnerability of fragmented governance, where sectoral mandates overlap or conflict, hindering effective coastal management.	
Objective	**Expected Outcomes**
(i) To establish a coordinated coastal governance framework.	(i) Integrated Coastal Zone Management (ICZM) plans developed, legally gazetted, and implemented for all priority coastal districts.
(ii) To enhance coastal hazard preparedness.	(ii) A functional, real-time early warning system for coastal hazards, including storm surges and coastal flooding, operational and accessible to coastal communities.
Summary of Adaptation Actions: 1. Develop and implement Integrated Coastal Zone Management (ICZM) plans for priority coastal districts, incorporating climate risk and vulnerability assessments. 2. Strengthen institutional coordination mechanisms for cross-sectoral coastal management, potentially through a national coastal management task force. 3. Develop and operationalize real-time early warning systems for coastal hazards, including storm surges, coastal flooding, and tsunamis, linked to community response plans. 4. Review and strengthen policy and regulatory frameworks to enforce setbacks, building codes, and environmental safeguards in the coastal zone.	
Scope	Governance, Spatial Planning, Policy and Regulation, Early Warning Systems
Geographic Coverage	The entire coastline of Tanzania Mainland.
Total Indicative Cost	USD 400,014,563
Targeted Beneficiaries	Coastal district authorities, sectoral ministries, private developers, coastal communities.
Lead Institution(s)	Vice President's Office (Environment), PO-RALG
Supporting Agency/Institutions	Ministry of Lands, Housing and Human Settlements Development, TMA, Ministries responsible for Infrastructure, Tourism, and Fisheries.

(f) Wildlife

The primary adaptation need for the wildlife sector is to secure wildlife heritage through climate-resilient corridors and habitats against key climate hazards such as drought, wildfire, habitat fragmentation, and human-wildlife conflict. Two adaptation programmes to build resilience in the wildlife sector are earmarked for Mainland Tanzania, emphasizing both ecological and governance dimensions. Priority is placed on maintaining and protecting wildlife corridors to counteract habitat fragmentation and ensure uninterrupted migration under climate stress. This is complemented by restoration and conservation of biodiversity, forests, habitats initiatives to address degradation caused by droughts, fires, and other disturbances. Enhancing the climate resilience of water sources for wildlife and improving wildfire detection and management are critical to safeguarding ecosystems against intensifying drought and rising temperatures. Addressing human-wildlife conflict, increasingly driven by climate-induced resource scarcity, is also pivotal for coexistence and ecological stability. From a governance

perspective, stronger enforcement of the Wildlife Conservation Act (2009), adoption of climate change guidelines, and mainstreaming climate considerations into sectoral policies are highlighted as foundational steps to close existing strategic and institutional gaps.

Programme WL-M1: Climate-Resilient Management of Wildlife Habitats and Migration Corridors	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme addresses the risks of habitat fragmentation and degradation caused by drought, altered rainfall, and land-use change. It tackles the vulnerability of wildlife populations that are unable to migrate to track shifting resources, leading to population decline and genetic isolation.	
Objectives	**Expected Outcomes**
(i) To build climate resilience in wildlife protected areas through restoration, sustainable land management, and protection measures	(i) Key wildlife corridors legally secured and effectively managed to ensure uninterrupted migration routes between protected areas
(ii) To secure and maintain climate-adaptive wildlife corridors by mapping, restoring, and legally recognizing priority connectivity routes	(ii) Reduced incidence and impact of wildfires and water scarcity within protected areas and dispersal zones
(iii) To strengthen institutional and community capacity for climate-informed corridor and habitat governance	(iii) Wildlife, forestry, agriculture, and local government institutions coordinate more effectively to manage climate-sensitive corridors and habitats
Summary of Adaptation Actions: 1. Mapping, restoring, and legally recognizing wildlife corridors and priority connectivity routes to ensure uninterrupted migration routes through participatory land-use planning and community conservation agreements. 2. Implement restoration and conservation initiatives for degraded habitats within and outside protected areas, including reforestation and soil and water conservation measures. 3. Improve the climate resilience of water sources for wildlife within protected areas through the construction and maintenance of sustainable water points. 4. Strengthen wildfire detection, prevention, and management systems through community patrols, fire breaks, and modern technology.	
Scope	Habitat Conservation, Land Use Planning, Ecosystem Restoration, Disaster Risk Management
Geographic Coverage	Key wildlife corridors and protected area landscapes across Tanzania Mainland (e.g., Serengeti, Selous, Ruaha ecosystems).
Total Indicative Cost	USD 400,014,563
Targeted Beneficiaries	Wildlife management authorities, local communities, conservation NGOs, tourism sector.
Lead Institution(s)	Ministry of Natural Resources and Tourism (Wildlife Division, TANAPA, TAWA)

Supporting Agency/Institutions	PO-RALG, Ministry of Lands, Housing and Human Settlements Development.
Programme WL-M2: Climate-Adapted Management of Human-Wildlife Conflict	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly targets the increasing frequency and intensity of HWC driven by climate-induced resource scarcity. It addresses the vulnerability of rural communities whose crops and livestock are threatened by wildlife, leading to economic losses and retaliatory killings of animals.	
Objectives	**Expected Outcomes**
(i) To reduce the frequency and severity of human-wildlife conflicts through the implementation of climate-resilient measures	(i) A significant reduction in crop raiding, livestock predation, and human casualties from HWC in targeted communities.
(ii) To strengthen the capacity of local communities and institutions to adaptively manage wildlife conflicts under changing climate conditions	(ii) Enhanced community participation in managing human-wildlife conflict.
Summary of Adaptation Actions: 1. Implement and scale up effective HWC mitigation measures, such as chili fences, beehive fences, physical barriers, and early warning systems for wildlife presence. 2. Strengthen community-based conservation and benefit-sharing mechanisms (e.g., from tourism, carbon credits) to increase local incentives for wildlife tolerance. 3. Support land-use planning in buffer zones to reduce the interface and potential for conflict between human activities and wildlife habitats. 4. Establish and strengthen rapid response units to manage problem animals and HWC incidents effectively and humanely.	
Scope	Community-based Conservation, Conflict Mitigation, Livelihood Support, Land Use Planning
Geographic Coverage	HWC hotspot areas adjacent to major protected areas across Tanzania Mainland.
Total Indicative Cost	USD 200,324,250
Targeted Beneficiaries	Rural communities affected by HWC, Wildlife Management Areas (WMAs), conservation authorities.
Lead Institution(s)	Ministry of Natural Resources and Tourism (Wildlife Division, TANAPA, TAWA)
Supporting Agency/Institutions	PO-RALG, Ministry of Agriculture, Ministry of Livestock and Fisheries.

(g) Infrastructure and Human Settlements

The primary adaptation need for this sector is to build resilient infrastructure and human settlements against identified key climate hazards such as urban flooding, sea-level rise, extreme rainfall, and landslides. Mainland Tanzania identifies three prioritized adaptation

programmes to build resilience in the infrastructure and human settlements sector, underscoring both structural resilience and governance reforms. Central to these measures is the formulation of national building codes that incorporate climate resilience standards to address regulatory weaknesses that permit unsafe construction, alongside investments in climate-proofing critical infrastructure against floods, storms, and other extreme weather events. Upgrading informal settlements with resilient drainage and basic services emerges as a vital intervention option to reduce urban flooding risks. Foundational strategies emphasize integrating climate risk into land-use planning, strengthening disaster management and early warning systems, and fostering inter-governmental coordination to overcome fragmented governance. Equally significant are measures promoting green and resilient building practices, advancing equitable land rights and tenure security, and improving land administration to enhance long-term adaptive capacity. Recognizing financial and knowledge constraints, there is a need for mobilization of alternative climate financing mechanisms and the promotion of climate response research and innovation as indispensable enablers for sustainable adaptation in the sector.

Programme IHS-M1: Climate-Proofing in Economic and Social Infrastructure	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme targets the high physical risks to infrastructure from floods, storms, landslides, and extreme heat. It addresses the vulnerability of infrastructure designed using outdated climate data, which is increasingly prone to failure, service disruption, and high maintenance costs.	
Objectives	**Expected Outcomes**
(i) To enhance the physical resilience of key national infrastructure.	(i) Critical public infrastructure in the transport, energy, and water sectors retrofitted or constructed to withstand projected climate impacts.
(ii) To integrate climate risk into public investment planning.	(ii) Climate risk screening and resilience standards are systematically integrated into all public investment project appraisal and approval processes.
Summary of Adaptation Actions: 1. Climate-proof critical public infrastructure, including transport (roads, bridges, ports, railways), energy (hydropower dams, transmission lines), and water systems against floods, storms, and other extreme weather events. 2. Integrate climate change projections and risk assessments into the design, siting, and engineering standards for all new infrastructure projects. 3. Develop and implement a national climate risk screening tool for all public investment projects, led by the Ministry of Finance. 4. Develop a National Infrastructure Resilience Strategy to coordinate actions across sectors. 5. Establish a climate infrastructure maintenance fund to sustain resilience upgrades.	
Scope	Physical Infrastructure, Engineering, Public Financial Management, Policy and Standards
Geographic Coverage	Nationwide, focusing on critical economic corridors and vulnerable infrastructure assets.

Total Indicative Cost	USD 6,000,000,000
Targeted Beneficiaries	All sectors of the economy, the general public, infrastructure-related ministries and agencies.
Lead Institution(s)	Ministry of Finance, Ministry of Works and Transport, Ministry of Energy, Ministry of Water
Supporting Agency/Institutions	All sectoral ministries, PO-RALG, Engineers Registration Board.

Programme IHS-M2: Climate-Resilient Urban Planning and Informal Settlement	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme targets the high risks of urban flooding, landslides, and heat stress, which disproportionately affect residents of informal settlements. It addresses the vulnerabilities of unplanned settlements, including substandard housing, inadequate drainage, and limited access to basic services.	
Objectives	**Expected Outcomes**
(i) To reduce urban climate vulnerability, especially in informal settlements.	(i) Priority informal settlements upgraded with climate-resilient infrastructure, including drainage, sanitation, water access, and secure housing.
(ii) To integrate climate resilience into urban governance.	(ii) Climate risk considerations and adaptation measures integrated into urban and land-use planning processes in all major cities.
Summary of Adaptation Actions: 1. Integrate climate risk considerations into urban master plans and detailed land-use planning processes. 2. Using community-based approaches, upgrade informal settlements with climate-resilient infrastructure, focusing on storm-water drainage, sanitation, safe water access, and secure housing. 3. Strengthen urban disaster management and early warning systems, focusing on reaching vulnerable communities in informal settlements. 4. Promote green urban infrastructure, such as parks, green roofs, and permeable surfaces, to reduce flood risk and mitigate the urban heat island effect.	
Scope	Urban Planning, Community Upgrading, Physical Infrastructure, Disaster Risk Management, Green Infrastructure
Geographic Coverage	Major urban centres in Tanzania Mainland focus on cities with large informal settlements (e.g., Dar es Salaam, Mwanza).
Total Indicative Cost	USD 2,491,374,375
Targeted Beneficiaries	Residents of informal settlements, municipal authorities, and urban planners.
Lead Institution(s)	PO-RALG, Ministry of Lands, Housing and Human Settlements Development.
Supporting Agency/Institutions	Ministry of Water, Ministry of Health, Ardhi University.

Programme IHS-M3: Climate-Resilient Building and Land Use Planning	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme addresses the risk of creating new vulnerable assets through construction in hazard-prone areas or with inadequate standards. It addresses the institutional vulnerability of outdated or poorly enforced building codes and land-use plans that fail to account for climate change.	
Objectives	**Expected Outcomes**
(i) To establish a climate-resilient regulatory framework for the built environment.	(i) National building codes and land use planning regulations were updated to incorporate climate resilience standards and effectively enforce them.
(ii) To enhance capacity for resilient planning and construction.	(ii) Enhanced capacity of local government authorities, planners, and construction professionals to apply and enforce climate-resilient standards.
Summary of Adaptation Actions: 1. Review and update national building codes to incorporate standards for resilience to floods, high winds, and extreme heat. 2. Strengthen the enforcement mechanisms for building codes and land use plans at the local government level. 3. Develop and disseminate climate risk and hazard maps to guide land use planning and development decisions. 4. Implement capacity-building and certification programmes for architects, engineers, and construction workers on climate-resilient building practices. 5. Establish innovation hubs for climate-resilient construction technologies. 6. Provide incentives (tax or certification) for builders adopting resilient and green standards.	
Scope	Policy and Regulation, Institutional Strengthening, Capacity Building, Enforcement.
Geographic Coverage	Nationwide
Total Indicative Cost	USD 400,648,500
Targeted Beneficiaries	Local government authorities, construction industry professionals, regulatory bodies, and the general public.
Lead Institution(s)	Ministry of Lands, Housing and Human Settlements Development, Ministry of Works and Transport.
Supporting Agency/Institutions	PO-RALG, National Construction Council, Engineers Registration Board, Ardhi University.

(h) Health

The adaptation priorities for the health sector converge on the overarching need to build climate-resilient health systems that reduce climate-induced public health risks by reinforcing disease surveillance, ensuring climate-resilient health infrastructure, and expanding Water,

Sanitation, and Hygiene (WASH) services to safeguard at least one million people in highly vulnerable zones. Mainland Tanzania presents two prioritized adaptation programmes for the health sector. Generally, they focus on direct interventions to protect core health functions from immediate climate threats, such as strengthening surveillance and early warning systems to address shifting burdens of vector- and water-borne diseases, climate-proofing health facilities against extreme weather events, and improving access to resilient WASH systems to curb cholera, typhoid, and related outbreaks. These adaptation programmes also advance foundational reforms to enhance systemic resilience, including bolstering disaster preparedness and response, advancing climate health research and innovation to close knowledge gaps, and establishing coordinated climate action plans to foster inter-sectoral collaboration. Complementary measures such as integrating climate considerations into national health policy, developing sectoral adaptation frameworks, and strengthening disaster risk reduction mechanisms address institutional and policy weaknesses that hinder effective adaptation pathway across the sector.

Programme HE-M1: Climate-Resilient Health Systems and Infrastructure	
Climate Risks and Vulnerabilities Addressed: The program targets to address the risks of health facility damage from floods and storms, and service disruption due to impacts on water and energy supply. It addresses the vulnerability of health infrastructure not designed to withstand extreme weather and the limited capacity of the health workforce to address climate-related health issues.	
Objectives	**Expected Outcomes**
(i) To ensure the continuity of health services (resilient infrastructure) during climate shocks.	(i) Priority health facilities climate-proofed with resilient infrastructure, reliable water supply (WASH), and sustainable energy sources.
(ii) To strengthen the capacity of the health workforce.	(ii) Health workers at all levels trained on the diagnosis, treatment, and prevention of climate-sensitive diseases.
Summary of Adaptation Actions: 1. Promote climate-resilient health infrastructure by retrofitting existing facilities and incorporating resilience standards into new construction, including flood protection, ventilation for heat, and secure roofing. 2. Improve and secure access to climate-resilient Water, Sanitation, and Hygiene (WASH) in health facilities and communities to prevent the transmission of water-borne diseases, especially during floods and droughts. 3. Integrate climate change and health into the curricula of medical and public health training institutions. 4. Develop and implement training programs for health workers on climate-sensitive diseases and climate-resilient health practices.	
Scope	Physical Infrastructure, Public Health, Capacity Building, WASH
Geographic Coverage	Nationwide, Focusing on healthcare facilities in high-risk flood and drought-prone areas.
Total Indicative Cost	USD 599,704,875

Targeted Beneficiaries	Patients, health workers, health facility managers, communities including women, children, elderly and people with disabilities.
Lead Institution(s)	Ministry of Health
Supporting Agency/Institutions	PO-RALG, Ministry of Water, Ministry of Energy

Programme HE-M2: Integrated Disease Surveillance and climate-Informed Early Warning Systems	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme directly targets the increasing risk of vector-borne (e.g., malaria, dengue) and water-borne (e.g., cholera, typhoid) diseases, whose transmission patterns are influenced by temperature and rainfall. It addresses the vulnerability of a health system that currently has limited capacity to use climate information for predictive health planning.	
Objectives	**Expected Outcomes**
(i) To strengthen surveillance and early warning for climate-sensitive diseases.	(i) An integrated national health surveillance and early warning system that incorporates climate data to predict and detect disease outbreaks.
(ii) To enhance public awareness and preparedness.	(ii) Effective health promotion and communication campaigns that inform communities about climate-related health risks and preventive measures.
Summary of Adaptation Actions: 1. Strengthen health surveillance and early warning systems by integrating meteorological data to improve forecasting for vector-borne and water-borne diseases. 2. Establish and operationalize coordinated climate-health action plans that link the health sector with other key sectors like water, environment, and agriculture for a multi-sectoral response to health risks. 3. Develop and disseminate public awareness campaigns on climate-related health risks and preventive actions. 4. Strengthen disaster preparedness and response within the health sector, including pre-positioning of medical supplies for anticipated disease outbreaks following extreme weather events.	
Scope	Public Health Surveillance, Early Warning Systems, Inter-Sectoral Coordination, Health Promotion
Geographic Coverage	Nationwide
Total Indicative Cost	USD 400,014,563
Targeted Beneficiaries	The general public, public health officials, community health workers, TMA
Lead Institution(s)	Ministry of Health
Supporting Agency/Institutions	Tanzania Meteorological Authority (TMA), Ministry of Water, Vice President's Office (Environment)

Programme HE-M3: Health Governance and Research for Climate Resilience	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme directly targets the increasing risk of vector-borne (e.g., malaria, dengue) and water-borne (e.g., cholera, typhoid) diseases, whose transmission patterns are influenced by temperature and rainfall. In addition, the program focuses on enhancing health governance informed by data-driven decision to better respond to climate related health risk.	
Objectives	**Expected Outcomes**
(i) To strengthen policy and institutional framework for climate-resilient health.	(i) National Health Policy and related strategies are updated to fully integrate climate change considerations.
(ii) To build a robust evidence base for climate-health adaptation.	(ii) A national research agenda on climate and health is established and implemented, generating locally relevant data and evidence.
Summary of Adaptation Actions: 1. Review and Update the National Health Policy (2007) to fully integrate climate change risks, vulnerabilities, and adaptation measures across all pillars of the health system. 2. Expand applied research on climate-health linkages, focusing on local vulnerabilities, the health impacts of saltwater intrusion in coastal areas, and the socio-economic dynamics of climate-induced health burdens. 3. Promote the adoption of affordable technologies for climate resilience, such as solar-powered vaccine refrigeration, resilient WASH infrastructure, and mobile health units for climate emergencies. 4. Establish a national climate and health research-to-policy platform to ensure that emerging evidence is systematically translated into actionable guidance for planners and practitioners.	
Scope:	
Scope	Public Health Surveillance, Early Warning Systems, Inter-Sectoral Coordination, Health Promotion
Geographic Coverage	Nationwide
Total Indicative Cost	USD 100,162,125
Targeted Beneficiaries	The general public, public health officials, community health workers, TMA
Lead Institution(s)	Ministry of Health
Supporting Agency/Institutions	Muhimbili University of Health and Allied Science, Ifakara Health Institute (IHI), National Institute for Medical Research.

(i) Tourism

The primary adaptation need for the tourism sector is to build climate-resilient tourism in the country against key climate hazards - ecosystem degradation (glacier melt, coral bleaching), altered wildlife migration patterns, and beach erosion. Mainland Tanzania outlines two prioritized adaptation programmes that aim to enhance climate resilience in the tourism sector, emphasizing the need to enhance resilience, diversify offerings, and strengthen governance

frameworks in the face of climate change. Central to these options is the prioritization of community-led tourism initiatives that address livelihood vulnerabilities and ensure more equitable benefit sharing, alongside diversification of tourism products to reduce dependence on climate-sensitive attractions such as wildlife and coastal resources. Targeted investment in climate-resilient infrastructure is highlighted as essential to safeguard against floods, erosion, and storm damage. Additional adaptation actions underscore the importance of adopting climate-sensitive approaches such as steering tourism investments towards climate-conscious pathways like renewable energy facilities and promoting climate-smart investment. There is also the need for reviewing the Tourism Act (2008) to integrate climate adaptation into tourism regulatory frameworks.

Programme TO-M1: Community-Led Climate-Resilient Tourism Diversification	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme addresses the economic risk of revenue loss due to the degradation of iconic, climate-sensitive tourism assets. It tackles the vulnerability of a sector heavily concentrated in a few geographical areas and the economic vulnerability of local communities who are often excluded from tourism benefits.	
Objectives	**Expected Outcomes**
(i) To diversify Tanzania's tourism product portfolio.	(i) New and diversified tourism products (e.g., cultural tourism, agro-tourism, adventure tourism) developed and successfully marketed
(ii) To promote community-led and eco-tourism.	(ii) An increase in the number of community-led tourism enterprises that generate direct benefits for local communities.
Summary of Adaptation Actions: 1. Promote the diversification of tourism products away from climate-sensitive attractions, focusing on cultural heritage, agro-tourism, and adventure tourism. 2. Promote and support community-led eco-tourism initiatives that ensure equitable benefit sharing and empower local communities as stewards of natural resources. 3. Embrace eco-tourism and green operational models within the tourism industry to minimize environmental footprints and enhance sustainability. 4. Strengthen education, awareness, and capacity-building for tourism operators and local communities on sustainable and climate-resilient tourism practices.	
Scope	Product Development, Community Enterprise, Capacity Building, Sustainable Business Models
Geographic Coverage	High-potential tourism areas across Tanzania Mainland, including both established and emerging destinations.
Total Indicative Cost	USD 399,380,625
Targeted Beneficiaries	Local communities, tourism operators, cultural heritage groups, Tanzania Tourist Board (TTB).
Lead Institution(s)	Ministry of Natural Resources and Tourism
Supporting Agency/Institutions	PO-RALG, Tanzania Tourist Board (TTB), private sector tourism associations.

