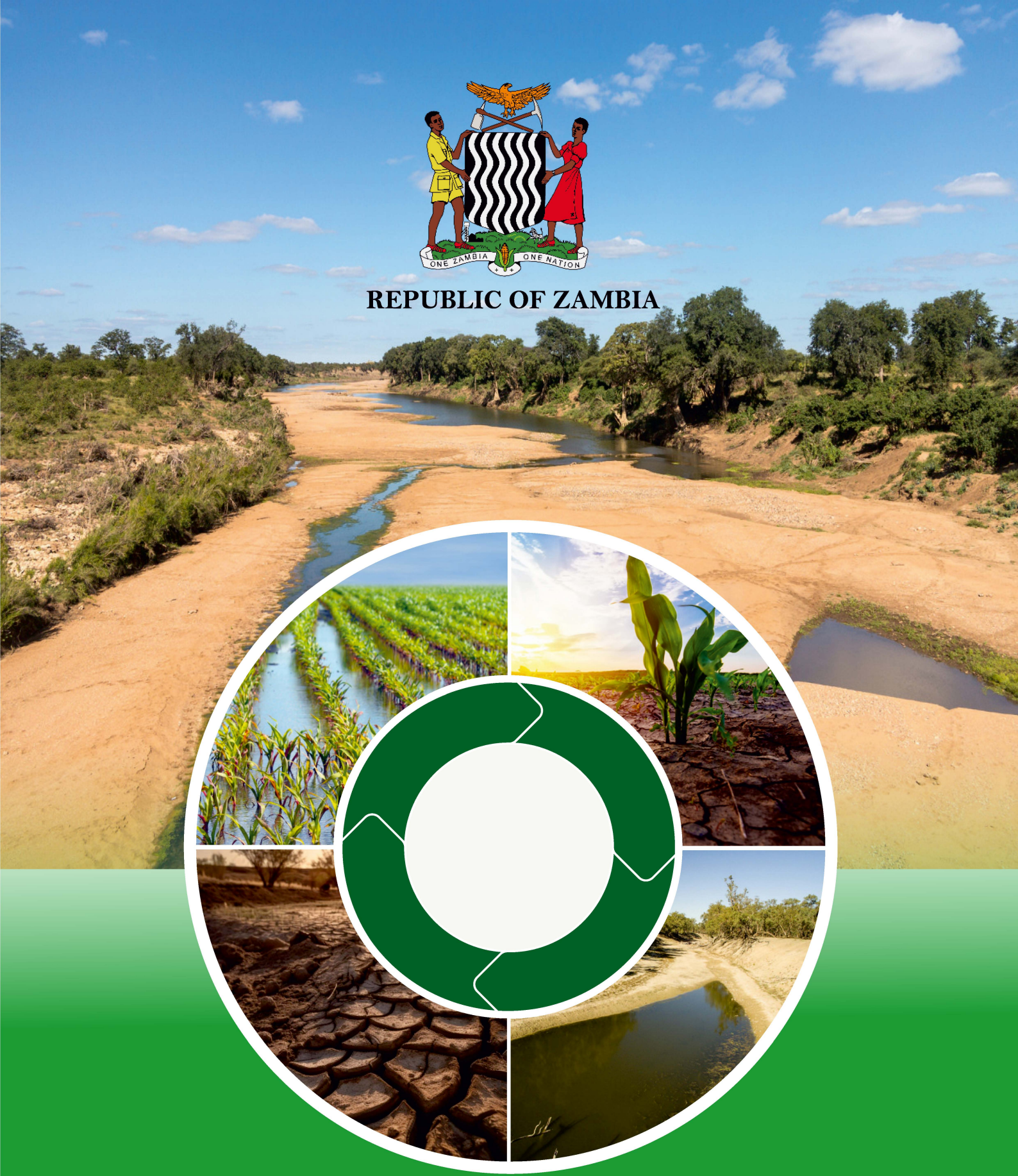
REPUBLIC OF ZAMBIA



NATIONAL ADAPTATION PLAN FOR ZAMBIA

(summary version)

OCTOBER 2023

FOREWORD

Climate change is one of the major challenges of this century. Projections by the Intergovernmental Panel on Climate Change (IPCC) indicate that if emissions of greenhouse gasses continue to rise, the global temperature is expected to increase beyond 1.5^{0}C. As a result, the world will be faced with a disastrous future in rising sea levels, shifts in agriculture growing seasons, biodiversity loss, as well as increased frequency and intensity of extreme weather events such as heat waves, storms, floods and droughts. If the rise in global temperatures is not addressed, Zambia will not be spared from these climate events.

The economy of Zambia is highly vulnerable to the impacts of climate change due to its geographical location, low adaptive capacity and a multitude of other socio-economic challenges. Subsequently, climate-sensitive sectors such as energy, agriculture, infrastructure, water, health, fisheries, wildlife and forestry are highly impacted by climate change. These impacts are already manifesting in extreme weather events such as frequent and prolonged droughts, flash floods and extreme temperatures which are expected to have far-reaching consequences. This phenomenon threatens the realization of Vision 2030 in which Zambia aspires to become "A Prosperous Middle-Income Nation by 2030".

The Government of the Republic of Zambia is implementing measures to address the adverse impacts to ensure that the country attains climate resilience. Among these measures is the development of the National Adaptation Programme of Action (NAPA, 2007), the National Climate Change Response Strategy (NCCRS, 2010), the National Policy on Climate Change (NPCC, 2016), and the Nationally Determined Contribution (NDC, 2016). The country also developed its Initial, Second and Third National Communications on climate change.

Zambia remains committed to protecting the climate system for the benefit of the present and future generations. In this regard, the government has developed the National Adaptation Plan (NAP) to address the country's vulnerability and resilience to climate change. The NAP has identified medium to long-term adaptation actions which will enable government to systematically implement priority adaptation actions that contribute to the implementation Vision 2030, National Development Plans and the NDC.

To implement this NAP, active engagement, coordination and partnership with various stakeholders, including development partners, the private sector, civil society organisations (CSOs), media, academic and research institutions, local communities, youths, persons with disabilities and children will be essential.

Hon. Eng. Collins Nzovu, MP
MINISTER OF GREEN ECONOMY AND ENVIRONMENT

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The development of the National Adaptation Plan (NAP) was achieved through a broad-based consultative process involving key stakeholders at the national, and provincial levels. We wish to thank various stakeholders including traditional leaders, civil society organizations, academia, the private sector, local communities, government line ministries and departments and cooperating partners for their contribution to the development of this NAP.

The Zambian Government also wishes to sincerely thank the Green Climate Fund (GCF) and the Global Water Partnership (GWP) for providing financial and technical support for the formulation of the NAP. The Government is greatly indebted to this support.

Further, Government acknowledges the technical inputs by the consultants, the Least Developed Countries Expert Group (LEG), Zambia Climate Change Network (ZCCN), International Institute for Sustainable Development (IISD), United Nations Population Fund (UNFPA), Alliance Biodiversity International (CIAT) and NAP Global Network during the formulation of the NAP.

The Government would also like to thank the drafting team, which included Prof. Felix Kalaba, Dr. Mubanga Kabwe, Dr. Charles Chisanga, and Ms. Monica Chundama.

Dr. Douty Chibamba
PERMANENT SECRETARY, MINISTRY OF GREEN ECONOMY AND ENVIRONMENT

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ABBREVIATIONS AND ACRONYMS

7NDP	Seventh National Development Plan
8NDP	Eighth National Development Plan
AER	Agro-Ecological Region
AfDB	Africa Development Bank
AFOLU	Agriculture Forestry and Other Land Use
ANR	Assisted Natural Regeneration
AWARE	Accelerated Water and Agricultural Resources Efficiency
CAF	Cancun Adaptation Framework
CAGs	Cluster Advisory Groups
CCA	Climate Change Acton
CCB	Climate Change Bill
CDD	Consecutive Dry Days
CDM	Clean Development Mechanism
CGIAR	Consultative Group on International Agricultural Research
CIAT	Alliance Biodiversity International
CIF	Climate Investment Funds
CO_2	Carbon dioxide
COMESA	Common Markets for Eastern and Southern Africa
COP21	Conference of the Parties
CSA	Climate Smart Agriculture
CWD	Consecutive Wet Days
DDCC	District Development Coordination Committees
DEM	Digital Elevation Model
DIPs	Integrated Development Plans
DMMU	Disaster Management and Mitigation Unit
DTR	Diurnal Temperature Range
EbA	Ecosystem-based Adaptation
ECZ	Environmental Council of Zambia
ERB	Energy Regulation Board
EU	European Union
FAO	Food and Agriculture Organization
GDP	Gross Domestic Product
GEF	Green Environment Fund
GHGs	Greenhouse gases
GMA	Game Management Area
GMPs	General Management Plans
GRZ	Government Republic of Zambia
GWP	Global Water Partnership
HEP	Hydroelectric Power
IPM	Integrated Pest Management
Irish-AID	Irish Agency for International Development
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management

LCMS	Living Conditions Monitoring Survey
LDC	Least Developed Countries
LKSC	Lower Kafue Sub-Catchment
Local	Local Climate Adaptive Living Facility
LPG	Liquid Petroleum Gas
MCA	Multi-Criteria Analysis
MGEE	Ministry of Green Economy and Environment
MLNREP	Ministry of Land, Natural Resources & Environmental Protection
MLGRD	Ministry of Local Government and Rural Development
MNDP	Ministry of National Development and Planning
MODIS	Moderate Resolution Imaging Spectroradiometer
MoFNP	Ministry of Finance and National Planning
MoH	Ministry of Health
MRV	Monitoring, Reporting and Verification
MoT	Ministry of Tourism
NAP	National Adaptation Plan
NAPA	National Adaptation Programmes of Action
NCCRS	National Climate Change Response Strategy
NDC	Nationally Determined Contribution
NDCC	National Development Coordinating Committee
NEP	National Energy Policy
NGO	Non-governmental Organization
NPCC	National Policy on Climate Change
PBCRG	Performance-based Climate Resilience Grants
PDCCs	Provincial Development Coordination Committees
PPCR	Pilot Programme for Climate Resilience
PPH	People per hectare
RCPs	Representative Concentration Pathways
SADC	Southern Africa Development Community
SCF	Special Climate Fund
SCRiKA	Strengthening Climate Resilience in the Kafue sub-Basin
SDGs	Sustainable Development Goals
TAZARA	Tanzania Zambia Railway line
TRALARD	Transforming Landscapes for Resilience and Development
UNDP	United Nation Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
USAID	United States Agency for International Development
WDC	Ward Development Committees
WMO	World Meteorological Organization
WWF	Wild Wide Fund for Nature
ZCCN	Zambia Climate Change Network
ZDHS	Zambia Demographic Health Survey
ZEMA	Zambia Environmental Management Agency
ZIFLP	Zambia Integrated Forest Landscape Project
ZMD	Zambia Meteorological Department

GLOSSARY

Adaptation: In human systems, the process of adjustment to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.