Programme TO-M2: Climate-Proofing of Key Tourism Infrastructure and Assets	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme targets the physical risks of damage to tourism infrastructure (e.g., lodges, roads, airstrips) from floods, storms, and coastal erosion. It also addresses the risk of degradation to key natural assets like beaches, coral reefs, and wildlife habitats.	
Objectives	**Expected Outcomes**
(i) To promote climate-resilient tourism infrastructure.	(i) Critical tourism infrastructure in high-risk areas (e.g., coastal zones, floodplains) retrofitted or constructed to be climate-resilient.
(ii) To conserve climate-sensitive natural tourism assets	(ii) Targeted conservation and restoration measures implemented to protect vulnerable natural assets such as beaches and coral reefs.
Summary of Adaptation Actions: 1. Invest in climate-resilient infrastructure in key tourism areas, including all-weather access roads, resilient water and energy systems for lodges, and coastal protection for beach resorts. 2. Develop and test disaster preparedness and response plans for tourism hotspots, with clear coordination between public and private sector bodies. 3. Implement nature-based solutions, such as beach nourishment and coral reef restoration, to protect coastal tourism assets. 4. Promote the adoption of renewable energy and water conservation technologies within tourism facilities to reduce their environmental footprint and operational risks.	
Scope:	
Scope	Physical Infrastructure, Nature-based Solutions, Disaster Risk Management, Green Technology
Geographic Coverage	Key tourism hotspots in Tanzania Mainland, particularly coastal areas and protected areas.
Total Indicative Cost	USD 199,690,313
Targeted Beneficiaries	Tourism operators, hotel and lodge owners, protected area authorities, tourists.
Lead Institution(s)	Ministry of Natural Resources and Tourism
Supporting Agency/Institutions	Ministry of Works and Transport, private sector tourism associations, TANAPA, TAWA.

7.2.2 Sector-Specific Adaptation Programmes for Zanzibar

(a) Agriculture and Livestock

The agriculture and livestock sector has two prioritized adaptation programmes, addressing several adaptation options that underscore a comprehensive approach to addressing climate-induced vulnerabilities in coastal, farming, and pastoral systems. For agriculture, top priorities include construction of embankments and seawalls in cropland areas of Unguja, Pemba, and adjacent islets to counter saltwater intrusion and coastal flooding, alongside promoting drought-tolerant crops such as cassava, bananas, and cloves to enhance resilience in coral rag and spice farming systems. The adoption of water-saving irrigation technologies, including

alternate wetting and drying (AWD) and drip irrigation, is highlighted as vital to address drought and erratic rainfall, while mangrove restoration and other nature-based solutions are proposed as long-term adaptation interventions against sea-level rise and storm surges.

Additionally, adjusting planting calendars supported by early warning and extension services is identified as a short-term measure to manage rainfall variability and heat stress. In the livestock sector, options prioritize research and adoption of climate-resilient breeds to withstand heat stress and disease, strengthening surveillance and vaccination programs to curb outbreaks, and introducing rainwater harvesting and solar-powered boreholes in drought-prone areas such as Micheweni. Further adaptation options include promoting drought-tolerant fodder and silage to reduce feed scarcity and improving poultry housing through shaded and ventilated structures to address heat stress. These adaptation intervention options foster long- term resilience under specific climate hazards while reflecting on sustaining food security and rural livelihoods.

Programme AGL-Z1: Coastal Agriculture Protection and Salinity Management	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly targets the risks of coastal flooding and saltwater intrusion into croplands. It addresses the high vulnerability of low-lying coastal farming systems, particularly rice paddies, to sea-level rise and storm surges.	
Objective	**Expected Outcomes**
(i) To protect coastal croplands from flooding and saltwater intrusion.	(i) Priority coastal farming areas in Zanzibar are protected by embankments, seawalls, and improved drainage systems.
(ii) To promote salinity-tolerant agricultural practices.	(ii) Widespread adoption of salt-tolerant crop varieties and improved soil and water management practices in salinity-affected areas.
Summary of Action 1. Construct and rehabilitate protective infrastructure such as embankments and seawalls in vulnerable coastal cropland areas of Zanzibar. 2. Promote the adoption of salt-tolerant crop varieties (e.g., rice, cassava) and integrated soil fertility management to improve productivity in saline soils. 3. Implement nature-based solutions, such as mangrove restoration, as a first line of defense to reduce wave energy and coastal erosion in agricultural zones. 4. Strengthen extension services to provide farmers with technical advice on salinity management and climate-resilient coastal farming practices.	
Scope	Physical Infrastructure, Agricultural Technology, Nature-based Solutions, Extension Services
Geographic Coverage	Low-lying coastal agricultural areas in Zanzibar
Total Indicative Cost	USD 500,810,625
Targeted Beneficiaries	Smallholder farmers in coastal areas, particularly rice farmers.
Lead Institution(s)	Ministry of Agriculture, Irrigation and Livestock (Zanzibar)
Supporting Agency/Institutions	Ministry of Infrastructure, Communications and Transport, Ministry of Blue Economy and Fisheries.

Programme AGL-Z2: Climate-Resilient Spice, Horticulture, and Livestock Production	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme targets the risks of reduced yields and quality in spice and horticultural crops due to altered rainfall patterns and heat stress. It also addresses the risks of heat stress and disease in livestock. It tackles the vulnerability of smallholder farmers who rely on these climate-sensitive products for their income.	
Objective	**Expected Outcomes**
(i) To enhance the resilience of spice and horticultural production.	(i) Widespread adoption of climate-resilient practices, including water-saving irrigation, drought-tolerant varieties, and improved crop management.
(ii) To build a climate-resilient livestock sector.	(ii) Reduced livestock mortality and improved productivity through the adoption of climate-resilient breeds, improved housing, and better disease management.
Summary of Action 1. Promote the adoption of water-saving irrigation technologies, such as drip irrigation, for spice and horticultural crops. 2. Support research and dissemination of drought-tolerant and heat-resistant crop varieties (e.g., cloves, cassava, bananas) and livestock breeds. 3. Strengthen disease surveillance and vaccination programs for livestock to control outbreaks of climate-sensitive diseases. 4. Promote improved poultry housing and other livestock management practices (e.g., shaded structures, improved ventilation) to mitigate heat stress. 5. Adjust planting calendars and provide early warning information to help farmers manage rainfall variability and heat stress. 6. Promote drought-tolerant fodder and silage to reduce feed scarcity during dry periods.	
Scope	Capacity Building, Technology Development and Transfer, Climate Information Services, Institutional Strengthening, Gender Mainstreaming
Geographic Coverage	Tanzania Mainland, with a focus on drought-prone central regions and flood-prone riverine zones.
Total Indicative Cost	USD 300,486,375
Targeted Beneficiaries	Smallholder farmers, agricultural extension officers, rural communities, farmer cooperatives, women and youth groups.
Lead Institution(s)	Ministry of Agriculture, Irrigation and Livestock
Supporting Agency/Institutions	Tanzania Meteorological Authority (TMA), Ministry of Water, President's Office – Regional Administration and Local Government (PO-RALG), Tanzania Agricultural Research Institute (TARI).

(b) Fisheries and Aquaculture

The fisheries and aquaculture sector in Zanzibar highlights three adaptation options as sustainable management of community-based marine protected areas (CMPAs), integrated

early warning systems, and restoration of critical fish habitats and other high commercial species. These prioritized adaptation options emphasize the need for ecosystem restoration, coastal protection, and nature-based solutions to deal with climate hazards in Zanzibar.

Programme FI-Z1: Sustainable Fisheries and Climate-Smart Aquaculture in Zanzibar	
Climate Risks and Vulnerabilities Addressed: The programme addresses the risk of climate change impacts on fish stock and diversity, marine ecosystems and aquaculture systems including seaweed farming. It tackles the economic vulnerability of key fisheries and aquaculture systems (small pelagic, crustacean, sea cucumbers and seaweed farming, and gleaning including women), by promoting sustainable capture fisheries, and diversified livelihoods through aquaculture, which can be more resilient to certain climate impacts.	
Objective	**Expected Outcomes**
(i) To enhance the sustainability of capture fisheries.	(i) Strengthened community-based fisheries management and a reduction in illegal and destructive fishing practices.
(ii) To enhance climate-smart aquaculture sector.	(ii) A significant increase in aquaculture production, particularly of high-value and climate-resilient species like seaweed and sea cucumbers.
Summary of Actions: 1. Strengthen community-based fisheries co-management through institutions like Shehia Fisheries Committees (SFCs) to improve local governance and enforcement against illegal fishing. 2. Promote the adoption of climate-smart fishing gear and practices to reduce bycatch and damage to sensitive habitats and integration of early warning systems for marine climate hazards. 3. Promote and scale up climate-resilient fishing, aquaculture and mariculture through critical fish habitat restoration, improved seaweed farming techniques and diversification into species like sea cucumbers and finfish. 4. Provide training and extension support to small-scale fishers and aquaculture farmers on sustainable practices, value addition, and business management.	
Scope	Sustainable Fisheries and aquaculture Management, Livelihood Diversification, Capacity Building
Geographic Coverage	Coastal communities across Zanzibar.
Total Indicative Cost	USD 299,852,438
Targeted Beneficiaries	Artisanal fishers, women gleaners, seaweed farmers (predominantly women), aquaculture farmers and entrepreneurs.
Lead Institution(s)	Ministry of Blue Economy and Fisheries (Zanzibar)
Supporting Agency/Institutions	Zanzibar Fisheries and Marine Resources Institute (ZAFIRI), CSOs, FVPO, State University of Zanzibar

(c) Water

Zanzibar outlines key adaptation options for enhancing resilience in the water sector, with a strong focus on inclusivity, sustainability, and innovation. The highest priority is the creation of a climate adaptation fund to support water infrastructure, followed by developing blended

finance models that combine public and private resources for resilience. Social inclusion is emphasized through ensuring disability-friendly access points, offering inclusive training programs, and empowering women and youth in water governance. Further measures include improving financial access for marginalized groups, integrating the water sector into early warning systems, and establishing community-based flood response plans. Building capacity is also central, with training for local water committees and strengthening institutional governance. In addition, technical measures such as research on climate-resilient technologies, development of vulnerability maps, smart water monitoring, and the promotion of solar-powered desalination highlight the importance of innovation in adaptation. Together, these options aim to create a more equitable, climate-resilient, and sustainable water system for Zanzibar.

Programme WA-Z1: Freshwater Security and Saline Intrusion Management	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme targets the severe risk of freshwater salinisation due to sea-level rise and the risk of water shortages from drought and erratic rainfall. It addresses the high vulnerability of a population almost entirely dependent on fragile groundwater resources.	
Objectives	**Expected Outcomes**
(i) Protect groundwater resources from saline intrusion.	(i) Improved monitoring and management of groundwater abstraction to prevent over-extraction and control the advance of saltwater.
(ii) Augment and diversify water supply sources.	(ii) Increase water availability through large-scale rainwater harvesting and identifying alternative technologies like desalination.
Summary of Adaptation Actions: 1. Strengthen the monitoring and regulation of groundwater abstraction to prevent over-extraction, particularly in coastal zones. 2. Implement managed aquifer recharge schemes to enhance groundwater replenishment. 3. Scale up rainwater harvesting at household, community, and institutional levels. 4. Promote research and piloting of climate-resilient water technologies, such as solar-powered desalination, in highly vulnerable areas. 5. Establish a climate adaptation fund and develop blended finance models to support investment in resilient water infrastructure. 6. Ensure water access points are disability-friendly and design inclusive water management training programs to address social inclusion.	
Scope	Water Resource Management, Physical Infrastructure, Technology and Innovation, Financial Mechanisms
Geographic Coverage	Nationwide in Zanzibar, with a focus on coastal areas and water-stressed regions.
Total Indicative Cost	USD 1,000,000,000
Targeted Beneficiaries	The entire population of Zanzibar, Zanzibar Water Authority (ZAWA), local water committees.
Lead Institution(s)	Ministry of Water, Energy and Minerals (Zanzibar)
Supporting Agency/Institutions	Zanzibar Water Authority (ZAWA), Department of Environment.

(d) Coastal and Marine

The main adaptation programmes for the coastal and marine environment sector in Zanzibar are presented below, with the focus on marine spatial planning, restoration and conservation of the ecosystem, institutional coordination, early warning systems as well as policy and regulatory frameworks. The top priority is to develop and implement a marine spatial plan (MSP) that includes climate-sensitive indicators to guide sustainable management of marine and coastal areas. This is followed by programs for ecosystem resilience, such as coastal reforestation and protection, which help reduce the impacts of storm surges and saltwater intrusion. Other important measures include climate risk mapping to identify vulnerable coastal infrastructure and croplands, as well as raising community awareness and education to close knowledge gaps about adaptation to the impacts of climate change.

Programme CM-Z1: Coastal Communities and Marine Ecosystems Resilience	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly targets acute risks of sea-level rise, intensified storms, ocean warming and marine heatwaves, saltwater intrusion, and accelerated coastal erosion. It addresses the high vulnerability of coastal populations, critical infrastructure (ports, roads) and habitats (coral reefs, seagrasses, mangroves, dunes, beaches), and economic assets (tourism, heritage sites).	
Objectives	**Expected Outcomes**
(i) To strengthen institutional capacity and governance for integrated coastal resilience.	(i) Enhanced policy frameworks, inter-agency coordination, and technical capacity for integrated coastal resilience planning, management and implementation.
(ii) To enhance coastal protection through a hybrid of ecosystem-based and engineered solutions.	(ii) Ecosystem-based Adaptation (EbA) scaled up, with over 5,000 hectares of critical coastal wetlands (mangroves, seagrass) and coral reefs under restoration or sustainable management to enhance natural buffering against climate impacts
(iii) To strengthen community adaptive capacity and improve preparedness.	(iii) Increased adoption of climate-resilient livelihoods and improved access to community-friendly early warning systems for extreme climate events.
Summary of Adaptation Actions: 1. Strengthen institutional governance through the establishment of a multi-agency coordination platform and the enforcement of regulatory frameworks for resilient coastal development. 2. Conduct detailed multi-hazard risk and vulnerability mapping for all coastal districts, including marine and critical assets such as dunes and beaches to guide evidence-based planning, and investment prioritization and effective adaptation. 3. Implement large-scale restoration and protection of degraded mangroves, seagrass, coral reef systems, dunes and beaches to serve as natural buffers. 4. Construct and reinforce integrated resilient infrastructure, including seawalls, groynes, dykes, and drainage systems, in high-risk zones, integrating nature-based solutions where feasible. 5. Diversify livelihoods through climate-smart agriculture, aquaculture, eco-tourism, and other blue economy enterprises, with a focus on women and youth. 6. Establish and operationalize mobile-enabled, community-friendly early warning systems for coastal hazards, integrated with national platforms and local response plans.	

7. Develop and roll out Marine Spatial Planning (MSP) with climate-sensitive indicators to guide sustainable coastal and marine ecosystems management.	
Scope	Institutional Strengthening, Ecosystem-based Adaptation, Ecosystems Management, Resilient Infrastructure, Livelihood Diversification, Early Warning Systems
Geographic Coverage	The entire coastal zones of Unguja and Pemba islands, Zanzibar.
Total Indicative Cost	USD 2,500,000,000
Targeted Beneficiaries	Over 500,000 people in vulnerable coastal communities, government agencies, local authorities, with a focus on women and youth.
Lead Institution(s)	First Vice President's Office (Zanzibar), Ministry of Blue Economy and Fisheries (MBEF)
Supporting Agency/Institutions	Ministry of Infrastructure, Communications and Transport, Ministry of Agriculture, Irrigation, Natural Resources and Livestock, Ministry of Tourism and Heritage, State University of Zanzibar

Programme CM-Z2: Economic Benefits of Blue Carbon Resources and Marine Biodiversity Credits	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme directly targets acute risks of sea-level rise, intensified storms, ocean warming and marine heatwaves, saltwater intrusion, and accelerated coastal erosion. It addresses the high vulnerability of coastal populations, critical infrastructure (ports, roads) and habitats (coral reefs, seagrasses, mangroves, dunes, beaches), and economic assets (tourism, heritage sites).	
Objective	**Outcome**
(i) To strengthen institutional and local community capacity for inclusive and gender-responsive blue carbon management and marine biodiversity credit system in Zanzibar.	(i) Enhanced technical expertise of government agencies, LGAs, and community organizations in blue carbon accounting, biodiversity credit valuation, MRV, and investment-ready project development.
(ii) To establish and operationalize innovative blue carbon trading and marine biodiversity credit mechanisms, and attract public and private investment.	(ii) At least two finance-ready pilot projects designed and implemented in Zanzibar, generating verified blue carbon credits AND/OR marine biodiversity credits, and attracting significant public and private sector investment.
(iii) To integrate the economic value of blue carbon and marine biodiversity into Zanzibar's national development planning and policy frameworks.	(iii) Comprehensive blue carbon and marine biodiversity data and considerations fully integrated into Zanzibar's key development plans, environmental policies, and contributions to national GHG inventories and NDC reporting and National Biodiversity Strategies and Action Plans (NBSAPs).
Summary of Adaptation Actions: 1. Strengthen institutional, technical, and community capacity for blue carbon management, including carbon accounting and MRV, tailored to the Zanzibar context.	

2. Establish and operationalize blue carbon trading, marine credits and investment mechanisms, including piloting community-led carbon credit projects in high-potential areas in Unguja and Pemba. 3. Implement large-scale restoration and protection of degraded blue carbon and marine biodiversity ecosystems (mangroves, seagrasses, coral reefs) as part of carbon and marine biodiversity credits projects. 4. Integrate blue carbon knowledge, data, and monitoring into Zanzibar's planning, policy systems, and the Blue Economy Agenda.	
Scope	Innovative Finance, Carbon Markets, Marine Biodiversity Credits, Ecosystem Services and Restoration, Institutional Capacity Building, Policy Integration, Community Livelihoods
Geographic Coverage	Coastal ecosystems across Unguja and Pemba islands including small islets of Zanzibar, with high blue carbon marine biodiversity potential
Total Indicative Cost	USD 500,000,000
Targeted Beneficiaries	Coastal communities in Zanzibar, CBOs, government agencies, private sector investors, marine conservation agencies, hotel industry.
Lead Institution(s)	First Vice President's Office (Zanzibar), Ministry of Blue Economy and Fisheries, Ministry of Agriculture, Irrigation, Natural Resources and Livestock
Supporting Agency/Institutions	Ministry of Tourism and Heritage, State University of Zanzibar, Institute of Marine Science, ZAFIRI, ZIPA, President's Office, Finance and Planning

(e) Wildlife

Zanzibar's wildlife sector faces growing threats from climate-induced stressors like drought, habitat degradation, sea-level rise, and escalating human-wildlife conflict, which severely impact key species like endemic primates and coastal birds. The primary adaptation strategy is integrated habitat restoration, notably of mangroves and forest corridors, driven by community-based initiatives to combat habitat loss and sea-level rise. Other crucial adaptation priorities include integrated water resource management to address the most frequently reported hazards of drought and water scarcity, formalizing local ecological knowledge into conservation planning, and introducing co-management and policy actions to mitigate human-wildlife conflict caused by resource scarcity. Ultimately, the comprehensive plan emphasizes habitat protection, conflict reduction, the promotion of ecotourism, and the development of species-specific conservation plans for long-term resilience.

Programme WL-Z1: Conservation of Climate-Vulnerable Island Ecosystems and Wildlife	
Climate Risks and Vulnerabilities Addressed: The programme targets the risks of habitat degradation from altered rainfall patterns and drought, as well as increased human-wildlife conflict as resources become scarcer. It addresses the vulnerability of isolated island ecosystems with limited capacity for species migration.	
Objectives	**Expected Outcomes**
(i) To build climate resilience across critical wildlife habitats	(i) Key protected areas and forest reserves (e.g., Jozani, Ngezi) have enhanced resilience through habitat restoration and improved management.
(ii) To manage human-wildlife conflict through climate-resilient practices	(ii) A reduction in conflict incidents between communities and wildlife through the implementation of effective climate mitigation measures.
Summary of Actions: 1. Implement restoration and conservation initiatives for degraded habitats within and outside protected areas, focusing on native species and ecosystem connectivity. 2. Enhance the climate resilience of water sources for wildlife within protected areas to mitigate the impacts of drought. 3. Strengthen the management of protected areas by integrating climate change considerations into park management plans. 4. Implement community-based human-wildlife conflict mitigation measures to promote coexistence.	
Scope	Biodiversity Conservation, Habitat Restoration, Protected Area Management, Community Engagement
Geographic Coverage	Key protected areas and biodiversity hotspots in Unguja and Pemba, Zanzibar.
Total Indicative Cost	USD 199,690,313
Targeted Beneficiaries	Conservation authorities, local communities adjacent to protected areas, endemic wildlife populations.
Lead Institution(s)	Ministry of Agriculture, Irrigation and Livestock (Department of Forestry and Non-Renewable Natural Resources
Supporting Agency/Institutions	Ministry of Tourism and Heritage

(f) Infrastructure and Human Settlements

Zanzibar prioritizes three adaptation programmes for the infrastructure and human settlements sector. The programmes focus primarily on the integration of structural resilience, climate-responsive planning, and strengthening institutions. Key adaptation measures suggested include the expansion of climate-resilient drainage systems in urban centres, including the reinforcement of coastal defences at critical ports such as Malindi, Wete, Mangapwani, and Mkoani to address risks from flooding, sea-level rise, and storm surges. Other adaptation options focus on integrating waste management into flood risk reduction and scaling up

household rainwater harvesting. These adaptation options address both drought and runoff, and promote drought-resistant crops alongside improved rural road networks to enhance food and livelihood security. Urban resilience is further proposed through greening initiatives and passive cooling designs to address extreme heat, coupled with the improvement of occupational safety standards for outdoor workers. Long-term cultural and socio-economic sustainability is suggested through the conservation of Stone Town's heritage assets against climate risks. Key foundational reforms highlight the need to strengthen the capacity of local government for climate planning and mainstream adaptation considerations into housing and settlement development.

Programme IHS-Z1. Climate-Resilient Urban, Port, and Transport Infrastructure	
Climate Risks and Vulnerabilities Addressed: The programme targets the high risks of flooding, storm surge damage, and coastal erosion to ports, roads, and urban drainage systems. It addresses the vulnerability of infrastructure located in low-lying coastal zones and designed without consideration for future climate change.	
Objective	**Expected Outcomes**
(i) To enhance the resilience of urban infrastructure.	(i) Expanded and climate-resilient drainage systems in major urban centers, significantly reducing flood risk.
(ii) To secure critical port and transport infrastructure.	(ii) Key ports (e.g., Malindi, Wete, Mkoani) and coastal roads reinforced and protected against sea-level rise and storm surges.
Summary of Actions: 1. Expand and upgrade climate-resilient drainage systems in urban centers like Zanzibar City. 2. Reinforce and elevate coastal defenses and infrastructure at critical ports, including Malindi, Wete, Mwangapwani, and Mkoani. 3. Climate-proof key coastal roads and bridges to ensure connectivity during and after extreme weather events. 4. Integrate climate risk assessments into the planning and design of all new infrastructure projects.	
Scope	Physical Infrastructure, Engineering, Urban Planning, Coastal Defense
Geographic Coverage	Major urban centers and key port and transport corridors in Unguja and Pemba, Zanzibar.
Total Indicative Cost	USD 2,000,000,000
Targeted Beneficiaries	Urban residents, port authorities, transport sector operators, businesses.
Lead Institution(s)	Ministry of Infrastructure, Communications and Transport (Zanzibar)
Supporting Agency/Institutions	Ministry of Lands, Housing, Water and Energy, Zanzibar Municipal Council.

Programme IHS-Z2: Climate Adaptation for Cultural Heritage and Stone Town	
Climate Risks and Vulnerabilities Addressed: The programme targets the risks of sea-level rise, coastal flooding, storm surges, and intense rainfall, which threaten the foundations, walls, and drainage systems of Stone Town's historic buildings. It addresses the vulnerability of ancient structures built with traditional materials that are susceptible to water damage and decay.	
Objective	**Expected Outcomes**
(i) To protect Stone Town's physical infrastructure from climate impacts.	(i) Critical coastal defenses protecting Stone Town reinforced, and drainage systems within the town upgraded to manage intense rainfall.
(ii) To integrate climate resilience into heritage management.	(ii) Climate-resilient conservation guidelines and practices developed and applied in the management and restoration of historic buildings.
Summary of Actions: 1. Construct and reinforce coastal defenses, including seawalls and breakwaters, to protect the Stone Town seafront from erosion and storm surges. 2. Upgrade the historic drainage system within Stone Town to improve its capacity to handle intense rainfall and prevent flooding. 3. Develop and apply climate-resilient conservation techniques and materials for the restoration of historic buildings, addressing issues like rising damp and material decay. 4. Strengthen the capacity of the Stone Town Conservation and Development Authority (STCDA) to integrate climate risk management into heritage site planning and operations.	
Scope	Cultural Heritage Conservation, Coastal Engineering, Urban Drainage, Specialized Capacity Building
Geographic Coverage	Stone Town, Zanzibar, and other key cultural heritage sites.
Total Indicative Cost	USD 500,000,000
Targeted Beneficiaries	Residents and businesses in Stone Town, tourism sector, heritage conservation authorities.
Lead Institution(s)	Ministry of Tourism and Heritage (Zanzibar), Ministry of Infrastructure, Communications and Transport
Supporting Agency/Institutions	Stone Town Conservation and Development Authority (STCDA), UNESCO.

Programme IHS-Z3: Climate-Resilient Building and Land Use Planning	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme addresses the risk of creating new vulnerable assets through construction in hazard-prone areas or with inadequate standards. It addresses the institutional vulnerability of outdated or poorly enforced building codes and land-use plans that fail to account for climate change.	
Objectives	**Expected Outcomes**

(iii) To establish a climate-resilient regulatory framework for the built environment.	(iii) National building codes and land use planning regulations were updated to incorporate climate resilience standards and effectively enforce them.
(iv) To enhance capacity for resilient planning and construction.	(iv) Enhanced capacity of local government authorities, planners, and construction professionals to apply and enforce climate-resilient standards.
Summary of Adaptation Actions: 1. Prepare and develop the national building codes to incorporate standards for resilience to floods, high winds, and extreme heat. 2. Strengthen the enforcement mechanisms for building codes and land use plans at the local government level. 3. Develop and disseminate climate risk and hazard maps to guide land use planning and development decisions. 4. Implement capacity-building and certification programmes for architects, engineers, and construction workers on climate-resilient building practices. 5. Integrate climate risk into land-use planning in Zanzibar.	
Scope	Policy and Regulation, Institutional Strengthening, Capacity Building, Enforcement.
Geographic Coverage	Nationwide
Total Indicative Cost	USD 100,162,125
Targeted Beneficiaries	Local government authorities, construction industry professionals, regulatory bodies, and the general public.
Lead Institution(s)	Ministry of Lands and Housing Development.
Supporting Agency/Institutions	PO-RALGSD, Ministry of Infrastructure, Communications and Transport (Zanzibar), Zanzibar Building Agency, Zanzibar Housing Corporation, Commission for Lands Engineers Registration Boards, Ardhi University.

(g) Health

Zanzibar identifies one adaptation programme for the health sector, mainly focusing on three adaptation options: climate-resilient health infrastructure; disaster preparedness and response (Health surveillance and early warning systems); and Water, Sanitation, and Hygiene (WASH). They address vulnerabilities in the health sector such as climate-sensitive disease outbreaks, infrastructure fragility, and water insecurity. The adaptation options aim to improve health facilities, services, and community resilience to climate risks. Priority measures include upgrading health facilities and drainage systems to withstand floods and strong winds while also deploying rapid response teams and climate-sensitive disease surveillance to address

outbreaks linked to floods and drought. Improvement in water purification and sanitation systems, together with promoting safe hygiene practices, are emphasized to reduce health risks from floods and sea level rise. In addition, mobile clinics and community health worker networks are proposed to improve access to health care in vulnerable areas. Long-term options include developing early warning systems that connect climate forecasts with health risks, disaster preparedness and response while ensuring health services during climate-related disruptions.

Programme HE-Z1: Resilient Public Health and WASH Services	
Climate Risks and Vulnerabilities Addressed: The programme targets the risks of climate-sensitive disease outbreaks (cholera, dengue) and the disruption of health services due to facility damage or water contamination. It addresses the vulnerability of the health system to climate shocks, particularly in flood-prone and water-scarce areas.	
Objectives	**Expected Outcomes**
(i) To strengthen surveillance and response to climate-sensitive diseases.	(i) A functional climate-sensitive disease surveillance system that provides early warning for potential outbreaks.
(ii) To enhance the resilience of health facilities and WASH services.	(ii) Priority health facilities upgraded to withstand floods and strong winds, with reliable access to safe water and sanitation.
Summary of Adaptation Actions: 1. Upgrade health facilities and their drainage systems to withstand floods and strong winds. 2. Deploy rapid response teams and strengthen climate-sensitive disease surveillance to address outbreaks linked to floods and drought. 3. Strengthen water purification and sanitation systems in communities and health facilities, and promote safe hygiene practices to reduce health risks from floods and sea-level rise. 4. Develop early warning systems that connect climate forecasts with health risks to improve preparedness.	
Scope	Physical Infrastructure, Public Health, Capacity Building, WASH
Geographic Coverage	Nationwide, Focusing on healthcare facilities in high-risk flood and drought-prone areas.
Total Indicative Cost	USD 300,662,426
Targeted Beneficiaries	Patients, health workers, health facility managers, communities.
Lead Institution(s)	Ministry of Health
Supporting Agency/Institutions	PO-RALG, Ministry of Water, Ministry of Energy.

(h) Tourism;

Zanzibar's tourism sector is vulnerable to climate change due to its reliance on coastal ecosystems, cultural heritage sites, and unpredictable weather patterns. This foundation is directly threatened by rising sea levels, coastal erosion, and extreme weather events, which damage critical infrastructure, degrade beaches and biodiversity, and endanger the safety of

both tourists and workers. Additional risks, such as coral bleaching and declining marine life, further jeopardize core activities like diving and ecotourism.

To address these threats, Zanzibar outlines one adaptation programme, with a number of prioritized adaptation options for the tourism sector. Immediate priorities focus on hardening climate resilient infrastructure in key areas like Stone Town, Northeast Unguja, and historic sites in Pemba (Mkama Ndume and Ndagoni). This involves constructing seawalls, improving drainage, reinforcing buildings, and adopting nature-based solutions to combat sea level rise and erosion. Restoration of coral reef aim to reduce the sector's climate sensitivity by restoring critical ecosystems like coral reefs and diversifying tourism products through inland cultural tourism and marine heritage. Further adaptation options aim to build climate-resilient coastal and marine safari programs that enhance livelihoods and enhance opportunities for blue economy. These prioritized adaptation options emphasize the integration of climate-resilient infrastructure in tourism sector, ecosystem restoration, and livelihood diversification to strengthen the sector's capacity to withstand the impacts of climate change.

Programme TO-Z1: Sustainable and Resilient Tourism Development	
Climate Risks and Vulnerabilities Addressed: The programme targets the risks of beach erosion, coral bleaching, and damage to coastal tourism infrastructure. It addresses the economic vulnerability of a sector heavily dependent on climate-sensitive assets and the vulnerability of coastal communities reliant on tourism-related employment.	
Objectives	**Expected Outcomes**
(i) To promote climate-resilient tourism infrastructure and assets	(i) Key tourism infrastructure in high-risk areas protected through a combination of engineered and nature-based solutions.
(ii) To promote climate resilient tourism products	(ii) Increased investment in and promotion of diversified tourism products (e.g., inland cultural tourism, marine heritage) and sustainable operational practices.
Summary of Actions: 1. Harden critical tourism infrastructure in key areas like Stone Town and Northeast Unguja through seawalls, improved drainage, and building reinforcement. 2. Implement nature-based solutions, such as coral reef and mangrove restoration, to protect coastal tourism zones and enhance their ecological appeal. 3. Diversify tourism offerings by developing and promoting inland cultural tourism and marine heritage preservation to reduce pressure on coastal ecosystems. 4. Establish advanced early warning systems for tourism safety to protect visitors and local communities from storms and flooding.	
Scope	Infrastructure Resilience, Nature-based Solutions, Product Diversification, Early Warning Systems
Geographic Coverage	Key tourism zones across Unguja and Pemba, Zanzibar.
Total Indicative Cost	USD 400,286,250
Targeted Beneficiaries	Tourism operators, hotel owners, local communities, tourists.
Lead Institution(s)	Ministry of Tourism and Heritage (Zanzibar)

Supporting Agency/Institutions	Ministry of Infrastructure, Communications and Transport, Ministry of Blue Economy and Fisheries.

7.3 Cross-cutting Adaptation Programme

Analysis of the cross-cutting adaptation options reveals a consistent, foundational need across all sectors in both Mainland Tanzania and Zanzibar for strengthened capacity, enhanced technology and research, improved disaster risk management, and enhanced gender-responsive and social inclusive. While these elements are embedded within sectoral programmes, a dedicated national programme is required to build the core enabling environment and provide the public good services that underpin all adaptation efforts. This programme aims to build the foundational human, institutional, and technical capacity for climate resilience across Tanzania. It will strengthen the generation, translation, and application of climate information and research; enhance national and local disaster risk management systems; and implement a coordinated national capacity development strategy for climate adaptation.

Programme CC-M1: National Climate Services, Research, and Capacity Development	
Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: The programme targets Information gaps hindering climate adaptation, Limited access to climate services, and poor coordination in early warning and response.	
Objectives	**Expected Outcomes**
(i) To strengthen national climate information and research systems.	(i) An enhanced national climate monitoring network and a user-driven climate services portal providing tailored information to all sectors.
(ii) To enhance national and local disaster risk management capacity.	(ii) A functional national multi-hazard early warning system (EWS) effectively linked to community-level preparedness and response plans.
(iii) To build human and institutional capacity for climate adaptation.	(iii) A coordinated national capacity-building programme implemented, strengthening the skills of children, youth, government officials, civil society, and the private sector to integrate climate resilience into their work
(iv) Ensure Gender-Responsive and Socially Inclusive Programme Delivery.	(iv) Increased equitable participation of women, youth, and other marginalized groups in program activities, decision-making, and the sharing of benefits
Summary of Adaptation Actions: 1. Strengthen Climate Information, Research, and Technology (Cross-Cutting - Technology & Research). 2. Enhance Disaster Risk Management (Cross-Cutting - DRM). 3. Integrate and Support Climate Change Education in Primary and Secondary Schools. 4. Conduct a Gender and Social Inclusion (GESI) Analysis.	
Scope	Climate Information Services, Research and Development, Disaster Risk Management, Institutional Strengthening, Capacity Building
Geographic Coverage	Nationwide
Total Indicative Cost	USD 349,985,664

Targeted Beneficiaries	National and local government agencies, Vocational Training Centres, sectoral ministries, research and academic institutions, civil society organizations, private sector, general public.
Lead Institution(s)	Vice President's Office (Environment), Prime Minister's Office (Disaster Management Department)
Supporting Agency/Institutions	Tanzania Meteorological Authority (TMA), PO-RALG, Ministry of Finance, Commission for Science and Technology (COSTECH), Research and Training Institutions.

Programme CC-M2: Transboundary Climate Resilience and Regional Cooperation

Climate Risks and Vulnerabilities Addressed by the Adaptation Actions: This programme addresses the systemic risks of maladaptation, resource conflict, and undermined national resilience resulting from uncoordinated responses to shared climate threats in transboundary ecosystems, water basins, and public health systems. It tackles the institutional vulnerability of planning in isolation and the missed opportunities for enhanced resilience and climate finance mobilization through regional collaboration.

Objectives	**Expected Outcomes**
(i) To integrate transboundary climate risks into national planning and diplomatic engagement.	(i) Enhanced technical and diplomatic capacity within key ministries to effectively negotiate and implement agreements on shared resources under climate change.
(ii) To leverage regional cooperation to enhance Tanzania's adaptive capacity.	(ii) Functional data-sharing protocols and joint early warning systems operational with neighboring countries for shared water basins, climate-sensitive diseases, and pests.
(iii) To increase access to international climate finance for large-scale adaptation.	(iii) A pipeline of bankable, multi-country adaptation projects developed and submitted to international climate funds, with at least two major regional projects funded by 2035.

Summary of Adaptation Actions:

1. Strengthen the technical and diplomatic capacity within the line ministries to effectively engage in transboundary water management negotiations.
2. Establish formal data and information-sharing protocols for shared water basins (hydrological data) and for early warning of climate-sensitive human and animal diseases and crop pests.
3. In collaboration with regional bodies and neighbouring countries, develop and fund joint, ecosystem-scale adaptation.
4. Strengthen Tanzania's technical and financial support to key regional institutions to enhance their capacity for regional climate risk management.

Scope	Institutional Strengthening, Regional Diplomacy, Data Sharing, Joint Project Development
Geographic Coverage	National institutions with a focus on engagement in all transboundary regions (EAC, SADC).
Total Indicative Cost	USD 449,461,688

Targeted Beneficiaries	Government ministries (Foreign Affairs, Water, Health, Livestock, Natural Resources), regional intergovernmental bodies, communities in border regions.
Lead Institution(s)	Vice President's Office (Environment), Ministry of Foreign Affairs and East African Cooperation.
Supporting Agency/Institutions	All sectoral ministries, Prime Minister's Office, PO-RALG, SADC and EAC Secretariats.

8. NAP IMPLEMENTATION AND FINANCING PLAN

8.1 Introduction

Effective implementation of the National Adaptation Plan (NAP) requires active participation and collaboration with key stakeholders. The stakeholders play a unique role in ensuring that NAP implementation is inclusive, actionable, and sustainable. This chapter presents key stakeholders for the implementation of the NAP for the United Republic of Tanzania, implementation and financing plan, covering a 10-year period from 2025 to 2035. The implementation plan is national in scope, encompassing both Mainland Tanzania and Zanzibar.

8.2 Implementation Plan

The section narrates on the overall plan to implement NAP. The plan is designed to guide and provide a roadmap to implementers and evaluators towards achieving the objectives of NAP while ensuring coordination, accountability and stakeholder's involvement. The chapter initially presents stakeholder's roles and responsibilities and further provides a detailed implementation plan which outlines the strategic interventions, key adaptation actions, monitoring indicators, and means of verification. It serves as both a planning tool and a monitoring framework to track progress and effectiveness of NAP toward a climate-resilient Tanzania. (Annex 2 - NAP Implementation Plan).

The NAP stakeholders represent government, developing partners, private sector, civil society, research and academic institution, local communities and media.

i) Vice President's Office and First Vice President's Office

The Vice President's Office (VPO) and the First Vice President's Office (FVPO) will take the leading role in the implementation of the NAP at the national level and beyond. They will be responsible for overall coordination, cooperation, and networking among stakeholders and various sectors, and will put in place the requisite enabling environment to enable implementation of the NAP.

In the mainland Tanzania, the VPO, Directorate of Environment (DoE) is responsible for effective implementation and coordination of climate change national efforts through the National Climate Change Steering Committee (NCCSC). Additionally, the National Climate Change Technical Committee (NCCTC) provides technical advice, coordinate actions of actors and broaden the participation of various actors in addressing climate change.

Further, The VPO-DoE works with climate change units in respective ministries, departments and agencies to ensure that climate change is mainstreamed in the respective sector development strategies and plans. It holds the overall mandate over all climate-related functions. The Environmental Management Act, Cap 191, establishes an institutional framework for environmental management in the country that include the climate change matters, and assigns roles for both the Central Government Sectors and the Local Government Authorities (LGAs).

In Zanzibar, the overall coordination of environmental management is mandated to the FVPO, Department of Environment. The Department's mandates include coordinating implementation of all matters related to climate change adaptation and mitigation. Zanzibar has also established a climate change governance framework comprising of Steering and Technical Committees that provide guidance on the Climate Change Policy and Strategy, the National Adaptation Plan of Action, and other climate change-related issues as defined under the UNFCCC and all its Protocols. The Committees are also responsible for oversight on implementation of the climate change policy, strategy, NAP, and other climate change programs in Zanzibar. This governance structure involves a wide range of actors and is guided by the Zanzibar Climate Change Strategy, forming the basis for NAP implementation.

ii) Prime Minister's Office

The office of the Prime Minister (Disaster Management Department) coordinates national climate-disaster risk management, policy, frameworks, and multi-level institutional arrangements in mainland Tanzania. Additionally, the office mainstreams climate-disaster risk reduction operations in Ministries, Departments, and Agencies (MDAs), particularly in sectoral bodies such as environment, agriculture, water, livestock, health, and infrastructure. The Prime Minister's Office also oversees the implementation of disaster risk reduction activities at Local Government Authorities (LGAs), districts, wards, and villages at the local level through disaster management committees.