Adaptive capacity: The combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities.

Anthropogenic: Resulting from or produced by human beings.

Anthropogenic emissions: Emissions of greenhouse gases, greenhouse gas precursors, and aerosols associated with human activities. These activities include the burning of fossil fuels, deforestation, land use changes, livestock, fertilization, etc., that result in a net increase in emissions.

Baseline/reference: The baseline (or reference) is any datum against which change is measured. It might be a 'current baseline,' in which case it represents observable, present-day conditions. It might also be a 'future baseline,' which is a projected future set of conditions excluding the driving factor of interest. Alternative interpretations of the reference conditions can give rise to multiple baselines.

Capacity: The combination of all the strengths, attributes, and resources available to an individual, community, society, or organization, which can be used to achieve established goals.

Catchment: An area that collects and drains precipitation.

Climate: Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. In various chapters in this report different averaging periods, such as a period of 20 years, are also used.

Climate change: A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forces, or to persistent anthropogenic changes in the composition of the atmosphere or in land use.

Climate extreme (extreme weather or climate event): The occurrence of a value of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. For simplicity, both extreme weather events and extreme climate events are referred to collectively as 'climate extremes.'

Climate projection: A projection of the response of the climate system to emissions or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon simulations by climate models. Climate projections are distinguished from climate predictions in order to emphasize that climate projections depend upon the emission/ concentration/radiative-forcing scenario used, which are based on assumptions concerning,

e.g., future socioeconomic and technological developments that may or may not be realized and are therefore subject to substantial uncertainty.

Climate scenario: A plausible and often simplified representation of the future climate, based on an internally consistent set of climatological relationships that has been constructed for explicit use in investigating the potential consequences of anthropogenic climate change, often serving as input to impact models. Climate projections often serve as the raw material for constructing climate scenarios, but climate scenarios usually require additional information such as about the observed current climate.

Climate variability: Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate at all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).

Cold days/cold nights: Days where maximum temperature, or nights where minimum temperature, falls below the 10th percentile, where the respective temperature distributions are generally defined with respect to the 1971-2000 reference period.

Disaster management: Social processes for designing, implementing, and evaluating strategies, policies, and measures that promote and improve disaster preparedness, response, and recovery practices at different organizational and societal levels.

Disaster risk: The likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.

Disaster risk management (DRM): Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, and sustainable development.

Disaster risk reduction (DRR): Denotes both a policy goal or objective, and the strategic and instrumental measures employed for anticipating future disaster risk; reducing existing exposure, hazard, or vulnerability; and improving resilience.

Diurnal temperature range: The difference between the maximum and minimum temperature during a 24-hour period.

Downscaling: Downscaling is a method that derives local- to regional-scale (up to 100 km) information from larger-scale models or data analyses. The full definition is provided in Section 3.2.3.

Drought: A period of abnormally dry weather long enough to cause a serious hydrological imbalance. Drought is a relative term, therefore any discussion in terms of precipitation deficit must refer to the precipitation-related activity that is under discussion. For example, shortage of precipitation during the growing season impinges on crop production or ecosystem function in general (due to soil moisture drought, also termed agricultural drought), and during the runoff and percolation season primarily affects water supplies (hydrological drought). Storage changes in soil moisture and groundwater are also affected by increases in actual evapotranspiration in addition to reductions in precipitation. A period with an abnormal

precipitation deficit is defined as a meteorological drought. A megadrought is a very lengthy and pervasive drought, lasting much longer than normal, usually a decade or more.

Early warning system: The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.

Exposure: The presence of people; livelihoods; environmental services and resources; infrastructure; or economic, social, or cultural assets in places that could be adversely affected.

Extreme weather or climate event: See Climate extreme.

Flood: The overflowing of the normal confines of a stream or other body of water, or the accumulation of water over areas that are not normally submerged. Floods include river (fluvial) floods, flash floods, urban floods, pluvial floods, sewer floods, coastal floods, and glacial lake outburst floods.

Governance: The way government is understood has changed in response to social, economic, and technological changes over recent decades. There is a corresponding shift from government defined strictly by the nation-state to a more inclusive concept of governance, recognizing the contributions of various levels of government (global, international, regional, local) and the roles of the private sector, of nongovernmental actors, and of civil society.

Greenhouse gas: Greenhouse gases are those gaseous constituents of the atmosphere, both natural and anthropogenic, which absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, by the atmosphere itself, and by clouds. This property causes the greenhouse effect. Water vapor (H_2O), carbon dioxide (CO_2), nitrous oxide (N_2O), methane (CH_4), and ozone (O_3) are the primary greenhouse gases in the Earth's atmosphere. Moreover, there are a number of entirely human-made greenhouse gases in the atmosphere, such as the halocarbons and other chlorine- and bromine containing substances, dealt with under the Montreal Protocol. Besides CO_2, N_2O, and CH_4, the Kyoto Protocol deals with the greenhouse gases sulphur hexafluoride (SF_6), hydrofluorocarbons (HFCs), and perfluorocarbons (PFCs).

Hazard: The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources.

Heat wave (also referred to as extreme heat event): A period of abnormally hot weather. Heat waves and warm spells have various and in some cases overlapping definitions. See also Warm spell.

Impacts: Effects on natural and human systems. In this report, the term 'impacts' is used to refer to the effects on natural and human systems of physical events, of disasters, and of climate change.

Insurance/reinsurance: A family of financial instruments for sharing and transferring risk among a pool of at-risk households, businesses, and/or governments. See Risk transfer.

Land use and land use change: Land use refers to the total of arrangements, activities, and inputs undertaken in a certain land cover type (a set of human actions). The term land use is also used in the sense of the social and economic purposes for which land is managed (e.g., grazing, timber extraction, and conservation). Land use change refers to a change in the use or management of land by humans, which may lead to a change in land cover. Land cover and land use change may have an impact on the surface albedo, evapotranspiration, sources and

sinks of greenhouse gases, or other properties of the climate system and may thus have radiative forcing and/or other impacts on climate, locally or globally.

Percentile: A percentile is a value on a scale of 100 that indicates the percentage of the data set values that is equal to or below it. The percentile is often used to estimate the extremes of a distribution. For example, the 90th (10 th) percentile may be used to refer to the threshold for the upper (lower) extremes.

Projection: A projection is a potential future evolution of a quantity or set of quantities, often computed with the aid of a model. Projections are distinguished from predictions in order to emphasize that projections involve assumptions concerning, for example, future socioeconomic and technological developments that may or may not be realized and are therefore subject to substantial uncertainty.

Resilience: The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, including through ensuring the preservation, restoration, or improvement of its essential basic structures and functions.

Runoff: That part of precipitation that does not evaporate and is not transpired but flows through the ground or over the ground surface and returns to bodies of water. See Hydrological cycle.

Scenario: A plausible and often simplified description of how the future may develop based on a coherent and internally consistent set of assumptions about driving forces and key relationships. Scenarios may be derived from projections but are often based on additional information from other sources, sometimes combined with a narrative storyline.

Streamflow: Water flow within a river channel, for example, expressed in $m^3 s^{-1}$. A synonym for river discharge.

Sustainable development: Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Vulnerability: The propensity or predisposition to be adversely affected.

Warm days/warm nights: Days where maximum temperature, or nights where minimum temperature, exceeds the 90th percentile, where the respective temperature distributions are generally defined with respect to the 1971-2000 reference period.

Warm spell: A period of abnormally warm weather. Heat waves and warm spells have various and, in some cases, overlapping definitions.

Water demand management: Water demand management is the strategies and practices aimed at efficiently managing and conserving water resources to meet current and future water needs. It involves implementing measures to reduce water consumption, increase water use efficiency and promote sustainable water use behaviors.

1.0 INTRODUCTION TO THE NAP FOR ZAMBIA

The National Adaptation Plan (NAP) for Zambia is a medium to long-term strategic framework developed by the Government of the Republic of Zambia. It was formulated to address identified risks and vulnerabilities in various sectors to enhance the country's resilience to the impacts of climate change. It also identifies primary hazards and recognises that climate change poses significant risks to the country's natural resources, socio-economic development, and livelihoods. This is particularly for vulnerable communities and sectors namely: agriculture (crop, livestock, and fisheries), forestry, water, transport, tourism, infrastructure, mining, wildlife and health.

The formulation of the NAP was a participatory and iterative approach involving analysis of climate risks, assessment of climate vulnerabilities, review of adaptation options, compilation and review of adaptation plans, integration of adaptation into national planning, and the establishment of implementation strategies, in line with the UNFCCC NAP guidelines. It involved participation of various stakeholders, which included government agencies, civil society organizations and academia.

The NAP is aligned to national development frameworks such as the Vision 2030, National Development Plan and the Nationally Determined Contribution (NDC). Further, it also aligns to international frameworks such as the United Nations Framework Convention on Climate Change (UNFCCC) and the Sustainable Development Goals (SDGs) to ensure coherence and synergy with global climate and development agendas. By implementing the NAP, Zambia is contributing to the achievement of the global goal on adaptation as outlined in the Paris Agreement, which are to enhance adaptive capacity, reduce vulnerability, and increasing resilience of systems and communities.

1.1 Objectives of the NAP

The following are the objectives:

i) To identify the country's vulnerabilities to climate change and develop medium and long-term adaptation actions to minimise the impacts.

ii) To integrate climate change adaptation into the national, sectoral and sub-national planning and budgeting processes.

iii) To strengthen institutional and technical capacities for the implementation of identified priority adaptation actions.

iv) To strengthen institutional coordination mechanisms for climate change adaptation actions at national, sectoral, and sub-national levels; and

v) To leverage emerging opportunities for resource mobilization for the implementation of the prioritised adaptation actions to address current and projected climate risks.

1.2 Scope of the NAP for Zambia

The NAP sets clear goals and objectives for adaptation, which include reducing vulnerability, enhancing adaptive capacity, building resilience, and ensuring sustainable development in the face of climate change. The scope of the Zambia NAP includes:

Vulnerability Assessment: This involves assessing the current and future risks and vulnerabilities associated with climate change in different agro-ecological regions (AERs), geographical regions and sectors namely: agriculture (crop, livestock, and fisheries), forestry, water, transport, tourism, infrastructure, mining, wildlife, and health.