In Zanzibar, climate-disaster roles are coordinated by the Zanzibar Disaster Management Commission (ZDMC) under the Second Vice President's Office (SVPO). The climate-disaster management roles of ZDMC unit are policy development and oversight, coordination of institutions and stakeholders, disaster preparedness, response and recovery, capacity-building, public awareness and information management, and resource mobilisation and financing. Disaster managements committees for mainland Tanzania and Zanzibar are therefore responsible in implementing NAP.

iii) Ministries Responsible for Finance and Planning

The President's Office (Planning and Investment), President's Office (Finance and Planning, Zanzibar), and Ministry of Finance-MoF (Mainland Tanzania) play an important role in financial resource mobilization and fund management for the implementation of the NAP. The Offices will be responsible for overseeing all climate related finance for the implementation of the NAP from local, multilateral and bilateral arrangements. They will monitor NAP finance flows from different sources to programs and projects undertaken by the VPO, FVPO, MDAs and LGAs.

iv) Sector Ministries, Departments and Agencies

The sector MDAs will play a leading role in the implementation of various adaptation options and their activities outlined in the NAP through their sectoral policies, plans, and programmes or projects. The leading sectors will collaborate with a number of other sector ministries and institutions, including the President's Office-Regional Administration and Local Government (PORALG), LGAs, Tanzania Meteorological Authority, Development Partners (DPs), Research and Academic institutions, NGOs/CBOs, Private sector, Media and Local communities. Under these mandates, VPO and FVPO will coordinate and monitor implementation of NAP adaptation programmes across MDAs. The MDAs will report annually to VPO and FVPO on the status and progress of integrating the prioritized NAP adaptation programmes into their sectoral strategies, action plans, and other implementation programs and projects.

v) National Environment Management Council (NEMC)

The NEMC, will play an important role on the enforcement of the NAP activities such as conducting the Environmental Impact Assessment (EIA) on the adaptation projects, Provides technical support and ensures environmental compliance of adaptation projects. The NEMC also, will facilitate the Monitoring and Evaluation to enhance climate adaptation activities.

vi) Local Government Authorities

Local Government Authorities (LGAs) are responsible for the implementation of adaptation interventions outlined in the NAP at the grassroots/local level. They are expected to ensure that their development plans and programmes align with various adaption options identified across priority sectors. The LGAs are expected to collaborate with MDAs, communities and other relevant stakeholders to ensure smooth implementation of the NAP at the local level. The VPO and FVPO are expected to efficiently coordinate LGAs and other stakeholders working in supporting the implementation of the NAP to ensure smooth cooperation and collaboration. The LGAs will report annually to VPO and FVPO on the status and progress of integrating the prioritized adaptation actions into their plans and programmes.

vii) Development Partners

Development partners and frameworks such as the Green Climate Fund (GCF), Global Environment Facility (GEF), United Nations Development Programme (UNDP), United Nations Disaster Risk Reduction (UNDRR), United Nations Environment Programme (UNEP), Adaptation Fund (AF), Climate Investment Funds (CIF), African Development Bank (AFDB), United Nations Capital Development Fund (UNCDF), IMF Resilience & Sustainability Facility (RSF), World Meteorological Organization (WMO) and other relevant financing institutions with interest in climate change will be approached for assistance to provide technical and financial resources for supporting implementation of the NAP. The assistance will be targeted mainly towards supporting implementation of various adaptation programmes across priority sectors.

viii) Frameworks

NAP implementation is anchored in a coherent set of frameworks that establish strategic direction, provide technical and financial support, and enable effective monitoring for climate adaptation and sustainable development. At the international level, the United Nations Framework Convention on Climate Change (UNFCCC) serves as the overarching global framework for coordinated climate action, guiding countries in developing and implementing national adaptation strategies. Complementing this, the Sendai Framework for Disaster Risk Reduction (SFDRR) provides a comprehensive global structure for reducing disaster risks and enhancing resilience to climate-induced hazards. Regionally, the East African Community (EAC) Climate Change Policy and Strategy acts as the guiding framework for harmonised adaptation efforts, cross-border collaboration, and coordinated regional responses to shared climate challenges. At the national level, the Tanzania Disaster Risk Reduction Framework operationalises these international and regional commitments by strengthening institutional capacity and embedding adaptation and resilience within local governance structures. These interconnected frameworks provide a strong and coherent foundation for advancing Tanzania's climate adaptation priorities, strengthening resilience, and promoting sustainable national development.

ix) Civil Society

Civil Society Organizations (CSOs) and Non-Governmental Organizations (NGOs) play an important role in climate change and adaptation. These are important stakeholders to collaborate and work together within the country. They provide useful information regarding the climate change and adaptation, conduct advocacy and awareness, research and provide other necessary resources for implementation of the NAP. In addition, they can provide financial support and technology needed for implementation of the NAP.

x) Private sector

The private sector, particularly financial institutions like CRDB Bank and NMB Bank are potential stakeholders, who have a stake in the NAP. They provide financial support to compliment the implementation of the NAP through their corporate social responsibility and sustainable finance instruments -green investments- such as green and social bonds, voluntary carbon markets, and blended finance. These financial institutions are called upon and encouraged to collaborate with the VPO and FVPO to mobilize financial resources to support the implementation of the NAP.

xi) Research and Academic Institutions

Research and training institutions play a critical role in the NAP, especially through generating knowledge, innovation, and skills needed to implement various adaptation programmes outline in the NAP. They are expected to build capacity on the ground through training, applied research in climate adaptation across sectors, and provide technical guidance and scientific input throughout NAP implementation.

xii) Local Communities

Local communities are at the frontline of the impacts of climate change. Their role in the NAP is central since they are primary actors in implementation of adaptation programmes and their activities at the grassroots or on the ground. They are active implementers of adaptation practices envisioned by the NAP.

xiii) Media

The media plays a pivotal role in climate adaptation through dissemination of climate information and raising awareness on climate change. It is a platform for advocacy, voices and dialogue about adaptation options and reporting activities of the NAP.

A summary of key NAP stakeholders' roles and responsibilities is presented in Table 8.1.

Table 8-1: Stakeholders roles and responsibilities for NAP implementation

Stakeholder	Roles and Responsibilities
The Vice President's Office-VPO and the First Vice President Office-FVPO	i) Provide overall coordination, technical leadership, guidance and advice on the implementation of the NAP. ii) Mobilize technical and financial resources from within and outside the country to support effective implementation of the NAP. iii) National level reporting
The Ministry of Finance-MoF (Mainland Tanzania) and President's Office-	i) Management of climate adaptation fund for NAP ii) Oversee flow of adaptation fund iii) Monitor climate adaptation grants, loans, and donor-supported finance

Stakeholder	Roles and Responsibilities
Finance and Planning-POFP (Zanzibar)	iv) Capacity development in finance and planning
The Prime Minister's Office	i) Coordinates the development and oversight of national climate-disaster risk management, policies, frameworks, and multi-level institutional arrangements ii) Oversees the development and implementation of climate disaster risk management at sectoral level iii) Implements and monitors climate-disaster risk reduction activities from the national to the local level through disaster management committees. iv) Conducts capacity building initiatives, public awareness campaigns and information management across sectors and at all government levels to effectively implement DRR measures v) Facilitates stakeholder coordination, resources mobilization and financing for climate and DRM.
The Second Vice-President's Office (SVPO-Zanzibar)	i) Policy development and oversight on climate-disasters ii) Institutions and Stakeholders coordination iii) Climate-disaster preparedness, response and recovery iv) Capacity-building, public awareness & information management v) Resource mobilisation and financing
Sector Ministries, Departments and Agencies (MDAs)	i) Mainstreaming climate issues into sectoral policies, strategies and plans. ii) Setting targets and allocating resources for implementation of climate adaptation priorities. iii) Set a conducive environment for Non-Governmental Organisations and the Private Sector to promote NAP implementation
National Environmental Management Council (NEMC) and Zanzibar Environmental Management Authority (ZEMA)	(i) Undertake and coordinate enforcement of the Environmental Management Acts. (ii) Enhance climate-related assessments. (iii) Facilitate Environmental Monitoring for enhancing climate adaptation.
Local Government Authorities (LGAs)	i) Mainstreaming climate issues into plans and programmes ii) Setting targets and allocating resources for implementation of climate adaptation programmes at local level. iii) Set a conducive environment for Non-Governmental Organisations and the Private Sector to promote NAP implementation
Development Partners	i) Support the government in implementing climate change initiatives through multilateral and bilateral arrangements. ii) Facilitate resource mobilization for adaptation, capacity building, and technology development and transfer iii) Provision of coordination and dialogue framework for involvement of multilateral and bilateral DPs.
Frameworks	i) Promote resilience building, risk reduction, and integration of adaptation into sustainable development planning. ii) Ensure long-term strategic direction for inclusive growth and climate-resilience.

Stakeholder	Roles and Responsibilities
	iii) Promote coordinated adaptation efforts, cross-border collaboration, and harmonization of climate actions. iv) Strengthen institutional capacity for risk management, early warning, and climate resilience.
Civil Societies (CSOs & NGOs)	i) Prioritize climate change adaptation into plans and programmes ii) Raise awareness, knowledge sharing, building capacity and conducting training on climate change across all levels. iii) Facilitate resource mobilization for implementation of NAP. iv) Advocating for policy change. v) Community engagement and involvement in adaptation actions. vi) Foster partnership and collaboration across other stakeholders.
Private sector	i) Facilitate sourcing of financial support for climate change adaptation actions. ii) Sharing expertise, innovations and technology. iii) Support the implementation of adaptation programmes across priority sectors. iv) Advocate for public-private dialogues to promote adaptation actions.
Research and Academic Institutions	i) Conduct research and disseminate findings on climate change issues to key stakeholders. ii) Raise awareness, knowledge sharing, building capacity and conducting training on climate change across all levels.
Local Community	i) Support the implementation of the NAP interventions at a local level/community. ii) Adopt and implement the recommended adaptation programmes and technologies in their localities. iii) Mobilize resources
Media	i) Awareness creation and public education ii) Advocacy and accountability iii) Knowledge sharing and stakeholder engagement

8.3 Financing Plan

The NAP financial plan is operationalized through a comprehensive implementation framework translating the nation's climate strategy into a costed and monitorable set of actions designed to build systemic resilience across all key sectors. The section provides details of domestic and international sources and further suggest financial resource mobilization strategies to implement national adaptation programmes developed across nine selected sectors.

8.3.1 Adaptation Finance Conceptualisation

Adaptation finance is described within the broad context of climate finance. It refers to the financial resources mobilised from public and private sources at domestic, regional, and international levels to support initiatives aimed at reducing the vulnerability of communities, ecosystems, and economic sectors to the adverse effects of climate change. Adaptation finance enables countries like Tanzania to enhance resilience, manage climate risks, and respond to current and projected climate-related shocks such as floods, droughts, sea-level rise, and biodiversity loss.

8.3.2 Sources of Adaptation Finance in Tanzania

Adaptation finance in Tanzania is mobilised from a mix of domestic and international sources, reflecting the multi-actor, multi-level nature of the climate finance architecture (Figure 8-1)

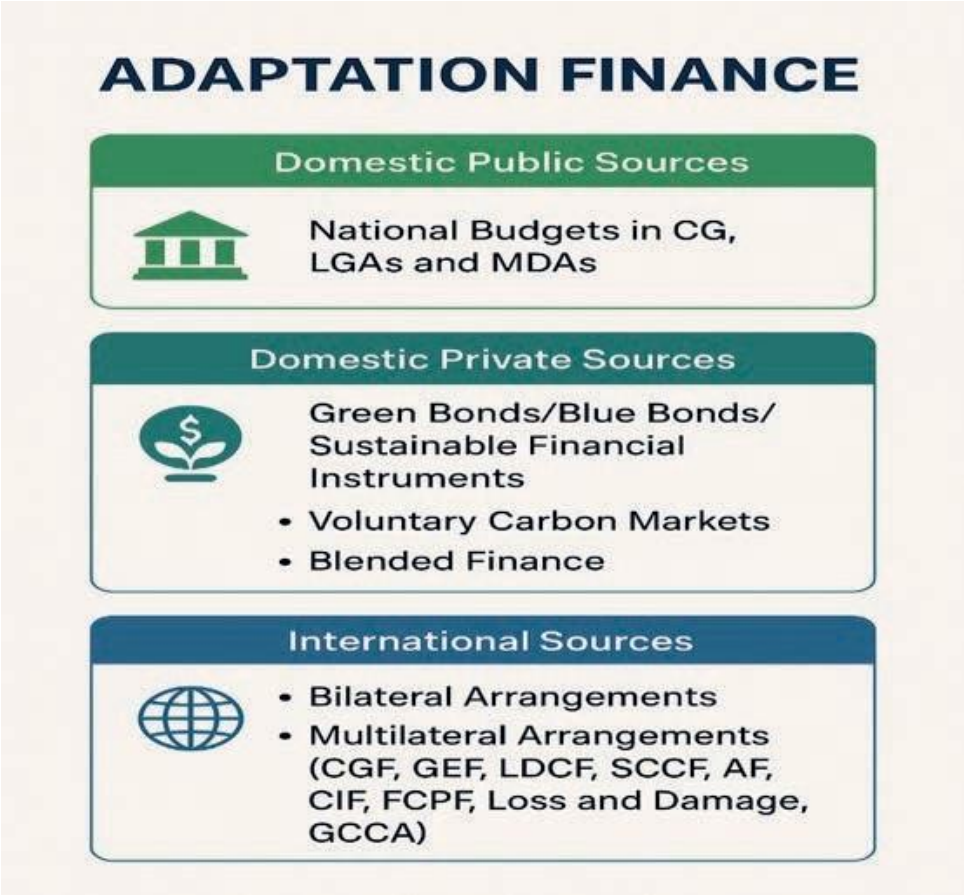

Figure 8-1: Adaptation Financing Architecture

i) Domestic Public Sources

This includes funds allocated in the budgets of the MDAs, Local Government Authorities (LGAs) and other government institutions. The budget allocation includes financing of adaptation-relevant interventions in sectors such as agriculture, livestock, health, tourism, fisheries, water, coastal and marine, wildlife and infrastructure. These allocations represent a foundational source of adaptation finance. The Ministry of Finance (MoF)- Dodoma and the President's Office- Finance and Planning (POFP)-Zanzibar are in a process to introduce climate finance tracking in budgets for MDAs. This system will help to track budgetary allocation and expenditure for climate change action, including adaptation initiatives.

Since climate finance tracking in the government budget has only been introduced recently, it is difficult to pinpoint how much funding is allocated for climate change interventions. However, climate finance in the government budget can be estimated from national planning frameworks such as the Five-Year Development Plan (FYDP III, 2021/22-2025/26) and Zanzibar Development Program (ZADEP 2021-2026). The Nationally Determined Contribution (NDC) of 2025 estimates that USD 48.606 billion will be needed to finance mitigation and adaptation initiatives over a ten-year period (2025-2035). The estimated cost

for adaptation interventions is USD 37.780 billion or USD 3.778 per year for a 10-year period. NDC financing comes from a mixture of domestic and international sources.

ii) Domestic Private Sources

Private sector participation is becoming central to climate finance in Tanzania, complementing limited public funds through instruments such as green bonds, voluntary carbon markets, and blended finance. Financial institutions and utilities including CRDB Bank, NMB Bank, and Tanga UWASA are raising climate aligned capital for adaptation related sectors such as water, agriculture, sanitation, and energy efficiency, signalling a growing shift toward sustainable private investment.

Green bonds and sustainable finance instruments mobilise capital for projects with environmental and social benefits by linking investment to clear performance standards and sustainability goals. Recent issues include CRDB's USD 68.3 million Kijani Green Bond, NMB's USD 30 million Jamii Sustainability Bond, and Tanga UWASA's USD 2.8 million Utility Green Bond, supporting climate smart agriculture, water management, renewable energy, and resilient infrastructure. Voluntary carbon markets generated about USD 13.4 million in 2024, with greater potential if governance and benefit sharing systems are strengthened.

Blended finance is attracting commercial capital for adaptation by reducing risk with concessional public funds. The Tanzania Agriculture Climate Adaptation Technology Deployment Programme combines USD 100 million from the Green Climate Fund with domestic co-financing to mobilise USD 200 million for smallholder resilience. Partnerships with IFC and FSD Africa that provide guarantees, anchor investments, and technical assistance have amplified the impact of green bonds, showing how catalytic capital and institutional readiness can scale private investment in climate adaptation.

Zanzibar's inaugural sub sovereign sukuk, issued in March to April 2025 and listed on the Dar es Salaam Stock Exchange in May 2025, showed strong investor demand with a profit rate around 10.5 percent and subscriptions above target. This demonstrated operational readiness for capital market fundraising. The same issuance infrastructure and disclosure practices can be adapted to a future blue bond with ring fenced use of proceeds and clear allocation and impact reporting for marine and coastal resilience.

iii) International sources

Tanzania mobilises substantial climate finance from international sources that complement domestic efforts to address mitigation and adaptation priorities. Key contributors include multilateral climate funds under the UNFCCC, international development banks, UN agencies, and bilateral partners. While UN agencies mainly provide technical support and catalytic grants, most concessional and non-repayable financing comes from multilateral financial institutions and targeted bilateral cooperation.

Through UNFCCC-affiliated mechanisms, Tanzania accesses major global funds such as the Green Climate Fund (GCF), the Global Environment Facility (GEF), the Least Developed Countries Fund (LDCF), the Special Climate Change Fund (SCCF), and the Adaptation Fund (AF). These funds provide grants, concessional loans, and guarantees to support climate-resilient infrastructure, ecosystem restoration, and low-emission development. The emerging Loss and Damage Fund is expected to strengthen national capacity to respond to irreversible climate impacts, including floods, droughts, and biodiversity loss.

Beyond the UNFCCC framework, Tanzania benefits from other multilateral initiatives such as the Climate Investment Funds (CIF), the Forest Carbon Partnership Facility (FCPF), and the Global Climate Change Alliance (GCCA). These mechanisms channel financing for renewable energy, sustainable forest management, and community resilience through partnerships with development banks and technical agencies. Tanzania has received about USD 1.1 billion in non-repayable funding and USD 7.98 billion in co-financing for 108 projects covering biodiversity, land restoration, pollution control, and capacity development.

In 2022, global adaptation finance amounted to about USD 76 billion, and from 2018 to 2022, approximately 92 per cent of adaptation flows were directed towards emerging and developing economies (CPI, 2024). The OECD reports that international donors provided USD 32.4 billion of adaptation finance to developing countries in 2022, indicating that roughly 40 to 45 per cent of the adaptation finance received by developing countries that year originated from international sources, with the remainder coming from domestic and other non-international sources (OECD, 2024). The same report warns that domestic adaptation finance is likely underestimated due to limited budget tagging, noting that only USD 4.1 billion from domestic governments was trackable between 2018 and 2022, and emphasising that domestic budgets are already the principal source in many developing countries.

8.3.3 Adaptation Finance Needs

The total cost of implementing the National Adaptation Program in Tanzania is estimated at USD 37 billion, comprising USD 28 billion for the Mainland Tanzania and USD 8.6 billion for Zanzibar. These cost estimates were developed through extensive consultative processes with sector experts, national institutions, and key stakeholders to ensure alignment with national development priorities and sectoral adaptation needs.

The estimated total adaptation finance needs for Mainland Tanzania amount to USD 28. billion, reflecting investment priorities across key economic and social sectors. The largest share is attributed to infrastructure (USD 8.8 billion), focusing on climate proofing of economic and social assets, resilient urban planning, and land use management. Agriculture follows with USD 6.1 billion, directed toward climate smart agriculture, irrigation modernization, and risk management. Other major allocations include water (USD 6 billion) for watershed protection and climate resilient water supply systems, and livestock (USD 2 billion) for rangeland and water resource management. Additional sectors such as coastal and marine ecosystems (USD 2 billion), health (USD 1.1 billion), fisheries (USD 0.8 billion), tourism (USD 0.6 billion), wildlife (USD 0.6 billion), and cross cutting initiatives (USD 0.8 billion) address complementary dimensions of resilience, research, and institutional capacity. The 36 core national adaptation programmes portfolio therefore presents 22 programmes for Mainland Tanzania valued USD 28. billion, USD 8.6 billion for the 12 Zanzibar adaptation programmes and USD 0.8 billion for the 2 cross-cutting adaptation programmes in (Table 8-2, 8-3 and 8-4). These adaptation programmes investments are designed to build climate resilience across communities, ecosystems, and infrastructure while advancing inclusive, low emission growth.

Table 8-2: Adaptation Finance Needs: Mainland Tanzania

SECTOR	PROGRAM	COST (USD)
Agriculture	AG-M1: Climate-Smart Agricultural Transformation and Knowledge Systems	1,600,000,000
	AG-M2: Agricultural Water Security and Irrigation Modernization	4,000,000,000
	AG-M3: Agricultural Risk Management and Financial Inclusion	500,000,000
Total		**6,100,000,000**
Livestock	LS-M1: Sustainable Rangeland and Water Resource Management	1,200,000,000
	LS-M2: Climate-Resilient Livestock Health and Production Systems	800,000,000
Total		**2,000,000,000**
Health	HE-M1: Climate-Resilient Health Systems and Infrastructure	600,000,000
	HE-M2: Integrated Disease Surveillance and Climate-Informed Early Warning	400,000,000
	HE-M3: Strengthening Health Governance and Research for Climate Resilience	100,000,000
Total		**1,100,000,000**
Tourism	4. TO-M1: Tourism Diversification and Community-Led Eco-Tourism	400,000,000
	5. TO-M2: Climate-Proofing of Key Tourism Infrastructure and Assets	200,000,000
Total		**600,000,000**
Fisheries	FI-M1: Community-Led Climate-Resilient Fisheries Management	500,000,000
	FI-M2: Diversification through Sustainable Aquaculture	300,000,000
Total		**800,000,000**
Water	WA-M1: Integrated Watershed and Water Source Protection	2,500,000,000
	WA-M2: Climate-Resilient Water Supply and Sanitation Services	3,500,000,000
Total		**6,000,000,000**
Coastal and Marine	CM-M1: Building Community and Ecosystem Resilience in Small Islands	1,000,000,000

	CM-M2: Enhancing Economic Benefits of Blue Carbon Resources (Mainland)	600,000,000
	CM-M3: Integrated Coastal Zone Management and Governance	400,000,000
Total		**2,000,000,000**
Wildlife	WL-M1: Wildlife Habitat and Corridor Protection	400,000,000
	WL-M2: Climate-Informed Human-Wildlife Conflict Mitigation	200,000,000
Total		**600,000,000**
Infrastructure and Human Settlement	IHS-M1: Climate-Proofing of Critical Economic and Social Infrastructure	6,000,000,000
	IHS-M2: Resilient Urban Planning and Informal Settlement Upgrading	2,500,000,000
	IHS-M3: Strengthening Building Codes and Land Use Planning	400,000,000
Total		**8,900,000,000**
GRAND TOTAL		**28,100,000,000**

On the other hand, Zanzibar's adaptation finance requirements are estimated at USD 8.6 billion, reflecting its unique island vulnerabilities and coastal economy. The coastal and marine sector dominates with USD 3 billion, focusing on integrated coastal resilience, small island protection, and blue carbon enhancement. Infrastructure and Human Settlement follows with USD 2.6 billion, targeting resilient ports, transport systems, the preservation of cultural heritage sites such as Stone Town, and climate-resilient building and land use planning. Other priorities include water security (USD 1 billion), agriculture (USD 0.5 billion), livestock (USD 0.3 billion), and fisheries (USD 0.3 billion), each addressing sector specific adaptation challenges such as salinity intrusion, coastal agriculture, and aquaculture sustainability. Investments in tourism (USD 0.4 billion), health (USD 0.3 billion), and wildlife protection (USD 0.2 billion) complete the portfolio, underscoring the need for a comprehensive and integrated approach to strengthen resilience across Zanzibar's blue economy and social systems.

Table 8-3: Adaptation Finance Needs: Tanzania Zanzibar

SECTOR	PROGRAM	COST (USD)
Costal and Marine	Enhancing Zanzibar's Comprehensive Coastal Resilience	2,500,000,000
	Enhancing Economic Benefits of Blue Carbon Resources (Zanzibar)	500,000,000
Total		**3,000,000,000**
Agriculture	Coastal Agriculture Protection and Salinity Management	500,000,000
Total		**500,000,000**
Livestock	Climate-Resilient Spice, Horticulture, and Livestock Production	300,000,000
Total		**300,000,000**
Fisheries	Sustainable Fisheries and Climate-Smart Aquaculture Development	300,000,000
Total		**300,000,000**
Water	Freshwater Security and Saline Intrusion Management	1,000,000,000
Total		**1,000,000,000**
Infrastructure and Human Settlement	Climate-Resilient Urban, Port, and Transport Infrastructure	2,000,000,000
	Climate Adaptation for Cultural Heritage and Stone Town	500,000,000
	Climate-Resilient Building and Land Use Planning	100,000,000
Total		**2,600,000,000**
Health	Resilient Public Health and WASH Services	300,000,000
Total		**300,000,000**
Tourism	Sustainable and Resilient Tourism Development	400,000,000
Total		**400,000,000**
Wildlife	Protection of Climate-Vulnerable Island Ecosystems and Wildlife	200,000,000
Total		**200,000,000**
GRAND TOTAL		**8,600,000,000**

Cross-cutting adaptation finance requirements are estimated at USD 799,447,352, reflecting the need to strengthen systems that support resilience across all sectors. The National Climate Services, Research, and Capacity Development Programme accounts for USD 350,000,000, focusing on improving climate information, research capacity, and skills development to guide evidence-based adaptation planning. Transboundary Climate Resilience and Regional Cooperation represent USD 450,000,000, supporting regional collaboration, knowledge exchange, and coordinated action to address climate risks that extend beyond Mainland Tanzania and Zanzibar's borders, including marine and coastal ecosystems. These cross-cutting investments complement sector-specific measures in coastal and marine protection, infrastructure and human settlement, water security, agriculture, fisheries, health, wildlife and tourism, ensuring a holistic and integrated approach to strengthening the country's climate resilience.

Table 8-4: Adaptation Finance Needs: Cross Cutting

SECTOR	PROGRAM	COST (USD)
Cross-Cutting	National Climate Services, Research, and Capacity Development	350,000,000
	Transboundary climate resilience and regional cooperation	450,000,000
GRAND TOTAL		**800,000,000**

Based on Table 8-2, four key adaptation programmes for the Mainland Tanzania are Climate-Proofing of Critical Economic and Social Infrastructure (USD 6 billion), Agricultural Water Security and Irrigation Modernization (USD 4 billion), Climate-Resilient Water Supply and Sanitation Services (USD 3.5 billion), and Resilient Urban Planning and Informal Settlement Upgrading (USD 2.5 billion). The aforementioned programmes collectively account for USD 16 billion, representing over 52% of the total budget.

Additionally, the USD 8.6 billion portfolio for Zanzibar reflects three key adaptation programmes, with the largest investments being directed towards Enhancing Zanzibar's Comprehensive Coastal Resilience (USD 2.5 billion) and Climate-Resilient Urban, Port, and Transport Infrastructure (USD 2 billion), underscoring the paramount importance of defending against sea-level rise and storm surges. The third critical adaptation programme is Climate Adaptation for Cultural Heritage and Stone Town, costing USD 500 million. The programme is uniquely dedicated towards preserving Zanzibar Stone Town's cultural heritage, demonstrating a strategic need in safeguarding both economic.

8.1.2 Financial Resource Mobilisation

Effective resource mobilisation is central to implementing Tanzania's NAP and ensuring sustained financing for climate resilience across all sectors. To support this, the government has developed the National Climate Finance Mechanism for the Mainland Tanzania and the Zanzibar Climate Finance Mechanism for Zanzibar. These mechanisms are not yet operational but are expected to become functional soon. They will provide coordinated national platforms for planning, mobilising, and managing adaptation finance from both domestic and

9. MONITORING, EVALUATION, AND LEARNING

9.1 Introduction

The overall objective of this Monitoring, Evaluation and Learning (MEL) Plan is to guide monitoring, evaluation and learning from the implementation of the NAP with a framework that acknowledges the importance of learning for accountability and continuous improvement (Beauchamp et al., 2024). Specifically, this Plan supports tracking the progress of the implementation of NAP programmes of interventions as presented in Chapter 7 to generate evidence-based feedback for efficiency, accountability, relevance and sustainability of the future adaptation programmes. The MEL Plan will facilitate sector performance assessment by using key performance indicators (KPIs) to support result-based decisions and the process of harmonized reporting under national, regional, and international climate change adaptation targets and policies.

9.2 Monitoring, Evaluation and Learning

This MEL for the NAP will involve establishing baselines, assessing performance indicators and setting effective tools (for data collection) for each identified strategic objective. Verifiable indicators to monitor and evaluate the progress being made for each adaptation programmes and actions under each priority sector as outlined in Annex 3. The MEL will require results-oriented performance indicators (KPIs) to track the progress, including dimensions in gender and other cross-cutting issues, ultimately enabling to assess the level of attainment of the set objectives outlined in the NAP for the identified period of time. VPO and FVPO have a mandatory responsibility to ensure MEL for NAP is properly conducted as per Annex 3- NAP MEL Strategy Matrix.

The essence of this MEL Plan is to structure the system for tracking progress, assessing effectiveness, relevance, efficiency, program design, sustainability, and ensuring accountability in the implementation of climate change adaptation strategies, while providing a roadmap for monitoring and evaluating the implementation of the NAP, which also includes the following.

(i) To guide the NAP process, enabling URT to integrate climate adaptation into national planning and produce ongoing adaptation plans.

(ii) To address the rising need for practical support from MDAs and LGAs in assessing adaptation progress and performance to enhance climate change adaptation efforts.

(iii) To establish systematic MEL tracking, assessment, and reporting of the progress made in adaptation efforts,

(iv) It harmonizes reporting systems across all levels, fostering cross-sectoral synergies to assess adaptation targets and mobilize financial and technical resources effectively

(v) To promote transparency and accountability by sharing objective indicators to guide informed adaptation decisions.

(vi) To foster mutual learning and continuous knowledge sharing to strengthen climate resilience in URT's communities and ecosystems.

The MEL plan tracks progress and effectiveness of adaptation interventions in reducing vulnerability and enhancing adaptive capacity by supporting the well-being of populations impacted by climate change across the URT.

9.3 NAP MEL Interventions & Tiers

In the URT, the NAP MEL Interventions focus on establishing a mechanism to track progress, assess the effectiveness of the climate change adaptation actions, and ensure the overall success of the NAP process. It works under three dynamic and comprehensive systems, harnessing three tiers of interventions designed to ensure both the effectiveness and efficiency of the NAP's implementation. The three tiers include:

(i) At the strategy and policy level, the NAP MEL Plan guides implementation by aligning with national, regional, and international climate policies. It evaluates effectiveness in addressing adaptation challenges and tracks progress toward strategic objectives.

(ii) At Planning and Program Level: This tier evaluates the quality of planning and identifies climate change gaps and adaptation strategies. It supports effective resource allocation and tracks progress toward NAP goals. Real-time insights ensure planned outcomes are being met efficiently.

(iii) At Project Level: This level focus on the scrutiny of implementation and progress for granular understanding of project progress, objectives, and targets. The NAP MEL framework will track outputs, outcomes, and impacts to institutionalize valuable lessons and best practices that can inform future project interventions in climate change.

9.4 Target Audience

The target audience for this NAP MEL framework in Tanzania (URT) includes the Vice President's Office – Directorate of Environment Dodoma, Ministry for Finance and Planning, in Dodoma, National Bureau of Statistics (NBS), Office of Chief Government Statisticians (OCGS), the First Vice President's Office Zanzibar, the President's Office Finance and Planning Zanzibar; Prime Ministry Office – particularly for disaster management related indicators, civil society organization, research, and academic institutions, Development Partners, Local Government Authorities and other nine priority sectors namely Agriculture and Livestock Sector; Water Resources Sector; Coastal and Marine Resources Sector; Human Health Sector; Energy Sector; Infrastructure and Human Settlements Sector; Tourism sector; Forestry and Ecosystems Sector, and Industry and Manufacturing Sector

9.5 Key Performance Indicators & Tools

9.5.1 Monitoring Indicators

These are quantifiable measurements that reflect the implementation of the MEL plan for the NAP-related activities. They track the results relating to what was planned at each level of the results chain in the MEL framework, as summarized in Figure 9.1:

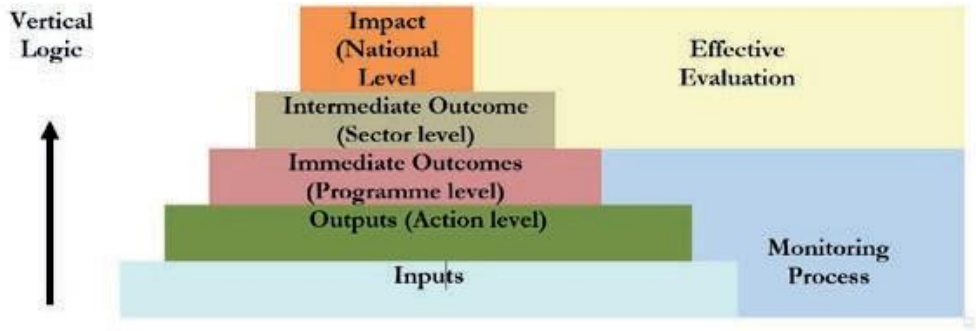

Figure 9-1: MEL Framework

ill also conduct a Baseline Indicator Survey to establish a reference point for measuring change and assessing the impact of climate change interventions. It will additionally involve determining the value of key indicators

9.5.2 Monitoring Tools

The NAP MEL Framework (Annex 3) was informed by Stocktaking for the National Adaptation Report (URT, 2020), the National Level Climate Risk and Vulnerability Assessment of 2024 Community Level Climate Risk and Vulnerability Study of 2025, The MEL Framework will be used to track progress of NAP, with the Climate Adaptation Knowledge Exchange Portal facilitating data collection, storage and exchange for monitoring and learning. The complete set of these monitoring tools include: -

(i) Data Collection and Activity Tracking Matrix

Data collection tools, which will be developed to track the implementation of climate change interventions. A NAP Activity Tracking Matrix will also be developed to help track progress and provide early warnings of potential problems and difficulties during the implementation of NAP-related interventions, as outlined in Annex 2.

(ii) Resource Mobilization, Budget Monitoring, and Expenditure Tracking Tool

The MEL budget monitoring and expenditure tracking tool, and Resource Mobilization strategy, will ascertain actual expenditures in the Sector that implement NAP actions against the planned budget. The tool will ensure that those expenditures are as per the planned and approved NAP activities for implementation, as outlined in Annex 3. This direct oversight is designed to adapt and strengthen URT climate change financing mechanisms by ensuring accountability.

(iii) Logical Framework

The purpose of Logic models is to show the causal relationship between inputs, activities, outputs, outcomes, and impacts vis-à-vis the goals and objectives. It thus provides the basis for monitoring and evaluation activities for all stages of the implementation of the NAP programme. Table 9.1 provides an illustrative example of a logic model.

Table 9.1: Logic model (Framework) for the NAP in the URT

The Strategic Goal of NAP M&E AND LEARNING FRAMEWORK: To guide the NAP stakeholders to monitor and evaluate development interventions that need to take into account climate change adaptation in URT			
INPUTS	ACTIVITIES / PROCESS	OUTPUTS	OUTCOMES
Resources (Human, Materials, and Financial)	• Undertake sectoral and institutional situational analysis on the results-based MEL System • Develop and implement an MEL plan for NAP process • Develop and train stakeholders on data collection tools. • Conduct data analysis and interpretation. • Conduct workshops on the MEL system that focus on results / RBM Approach.	National Adaptation Plan MEL Framework developed, validated, and operationalized at all levels. Improved generation and management of disaggregated and	Improved utilization of evidence-based climate change information for planning and decision-making purposes

	• Conduct Data Quality Assurance of the climate change data generated • Develop, install, and maintain an electronic database on climate change adaptation at the DoE. • Conduct a mid-term and End-of-term evaluation of the Climate Change Adaptation strategy	gender-responsive climate change data Enhanced absorption of the climate change program resources	
MEL Framework Assumptions: Strong social, economic, environmental, and political support; Strong Government, DPs, and community commitment; Gender Equity			

Source: Adapted from the National MEL System in Tanzania

(iv) The Results Framework for the NAP

The Results Framework Matrix for the NAP contains indicators that will explain how progress in the implementation of climate change interventions will be measured. It helps ensure that adaptation efforts are effective, efficient, and contribute to short, medium, and long-term resilience Plans. The URT will also conduct a Baseline Indicator Survey to establish a reference point for measuring change and assessing the impact of climate change interventions. It will additionally involve determining the value of key indicators that lack baseline data. The results frameworks for NAP is attached as Annex 3- NAP MLE Strategy Matrix.

9.6 Performance Reporting

To enhance transparency and accountability, URT has developed a robust NAP reporting framework. Reports will be generated at national and sub-national levels across monthly to annual intervals. Mid-term, end-term, and international reports (e.g., BTRs, SDGs, and NDCs) are also included. These reports track climate and environmental project progress and promote adaptation efforts. NAP reporting aligns with national plans like ZADEP, the Tanzania Development Vision 2050 and Zanzibar Development Vision 2050. It also integrates regional and global reporting systems for consistency and impact. The Table 9.2 summarises alignment of NAP Reporting with National, Regional, and International Reporting.

Table 9.2: Alignment of NAP Reporting with National, Regional, and International Reporting

Types of Planned NAP Reports	Contents	Frequency	Level of Reporting	Responsibility
Monthly and Quarterly NAP implementation reports	Detailed overview of the planned progress reports of NAP implementation.	Quarterly	Departmental / Project Level	Vice Presidents' Office & First Vice Presidents' Office
Semi-annual implementation report	Detailed overview of the planned progress reports of NAP implementation.	Semi-annual	National	Vice Presidents' Office

				& First Vice Presidents' Office
Annual NAP implementation reports	Detailed overview of the planned progress reports of NAP implementation.	Annually	National	Vice Presidents' Office & First Vice Presidents' Office
National communication report	Progress in the implementation of climate change interventions in the URT	Every four years	National	Vice Presidents' Office & First Vice Presidents' Office
Risk and Vulnerability Assessment Reports	It identifies and analyses potential threats and weaknesses within a system or organization, providing a prioritized list of vulnerabilities and recommendations for remediation	Once, between 3 years	National	Vice Presidents' Office & First Vice Presidents' Office
Baseline indicator survey report	It establishes a reference point for measuring the change and impact of climate change interventions. It will also involve identifying key indicators that will not have their baseline data.	Before NAP implementation	National	Vice Presidents' Office & First Vice Presidents' Office
Mid-Term Review Reports	Comprehensive overview of progress in the implementation of NAP interventions, including effectiveness, relevance, accountability, and sustainability of the NAP interventions.	Once, between 2 and 3 years	National	Vice Presidents' Office & First Vice Presidents' Office
End-of-Term Review Reports	Comprehensive overview of progress in the implementation of CCA interventions, including effectiveness, relevance, accountability, and sustainability of the CCA interventions.	Once, between 4 and 5 years	National	Vice Presidents' Office & First Vice Presidents' Office
Reports of sectorial ministries on	Sectorial Ministries' level information and analysis on expenditure, current	Annually	National	Sectoral Ministries

NAP projects & initiatives	status, and expected outputs (reports) of key activities undertaken in implementing CCA interventions			
Regional and international levels Reports	UNFCCC's Paris Agreement tools: Biannual Transparency Reports (BTRs) highlight progress in the implementation of climate change actions in the URT Biennial Update Reports	Every two years	National, International	VPO in collaboration with FVPO
	National Determined Contributions (NDCs) Reports	Every five years	National, International	
	Voluntary National Review (VNR) Report of the Implementation of the Sustainable Development Goals (SDGs) in the URT.	Voluntary Reporting	National, International	

9.7 MEL Learning & Platforms

To ensure improved skills and accountability in NAP implementation, URT has developed capacity-building plans for staff and stakeholders. These include e-learning platforms, knowledge sharing, and training courses at various levels. MEL workshops, mentorship, and participatory supervision visits are also key components. The Department of Environment and MEL units will train a dedicated team of MEL experts to support CCA project implementers. These trainers will deliver technical assistance and guidance across all projects. URT will also adopt best practices from other countries to strengthen national adaptation efforts.

9.8 Revising & Updating the URT NAP & Its M&E Framework

Updating the National Adaptation Plan (NAP) Monitoring, Evaluation and Learning (MEL) Framework involves revisiting and refining the existing framework to ensure it effectively tracks progress and informs future adaptation actions in the URT.

The performance review can be carried out through meetings, mid-term and end-of-term reviews, as well as rapid appraisal. The review can be undertaken by considering relevance, coherence, effectiveness, efficiency, impact, and sustainability.

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ANNEX I: ADAPTATION OPTIONS

PRIORITY ADAPTATION NEEDS AND OPTIONS

1. Introduction

This chapter builds a comprehensive framework for national adaptation, providing a purview that shows a shift from adaptation assessment to action. It frames adaptation as a proactive, strategic process of building resilience to the identified climate risks and vulnerabilities. The chapter outlines an evidence-based response to Tanzania's systemic climate risks and vulnerabilities established in chapter five. It comprehensively translates potential climate risks and vulnerabilities established from climate Risks and Vulnerability Assessment (RVA) into a coherent set of adaptation needs and options. The developed priority adaptation needs and options provide a strategic direction for national policy, sectoral planning, and sustainable development. The adaptation options are informed by findings from the climate Risk and Vulnerability Assessment reports for Mainland Tanzania and Zanzibar (RVA, 2025), Nationally Determined Contribution (NDC) and Community Level Risk and Vulnerability Assessment reports .

2. Adaptation Needs

The adaptation needs for each of the nine key sectors were developed based on key climate hazards, elements at risk, and impacts as analysed in the climate Risk and Vulnerability Assessment Reports for Mainland Tanzania and Zanzibar (see Table 1).