Adaptation Priorities: The identified climate change adaptation priorities will be utilized to enhance adaptive capacity. Based on the vulnerability assessment, the NAP identifies priority areas where adaptation efforts should be focused. These priorities vary depending on AERs, geographical regions and sector-specific environmental, social, human, financial, institutional, and physical vulnerabilities.

Implementation Strategies: The NAP outlines strategies and measures to achieve the adaptation goals and objectives. This involves policy changes, capacity building, technological advancements, financial mechanisms, and institutional arrangements.

Resource mobilization: The NAP articulates resource mobilization and financing strategies for the implementation of identified adaptation actions and strategies.

Monitoring, Evaluation, Learning and Reporting (MELR): The NAP provides mechanisms for monitoring and evaluating the effectiveness of adaptation actions. This includes indicators for MELR and allows for adjustments and improvements as needed.

1.3 The NAP formulation process

The Zambia NAP formulation process was first launched in 2014 and re-launched in 2021 following readiness grant support from the Green Climate Fund (GCF). This process builds on earlier national processes to address climate change such as the National Adaptation Programme of Action (GRZ, 2007), National Climate Change Response Strategy (GRZ, 2010), National Policy on Climate Change (GRZ, 2016), Climate Change Gender Action Plan (GRZ 2018), Green Growth Strategy for Zambia (currently under development) and the Revised Nationally Determined Contributions (GRZ, 2021) and it is aligned with the Eighth National Development Plan (8NDP) (GRZ 2022). The NAP process commenced with a Stocktaking exercise in 2021. The

Stocktaking Report benchmarked the status of the climate change adaptation activities in the country and identified gaps. This was followed by development and consensus building on the roadmap for the formulation of the Zambia NAP.

The next step involved synthesizing data on vulnerabilities of sectors, geographical regions, and marginalized social groups (women, youths, elderly, persons with disabilities, people living with HIV/AIDS), and current and future impacts of climate change. This also involved documentation of lessons and best practices from past and ongoing projects on adaptation.

This was followed by the prioritization of gender-sensitive adaptation actions in different sectors and geographical regions. The prioritized climate change actions identified by stakeholders were screened and appraised using a Multi-Criteria Analysis (MCA) tool, which enabled decision-makers to create a structured framework for comparing a set of defined options across several diverse criteria to evaluate adaptation options across a range of priorities. The MCA provided a structured approach to determine the feasibility of proposed adaptation actions against identified criteria. The tool helped decision makers to evaluate alternatives and make trade-offs while considering multiple factors. Adaptation options were evaluated across 10 criteria including institutional governance, social, environmental, gender, technical, cost-effectiveness, and inclusiveness among others.

Capacity building in the systems and tools for integration of adaptation plans and budgets; coordination mechanisms, climate finance, climate data analysis, monitoring, reviewing, and reporting at national and sub-national levels was included in the whole NAP formulation process. It also included training of the National Technical Committee on Climate Change on how to use the Multi-Criteria Analysis (MCA) Tool in prioritizing adaptation options at national and provincial levels.

The principal NAP formulation process enabled medium- and long-term strategic planning and coordination of adaptation in line with National Development Planning processes. Gender was an integral dimension in the NAP process, guided by Zambia's 2018 Climate Change Gender Action Plan. The NAP formulation process recognized gender differences in adaptation needs, opportunities, and capacities. In addition, the participation of youths, women and men in adaptation decision-making processes and their knowledge, concerns and experiences were taken into consideration.

The NAP formulation process in Zambia was a multi-sectorial and participatory process that required strong coordination and collaboration. The NAP provides a framework for Zambia to ensure that medium and long-term development planning and budget processes integrate climate change adaptation in order to effectively identify climate change adaptation actions.

The NAP formulation process was participatory, engaging a diverse array of stakeholders following bottom-up and top-down approaches to ensure that the formulation process is country-driven. Sectorial and regional engagements were held at national and provincial levels with the various sector players which included government, civil society organizations, academia, and development agencies among others.

The last step involved drafting and validation of the NAP document by stakeholders at national and sub-national levels.

The following are the NAP key result areas for the formulation phase:

I. Strengthened institutional coordination and collaboration for adaptation planning in Zambia.
II. Established a system for integrating climate change adaptation into plans and budgets.
III. Prioritized adaptation actions for sectors and geographic areas.
IV. Strengthened capacity of planning authorities, sectors, and civil society in:
    - Systems and tools for integrating adaptations into plans and budgets.
    - Climate finance.
    - Climate data analysis.
    - Gender transformative approaches for climate change.
    - Monitoring, reviewing, and reporting at national and sub-national levels; and
    - Use of the Multi-Criteria Analysis (MCA) Tool in prioritizing adaptation options at National and Province levels.
V. Developed a Monitoring, Evaluation, Learning and Reporting Framework for the NAP.
VI. Developed a resource mobilization strategy for the implementation of the NAP; and
VII. Developed a NAP communication strategy.

2.0 POLICIES AND PROGRAMMES ON ADAPTATION

Globally, there are several policies and strategies developed to address climate change impacts. In Zambia, the NAP process was informed by national policies and strategies among them, the NPCC that was promulgated in 2016, the NAPA, NDC, and the NCCRS among others. This is to enhance adaptation actions in the country.

Zambia's legislation and policy frameworks, prioritises the climate change agenda that promote the unlocking of bilateral and multilateral funding potential. Strong political commitment and comprehensive overarching institutional and policy coordination frameworks are key triggers of international financing for Climate Change Action (CCA). Creating an enabling environment that provides this level of support is an important first step in accessing climate finance.

Over the years, Zambia has received funding from bilateral and multilateral partners to implement various project related climate adaptation actions in different sectors and geographical areas to address climate change impacts.

Some of the implemented projects include the *Accelerate Water and Agricultural Resources Efficiency in Zambia (AWARE)*, *Pilot Programme for Climate Resilience (PPCR) Phase II, Strengthening Climate Resilience in the Kafue Sub Basin (Scrika)* and *Transforming Landscapes for Resilience and Development (TRALARD)*. Others are *Strengthening Climate Resilience of Agricultural Livelihoods in Agro-ecological Regions I and II (SCRALA)*, *Ecosystems-Based Adaptation (EbA) project* as well as the *Local Climate Adaptive Living (LoCAL) mechanism*. Civil Society Organisations are also implementing adaptation projects, such as the *Voices for Climate Action (VCA) project* implemented by a consortium of Civil Society Organisations, which include Wild Wide Fund (WWF), Zambia Climate Change Network (ZCCN), Action Aid Zambia, HIVOS, and Civil Society for Poverty Reduction (CSPR).

Key Lessons learnt from Implemented Projects:

- Policies and leadership: strong leadership and consistent policies are critical for mainstreaming climate change and implementation of adaptation efforts in development planning.
- Stakeholder participation: this is key in participatory processes for adaptation planning to foster ownership and enhance livelihoods as well as community values.
- Indigenous knowledge and science: blending of indigenous knowledge and science contributes to building adaptive capacities in communities.
- Benefits and trade-offs: Unequal distribution of benefits and environmental trade-offs threaten the successful implementation of adaptation actions where common resources have multiple uses and beneficiaries such as farmers versus gatherers in forest ecosystems. Acknowledging and understanding the multiple uses and beneficiaries is

key to the successful implementation of Ecosystem Based Adaptation (EbA) approaches.

- Planning: Integrated Planning at district level has been central in delivering technical solutions at implementation level.
- Inclusivity: Inclusion of vulnerable groups, women and youths in project implementation increases their access to the available natural resources for improved livelihoods at household level.
- Financing: Bilateral and multilateral partners as well as private sector are important in providing supplementary technical and financial assistance.
- Institutional arrangements: the use of existing government and project implementation structures is key in the integration of adaptation activities in development planning.
- Adaptation and resilience: Climate change adaptation and resilience building require partnerships beyond the primary sector focus areas to include local communities, civil society as well as private sector in order to address felt needs.
- Governance and infrastructure management: In addition to providing communities with physical assets that help to build resilience, there is also a need to focus on local governance capacities and socio-cultural values. This enhances accountability in project implementation and promotes community participation; and
- Capacity building: Adaptation initiatives require continuous learning and feedback loops. These elements need to be incorporated in the project design and implementation.

3.0 CLIMATE CHANGE, HISTORICAL EVENTS, TRENDS AND FUTURE PROJECTIONS

Zambia is faced with extreme climatic conditions such as droughts, seasonal and flash floods, extreme temperatures, wet spells and dry spells characterized by increased intensity, frequency and magnitude. Changes in rainfall patterns threatens productivity of livestock, fisheries, aquaculture and rainfed agriculture in Zambia (FAO, 2015; Rojas-Downing et al., 2017; Ngoma et al., 2021). Climate variability continues to be a major threat to sustainable development in the agricultural sector leading to threatened food security, disruption of livelihoods, destruction of natural and agriculture resource base, poor adaptive capacity among farmers, inadequate research and development, reduced productivity, inability to measure, and report greenhouse Gas (GHG) emissions from Agriculture Forestry and Other Land Use (AFOLU), livestock and crop disease outbreak.

Increasing trends in temperature and variability in rainfall of about 0.34oC per decade and 1.9 mm per month, respectively, threaten livelihoods of 60% of the population that depend on agriculture (Mubanga et al. 2020). At agricultural field level, the consequences of this new scenario have led to waterlogged fields, water shortages, destruction of crops and higher incidences of crop and livestock diseases. Crop simulation models indicates an increase in maize yield by more than 25% in parts of Agro-Ecological Region (AER) III but likely to decrease by the same magnitude in parts of AER IIa (World Bank Group, 2019). Further, the simulation studies suggested that while overall production may increase, net exports of most of the agricultural commodities are declining including net trade (World Bank Group, 2019).

Agriculture is a key sector for Zambia's economy which is however sensitive to climate change and climate related impacts. The agriculture production output is projected to decline by 30% by 2080 under the current climate change scenarios unless adaptation actions are applied and the Agriculture Policy is climate proofed (ZaAS, 2013). Much of the agricultural land will be lost due to climate change (UNFCCC, 2006) to other Land Use/Land Cover Changes (LULCC) (Chisanga et al., 2022c). There are many factors that compound the impacts of the current climate change and variability in Zambia, and these have negative effects on the ability for the country to cope. These include poverty, limited infrastructure, illiteracy, weak institutions, lack of technology and information, low level of primary health care and low management (UNFCCC, 2006).