Table 1: Sectoral Adaptation Needs as per Climate hazards

Sector	Climate Hazard	Elements at Risk	Impacts	Adaptation Needs
Agriculture	Drought	Soil moisture, water sources (rivers, lakes, wells, natural ponds, caves and streams), crops,	Crop failure, reduced yields, loss of farmer income, food shortages and malnutrition, depletion of water sources, conflicts over water and grazing land, pest and diseases outbreaks,	Agricultural productivity & food security
	Flood	Farmland (topsoil), crops, infrastructure (roads, bridges, irrigation	Loss of topsoil and soil fertility (erosion), destruction of standing crops,	Soil conservation & post-disaster recovery

		channels), storage facilities,	waterlogging of fields, damage to infrastructure isolating markets, contamination of water sources, and post-flood disease outbreaks	
	Sea Level Rise	Coastal agricultural land, freshwater aquifers (saltwater intrusion), mangrove ecosystems, coastal infrastructure	Permanent inundation of farmland, salinization of soils and freshwater sources, loss of productive land for crops like coconuts and cashews, damage to coastal irrigation systems, coastal erosion, saltwater intrusion, loss of infrastructure, land & property, habitat loss	Land protection & salinity management
Livestock	Drought	Pastures, forage, water points, livestock health (cattle, goats, sheep, poultry)	• Depletion of pasture and water sources • Reduced milk and meat production • Livestock weight loss, disease outbreaks, and increased mortality • Escalated farmer-herder conflicts over scarce resources	Sustainable resource management and improved livestock productivity
	Floods	Livestock (drowning), pastures, animal housing, veterinary access roads	• Drowning of livestock • Destruction of animal infrastructure • Contamination of water sources,	Disaster resilience and emergency management for livestock

			leading to disease (e.g., leptospirosis) • Waterlogging of pastures • Isolation from markets and veterinary services due to damaged roads,	
	Extreme Temperatures/Heat waves	Livestock health (especially exotic and cross-breeds), water availability	• Heat stress: reduced feed intake, lower milk yields, reduced fertility • Increased water requirements and competition • Higher mortality rates in poultry and young stock	Climate adaptation and thermoregulation for livestock
Water	Flood	Water treatment plants; pipelines; boreholes; reservoirs; river water quality, wells, natural ponds	Contamination of water sources; damage to infrastructure; disruption of supply; siltation of dams.	Resilient water infrastructure & quality management
	Drought	River flows; reservoir levels; groundwater aquifers; rural water points.	Water shortages; conflicts between users; failure of boreholes; hydropower outages.	Water conservation & demand management
	Declining Rainfall	Surface water availability; soil moisture; groundwater recharge.	Reduced river flow; longer dry seasons; increased water scarcity; crop failure.	Sustainable water resource development
	Increased Temperature	Reservoir water levels; water quality and quantity; evaporation rates.	Higher evaporation losses from reservoirs; algal blooms; increased water demand.	Efficiency and system durability

	Sea and lake level rise	Coastal water intake points; groundwater aquifers; sewage systems.	Saltwater intrusion into freshwater aquifers; inundation of coastal infrastructure.	Salinity intrusion prevention & water security
	Extreme Weather Events	Entire water supply chain (source to tap); power supply for pumping.	Total system failure; extended service disruptions; catastrophic damage to assets.	Build system-wide resilience and redundancy.
Coastal and Marine	Sea-Level Rise	Coastal communities & infrastructure; beaches; aquifers; mangrove forests; seagrass and seaweed beds.	Coastal erosion, saltwater intrusion, loss of land & property, habitat loss.	Coastal protection & freshwater security
	Increased Sea Temperature	Coral reefs; fisheries; marine biodiversity; tourism industry.	Coral bleaching, loss of marine biodiversity, reduced fish stocks, decline in tourism revenue.	Ecosystem resilience & livelihood diversification
	Extreme Weather Events	Coastal infrastructure; fishing communities & assets; reefs; beaches; mangroves.	Physical destruction from storm surges, loss of life and property, damage to ecosystems, beach erosion.	Disaster preparedness & ecosystem protection
	Changed Currents/Winds	Fisheries productivity; nutrient cycling; coastal sediment transport.	Disrupted fish spawning and migration patterns, altered fishing grounds, changes in erosion/accretion patterns.	Adaptive & flexible governance
Health	Floods	Health facilities (hospitals, clinics, warehouses), access roads,	Damage to health infrastructure and disruption of health care services; contamination of	Resilient health systems & epidemic preparedness

		water and sanitation systems, communities (especially in low-lying areas).	water sources leading to cholera, dysentery, and typhoid outbreaks; malnutrition; displacement of people increasing disease risk; disruption of supply chains for medicines and vaccines; isolation of health facilities.	
	Drought	Water supply for health facilities, food security, nutrition levels, sanitation and hygiene.	Water scarcity disrupts health facility operations (sanitation, sterilization); increased malnutrition, especially in children and pregnant women; heightened risk of water-washed diseases (scabies, trachoma); migration and conflict over resources straining health services.	Water & nutrition Security
	Strong winds	Health facility roofs, windows, and power lines; medical supply chains; emergency response capabilities.	Structural damage to clinics and hospitals; injury from flying debris; power outages disrupting medical services (e.g., refrigeration for vaccines, operation theatres); disruption to transportation; spread of airborne diseases	Infrastructure & operational resilience

	Landslide	Health facilities built on slopes or at the base of hills; access roads to remote health posts; communities in mountainous areas.	Destruction of health infrastructure; burial of roads cutting off access to care; injuries and fatalities requiring emergency response; potential contamination of water sources.	Risk reduction & Early Warning Systems
	Extreme temperature	Patient health (elderly, children, pregnant women, chronically ill), health worker comfort, medicine storage conditions.	Increase in heat-related illnesses (HIV, heatstroke, dehydration); exacerbation of cardiovascular and respiratory diseases; heat stress reducing health worker productivity; failure of cold chain storage for temperature-sensitive medicines.	Thermal Risk Management & System Security
	Sea-level rise	Coastal health infrastructure, freshwater lenses, coastal communities.	Salinization of freshwater sources and coastal land; damage to coastal roads and health facilities from erosion and storm surges; displacement of populations leading to overcrowding and disease spread; increased risk of waterborne diseases.	Coastal health Infrastructure protection
Infrastructure and Human Settlements	Flood	Roads, bridges, railways; drainage	Disruption of transport and supply chains;	Climate resilient infrastructure & strategic planning

		systems; power substations; water treatment plants; buildings in floodplains.	damage to infrastructure; water contamination; property destruction; loss and displacement of people.	
	Heat waves	Power grids (demand for cooling); water supply systems; road surfaces (buckling); building interiors.	Overloaded power grids leading to blackouts; accelerated deterioration of materials; water shortages; reduced labour productivity; heat-related illnesses; increased cost of repair.	Resilient infrastructure & proactive zoning
	Extreme rainfall	Road surfaces, unpaved roads; drainage systems; building foundations; slopes near infrastructure.	Erosion and washouts of roads; overwhelming of drainage systems leading to flash floods; waterlogging and foundation damage; landslides.	Water security & sustainable habitat management
	Landslides	Roads, railways, and bridges; transmission towers; buildings on slopes; pipelines.	Destruction of transport routes; damage to property and infrastructure; disruption of essential services (water, power); loss of life.	Sustainable resource management
	Extreme wind events	Roofs of buildings; power lines and pylons; communication towers; signage; informal settlements.	Widespread power outages; damage to buildings and homes; flying debris causing secondary damage; disruption to communication networks.	Adaptive ecological management

Tourism	Floods	Historical sites, Tourist lodges & camps (especially riverside/coastal), access roads & airstrips, wildlife viewing areas, tourist safety.	Property damage, road closures strand tourists, cancelled bookings, erosion of scenic landscapes, visitor injury.	Community engagement & visitor awareness
	Drought	Wildlife populations (reliable sightings), scenic beauty of landscapes, water supply for lodges.	Reduced wildlife visibility at waterholes, increased animal mortality, bleak landscapes, water rationing at facilities, negative visitor experience.	Resilient infrastructure & strategic planning
	Water scarcity	Lodge operations, guest comfort, sanitation, swimming pools.	Operational disruption, negative guest reviews, reputational damage, conflict with local communities over water resources.	Resilient infrastructure & proactive zoning
	Rainfall pattern changes	Wildlife migration patterns (e.g., Great Migration), seasonal booking predictability, "shoulder" seasons.	Unpredictable animal movements, tourist disappointment, disruption to long-established seasonal pricing and marketing models.	Water security & sustainable habitat management
	Strong winds	Lodge roofs, tented camps, power lines, and trees near infrastructure.	Property damage, safety hazards, power outages, cancelled activities (e.g., balloon safaris).	Sustainable resource management
	Wildfire	Tourist lodges and camp sites, (especially in wooded areas), scenic views,	Property loss, road closures, habitat degradation reducing wildlife sightings, smoky	Adaptive ecological management

		wildlife habitats, air quality.	conditions affecting health and views.	
	Extreme temperature	Guest comfort and health, outdoor activity viability (e.g., walking safaris), staff working conditions.	Heat stress, reduced demand for daytime activities, increased demand for energy-intensive air conditioning.	Infrastructure resilience & emergency response
	Invasive species	Scenic landscapes, grazing for wildlife (and thus viewing quality), biodiversity.	Degradation of iconic savannah/forest vistas, reduction in herbivore populations, increased fire risk from invasive grasses.	Proactive risk management & community involvement
	Pandemic/diseases	Tourist health, staff health, industry viability, international travel policies.	Sudden travel bans and cancellations, tourist fears, operational shutdowns, massive revenue loss (as seen with COVID-19).	Visitor safety & health monitoring
	Human-wildlife conflicts	Tourist safety, community relations, reputation of destination.	Animal attacks on guests or staff, negative media coverage, retaliatory killing of key tourist animals (lions, elephants).	Invasive species control & habitat management
	Sea-level/water level rise	Historical sites, coastal hotels and infrastructure, beach assets, coastal erosion, mangrove ecosystems.	Inundation of property, loss of beaches, damage to coral reefs (snorkeling/diving), saltwater intrusion into freshwater sources.	Disease surveillance & risk reduction
Wildlife	Floods	Wildlife (especially ground-dwelling	Drowning, habitat destruction, soil erosion, spread of	Climate resilient infrastructure & proactive zoning

		species), habitats (nesting grounds, burrows), tourist infrastructure (roads, lodges), freshwater sources.	water-borne diseases, disruption of tourism revenue.	
	Drought	Water-dependent species (elephants, buffalo, hippos), vegetation, prey-predator balance, freshwater availability.	Mass wildlife mortality, reduced reproductive success, concentration of animals at water sources leading to conflict and disease spread, habitat degradation.	Water security & drought-resilient habitat management
	Water scarcity	All wildlife species, ecosystem health, tourist operations.	Increased competition and aggression at water points, population decline, and wild domestic animal conflict reduced	Sustainable water resource management
	Rainfall pattern changes	Migratory species (wildebeest, zebra), plant phenology (timing of fruiting, flowering), ecosystem cycles.	Mistiming of migrations (e.g., calving season out of sync with green-up), food scarcity, reduced ecosystem productivity.	Adaptive ecological management & habitat connectivity
	Strong winds	Forest canopy structure, bird nests, tourist infrastructure, power lines.	Habitat damage, animal injury, property damage, power outages.	Infrastructure resilience & emergency response
	Wildfire	Forests, grasslands, ildlife migration patterns, wildlife migration patterns, ground-	Loss of habitat, wildlife mortality, soil erosion, alteration of vegetation composition.	Proactive fire management & community preparedness

		dwelling species, soil nutrients, carbon stores.		
	Extreme temperature	Thermo-sensitive species (like amphibians mammals) animal health, tourist comfort.	Heat stress, reduced fertility, changes in foraging behaviour (nocturnal activity), increased water needs.	Thermal stress management & health monitoring
	Invasive species	Native flora and fauna, habitat structure, grazing resources.	Out competition of native species, alteration of fire regimes, habitat loss, reduced forage quality for herbivores.	Invasive species control & habitat restoration
	Pandemic/diseases and parasites	Wildlife populations (especially stressed or concentrated ones), livestock, human health.	Population die-offs (e.g., canine distemper in lions), reduced genetic diversity, zoonotic disease spill over to humans and livestock.	Disease surveillance & transmission risk reduction
	Human-wildlife conflicts	Crops, livestock, human lives, wildlife (retaliatory killing).	Injury and death, economic losses for communities, negative attitudes towards conservation, decline in predator populations.	Conflict management & coexistence
	Sea-level/water level rise	Coastal habitats (mangroves, estuaries), nesting sites for turtles and birds, coastal infrastructure.	Habitat loss and fragmentation, saltwater intrusion into freshwater habitats, loss of biodiversity.	Ecosystem-based adaptation & managed retreat
Fisheries	Increased Sea/Lake Temperatures	Fish stocks (especially temperature-sensitive species), coral	Shift in fish species distribution, reduced catches of preferred species,	Protection of temperature-sensitive species & livelihoods

		reefs, fishing income.	coral bleaching, loss of biodiversity.	
	Increased Frequency of Extreme Weather Events	Fishers' lives, fishing vessels (dhows, canoes), landing sites, infrastructure.	Increased risk of drowning, damage/loss of boats and gear, disruption of fishing activities, loss of life.	Safety at sea & protection of fishing assets
	Changes in Rainfall Patterns	Lake & small water bodies levels, river flow, aquaculture ponds, water quality.	Lower water levels in lakes (e.g., Lake Tanganyika) % small water bodies, affecting fish breeding and access. Pond overflow or drought.	Management of freshwater fisheries & Aquaculture Systems
	Flood	Landing sites, fish markets, processing facilities (e.g., solar dryers), roads.	Destruction of infrastructure, contamination of water bodies, loss of processed fish, disruption of market access.	Protection of shore-based fisheries infrastructure
	Marine Heatwaves	Coral reefs, seagrass beds, fish breeding grounds, overall ecosystem health.	Mass coral mortality, loss of critical fish habitats, rapid decline in fish productivity.	Protection of critical marine habitats & Ecosystem health
	Ocean Acidification	Shellfish, plankton (base of food web), coral reefs, and potential for aquaculture.	Weakened shells, reduced survival of larval fish, and disruption of the entire marine food web.	Safeguarding calcifying organisms & the marine food web, and monitoring of water quality parameters

3. Sector-Specific Adaptation Options

Prioritizing adaptation options is critical for policymakers, development agencies, and local communities to allocate resources efficiently. This section provides a critical narration of ranked adaptation options for the nine selected priority sectors. The section presents the ranked adaptation options for Tanzania Mainland and Zanzibar. Ranking and appraising adaptation options involved evaluating adaptation needs emerging from an extensive analysis of empirical

evidence from NDC.03 and RVA reports. Adaptation options were systematically assessed based on multiple criteria analysis. The prioritization criteria and weight entail effectiveness (30%), feasibility (25%), sustainability (25%), equity and inclusiveness (20%). Each adaptation option was further assessed using a weighted scoring system of 1-5, where 5 is the highest ranked option.

Adaptation timing refers to when an action is implemented in relation to a climate shock. The strategies are either Foundational, Anticipatory (Proactive), Direct, or Recovery (Reactive).

(i) Foundational adaptation actions aim to strengthen the underlying systems, capacities, and enabling environments that make direct adaptation possible and effective. They are often less visible but are critical for long-term sustainability and scaling up efforts.
(ii) Direct adaptation actions are tangible, on-the-ground measures or technologies that directly address a specific climate impact. They are often visible and directly alter agricultural practices, infrastructure, or the environment.
(iii) Anticipatory (Proactive) adaptation actions are taken before the impacts of climate change are observed. The goal is to prepare for and reduce potential future damage. A proactive approach builds resilience in advance.
(iv) Recovery (Reactive) adaptation actions are specific type of reactive action focused on restoring systems and livelihoods after a climate shock has occurred. It overlaps with disaster recovery and aims to improve resilience against future events.
(v) Responsive adaptation refers to actions that are taken after the impacts of a climate change event have already been observed or felt. It is a reactive approach, as the name implies, where the primary goal is to respond to and cope with damages and losses that have already occurred.

I. Sector – specific Adaptation Options for Mainland Tanzania

The prioritized adaptation options for each of the nine sectors for Mainland Tanzania are as follows:

(a) Agriculture

The primary adaptation need for the agriculture sector is to enhance climate resilience in agriculture against key climate hazards - drought, erratic rainfall, flooding, and soil degradation. The sector highlights several priority adaptation options to address such climate challenges. The most important is the use of Climate-Smart Agriculture practices to manage drought, soil degradation, and floods. Small-scale irrigation is ranked next, helping farmers cope with drought and water shortages. The introduction of drought-tolerant and early- maturing crop varieties is also a priority to deal with changing rainfall patterns. Strengthening climate information services is needed to fill knowledge gaps and improve institutional support. Weather-index based crop insurance is recommended to reduce economic risks from climate shocks, both before and after disasters. Lastly, large-scale irrigation systems, such as dam and canal projects, are also identified as an option for tackling water scarcity and drought. Table 2 presents a list of prioritised adaptation options and their adaptation timing classification.

Table 2: Prioritised Adaptation Options for the Agriculture Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Climate-Smart Agriculture (CSA)	1	Direct	Drought, Soil Degradation, Floods	Anticipatory
Small-Scale Irrigation	2	Direct	Drought, Water Scarcity	Anticipatory
Drought-tolerant and early-maturing crop varieties (DTCVs)	3	Direct	Drought, Shifting Rainfall Patterns	Anticipatory
Climate information services	4	Foundational	Knowledge Gaps, Weak Institutional Support	Anticipatory
Weather-Index Based Crop Insurance (WIBI)	5	Foundational	Economic Vulnerability to Climate Shocks	Anticipatory, Recovery
Large-Scale Irrigation Large-Scale Irrigation	6	Direct	Drought, Water Scarcity	Anticipatory

(b) Livestock

The primary adaptation need for the livestock sector is to strengthen climate resilience in livestock-based livelihoods. The livestock sector outlines several priority adaptation options to reduce the impacts of climate change to improve climate resilience across pastoral and agro-pastoralist livelihood systems. The most important one is sustainable rangeland and water management to deal with drought, degraded pasture, and water scarcity. Improving veterinary services is also key to protect animals from new diseases caused by changing temperatures and rainfall. Building climate-resilient livestock infrastructure helps protect animals from drought, floods, and extreme heat. Early warning systems that combine local and modern knowledge can support timely responses while better animal health practices reduce risks from diseases. Adding value to livestock products and improving market access will strengthen resilience to climate change. Management of wildlife–livestock conflict can help prevent competition over scarce resources. Weather-indexed insurance will protect farmers against climate shocks while

reviewing the National Livestock Policy and strengthening research and extension services will provide long-term support for adaptation (Table 3).

Table 3: Prioritised Adaptation Options for the Livestock Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Water resources management	1	direct	Drought, Pasture Degradation, Water Scarcity	Anticipatory, Recovery
Sustainable rangeland management	2	Direct	Drought, Pasture Degradation, Water Scarcity	Anticipatory, Recovery
Veterinary services	3	Direct	Increased Disease Vectors (due to temp/rainfall change)	Anticipatory, Responsive
Livestock infrastructures	4	Foundational	Drought, Extreme Heat, Floods	Anticipatory
Integrated early warning systems	5	Direct	Drought, Floods (enabling timely response)	Anticipatory, Recovery
Value addition and market access	6	Direct	Market Inefficiency (exacerbated by climate-driven supply shocks)	Anticipatory, Responsive
Management of wildlife–livestock conflict	7	Foundational	Human-Wildlife-Livestock Conflict (driven by resource scarcity)	Anticipatory
Weather-indexed insurance schemes	8	Foundational	Economic Vulnerability (multiplied by climate shocks)	Recovery Responsive, Anticipatory
National Livestock Policy review	9	Foundational	Weak Governance/Policy (hindering effective adaptation)	Anticipatory, Recovery

(c) Fisheries

The primary adaptation need for the fisheries sector in Mainland Tanzania is to build climate resilience in fisheries. The fisheries sector has several key adaptation options to cope with the impacts of climate change. Climate-smart fishing is a top priority to reduce post-harvest losses and improve resilience. Institutional capacity for Beach Management Units improves local governance and ensures sustainable resource management. Sustainable management of MPAs and LMMAs while enhancing practices that promote climate-resilience in aquaculture and mariculture would help to address the declining fish stocks caused by warming and ocean

acidification. In addition, reviewing the Fisheries Act, enhancing extension services, and building knowledge and capacity are all essential for long-term resilience are all essential for long-term resilience. Table 4 presents the prioritized adaptation options for the Fisheries sector, including their timing classification.

Table 4: Prioritized Adaptation Options for the Fisheries Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Climate-smart fishing	1	Foundational	Post-Harvest Loss; Declining Wild Stocks (Migrating Fish Stocks)	Anticipatory
Institutional capacity for BMUs	2	Foundational	Weak Local Governance (hindering sustainable resource management)	Anticipatory
Sustainable management of MPAs & LMMAs	3	Direct	Ecosystem Degradation (coral bleaching, habitat loss)	Anticipatory
Review Fisheries Act (2003)	4	Foundational	Outdated Policy Framework (hindering effective adaptation)	Anticipatory

(d) Water

The primary adaptation need for the water sector in Tanzania is to enhance climate resilience for water resources. Achieving this, requires a multi-pronged approach that addresses a number of adaptation options within and across the sector. Table 5 presents a range of prioritized adaptation options to enhance climate resilience in the water sector. Restoration and conservation of water sources is the foremost among the options to address the impacts of drought and water scarcity. Complementary measures include strengthening domestic water supply systems, enforcing the Water Resources Management Act, and empowering local water user associations to improve governance. Ensuring safe and reliable water supplies requires climate-resilient safety plans, the integration of efficient water harvesting and water use technologies, and enhanced monitoring of water quality. Institutional capacity building, particularly for water utilities, is also essential for effective service delivery under changing climatic conditions. Furthermore, sustainable wastewater management and improved hygiene practices play a crucial role in reducing pollution and safeguarding public health. These adaptation options are designed to respond to, and recover from the challenges posed by climate hazards such as droughts, floods, and others climate-related pressures.