Heavy rainfall, dry spells and droughts are extreme rainfall patterns that impacts sectors, agro-ecological regions, provinces, and the communities. Flash floods and floods generally occur in the rainy season, particularly from December to February (DJF) where high intensity precipitation events are most prominent (Hachigonta and Reason, 2006). Zambia is vulnerable to and has experienced high intensity of floods in 2006/2007, 2007/2008, 2008/2009, 2009/2010 and 2011/2012 (Sichingabula, 1998; ZVAC, 2009, 2010, 2012). In 2009-2010, flash floods and riverine floods due to heavy rainfall events over Zambia caused water logging and affected over 238,258

people (Mubanga and Chisanga, 2020; Mubanga et al., 2020). In other seasons, floods have damaged crops, livestock, and infrastructure and contributed to pest epidemics (MTENR et al., 2007; MTENR, 2010). The flooding events during 2006/2007 rainy season saw nearly 1.5 million people (Neubert et al., 2011) affected in 41 out of 72 districts in Zambia (GRZ-Government of Republic of Zambia, 2007). According to the Zambian Vulnerability Assessment Committee (ZVAC) report, some 1.4 million people depended on food relief following the floods in 2006/07. The magnitude and timing of the floods also caused problems, as the regions that are used to the floods were caught unprepared by earlier occurrences and higher magnitudes (Kalantary, 2010).

Droughts and dry spells occur even more frequently than floods (Thurlow et al., 2012; Libanda et al., 2019) and notably, AER1 is the country's most drought-prone region (Mubanga et al., 2020). These can span multiple years and have intense effects on livelihoods and food security. Cattle, which are crucial to livelihoods of many Zambians, are stressed during times of extreme drought, a result of reduced plant growth and a shortage of pasture (Gannon et al., 2006). Smaller scale droughts also occurred in 1986-2018, 1994-1995, 2004-2005, and 2017-2018 (Thurlow et al., 2012; Libanda et al., 2015; Libanda and Ngonga, 2018). It is important to understand broad-scale changes in the climate (WMO, 2020, 2021). However, the most acute impacts of weather and climate are often felt during extreme meteorological events such as heavy rain, droughts, heat waves and windstorms, including tropical storms (WMO, 2020, 2021).

Climate trends in Zambia have shown that many climate-induced hazards such as droughts, floods and extreme temperatures have increased in frequency and intensity over the past few decades. Projections show that by 2030, Zambia will experience a notable rise in compound heat, drought and flood events compared to current baseline conditions. This implies that the existing climate risks observed on the ground will be exacerbated even further in the future.

3.1 Climatic conditions in agro-ecological regions

Zambia is divided into three major AERs (AER I, AER IIa, AER IIb and AER III) (Figure 1), which are largely based on annual rainfall amounts but also integrate soils and other climatic characteristics (Chabala et al., 2013). Zambia's AERs are experiencing warmer winters and hotter summers and annual rainfall has decreased by 1.9 mm per month (2.3% per decade) since 1960 particularly in the months of December, January and February (MTENR, 2010; UN, 2012). Temperature-based climate indices have had statistically significant impacts on AERs and ecosystems (Mubanga et al., 2020; Chisanga et al., 2022b). The projected future changes in rainfall due to climate change indicates that AERI will receive more rainfall in January to March and October to December by 2050 (Chisanga et al., 2020a; Mubanga et al., 2020). In contrast, AERII will experience minimal decreases of rainfall in these periods and AERIII is projected likely to receive less rainfall (Table 1). The projected changes in rainfall are statistically non-significant.

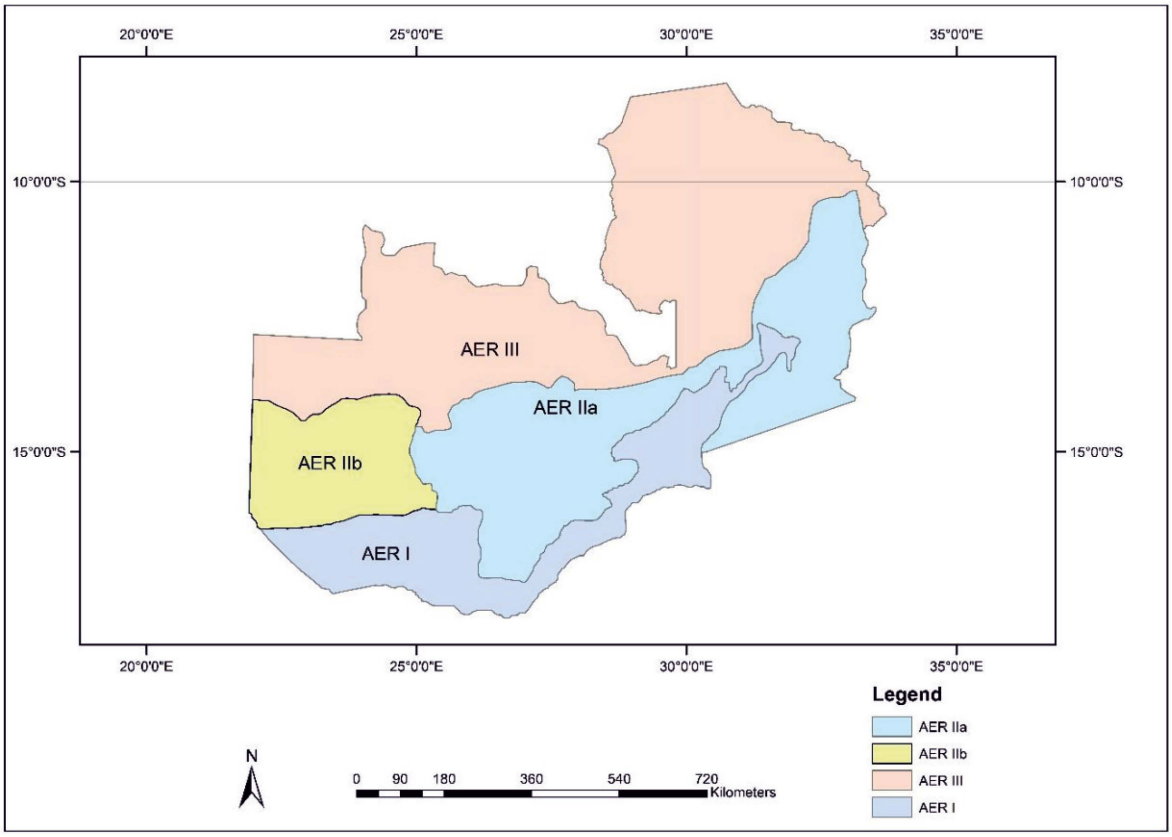

Figure 1: Agro-ecological Regions of Zambia

Table 1: Summary of projected climate changes across AERs of Zambia for key climate variables by 2050

Region	Average temperature (ºC)	Total annual rainfall (mm/year)	Number of heavy rainfall (Days/year)	Rainy days (Days/year)
AERIII	**Increasing** +2 °C to +3 °C by 2050s but changes evident in next decades	**Normal to increasing**, no change by 2015, but change ranging from no change to clear increase of up to15% could become evident after 2070s	**Normal to increasing**, ranging from no change to increasing by 2050, but generally increasing by up to 50% by 2100	**Normal to decreasing**, ranging from no change to decreasing of up to 10% by 2100. Change may become evident from 2060s
	Increasing +1.5 °C to +3 °C by 2050s but changes evident in next decades	**Normal to decreasing**, no change by 2015, but change ranging from no change to clear decrease of up to 20% could become evident after 2070s	**Normal to increasing**, ranging from no change to increasing by 2050, but generally increasing by up to 50% by 2100	**Normal to decreasing**, ranging from no change to decreasing by 2050, and generally decreasing by up to 15% by 2100
AERII	**Increasing** +2 °C to +3 °C by 2050s but changes evident in next decades	**Normal to decreasing**, ranging from no change to a clear decrease of up to 35% by 2100. Change may become evident from 2040s	No consistent signal in projections	**Normal to decreasing**, ranging from no change to decreasing by 2050, and generally decreasing by up to 35% by 2100
AERI	**Increasing** +1.5 °C to +3 °C by 2050s but changes evident in next decades	**Normal to decreasing**, ranging from no change to a clear decrease of up to 35% by 2100. Change may become evident from 2020s	No consistent signal in projections	**Normal to decreasing**, ranging from no change to decreasing by 2050, and generally decreasing by up to 35% by 2100

Adapted from: AfDB Group (2022)

3.2 Projected changes in selected climate indices over Zambia

The Summer days (SU; daily temperature > 25 oC), Monthly maximum of daily maximum temperature (TXx), Cool Nights (TN10p), Warm Nights (TN90p), Cool Days (TX10p), Warm Days (TX90p), Diurnal Temperature Range (DTR), Maximum 1-day precipitation (Rx1day), Maximum 5-day precipitation (Rx5day), Annual total wet-day precipitation (Total rainfall; PRCPTOT), Consecutive Dry Days (CDDs) and Consecutive Wet Days (CWDs) under Representative Concentration Pathways (RCP4.5, RCP8.5) are shown in Table 2. These climate indices exert impacts on sectors. Climate indices such as annual precipitation total, diurnal temperature range, simple daily intensity index, and annual contribution from very wet days are societal impact indices. Changes in frequency and magnitude of extreme weather events have an important impact on mortality rates, especially among elderly people.

The summer days exhibits an increase in daily temperature > 25oC during 2021-2050 relative to the baseline (1971-2000) under RCP4.5 and RCP8.5. The summer days show an increase in days of 0.03-170 and 0.03-162 days under RCP4.5 and RCP8.5, respectively. The summer days shows an increase in the northern part of Zambia. However, monthly maximum of daily maximum temperature under RCP8.5 shows an increase in monthly maximum of daily maximum temperature from 1.56oC to 2.39oC. The number of cool nights and warm nights exhibits both an increase and decrease in cool and warm nights in selected parts of the country. There are both increase and decrease in the number of cool days under RCP4.5. The number of cool days and warm days shows an increasing trend from 2021-2050 relative to 1971-2000 under RCP4.5 and RCP8.5 (Table 2). The occurrence of larger number of cool days (-0.09 to 0.50 days) and warm days (-0.08 to 0.50 days) will occur under RCP4.5.