Table 5: Prioritised Adaptation Options for the Water Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Restoration and conservation of water sources	1	Direct	Drought, Water Scarcity	Anticipatory, Responsive
Water harvesting technologies	2	Direct	Drought, Water Scarcity	Anticipatory, Responsive
Domestic water systems	3	Direct	Drought, Floods (affecting water supply quality & quantity)	Anticipatory, Recovery
Water Resources Management Act	4	Foundational	Weak Governance & Regulation of Water Resources	Anticipatory
Water User Associations	5	Foundational	Weak Local Water Management	Anticipatory
Water safety plans	6	Direct	Water Contamination (from floods, drought)	Anticipatory, Responsive
Water efficiency technologies	7	Direct	Water Scarcity	Anticipatory
Water utilities	8	Foundational	Weak Institutional Capacity of Service Providers	Anticipatory
Water quality monitoring	9	Direct	Water Contamination (from floods, drought)	Anticipatory, Responsive
Sustainable wastewater management	10	Foundational	Water Pollution (a development issue exacerbated by climate)	Anticipatory, Recovery

(e) Coastal and Marine

The primary adaptation need for the coastal and marine sector is to strengthen coastal and marine climate resilience against key climate hazards as sea-level rise, coastal erosion, storm surges, and coral bleaching. Table 6 highlights a set of prioritized adaptation options aimed at strengthening resilience in the coastal and marine sector. Foremost is the integration of coastal zone management plans to ensure sustainable and well-coordinated use of coastal resources. Equally critical is the restoration and conservation of the ecosystem, which serve as natural barriers against erosion and storm surges. Equally critical is the restoration and conservation of mangroves, which serve as natural barriers against erosion and storm surges. Capacity building in institutional coordination across ministries is essential to overcome fragmented governance while conservation and restoration of coral reefs are vital to counteract bleaching

driven by rising sea temperatures. Investment in real-time early warning systems will bolster preparedness for coastal hazards such as flooding and storm surges. Furthermore, reinforcing policy and regulatory frameworks, alongside marine spatial planning and enhancement of extension services, will strengthen community knowledge and adaptive governance in response to climate-related impacts.

Table 6: Prioritized Adaptation Options for the Coastal and Marine Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Integrated coastal zone management plans	1	Foundational	Uncoordinated & Unsustainable Coastal Development	Anticipatory
Restoration and conservation of the ecosystem	2	Direct	Coastal Erosion, Storm Surges (from SLR & storms)	Anticipatory, Recovery
Institutional coordination	3	Foundational	Fragmented Governance (hindering effective management)	Anticipatory
Early warning system	4	Direct	Coral Bleaching (from rising sea temperatures)	Anticipatory, Recovery
Policy and regulatory frameworks	5	Direct	Weak Regulatory Frameworks	Anticipatory, Responsive
Marine Spatial Planning	6	Foundational	Fragmented Governance (hindering effective control & monitoring)	Anticipatory

(f) Wildlife

The primary adaptation need for the wildlife sector is to secure wildlife heritage through climate-resilient corridors and habitats against key climate hazards such as drought, wildfire, habitat fragmentation, and human-wildlife conflict. A hierarchy of adaptation options for the wildlife sector is presented in Table 7, emphasizing both ecological and governance dimensions. Priority is placed on maintaining and protecting wildlife corridors to counteract habitat fragmentation and ensure uninterrupted migration under climate stress. This is complemented by restoration and conservation of biodiversity, forests, habitats initiatives to address degradation caused by droughts, fires, and other disturbances. Enhancing the climate resilience of water sources for wildlife and improving wildfire detection and management are critical to safeguarding ecosystems against intensifying drought and rising temperatures. Addressing human-wildlife conflict, increasingly driven by climate-induced resource scarcity, is also pivotal for coexistence and ecological stability. From a governance perspective, stronger enforcement of the Wildlife Conservation Act (2009), adoption of climate change guidelines,

and mainstreaming climate considerations into sectoral policies are highlighted as foundational steps to close existing strategic and institutional gaps.

Table 7: Prioritized Adaptation Options for the Wildlife Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Protection of wildlife corridors	1	Direct	Habitat Fragmentation, Disrupted Migration (due to climate stress)	Recovery, Anticipatory
Restoration and conservation of biodiversity, forests, habitats	2	Direct	Habitat Degradation (from drought, fire, etc.)	Anticipatory, Recovery
Sustainable water sources management for wildlife	3	Direct	Water Scarcity (from drought)	Anticipatory, Responsive
Management of Human-Wildlife Conflict (HWC)	4	Foundational	Human-Wildlife Conflict (driven by climate-induced resource scarcity)	Anticipatory
Management of wildfire detection	5	Direct	Increased Wildfire Risk (from drought, higher temperatures)	Anticipatory, Responsive
Review & update the Wildlife Conservation Act (2009)	6	Foundational	Weak Governance (enabling poaching, habitat encroachment)	Anticipatory

(g) Infrastructure and Human Settlements

The primary adaptation need for this sector is to build resilient infrastructure and human settlements against identified key climate hazards such as urban flooding, sea-level rise, extreme rainfall, and landslides. Table 8 delineates prioritized adaptation options for the infrastructure and human settlements sector, underscoring both structural resilience and governance reforms. Central to these measures is the formulation of national building codes that incorporate climate resilience standards to address regulatory weaknesses that permit unsafe construction, alongside investments in climate-proofing critical infrastructure against floods, storms, and other extreme weather events. Upgrading informal settlements with resilient drainage and basic services emerges as a vital intervention option to reduce urban flooding risks. Foundational strategies emphasize integrating climate risk into land-use planning, strengthening disaster management and early warning systems, and fostering inter- governmental coordination to overcome fragmented governance. Equally significant are measures promoting green and resilient building practices, advancing equitable land rights and tenure security, and improving land administration to enhance long-term adaptive capacity. Recognizing financial and knowledge constraints, there is a need for mobilization of alternative

climate financing mechanisms and the promotion of climate response research and innovation as indispensable enablers for sustainable adaptation in the sector

Table 8: Prioritized Adaptation Options for the Infrastructure and Human Settlements Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
National building codes	1	Foundational	Weak Regulatory Framework (allowing vulnerable construction)	Anticipatory
Climate-proofing infrastructure	2	Direct	Extreme Weather Events (floods, storms) are damaging infrastructure	Anticipatory, Recovery
Integrated land-use planning	3	Direct	Urban Flooding (from extreme rainfall)	Anticipatory, Recovery
Disaster management and early warning systems	4	Foundational	Weak Disaster Preparedness and Response Capacity	Anticipatory, Responsive
Inter-governmental climate coordination	5	Foundational	Siloed Governance (hindering integrated planning)	Anticipatory

(h) Health

The adaptation priorities for the health sector converge on the overarching need to build climate-resilient health systems that reduce climate-induced public health risks by reinforcing disease surveillance, ensuring climate-resilient health infrastructure, and expanding Water, Sanitation, and Hygiene (WASH) services to safeguard at least one million people in highly vulnerable zones. Table 9 presents the prioritized adaptation options for the health sector in Tanzania Mainland. Generally, they focus on direct interventions to protect core health functions from immediate climate threats, such as strengthening surveillance and early warning systems to address shifting burdens of vector- and water-borne diseases, climate-proofing health facilities against extreme weather events, and improving access to resilient WASH systems to curb cholera, typhoid, and related outbreaks. The adaptation options also advance foundational reforms to enhance systemic resilience, including bolstering disaster preparedness and response, advancing climate health research and innovation to close knowledge gaps, and establishing coordinated climate action plans to foster inter-sectoral collaboration. Complementary measures such as integrating climate considerations into national health policy, developing sectoral adaptation frameworks, and strengthening disaster risk reduction mechanisms address institutional and policy weaknesses that hinder effective adaptation pathway across the sector.

Table 9: Prioritized Adaptation Options for the Health Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Disaster preparedness and response (Health surveillance and early warning systems)	1	Direct	Increased Frequency/Intensity of Climate-Related Disasters Increased/Shifting Disease Burden (vector & water-borne)	Anticipatory, Responsive
Health infrastructure	2	Direct	Extreme Weather Events (floods, storms) damaging infrastructure	Anticipatory, Recovery
Water, Sanitation, and Hygiene (WASH)	3	Direct	Water-borne Diseases (Cholera, Typhoid)	Anticipatory, Recovery
Coordinated climate action plans	4	Foundational	Lack of Inter-Sectoral Coordination	Anticipatory
National Health Policy (2007) review	5	Foundational	Weak Policy Framework	Anticipatory

(i) Tourism

The primary adaptation need for the tourism sector is to build climate-resilient tourism in the country against key climate hazards - ecosystem degradation (glacier melt, coral bleaching), altered wildlife migration patterns, and beach erosion. Table 10 delineates prioritized adaptation options for the tourism sector, emphasizing the need to enhance resilience, diversify offerings, and strengthen governance frameworks in the face of climate change. Central to these options is the prioritization of community-led tourism initiatives that address livelihood vulnerabilities and ensure more equitable benefit sharing, alongside diversification of tourism products to reduce dependence on climate-sensitive attractions such as wildlife and coastal resources. Targeted investment in climate-resilient infrastructure is highlighted as essential to safeguard against floods, erosion, and storm damage. Additional adaptation options underscore the importance of adopting climate-sensitive approaches such as steering tourism investments towards climate-conscious pathways like renewable energy facilities and promoting climate-smart investment. There is also the need for reviewing the Tourism Act (2008) to integrate climate adaptation into tourism regulatory frameworks.

Table 10: Prioritized Adaptation Options for the Tourism Sector in Mainland Tanzania

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Community-led tourism initiatives	1	Foundational	Livelihood Vulnerability, Inequitable Benefit Sharing	Anticipatory
Diversification of tourism products	2	Foundational	Over-reliance on Climate-Sensitive Attractions (e.g., wildlife, beaches)	Anticipatory

Tourism infrastructure	3	Direct	Damage to Infrastructure (from floods, erosion, storms)	Anticipatory, Recovery
Renewable energy facilities	4	Direct	High Carbon Footprint (contributing to climate change)	Anticipatory
Climate-Smart tourism investments	5	Foundational	Unsustainable Investment Patterns (development issue)	Anticipatory
Review & update the Tourism Act (2008)	6	Foundational	Weak Regulatory Frameworks (enforcement gap)	Anticipatory

II. Sector-Specific Adaptation Options for Zanzibar

The prioritized adaptation options for each of the eight sectors for Zanzibar are as follows:

(a) Agriculture and Livestock

The prioritized adaptation options for the agriculture and livestock sector for Zanzibar are presented in Table 11. The options underscore a comprehensive approach to addressing climate-induced vulnerabilities in coastal, farming, and pastoral systems. For agriculture, top priorities include construction of embankments and seawalls in cropland areas of Unguja, Pemba, and adjacent islets to counter saltwater intrusion and coastal flooding, alongside promoting drought-tolerant crops such as cassava, bananas, and cloves to enhance resilience in coral rag and spice farming systems. The adoption of water-saving irrigation technologies, including alternate wetting and drying (AWD) and drip irrigation, is highlighted as vital to address drought and erratic rainfall, while mangrove restoration and other nature-based solutions are proposed as long-term adaptation interventions against sea-level rise and storm surges.

Additionally, adjusting planting calendars supported by early warning and extension services is identified as a short-term measure to manage rainfall variability and heat stress. In the livestock sector, options prioritize research and adoption of climate-resilient breeds to withstand heat stress and disease, strengthening surveillance and vaccination programs to curb outbreaks, and introducing rainwater harvesting and solar-powered boreholes in drought-prone areas such as Micheweni. Further adaptation options include promoting drought-tolerant fodder and silage to reduce feed scarcity and improving poultry housing through shaded and ventilated structures to address heat stress. These adaptation intervention options foster long- term resilience under specific climate hazards while reflecting on sustaining food security and rural livelihoods.

Table 11: Climate Adaptation Priorities for Agriculture and Livestock Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Agriculture				
Embankments/Seawalls for cropland areas in the coastal areas	1	Infrastructure	Saltwater intrusion, coastal flooding	Direct
Drought-tolerant crops in coral rag and spice farming systems	2	Technology & Practices	Prolonged drought, heat stress	Anticipatory
Irrigation systems	3	Technology & Infrastructure	Drought, erratic rainfall	Direct
Mangrove restoration and other nature-based solutions	4	Ecosystem-based Adaptation	Sea level rise, storm surges	Anticipatory, Direct
Livestock				
Disease surveillance & vaccination programs	1	Capacity Building & Health	Disease outbreaks, humidity	Responsive
Rainwater harvesting & solar boreholes in highly drought-prone areas	2	Infrastructure	Water scarcity, drought	Direct
Drought-tolerant fodder & silage	3	Technology & Practices	Feed scarcity, drought	Anticipatory
Shaded & ventilated housing for poultry	4	Infrastructure	Heat stress	Direct

(b) Fisheries and Aquaculture

The fisheries and aquaculture sector in Zanzibar highlights three adaptation options as sustainable management of community-based marine protected areas (CMPAs), integrated early warning systems, and restoration of critical fish habitats and other high commercial species (Table 12).

These prioritized adaptation options emphasize the need for ecosystem restoration, coastal protection, and nature-based solutions to deal with climate hazards in Zanzibar.

Table 12: Climate Adaptation Priorities for Fisheries and Aquaculture Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Sustainable management of community-based marine protected areas (CMPAs)	1	Governance & Management	Overfishing, Coral Bleaching	Direct, Anticipatory
Integrated early warning systems	2	Technology & Early Warning	Storms, Temperature Shifts	Foundational, Responsive
Restoration of critical fish habitats and other high commercial species	3	Ecosystem-based Adaptation	Habitat Loss, Coastal Erosion	Anticipatory, Direct

(c) Water

Table 13 outlines key adaptation options for strengthening water sector resilience in Zanzibar, with a strong focus on inclusivity, sustainability, and innovation. The highest priority is the creation of a climate adaptation fund to support water infrastructure, followed by developing blended finance models that combine public and private resources for resilience. Social inclusion is emphasized through ensuring disability-friendly access points, offering inclusive training programs, and empowering women and youth in water governance. Further measures include improving financial access for marginalized groups, integrating the water sector into early warning systems, and establishing community-based flood response plans. Building capacity is also central, with training for local water committees and strengthening institutional governance. In addition, technical measures such as research on climate-resilient technologies, development of vulnerability maps, smart water monitoring, and the promotion of solar-powered desalination highlight the importance of innovation in adaptation. Together, these options aim to create a more equitable, climate-resilient, and sustainable water system for Zanzibar.

Table 13: Climate Adaptation Priorities for the Water Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Climate adaptation fund for water infrastructure	1	Financial	Drought & Flooding	Foundational
Blended finance models for water resilience	2	Financial	Drought & Flooding	Foundational
Disability-friendly water access points	3	Social & Institutional	Drought	Direct
Inclusive water management training programs	4	Capacity Building	All Hazards	Foundational
Integrated early warning systems	5	Technical / Institutional	Flooding & Cyclones	Foundational, Responsive
Community-based flood response plans	6	Community Planning	Flooding	Recovery, Responsive
Institutional capacity for water governance	7	Governance	All Hazards	Foundational

(d) Coastal and Marine

The main adaptation options for the marine and coastal ecosystems sector in Zanzibar are presented in Table 14, with the focus on marine spatial planning, restoration and conservation

of the ecosystem, institutional coordination, early warning systems as well as policy and regulatory frameworks. The top priority is to develop and implement a marine spatial plan (MSP) that includes climate-sensitive indicators to guide sustainable management of marine and coastal areas. This is followed by programs for ecosystem resilience, such as coastal reforestation and protection, which help reduce the impacts of storm surges and saltwater intrusion. Other important measures include climate risk mapping to identify vulnerable coastal infrastructure and croplands, as well as raising community awareness and education to close knowledge gaps about adaptation to the impacts of climate change.

Table 14: Climate Adaptation Priorities for the Coastal and Marine Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Marine Spatial Planning	1	Planning & Governance	Coastal Erosion, Sea Level Rise	Foundational, Anticipatory
Restoration and conservation of the ecosystem	2	Ecosystem-based Adaptation	Storm Surges, Saltwater Intrusion	Direct, Anticipatory
Institutional coordination	3	Foundational	Fragmented Governance (hindering effective management)	Anticipatory
Early warning system	4	Early Warning & Safety	Storms & Flooding	Anticipatory, Responsive
Policy and regulatory frameworks	5	Infrastructure & Ecosystem-based Adaptation (EbA)	Coastal Erosion	Direct, Anticipatory

(e) Wildlife

Zanzibar's wildlife sector is increasingly threatened by climate-induced stressors such as drought, habitat degradation, sea-level rise, and human-wildlife conflict. Key species, including endemic primates and coastal birds, are losing habitat and facing resource scarcity. Priority adaptation options to enhance climate resilience in the sector, include integrated habitat restoration initiatives that include community participation, management of human-wildlife conflict, and species-specific conservation planning.

Community perceptions highlight drought and water scarcity as the most severe and frequent hazards. Adaptation priorities include integrated water resource management, habitat restoration, and formalizing local ecological knowledge into conservation planning. Table 15 outlines key adaptation options for the wildlife sector, focusing on habitat protection, conflict reduction, and long-term conservation. The top priority is to restore habitats such as mangroves and forest corridors through community-based initiatives to address sea level rise and habitat loss. Another key measure is the introduction of co-management and policy actions to reduce human-wildlife conflict caused by resource scarcity. Promoting wildlife conservation through ecotourism and integrating local ecological knowledge are also emphasized as options that can both support biodiversity and benefit local communities. In the long run, species-specific conservation plans are suggested to tackle threats from wildfires and other extreme events.

Table 15: Climate Adaptation Priorities for the Wildlife Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Habitat restoration with community inclusion	1	Ecosystem-Based; Community & Livelihoods	Sea Level Rise & Habitat Loss	Anticipatory, Direct
Human-wildlife conflict	2	Policy & Community	Resource Scarcity	Responsive
Species-Specific Conservation Plans	3	Biodiversity Management	Wildfires & Extreme Events	Anticipatory, Recovery

(f) Infrastructure and Human Settlements

Climate adaptation options for the infrastructure and human settlements sector in Zanzibar are presented in Table 16. The adaptation options focus primarily on the integration of structural resilience, climate-responsive planning, and strengthening institutions. Key adaptation measures suggested include the expansion of climate-resilient drainage systems in urban centres, including the reinforcement of coastal defences at critical ports such as Malindi, Wete, Mwangapwani, and Mkoani to address risks from flooding, sea-level rise, and storm surges. Other adaptation options focus on integrating waste management into flood risk reduction and scaling up household rainwater harvesting. These adaptation options address both drought and runoff, and promote drought-resistant crops alongside improved rural road networks to enhance food and livelihood security. Urban resilience is further proposed through greening initiatives and passive cooling designs to address extreme heat, coupled with the improvement of occupational safety standards for outdoor workers. Long-term cultural and socio-economic sustainability is suggested through the conservation of Stone Town's heritage assets against climate risks. Key foundational reforms highlight the need to strengthen the capacity of local government for climate planning and mainstream adaptation considerations into housing and settlement development.

Table 16: Climate Adaptation Priorities for the Infrastructure and Human Settlement Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Climate-resilient drainage infrastructure	1	Infrastructure	Flooding, Sea-level rise	Direct
Integrated waste management	2	Infrastructure & Management	Flooding	Direct, Anticipatory
Rainwater harvesting at household	3	Infrastructure & Technology	Drought	Direct
Promote drought-resistant crops	4	Technology & Infrastructure	Drought	Anticipatory, Direct
Conserve heritage assets in Stone Town	5	Infrastructure & Cultural Heritage	Sea-level rise, Flooding	Direct, Anticipatory
Mainstream climate adaptation into housing and settlement planning	6	Planning & Policy	Cross-cutting	Foundational, Anticipatory

(g) Health

The prioritized adaptation options for the health sector in Zanzibar are presented in Table 17 as mainly three: climate-resilient health infrastructure; disaster preparedness and response (Health surveillance and early warning systems); and Water, Sanitation, and Hygiene (WASH). They address vulnerabilities in the health sector such as climate-sensitive disease outbreaks, infrastructure fragility, and water insecurity. The adaptation options aim to improve health facilities, services, and community resilience to climate risks. Priority measures include upgrading health facilities and drainage systems to withstand floods and strong winds while also deploying rapid response teams and climate-sensitive disease surveillance to address outbreaks linked to floods and drought. Improvement in water purification and sanitation systems, together with promoting safe hygiene practices, are emphasized to reduce health risks from floods and sea level rise. In addition, mobile clinics and community health worker networks are proposed to improve access to health care in vulnerable areas. Long-term options include developing early warning systems that connect climate forecasts with health risks, disaster preparedness and response while ensuring health services during climate-related disruptions.