Diurnal temperature range during 2021-2050 relative to 1971-2000 under RCP4.5 (0.03-1.25 oC) and RCP8.5 (-0.21 to 1.00 oC). Diurnal temperature range is an important indicator for climate change (Braganza et al., 2004; Qu et al., 2014) and has significant impacts on agricultural production and productivity. The factors influencing diurnal temperature range includes; land use/land cover changes (LULCC), urbanization, irrigation, station moves, desertification, and other climatic effects (Qu et al., 2014). Diurnal temperature range is an important meteorological indicator of global climate change with higher values inducing stroke morbidity (Lei et al., 2020).

The maximum 1-day precipitation, maximum 5-day precipitation and annual total wet-day precipitation exhibit an increase and decrease in the amount of rainfall under RCP4.5 and RCP8.5. Table 2 shows higher reduction compared to increase in Rx5day under RCP4.5. However, the Total rainfall shows a decrease trend in selected northern, central, and southern parts of Zambia. The Consecutive Dry Days and Consecutive Wet Days exhibit both an increase and

decrease in consecutive dry and wet days under RCP4.5 and RCP8.5. The Consecutive Wet Days will increase/decrease under RCP4.5 (-24.27 to 29.63 days) and RCP8.5 (-17.40 to 13.90 days). The trend in Consecutive Wet Days is statistically significant in selected parts of Western, North-western, Southern, Northern, Muchinga and Lusaka provinces. Consecutive Wet Days for most of the country were statistically non-significant. The Consecutive Wet Days for the period 2021-2050 under RCP8.5 shows a decreasing trend of 0.6 days in Eastern and selected parts of Muchinga, Northern, Luapula, Central, Copperbelt and Southern provinces. However, all the trends observed under RCP8.5 are statistically non-significant. There is a higher reduction in Consecutive Wet Days under RCP4.5 (-100.37 to -5.43 days) compared to RCP8.5 (-83.37 to -4.50 days). The Consecutive Wet Days and Consecutive Wet Days has implication on agriculture productivity and production.

Table 2: Computed Expert Team on Sector Specific Indices during 2021-2050 relative to 1971-2000 scenarios at annual basis

Indices	Description	Sector	2021-2050/1971-2000 Change (RCP4.5)	2021-2050/1971-2000 Change (RCP8.5)
CDD	Consecutive dry days (PR<1.0 mm)	Water, Agriculture, Health, Transport, Energy, Forestry	-24.27 to 29.63	-17.40 to 13.90
CWD	Consecutive wet days (PR>1.0 mm)	Water, Agriculture, Health, Transport, Tourism, Wildlife	-100.37 to -5.43	-83.37 to -4.50
SU	Summer days (daily temp >25ºC)	Health, Tourism, Wildlife, Agriculture	0.03 to 170.73	0.03 to 162.37
DTR	Diurnal temperature range	Agriculture	0.03 to 1.25	-0.21 to 0.100
PRCPTOT	Sum of daily PR>=1.00 mm	Water, Agriculture	-342.64 to 116.68	-294.12 to 221.15
Rx1day	Maximum 1-day PR total	Water, Agriculture, Infrastructure, Energy, Forestry, Tourism, Wildlife	-8.84 to 10.42	-08.79 to 7.48
Rx5day	Maximum 5-day PR total	Water, Agriculture, Infrastructure, Mining, Energy, Forestry, Tourism, Wildlife, Transport	-21.19 to 24.97	-19.64 to 17.49
TN10p	Percentage of cold nights (%)	Agriculture, Health	-0.48 to 0.30	-0.36 to 0.33
TN90p	Percentage of warm nights (%)	Agriculture, Health	-0.32 to 0.37	-0.22 to 0.35
TX10p	Percentage of cool days	Agriculture	-0.09 to 0.50	-0.18 to 0.34
TX90p	Percentage of hot days (%)	Agriculture, Health, Water, Transport	-0.08 to 0.50	-0.02 to 0.48
TXx	Warmest daily maximum TX (ºC)	Agriculture, Health, Water, Mining, Water, Wildlife, Infrastructure, Transport	1.44 to 2.44	1.56 to 2.39

*Summer days (SU; daily temperature > 25 ºC), Monthly maximum of daily maximum temperature (TXx), Cool Nights (TN10p), Warm Nights (TN90p), Cool Days (TX10p), Warm Days (TX90p), Diurnal Temperature Range (DTR), Maximum 1-day precipitation (Rx1day), Maximum 5-day precipitation (Rx5day), Annual total wet-day precipitation (PRCPTOT), Consecutive Dry Days (CDDs) and Consecutive Wet Days (CWDs) under Representative Concentration Pathways (RCP4.5, RCP8.5)

**Agriculture: Crop, Fisheries, Livestock

4.0 ADAPTATION ACTIONS FOR CLIMATE HAZARDS

Droughts, floods, high temperatures and windstorms were identified as the main hazards affecting the sectors, geographical regions and social groups. In assessing the vulnerability of sectors and geographical regions as well as the adaptation options, five (5) vulnerability elements were considered, namely environmental, social, human, financial, physical and institutional vulnerabilities. The tables in the sections below for each hazard are in two parts. The first part focusses on vulnerability (Exposure by Hazards, Sensitivity, Adaptive capacity, Climate Risk level). The second, focusses on adaptation actions, Target groups to respond to vulnerability and affected area (Sectors, Provinces and AERs).

4.1 Adaptation actions to droughts

Droughts are a major climate hazard that exacerbates vulnerabilities among different groups and societies in Zambia (*Table 3*). Drought as used under this section refers to seasonal droughts, intra-seasonal droughts and dry spells. With over 60% of the Zambian population dependent on farming for their livelihood, droughts are a major climatic vulnerability that impacts nearly all sectors of the Zambian economy. The assessment involved a description of how droughts have constituted these elements vulnerable, the variants of the elements exposed to hazards, the adaptive capacity of the communities which are susceptible to these vulnerabilities as well as the ranking of the climate risk which droughts pose on the identified vulnerability elements. Further, adaptation options for managing the vulnerabilities as a result of droughts were identified while the susceptible regions in Zambia to these vulnerabilities were also identified.

Table 3: Vulnerabilities and adaptation actions to droughts (periodic and seasonal, dry spells, intra-seasonal drought [Onset and cessation])

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Environmental	Loss of the natural resource base (land, ecosystems, pasture, water sources, forests) due to droughts	High – Regeneration of miombo woodlands takes very long once degraded, water resources easily dry up in drought-prone areas, and pastures dry up in drought periods Increased desertification	High – The natural resource's ability to regenerate and bounce back from a perturbation is high	Low	High	• Sustainable forestry management • Rangeland management • Assisted natural regeneration • Water catchment protection and conservation • Tree planting to increase tree cover • Reduce deforestation and forest degradation • Creation of awareness on the importance of forest conservation • Promote utilization of alternative non-wood fuel sources of energy • Promote agroforestry • Promotion of the use of locally adapted livestock (indigenous) strains/breeds • Promotion of the consumption of livestock and livestock products from locally adapted livestock strains/breeds	Natural Resource Managers and communities	Agriculture Livestock Fisheries Wildlife Forestry Water	All Provinces	All AERs
	Declining fish stock in natural water bodies due to droughts	Medium – Drying up of water bodies due to droughts could reduce fish stock	Medium- Most of the fish is in perennial water bodies which do not dry as a result of droughts	Medium	Medium	• Water catchment protection and conservation • Protection and restoration of critical habitats (Fish breeding areas) • Sensitize communities towards sustainable fish farming practices • Rehabilitate aquatic environments around river mouths	Water Resource managers, Water users associations	Water Fisheries	Southern, Western, Central, Luapula, Northern, Lusaka	AER I & II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
	Increased fish diseases and outbreaks	Low – Quality of water reduces due to droughts which makes fish susceptible to disease outbreaks e.g. epizootic ulcerative syndrome	Medium - Most of the fish is in perennial water bodies which do not dry as a result of droughts	Medium	Medium	• Water catchment protection and conservation • Control the spread of fish disease to other natural water bodies • Strengthen aquaculture regulations	Fishing Communities, Water management agencies, Fishery Resource Managers	Fisheries Water	Southern, Western, Eastern	AER I & II
	Reduced water availability for wildlife due to droughts	High – Game areas that do not have perennial rivers are highly susceptible to reduced water from droughts	High – Existence of water stress zones in national parks	High	High	• Provision of water points in water-stressed national parks and GMAs (weirs, dams, reservoirs) • Promote artificial groundwater recharge	Wildlife managers, Community Resource Boards (CRBs)	Wildlife, Water	Southern, Western, Eastern, Central	AER I & II
	Increased mortality of wildlife due to droughts	High – Animals become susceptible to drought induced stress due to reduced water points and food	Medium	Medium	Medium	• Establish a mechanism for surveillance of the well-being of wildlife • Restock depleted national parks • Improve planning and management of wildlife estates • Supplementary feeding and water provision for wildlife • Creating community wildlife ranches and reserves as an additional conservation effort for the conservation of endangered species as well as biodiversity enhancement. • Establish community game ranches/ community parks for the conservation of wildlife species • Strengthen the operational capacity of Community Resource Boards (CRB)	Wildlife managers, Community Resource Boards (CRBs)	Forest, Wildlife and Tourism	Southern, Western, Eastern, Central	AER I & II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						including knowledge of climate				
	Increased wildlife habitat loss due to increased incidences of fire	Medium – Droughts and high temperatures exacerbate incidences of forest fires	Medium – The country is a combination of miombo and savannah rangelands. While much of the miombo habitat is resilient, the grasslands are less so	Low	Medium	• Develop and implement fire management plans for national parks and game management areas • Promote the development and implementation of forest fire management (plans) in PFAs and open forests	Wildlife managers, Community Resource Boards (CRBs) Community Forest Management Groups (CFMGs)	Forestry Wildlife	Southern, Western, Eastern, Central	AER I & II
	Reduced stream flow due to droughts	High – Hydrological droughts and dry spells which commonly occur contribute to reduced stream flow	Low – Human environmental degradation reduces the capacity for stream flow	High in AER I, II and low in AER III	High	• Strengthen compliance with environmental water flows • Monitoring and management of water resources • Water catchment protection and conservation	Water Resource managers Water users associations	Water	Southern, Western, Central, Luapula, Northern, Lusaka	AER A. II & III
	Increased forest loss/tree mortality due to droughts	Medium - The local forests are largely miombo woodlands which are quite resilient to droughts	Medium – Local forests are not adapted to long-term water stress as a result of droughts	High	High	• Afforestation • Reforestation • Protection of water catchments located in forests • Assisted natural regeneration	Community Resource Boards, Community Forest Groups Forest users	Agriculture Forests	All provinces	All AERs
	Reduced Non-Wood Forest Products e.g. mushrooms due to droughts	High – Increased frequency and intensity of droughts have contributed to reduced non-wood forestry products	Low – Non-wood forestry products are not adapted to long-term droughts and dry spells	High	High	• Promote participatory forestry management (CFMGs) • Promote forest management anchored on ecosystem and /or landscape approaches	Community Forestry Management Groups, Community Forest Groups	Forestry	All provinces	All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
							Forest users			
	Moisture stress/ changes in phenology at the start and end of the growing season	High – Late onset of rains entail intra-seasonal droughts which makes it a challenge for plants to grow. Further, the early offset of rain also contributes to moisture stress on plants	Medium – Most woodlands in Zambia can still grow with reduced rainfall and dry spells	Medium	Medium	• Promote Assisted Natural Regeneration (ANR) in indigenous forests /or Restoration of degraded areas	Community Forestry Management Groups, Community Forest Groups Forest users	Forestry	Southern, Western, Eastern, Central	AER I & II
	Shift in forest species distribution /loss or reduced forest biodiversity due to droughts	Medium –Droughts and increased temperatures affect the diversity of species and introduce new one	Medium – The duration of droughts and temperatures in Zambia do not enhance species diversity change	Medium	Medium	• Undertake regular or periodic forest inventories to assess species composition, stocking levels and distribution	Community Forestry Management Groups Forest users	Forestry	Southern, Western, Eastern, Central	AER I & II
	Increased temperatures and drought conditions contribute to frequent risks of forest fires	Medium – Droughts and high temperatures exacerbate incidences of forest fires	Medium – The country is a combination of miombo and savannah rangelands. While much of the miombo habitat is resilient, the grasslands are less so	Low	Medium	• Establishing fire management infrastructure in and around protected forest areas (PFAs) • Establishment of forest fire early warning and rapid response system • Development of fire risk maps which specifies high and low risks	Wildlife managers, Community Resource Boards (CRBs)	Forestry Wildlife	Southern, Western, Eastern, Central	AER I & II
Social	Reduced water quality and quantity as a result of droughts	High – Droughts can induce water scarcity and often reduced water in water bodies compromise the water quality which affects populations utilising the resource	Low – Most rural communities have only one source of water e.g. a river, or a stream and when water quantity and quality are affected they	High	High	• Promote rainwater harvesting • Construction of new and rehabilitation of existing dams in accordance with climate-smart codes and standards • Development of well fields	Rural Communities Water Resource managers Water utility companies	Water Agriculture Energy Transport	All provinces	AERA I, II & III

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
			become vulnerable			• Promote recycling and use for domestic, agricultural and industrial use • Water quality monitoring and control • Improve resource management around water points and boreholes • Mapping and assessment of available groundwater resources • Strengthen Water Catchment Management and Protection				
	Reduced groundwater levels due to droughts	High – Droughts can enhance the reduction of groundwater due to limited water seepage in the ground	Medium – High rainfall areas have a high adaptive capacity as there is reduced incidences of droughts while low rainfall areas have low adaptive capacity due to frequent drought occurrences	High	High	• Strengthen regulations for borehole drilling • Improve domestic water supply by utility companies • Protection of groundwater recharge zones • Construction of artificial ground recharge infrastructure • Expansion of climate-resilient water supply infrastructure • Protection of wetlands and wetland resources based on the EbA approach	Water Resource Managers, Disaster Risks Managers, Insurance Companies	Water Agriculture	Southern, Eastern	AER I
++Human	Reduced availability of water supply and sanitation	High – Especially for communities whose water sources are affected by droughts and those without health posts	Low – Especially for communities dependent on a single natural source of water	High	High	• Enhance water demand management • Improved water harvesting techniques • Promote ecological sanitation which uses less water	Small-scale farmers that are exposed to drought hazards Communities with water challenges,	Water Agriculture	Southern Western Eastern Central	AER I & II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						• Enhance water resource management	Disaster Risks Managers, Insurance Companies			
	Reduced interest in agriculture due to droughts affecting crops	Low – Agriculture is still the mainstay for most households in Zambia even in drought-prone areas	High – Availability of alternative livelihoods to agriculture	Low	Low	• Promote water harvesting • Incentivizing the agriculture sector (policy and financial incentives) • Agro-processing & value addition	Small-scale farmers Communities with water challenges	Agriculture	Southern Western Eastern Central	AER I & II
	Increased human-wildlife conflicts	High – This is due to drought induced movement of wildlife into human settlements	Low due to increased frequency and severity of droughts	High	High	• Development of participatory village land use plans • Provision of water points in national parks • Enforce equitable benefit sharing arrangements among government, communities and the private sector in the management of wildlife resources. • Relocating humans from wildlife corridors • Awareness of animal behaviour and how to interact with wildlife. • Training community members as blasters aimed at scaring animals from human settlements • Promote public private community partnerships in the sustainable management of wildlife resources	Communities living in GMA, Wildlife Resource Managers	Wildlife	Western, Southern, Eastern, Central, Lusaka	AER I $ II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
	Crop failure and food insecurity due to droughts	High – Intra-seasonal droughts and dry spells severely contribute to crop failures and food insecurity	Low – Drought prone areas and small-scale farmers have minimal capacity to deal with food insecurities due to droughts	High	High	• Encouraging crop diversification to drought-tolerant crops and varieties • Promoting use of indigenous food and crop varieties which are tolerant to droughts; • Enhancing alternative livelihoods in low-rainfall regions • Improved grain storage facilities for produce at national level • Promote seed conservation of indigenous crop varieties • Promotion use of indigenous and local knowledge in food production systems	Small scale farmers, Disaster Risks Managers, Insurance Companies	Agriculture	Southern Western Eastern Central	AER I & II
	Increased incidence of climate-sensitive diseases, water-borne diseases (diarrhoeas: cholera, dysentery and typhoid); vector-borne (Malaria) and airborne respiratory conditions	High – This is due to high prevalence of water challenges (both quality and quantity) and a lack of health posts in most communities	Low – Especially for rural communities due to reduced access to healthcare	High	High	• Strengthening public health emergency preparedness and response to climate-sensitive diseases • Strengthening of surveillance activities (Tracking of diseases and trends related to climate change) • Integrate health services and protection measures into climate vulnerability assessments • Strengthen surveillance for water quality at the sources	Health care managers Rural and Urban Communities affected by water quality issues	Agriculture Health	Southern Western Central Lusaka Eastern	AER I &II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						• Domestic (household) water purification in hotspots • Research in climate-sensitive diseases • Malaria control activities (vector control (i.e., IRS, ITN etc.) • Surveillance of malaria incidence • Surveillance of non-pneumonia disease incidence • Implement health promotion activities				
	Poor nutrition levels due to reduced food productivity and production.	High - Failure to grow healthy foods by communities in drought-prone areas due to water challenges	Medium – Concentration is on a maize diet which reduces on the diet richness and encourages stunting in children	High	High	• Promote health education on how to prepare and use available foods • Promote cultivation of fortified food crops (orange-fleshed sweet potatoes and maize) • Promoting the preparation and preservation of foods • Enhance food production and post-harvest and preservation techniques.	Small scale farmers	Health Agriculture	Southern Central Western Eastern Lusaka	AER I&II
Financial	Reduced income from agriculture, livestock and fisheries due to reduced productivity and yield as a result of droughts	High – Droughts contributing to reduced productivity have severely affected small-scale farmers' income from selling crops, livestock and fish	Low – Inadequate financial capacity to take adaptation actions or drought mitigation measures	High	High	• Agriculture insurance. • Income diversification • Promotion of the use of locally adapted livestock (indigenous) strains/breeds • Promotion of the consumption of livestock and livestock products from locally	Small scale farmers, Disaster Risks Managers, Insurance Companies	Agriculture	Southern Western Eastern Central	AERs I & II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						adapted livestock strains/breeds				
	Effect on input supplies by affecting product prices, fishmeal, and fish oil costs, and other goods and services needed by fishers and aquaculture producers.	High – Increased prices due to reduced availability of supply as a result of droughts	Low – High prices coupled with low financial capacity	High	High	• Promote alternative livelihoods such as rice farming, beekeeping, etc.	Small scale farmers	Agriculture Fisheries	All provinces	All AERs
	Reduced income from tourism and wildlife-based activities due to reduced tourist visits to the water-based tourism sites	High – Most of Zambia's tourist activities are eco-based which are susceptible to droughts	Medium – There is potential for alternative tourist sites in high rainfall regions and non-nature-based tourism	Medium	Medium	• Enhancing tourism in high-rainfall areas	Community-Resource Boards (CRBs) Tour Operators, Communities benefiting from tourist activities	Tourism, Wildlife	All provinces	AERs I, II & III
	Costs to the health sector increase during droughts because of outbreaks of diseases.	High – Increased disease and health conditions related to droughts resulting in high costs of health access	High – Low financial capacity to deal with health complications related to disease outbreaks	High	High	• Promotion of health insurance • Promotion of production of crops enhancing balanced diets	Small scale farmers Communities without health posts	Health	Southern Western Eastern Central Lusaka	AER I & II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
	Droughts in some cases cause a reduction in available water needed for mineral processing resulting in reduced income from mines	Low – Most mines in drought-prone areas have alternative sources of water	High – Most mines have alternative	Low	Low	• Promotion of efficient utilisation of hydro-schemes upstream water to enhance or ensure availability of water downstream for hydro-power production. • Recycle water in mining and mineral processes • Practice water recycling to minimize the pumping of water • Use water-efficient mining and mineral processes	Institutions operating in the mining sector	Water, Mining	Copperbelt Southern North-Western Luapula	AER I & III
	Reduced income/ loss of livelihood for local fishers	Medium – Increased frequency of droughts contributes to loss of household incomes from affected fisheries	Low – Most fishers lack viable alternative livelihoods	Medium	Medium	• Promote alternative livelihoods such as rice farming, beekeeping, etc.	Fishers in various communities, Disaster Risks Managers, Insurance Companies	Fisheries	Luapula Southern Lusaka Western Central	AER I, II & III
	Droughts causes a reduction in power supply generated from hydroelectric power (HEP) that is distributed to the mines and manufacturing industries	High – Reduced water in water bodies such as the Zambezi affecting power generation to the mines and manufacturing industries	Medium – Mines have the financial capacity to utilise alternative power sources even though this may increase the cost of production	Medium	Medium	• Use of clean power alternatives that are locally accessible, e.g. creating hydro-electric power from water that is pumped from the pit, setting up a solar power plant. • Investment in exploring alternative energy sources such as solar energy, thermal energy, and nuclear energy.	Institutions operating in the mining sector	Energy, Water Mining	Copperbelt Southern North-Western Luapula	AER I & III