Table 17: Climate Adaptation Priorities for the Health Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Climate-resilient health infrastructure	1	Infrastructure	Floods, Strong Winds	Direct, Anticipatory
Disaster preparedness and response (Health surveillance and early warning systems)	2	Monitoring & Early Warning	Floods, Drought	Responsive
Water, Sanitation, and Hygiene (WASH)	3	Direct	Water-borne Diseases (Cholera, Typhoid)	Anticipatory, Recovery

(h) Tourism;

Zanzibar's tourism sector is vulnerable to climate change due to its reliance on coastal ecosystems, cultural heritage sites, and unpredictable weather patterns. This foundation is directly threatened by rising sea levels, coastal erosion, and extreme weather events, which damage critical infrastructure, degrade beaches and biodiversity, and endanger the safety of both tourists and workers. Additional risks, such as coral bleaching and declining marine life, further jeopardize core activities like diving and ecotourism.

To address these threats, the sector outlines a number of prioritized adaptation options presented in Table 18. Immediate priorities focus on hardening climate resilient infrastructure in key areas like Stone Town, Northeast Unguja, and historic sites in Pemba (Mkama Ndume and Ndagoni). This involves constructing seawalls, improving drainage, reinforcing buildings, and adopting nature-based solutions to combat sea level rise and erosion. Restoration of coral reef aim to reduce the sector's climate sensitivity by restoring critical ecosystems like coral reefs and diversifying tourism products through inland cultural tourism and marine heritage. Further adaptation options aim to build climate-resilient coastal and marine safari programs that enhance livelihoods and enhance opportunities for blue economy. These prioritized adaptation options emphasize the integration of climate-resilient infrastructure in tourism

sector, ecosystem restoration, and livelihood diversification to strengthen the sector's capacity to withstand the impacts of climate change.

Table 18: Climate Adaptation Priorities for the Tourism Sector in Zanzibar

Adaptation Option	Rank	Category	Primary Climate Link	Adaptation Timing
Coastal and cultural town infrastructure	1	Infrastructure & Ecosystem-based Adaptation (EbA)	Sea Level Rise & Coastal Erosion	Direct, Anticipatory
Coral reef restoration	2	Ecosystem-based Adaptation	Marine Heatwaves & Biodiversity Loss	Anticipatory, Direct
Diversification of tourism products	3	Economic Diversification	Seasonal Weather Variability	Anticipatory
Early Warning Systems for Tourism Safety	4	Early Warning & Safety	Storms & Flooding	Anticipatory, Responsive

4. Cross cutting Adaptation Options

There are a number of cross-cutting adaptation options identified during climate Risks and Vulnerability assessment focusing on gender and vulnerable groups, financing climate adaptation, disaster management, capacity building as well as technology and research. The recommended cross-cutting adaptation options for Mainland Tanzania and Zanzibar are presented separately as follows:

I. Cross-cutting Adaptation Options for Mainland Tanzania

This part outline the matrix of recommended cross-cutting adaptation options across the nine key sectors in Mainland Tanzania.

Table 19: Matrix of Cross-cutting Adaptation Options by Sector for Tanzania Mainland

Cross-Cutting Issue	Agriculture	Coastal-Marine	Fisheries	Health
Gender & Vulnerable Groups	Develop gender-responsive options that recognize the unique barriers faced by women, youth, and marginalized groups.	Ensure adaptation options are explicitly gender-responsive, actively engaging women in planning and implementation to ensure benefits reach them and other vulnerable groups.	Implement explicitly gender-responsive adaptation options, ensuring benefits from investments (e.g., in aquaculture or processing) reach women and other vulnerable groups.	Prioritize the needs of women, children, and the elderly in adaptation interventions, ensuring equity-based approaches.
Disaster Management	Establish effective early warning systems for floods,	Strengthen disaster management by investing in robust early warning	Strengthen disaster management through robust early warning	Strengthen disaster risk reduction, including early

	droughts, and pest outbreaks to enable farmers to take precautionary measures	systems and developing community-level disaster preparedness plans	systems, effective communication to remote communities, and community-level preparedness plans.	warning systems, emergency medical services, and post-disaster recovery to reduce health impacts
Technology & Research	Invest in long-term research to develop new crop varieties tolerant to drought, extreme temperatures, and flooding. Integrate traditional and indigenous knowledge into modern adaptation strategies	Establish a joint scientific-community monitoring program for key coastal risks like coral bleaching and erosion	Support access to safer, more modern fishing equipment to cope with extreme weather. Invest in research and knowledge systems, including community-based monitoring	Expand applied research and introduce affordable technologies (e.g., hermetic storage bags, solar dryers, resilient WASH infrastructure) to reduce health risks
Capacity Building	Strengthen agricultural extension services to provide farmers with timely, location-specific advice on climate-smart agriculture and pest management	Implement targeted awareness campaigns to raise understanding of climate risks and adaptation options. A cross-cutting theme of education and awareness emerged as a universally recommended strategy	Champion education and knowledge sharing through targeted awareness campaigns to build immediate understanding and support for sustainable practices.	Implement targeted community training, build capacity for health workers, and strengthen institutions to improve prevention and response to climate-health risks
Financing	Climate-Proofed Input Financing: Establish loan programs through microfinance institutions (MFIs, SACCOs) Receipt System & Index-Based Insurance: Blended Finance for Agribusiness	Blue Carbon Credits: Resilience Fees for Coastal Properties: Catastrophe (Cat) Bonds for Coastal Cities	Debt-for-Nature Swaps for Marine Conservation: Community-Based Fishing Quotas & Licenses Insurance for Lost Fishing Gear	Climate Health Impact Funds Results-Based Financing (RBF) for Clinics Public-Private Partnerships (PPPs) for Vaccine Cold Chains

Table 20: Matrix of Cross-cutting Adaptation Options by Sector for Tanzania Mainland

Cross-Cutting Issue	Infrastructure & Human Settlement	Livestock	Tourism	Water
Gender & Vulnerable Groups	Implement gender-sensitive planning, social protection mechanisms, and ensure inclusive participation of women, youth, and vulnerable groups in climate governance	Design policies and interventions to address gender inequalities, ensuring women and vulnerable groups have equal access to resources, services, and decision-making power	Develop gender-responsive tourism policies, mandate collection of sex-disaggregated data, and ensure women's active participation in adaptation planning	Not explicitly mentioned in the provided cross-cutting adaptation options
Disaster Management	Strengthen disaster preparedness with robust early warning systems, community disaster committees, and regular preparedness drills. Vigorously enforce building codes and land-use planning	Develop early warning systems for climate-linked disease outbreaks to enable farmers to take proactive measures. Implement natural disaster management as a top priority to build resilience	Develop and test disaster preparedness and response plans for tourism hotspots with clear coordination between national, district, local, and private sector bodies	Invest in and scale up integrated early warning systems for both floods and droughts, ensuring forecasts are effectively communicated to water managers and vulnerable communities
Technology & Research	Implement structured technology transfer programs for solutions like solar-powered irrigation, rainwater harvesting, and cyclone-resistant building materials. Support locally driven research on hazard mapping and vulnerability	Promote modern breeding technologies like Artificial Insemination (AI) and enhance disease management through digital technologies for improved production and trade	Invest in "hard" technologies like resilient infrastructure and "soft" technologies like early warning systems for tourists and operators. Bundle technology transfer with training and financial support	Invest in modernizing water resource monitoring networks (river flow, groundwater levels, water quality) to create a robust evidence base for adaptive management
Capacity Building	Target both community empowerment (e.g., farmer field schools, disaster planning training) and institutional strengthening (e.g., technical training in risk mapping, adaptive urban planning)	Strengthen extension services to provide farmers with access to the latest knowledge and technologies through training, deployment of officers, and demonstration farms	Implement continuous training programs for tour guides, lodge staff, and local communities on climate impacts, resilient practices, and sustainable tourism	Implement targeted awareness campaigns and support for adopting water-saving technologies (e.g., rainwater harvesting) at the community and household level

	Resilience-Backed Bonds: Differential Property Tax: Mandatory Resilience Insurance	Livestock Insurance & Savings Groups: Grazing Land Leases & Sustainable Investment Value Chain Financing for Fodder	Sustainability-Linked Loans for Lodges: Tourism Conservation Levies: Diversification Funds	Water Resilience Bonds Payment for Ecosystem Services (PES): Formalize Tiered Tariff Systems

Table 21: Matrix of Cross-cutting Adaptation Options by Sector for Tanzania Mainland

Cross-Cutting Issue	Wildlife
Gender & Vulnerable Groups	Ensure wildlife adaptation options are explicitly gender-responsive, actively engaging women in planning and implementation of conservation actions
Disaster Management	Strengthen disaster management by investing in robust early warning systems for extreme weather and developing disaster preparedness plans for protected areas
Capacity Building	Address the strong community-perceived need for systemic capacity building through education and awareness programs that provide specific, actionable climate and conservation knowledge
Technology & Research	Provide access to "hard" technologies like fire-fighting equipment and "soft" technologies like wildlife monitoring systems. Promote community-based participatory research to co-develop locally appropriate conservation solutions
Financing	Wildlife Conservation Trusts Rhino Bonds & Other Conservation Notes Payment for Presence

II. Cross-cutting Adaptation Options for Zanzibar

This part also outline the matrix of recommended cross-cutting adaptation options across seven key sectors in Zanzibar.

Table 22: Matrix of Cross-cutting Adaptation Options by Sector for Zanzibar

Cross-Cutting Issue	Agriculture & Livestock	Water	Fisheries	Marine & Coastal
Financing	Introduce livestock insurance schemes for smallholder farmers	Establish climate adaptation fund for water infrastructure	Develop Blue Carbon finance mechanisms for mangrove restoration	Establish marine and coastal adaptation fund
	Establish climate-smart agricultural financing mechanisms	Develop blended finance models for water resilience	Establish community-managed adaptation funds for fisheries	Develop blended finance models for ecosystem resilience
Gender and Vulnerable Groups	Ensure livestock shelters and water	Ensure water access points are	Ensure inclusive access to fisheries training and gear	Ensure coastal infrastructure is accessible

	points are accessible	disability-friendly		
	Design inclusive training programs for disabled farmers	Design inclusive water management training programs	Design disability-friendly coastal infrastructure	Design inclusive disaster shelters and evacuation plans
	Empower women and youth through targeted livestock programs	Empower women and youth in water governance	Empower women in seaweed farming and fisheries governance	Empower women and youth in coastal restoration projects
	Improve access to credit and extension services for marginalized groups	Improve access to water-related financial services for marginalized groups	Support youth-led sustainable aquaculture initiatives	Ensure equitable access to marine resources and decision-making
Disaster Management	Integrate livestock into early warning and contingency planning	Integrate water sector into early warning systems	Implement early warning systems for marine hazards	Implement early warning systems for coastal hazards
	Develop community-based disaster response for livestock keepers	Develop community-based flood response plans	Develop cyclone-resilient fishing shelters	Develop community-based disaster response protocols
Capacity Building	Train farmers in climate-smart livestock practices	Train local water committees in climate resilience	Train fishers in climate-resilient practices	Train local communities in climate-resilient coastal practices
	Strengthen extension services and para-vet networks	Strengthen institutional capacity for water governance	Strengthen co-management institutions like SFCs	Strengthen institutional capacity for marine governance
Technology and Research	Conduct studies on climate-resilient livestock breeds	Conduct studies on climate-resilient water technologies	Conduct studies on ocean acidification impacts on shellfish	Conduct studies on climate impacts on coastal ecosystems
	Research sustainable fodder and water management systems	Develop vulnerability maps for water hotspots	Develop climate-resilient seaweed strains	Develop vulnerability maps for marine and coastal zones
	Promote mobile apps for disease surveillance and market info	Introduce smart water monitoring systems	Introduce smart gear for sustainable fishing	Introduce smart monitoring systems for coastal erosion
	Introduce renewable energy solutions like	Promote solar-powered desalination units	Promote solar-powered cold storage for fish preservation	Promote eco-engineering solutions like living shorelines
	biogas from manure			

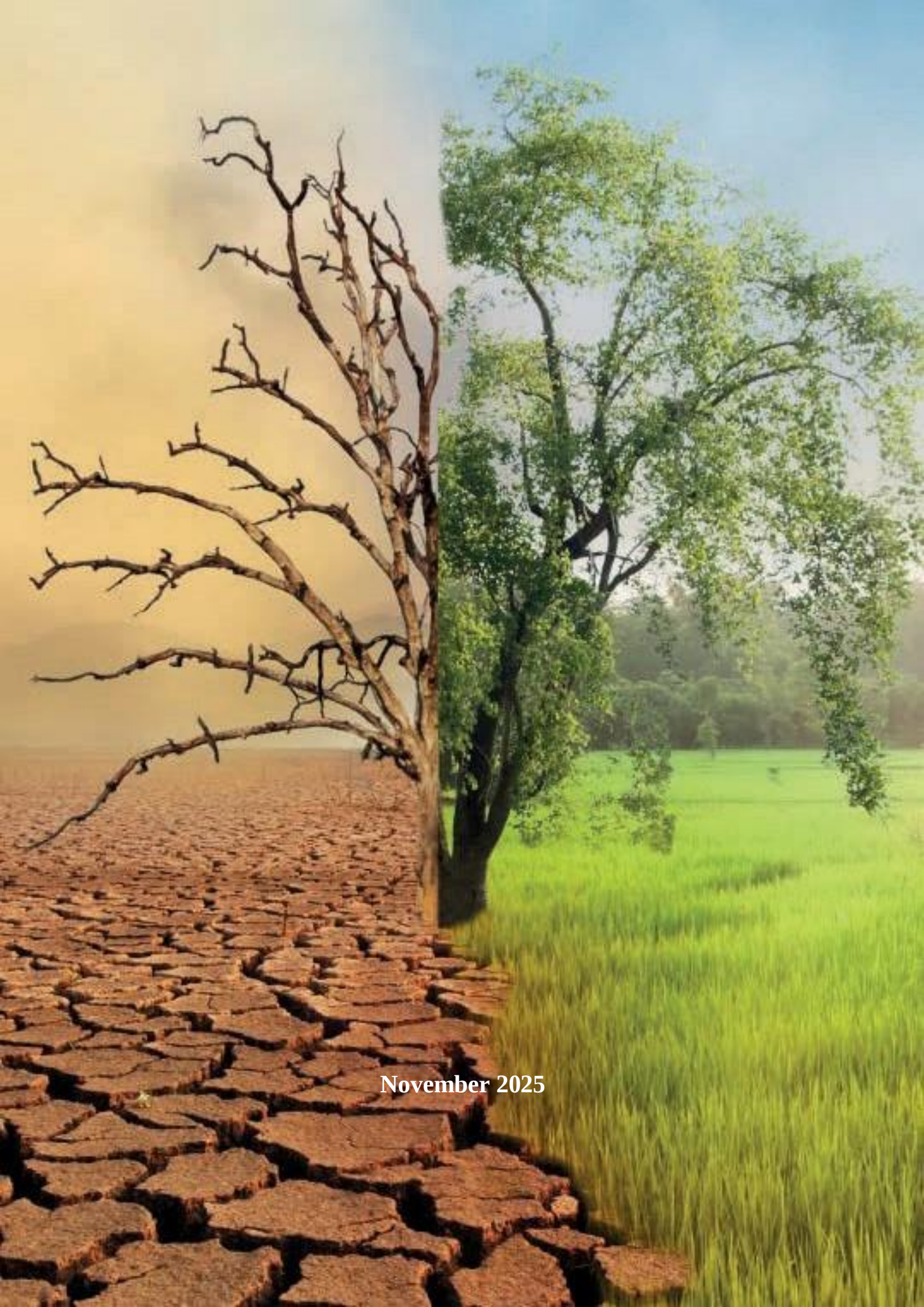
Table 23: Matrix of Cross-cutting Adaptation Options by Sector for Zanzibar

Cross-Cutting Issue	Tourism	Infrastructure & Human Settlement	Fisheries
Financing	Establish tourism climate adaptation fund	Operationalize climate adaptation funds for infrastructure upgrades and drainage systems	Develop health adaptation fund for climate resilience
	Develop public-private partnerships for resilient tourism infrastructure	Develop public-private partnerships for resilient infrastructure financing	Introduce insurance schemes for climate-related health shocks
Gender and Vulnerable Groups	Ensure accessible design in tourism infrastructure	Train local government staff in climate risk reduction and planning	Ensure inclusive access to climate-resilient health services
	Provide inclusive training for tourism service providers	Conduct community workshops on infrastructure resilience and maintenance	Design accessible emergency response systems
	Empower women and youth in tourism entrepreneurship	Ensure women and youth are included in infrastructure planning and decision-making	Empower women in health adaptation planning
	Ensure equitable access to tourism-related resources and decision-making	Design inclusive infrastructure that addresses mobility and safety for women and girls	Ensure equitable access to health services during climate events
Disaster Management	Implement early warning systems for tourism zones	Integrate universal design standards in public infrastructure projects	Integrate health sector into national disaster preparedness
	Develop evacuation and contingency plans for tourist areas	Ensure disaster shelters and evacuation routes are accessible to persons with disabilities	Develop contingency plans for health service continuity
Capacity Building	Train tourism operators in climate risk management	Establish multi-hazard early warning systems for floods and heatwaves	Train health personnel in climate risk response
	Strengthen institutional capacity for tourism governance	Develop community-based disaster response plans and drills	Strengthen institutional capacity for health governance
Technology and Research	Conduct studies on climate impacts on tourism assets	Conduct localized studies on storm-water flows and coastal erosion	Conduct studies on climate-health linkages
	Develop vulnerability maps for tourism hotspots	Develop vulnerability maps for infrastructure hotspots	Develop vulnerability maps for health infrastructure
	Introduce smart tourism monitoring systems	Introduce smart drainage systems and sensors for flood monitoring	Introduce mobile health units for climate emergencies
	Promote eco-certification and green technologies in tourism	Promote energy-efficient housing and passive cooling technologies	Promote telemedicine for remote climate-affected areas

ANNEX II: LIST OF MEMBERS OF THE NATIONAL ADAPTATION PLAN TECHNICAL TEAM

S.N	Position	Name, Organisation
1.	NAP Coordinator	Ms. Asia Akule, United Nations Development Programme
2.	NAP Assistant Coordinator	Mr. Nassir Tahir Ali, United Nations Development Programme
3.	Programme Manager	Dr. Abbas Kitogo, United Nations Development Programme
4.	Chairperson	Prof. Boniface Mbilinyi, Sokoine University of Agriculture
5.	Ass. Chairperson	Dr. Guido Uhinga, Ardhi University
6.	Member	Prof. Siza Tumbo, University of Dodoma
7.	Member	Prof. Emmanuel Elia, University of Dar es Salaam
8.	Member	Dr. Richard Madege, Sokoine University of Agriculture
9.	Member	Dr. Erick Mkwizu, University of Dar es Salaam
10.	Member	Dr. Idrissa Hamad, State University of Zanzibar
11.	Member	Dr. Sarah Osima, Tanzania Meteorological Agency
12.	Member	Dr. Michael Muganda, Sokoine University of Agriculture
13.	Member	Mr. Shekha Mjaja, Zanzibar Environmental Management Authority
14.	Member	Mr. Makame K. Makame, Ministry of Agriculture, Irrigation, Natural Resources and Livestock (Zanzibar)
15.	Member	Mr. Ilyas Haji, First Vice President's Office (Zanzibar)
16.	Member	Dr. Omar Shajak, First Vice President's Office (Zanzibar)
17.	Member	Dr. Salum, First Vice President's Office (Zanzibar)
18.	Member	Prof. Robert Kiunsi, Ardhi University
19.	Member	Prof. Tungaraza, Sokoine University of Agriculture
20.	Member	Dr. Patrick Ndaki, University of Dar es Salaam
21.	Member	Mr. Mahfoudh S. Haji, Zanzibar Climate Change Alliance
22.	Member	Mr. Ally Kimwaga, M&E Expert from First Vice President's Office (Zanzibar)
23.	Member	Eng. Joseph Kiruki, Vice President's Office
24.	Member	Mr. Mahuna A. Msangi, Vice President's Office
25.	Member	Ms. Getrude Sombe, Vice President's Office

26.	Member	Mr. Jacob Bulemo, Vice President's Office
27.	Member	Dr. Issa Mussa Nyashilu, Vice President's Office
28.	Member	Mr. Samuel Sudi, NDC Partnership
29.	Member	Ms. Suzan Mbilinyi, Vice President's Office
30.	Member	Ms. Oliva Minja, Vice President's Office
31.	Member	Mr. Tawfiq Halfan, Vice President's Office
32.	Member	Ms. Asya, First Vice President's Office (Zanzibar)
33.	Member	Mr. Charles Bundu, Catholic Relief Service (CRS)



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