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Physical	Loss of soil nutrients and damage to soil structure due to droughts	High – Top fertile soils in drought-prone areas are exposed to objects of erosion such as wind, and water	Medium – Conventional farmers have a low adaptive capacity but farmers practising climate-smart agriculture face fewer such challenges	High	High	• Irrigation schemes operationalized • New irrigation farming developed • Promotion of Climate-Smart Agriculture • Irrigation infrastructure constructed and rehabilitated • Promotion of irrigation and efficient use of water resources. • Strengthen soil and water conservation technologies	Organisations and projects supporting agriculture Small scale farmers	Agriculture Water	Southern Western Eastern Lusaka Central	AER I & II
	Loss of water-based tourism sites as sites dry up due to prolonged droughts	High – Most water-based tourism sites in drought-prone areas are susceptible to droughts	Low – Most of Zambia's tourism is water-dependent and there is generally poor natural resource management techniques employed at tourism sites	High	High	• Promote non-water based tourism products and packages • Intensive Management programs such as drilling water points for wildlife • Promote supplementation of feed for wildlife during drought periods • Encouraging participatory approach to rangeland management involving communities living in or around wildlife-protected areas, and who depend on rangeland resources for their livelihoods	Tourism managers Community-based tourism groups Wildlife Managers	Wildlife, Tourism Water Agriculture Wildlife Forestry	Southern Western Central Eastern	AER I & II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
	Reduced hydropower supply to the households due to droughts	High – Increased incidences of droughts affect hydropower generation which affects supply to households	Low – Few but expensive alternatives available such as solar which hinders uptake of alternative sources of power	High	High	• Promote installation and utilization of alternative power sources • Promote implementation of off-grid power supply for households so that there is more energy diverted to mineral production • Augment processes for transitioning to Renewable Energy Technologies (RETs) • Promote increased use of alternative energy • Conduct research and produce an atlas of Zambia's renewable energy hot spots	Managers in energy-providing institutions (Public and Private sctors) Households	Energy	All Provinces	AER I, II & III
	Reduced power supply from hydro, resulting in low production by industries	High – High incidences of droughts contributing to load-shedding to industries	Medium – Most small-scale industries may not have the financial capacity to utilize alternative sources of power	High	High	• Install and utilize alternative power sources • Increased use of alternative energy	Electricity producers Industries	Energy	All Provinces	AER I, II & III
	Increased dust levels in mining areas	Medium – Droughts tend to contribute to increased dust among mining sites and surrounding areas	High – Mining companies have the capacity to manage the dust around mining activities	Medium	Medium	• Undertake regular dust suppression measures • Plant trees and allow vegetation to regenerate in areas that are not utilized	Institutions operating in the mining sector	Mining	Copperbelt Southern North Western	AER I & III
Institutional	Weak community structures to cope with drought-induced hazards	Medium – Increased incidences of droughts affecting communities in drought-prone areas	Low – The lack of technical skills and structures that make communities	Medium	Medium	• Strengthening community structures for managing droughts	Farmer cooperatives, Water User Associations, Women Groups,	Agriculture Water Financial	All provinces	All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
			manage drought-induced impacts				Agriculture Extension Officers, Disaster Risks Managers, Insurance Companies			
	Weak or inexistent infrastructure meant to improve tourism diversification from ecosystem-based tourism	High – Ecosystem-based tourism is highly susceptible to droughts which are prevalent in the southern part of Zambia	Low – Generally, there is low capacity to absorb the latest technology, poor capacity to generate and disseminate tourism information, as well as inadequate financial capacity to develop and manage tourism infrastructure	Medium	Medium	• Providing early warning information • Develop infrastructure in tourism sites • Diversify tourism from an ecosystem-based	Tourism managers Community-based tourism groups	Tourism	Southern Western Northern Eastern Luapula	All AERs
	Inadequate early warning systems for predicting droughts	High – There are increased frequencies and intensity of droughts	Medium - Poor capacity of weather makers to predict incidences, frequency and intensity of droughts and dry spells	High	High	• Developing emergency response mechanisms • Application of drones, GIS/remote sensing in mapping of drought-prone areas • Integrated Indigenous Knowledge Systems (IKS) with modernized early warning systems • Increase the installation of automatic weather stations • Enhance early warning systems • Up-scaling on dissemination of climate services	§ Small-scale farmers that are exposed to droughts, Disaster Risks Managers, Insurance Companies	All sectors		

4.2 Adaptation actions to floods

With climate change certain areas in the country are at higher risk of flooding than others but anywhere that receives prolonged and heavy rainfall can also be at risk. Table 4 below details the climate vulnerabilities and adaptation action associated with floods. Floods affect all provinces, AERs and sectors. The increased frequency and intensity of floods leads to poor crop yields, compromising food security and exacerbating poverty among the rural and peri-urban population.–Food insecurity is associated with poor nutrition especially among children. Floods obliterate food resources, leading to food insecurity and inadequate dietary diversity which in turn lead to prevalence of malnutrition cases in Zambia (NAPA, 2007; GRZ-TNC, 2020).

Floods compromise the quality of water, sanitation, and hygiene (Mwitwa, 2018). This raises health concerns and increases women's vulnerabilities to risks of attack as they look for water, compromised menstrual hygiene, physical stress, and loss of time in other productive areas (GRZ & IUCN, 2018). The mining sector has also not been spared. Extreme climate events such as floods can adversely impact mining operations.

The vulnerability of the wildlife sector to climate change is linked to the vulnerability of tourism. High rainfall presents both vulnerabilities and opportunities for tourism. However, there is little information on climate change vulnerabilities of tourism in high rainfall areas in Zambia.

Floods have implications on the health sector (NAPA, 2007; GRZ-TNC, 2020). Further, costs to the health sector increase have increased with floods because of outbreaks of diseases. The diseases associated with floods include water borne diseases. Climate change has increased the geographic coverage and survival of mosquito populations thereby increasing the vulnerability of Zambians that previously may not have been exposed to Malaria (USAID, 2012; Ngarakana-Gwasira et al., 2016). In recent years, infrastructure in Zambia has suffered the onslaught of high rainfall. High rainfall and floods compromise the structural integrity of such infrastructure, leading to deterioration and eventual total collapse.

Table 4: Vulnerabilities and adaptation actions to floods (periodic and seasonal, water logging)

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Environmental	Loss of terrestrial vegetation from extreme flooding	High- removal of trees /vegetation poor survival of trees and plants from by high velocity waters and inundation	Medium – slow flood waters recession and dry out of soils delays regrowth of vegetation Poor adoption of resource conservation methods/ technologies	Medium	Medium	• Promote sustainable forestry; • Rangeland/pasture management; • Mapping and zoning of flood prone areas • Sustainable floods management; • Water catchment conservation and management • Promotion of climate-smart agriculture • Up-scaling on dissemination of climate services • Promoting agroforestry • Promote conservation agriculture (CA)	Natural resource managers; Community groups (in water, forests, wildlife and agriculture)	Agriculture, Water, Wildilife Forestry; Civil socitey	All provinces	AER I, II & III
	Increased wildlife mortality due to floods	Medium- wildlife drowning and disease proliferation and habitat destruction; Break down of predator-prey relationships	Medium -mobility and ability of wildlife to move out of the way of rising waters to higher ground	Medium	Medium	• Sustainable floods management; • Protection of wildlife habitats and corridors • Protection of wildlife breeding grounds • Conservation of habitats to support wildlife in protected and open areas	Wildlife Management Officer; Ecologists; Water resource managers; Community Resource Boards	Tourism and Wildlife, Water	All provinces	AER I, II & III
	Increase in erosion and sedimentation in dams, lakes and rivers	Medium-erosion and collapse of river banks obstruction of river beds and streams, suffocating	Medium-erosion and sedimentation have less negative impact on more less degraded and intact	Low	Medium	• Mapping, zoning and protection of ecologically sensitive areas; • Maintenance of vegetated buffer strips along watercourses • De-silting of dams	Land use Planners; Foresters; Agriculture extension officers	Lands; Agriculture; Forests	All provinces	AER I,II & III

		aquatic organisms, and destroying habitats								
	Decline in ecosystems services due to extreme floods	High-seasonal inundation of low-lying areas; river bank erosion and deposition; sanitation breakdown	Medium-ecosystem recovery following extreme floods highly variable; small floods increase in primary production, water regulation; ground water recharging, recreation and tourism	Medium	Medium	• Water catchment protection and conservation; • Promote sustainable flood management; • Manage species and habitats to protect ecosystem functions; • Increase knowledge and information on impacts and responses of fish, wildlife, and vegetation to floods; • Improve pond site selection and design processes	Water Resources Managers; Land use planners; Disaster managers; Civil Society Organisation	Water, Forestry, Agriculture and local government; Disaster management	All	AERs I, II, & III
	Decline in fish stocks due to flooding	Low-periodic flooding in aquatic ecosystems (rivers and wetlands)	High-fish stock recovery quick provided that instream habitat is not dramatically affected; Small seasonal floods can be beneficial to native fish stocks	Low	Medium	• Sustainable fisheries Management • Strengthening of the early floods warning systems and preparedness; • Sensitize communities towards sustainable fish farming practices • Rehabilitate aquatic environments around river mouths • Strengthen community sensitization and enforcement of fisheries regulations including fish bans • Conservation of habitats to support healthy fish stocks	Fisheries Officers; Fish management and conservation groups;	Fisheries and Forestry sectors	Southern; Central; Luapula; Northern	Agro-Ecological Regions (AER) II & III
Social	Disruption of the socio-economic status of urban, peri-urban and rural people.	High-Direct effect on production assets, displacement of people and livestock; damage to infrastructure	High-poor livelihood conditions of communities in flood prone locations	High	High	• Sustainable flood Management; • Emergency humanitarian response (food, water, sanitation and protection, especially to women and children)	Disaster mitigation managers; District planners; Community Development Officers;	Disaster mitigation and management; Health, Fisheries; Forestry, Community Development;	All	Agro-Ecological Regions (AER) I, II & III

		(roads dwellings etc.).				• Relocating communities affected to higher ground • Adoption of alternative livelihoods such as rice farming, beekeeping, etc.; • Enhanced social protection programs with improved targeting of beneficiaries (social cash transfer, FSP, FISP	agriculture extension staff; Health staff; Vulnerable groups (Small scale rural farmers, women and girls; OVCs, the elderly; PWD and PLWHIV/AIDS)	Local government; agriculture and Civil society		
	Increased personal risk for women and adolescent girls in search for clean water	Medium - Decreased household water sources of household water supply sources	Medium - Lack of access to clean and safe water; Dangerous, time-consuming and physically demanding water fetching	Medium	Medium	• Awareness and sensitization in climate change climate change issues and their implications • Improving access to clean water and sanitary facilities • Developing local rainwater harvesting measures	Institutions responsible for water resource development, water supply and sanitation, civil society, VWASHE, DWASHE	Water supply sector; Health, Infrastructure	All	Agro-Ecological Regions (AER) I, II & III
Human	Reduced crop production due to flooding	High - damage to cultivated crop land due to flooding and water logging	High - poor adoption of CSA technologies; Poor agriculture floods control	High	High	• Promote flood protection structures on crop lands, water sources and ecosystems; • Introduction of climate resilient and drought tolerant crop types and varieties; • Investment in community-based floods early warning system	Agriculture Planners; Agriculture extension Workers	Agriculture, Water sectors	All	AER I,II & III
	Increased under nutrition or malnutrition from food shortages caused by floods	High - Reduced nutritional status especially for low income communities	High - Limited food intake and poor access to sufficiently nutritious foods	High	High	• Promote health education and on how to prepare and use available foods • Promoting the preservation of indigenous foods; • Diversifying foods and enhanced diet supplement • Diversifying growing of indigenous plants, roots, tubers and fruits • Food fortification • Infant and child feeding at under-five clinics and	Health planners; nutrition and agriculture extension staff. Community groups, civil society	Health, Agriculture; Community Development; Civil Society organisations	All provinces	AER I,II & III

						School Health Nutrition in schools				
	Increased human-wildlife conflicts	High – This is due to flood induced movement of wildlife into human settlements	Low due to increased frequency of floods	High	High	• Relocating humans from wildlife corridors • Awareness of animal behaviour and how to interact with wildlife. • Training community members as blasters aimed at scaring animals from human settlements	Communities living in GMA, Wildlife Resource Managers	Wildlife	Western, Southern, Eastern, Central, Lusaka	AER I $ II
	Pollution of water sources from flood waters	High-communities at risk of contaminated of surface and groundwater	High-Inadequate water resources management	High	High	• Mapping and zoning of flood prone areas • Integrate landscape approaches in land use plans • Protection of ground and surfaces water sources from pollution • Water quality monitoring and control • Enhanced water catchment management and protection	District planners; water resource managers; Forests managers; urban and rural communities (and small-scale farmers flood areas)	Water, Forestry, Health, Infrastructure	All	Agro-Ecological Regions (AER) I, II & III
	Increase in waterborne, (zoonotic-vector borne) diseases	High-exposure to high risk diseases from and stagnant waters	High- Poor surveillance and early warning of flood induced water borne, diseases.	High	High	• Strengthening public health emergency preparedness and response for climate sensitive diseases • Strengthening disease surveillance and control activities • Strengthening research in climate sensitive diseases; • Promoting sustainable medical facilities and practices	Public health and water resources managers	Health, Water	All	AER I, II, & III
	Increased flooding of mining pits	Medium - damage to mining infrastructure and disruption of mining operation	Medium -Inadequate dewatering of mining pits and damage to equipment	Medium	Medium	• Designing and implementing flood responsive mine dewatering plans	Mining operations regulators; Mining establishment; small scale miners	Mining	All provinces	Agro-Ecological Regions

						• Installation of adequate mining pits water pumping equipment during flood events				(AER) II & III
	Flooding of mines tailings storage facilities causing local environmental degradation such as bleaching	Medium-damage to the local environment from acidic tailings	Medium Inadequate management of tailings storage facilities	Medium	Medium	• Improve pollution control around tailings storage facilities • Design of climate resilient tailings dumps (flood responsive dewatering) • Design of tailings dumps that respond to the threats of floods • Location of tailings storage facilities away from human settlements/activity • Neutralising tailings in all tailings storage facilities to avoid bleaching/breaching in case of floods	Mining operations regulators; Mining establishment; small scale miners	Mining	Copperbelt; North-western provinces	AER III
	Flooding of hydro-electric generation power stations	Medium - Damage to power generation equipment and reduced power supply	Low-Inadequate emergency flood management for hydro power generation stations	Low	Low	• Catchment protection and conservation • Promote alternative use of power locally available e.g., solar or geothermal • Promote insurance of hydro-electric power plants and stations	HEP power supply companies, Insurance companies	Energy, Water	Southern, Central; Northern	AER I, II & III
Financial	Reduced agriculture (crops and livestock) productivity, fish as a result flooding and water logging	Medium-reduced income from crop, fish and livestock sales	High- financial capacity to take adaptation actions or flood mitigation measures	High	High	• Engaging communities in alternative income generating activities outside of crop farming • Providing financial incentives to the agriculture sector • Encouraging precision agriculture/ use of ICTs • Adoption of alternative livelihoods such as rice farming, beekeeping, etc. • Promote insurance of hydro-electric power plants and stations	Rural based small-scale farmers, Insurance companies	Finance, Fish and livestock	All provinces	AER I, II & III

	Disruption of mining operations	Medium-reduced income from mining to the economy	Medium-inadequate climate risk measures for mining activities	Medium	Medium	• Formulate a disaster management for flooding events to mitigate losses (life or damage to equipment) • Promote insurance of mines	Large and small; Small scale miners	Mining	Southern, Copperbelt, Central;	AER I&II
	Reduced incomes resulting from disruption of tourism activities	Medium-reduced incomes from tourist activities	Low-Inadequate risk reduction climate risk measures in tourist areas	Low	Medium	• Diversification of tourism product to more indoor activities	Tourism planners Tourist operators; Community groups	Tourism, Wildlife, Tourism	All provinces	AER I, II & III
Physical	Loss of agricultural fields, soil fertility	Medium - Degradation of farm lands, soils and conservation structures	Medium - Poor floods risk management measures in agricultural fields	Medium	Medium	• Construction of climate smart infrastructure • Promote CSA	Small-scale farmers that are exposed to flood hazard	Agriculture	All	Agro-Ecological Regions (AER) I, II & III
	Increased damage to infrastructure (roads, water, building bridges and tourist roads)	High - collapse of infrastructure such as roads, culverts with secondary impacts on health and education from extreme flooding	High - Lack of climate resilience guidance for infrastructure development	High	High	• Increase funding for regular maintenance of existing road infrastructure and buildings • Enhance climate proofing of water infrastructure • Promote application of climate smart resilient codes in for roads development (including roads in National Parks and Game Management Areas and in high potential agricultural areas) • Construction, rehabilitation and maintenance of loop roads in National Parks and Game Management Areas in tourist sites in accordance with climate smart building codes and standards • Periodic dredging of water canals • Development of climate resilient building codes and standards	Government departments, local authorities Road and building contractors, Insurance companies	All sectors	Southern, Lusaka; Central, Copperbelt and Eastern	Agro-Ecological Regions (AER) I, II & III

						• Undertake training for climate proofing of infrastructure • Promote insurance of infrastructure and buildings				
Institutional	Preparedness and response by institutions (national, and subnational) for floods management	Medium - centralisation of preparedness for response (planning to respond)	Medium - gaps in stakeholder community participation	Low	Medium	• Strengthen and decentralise national flood management • Implement multi-sectorial response to ensure recovery, rehabilitation and restoration; • Strengthen coordination among institutions for timely assistance to severely affected people. • Investments to enhance emergency preparedness and response • Strengthen gender and indigenous knowledge systems mainstreaming in flood risk management	Sector focal points; Disaster manager; district planners Community institutions	All sectors	All provinces	Agro-Ecological Regions (AER) I, II & III

4.3 Adaptation actions to high temperatures

Temperature in Zambia is projected to increase by 1.9°C and 2.3°C by 2050 and 2100, respectively (Hamududu and Ngoma, 2020). Climate change has already led to a rise in global temperatures, causing more frequent and intense heat waves. Zambia, like many other countries, has experienced the impacts of these extreme weather events. In recent years, the country has witnessed prolonged periods of high temperatures, with consequences on the agriculture, infrastructure, livestock and human health among others.

The impacts of high temperatures and heat waves are felt across Zambia, but some sectors and regions are particularly vulnerable. Agriculture, which is a key sector for the country's economy, is particularly susceptible to the effects of climate change. Prolonged dry spells and high temperatures have led to crop failures, reduced yields, and livestock deaths, resulting in food insecurity and loss of income for many farmers. In addition, vulnerable regions such as the Southern and Western provinces, which are already prone to drought, are facing an increased risk of water scarcity due to reduced rainfall and increased evaporation. Poor communities, particularly those in rural areas, are also at risk of health problems such as heat stroke and dehydration, which can be fatal without proper medical attention.

The prolonged dry spells and high temperatures will contribute to food insecurity and water scarcity in the country. *Table 5* shows high temperature hazards, vulnerabilities and proposed adaptation measures.

Table 5: Vulnerabilities and adaptation actions to high temperatures (heat waves and heat stress) in geographical regions and sectors

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Environmental	Increased incidences of forest fires	Medium - high temperatures will increase incidences and intensity of forest fires	Medium – Rangelands, grasslands have medium adaptive capacity while woodlands have a high adaptive capacity to forest fires	Low	Medium	▪ Establishing fire management infrastructure in and around protected forest areas ▪ Development of fire risk maps which specifies high and low risks ▪ Early burning of fires in forests, cultivated fields and rangelands ▪ Establishment of forest fire early warning and rapid response systems. ▪ Installation of fire control measures infrastructure in tourism sites ▪ Develop and implement fire management plans for national parks and game management areas	Community forest groups, Forest, department, Department of Wildlife and National Parks Small-scale farmers, livestock farmers	Forestry, agriculture, tourism, wildlife and livestock	All provinces	I,II, III
	Changes in fish species distribution	Medium - high temperatures will negatively affect the functioning of aquatic ecosystems and affect fish growth and reproduction thereby changing distribution of fish species	Medium- fish species have temperature ranges which if exceeded will lead to changes in their distribution	Medium	Medium	▪ Adoption of alternative livelihoods by households in fish dependent communities.	Fishing communities	Fisheries	Luapula, Lusiaka, Western, Southern, Northern, Central	I,II,III
	Increased exposure to pests and diseases including heat stress, stroke and heat waves.	Medium – high temperature will increase pests and diseases for crops, livestock, fish and wildlife.	Low adaptive capacity due to inadequate surveillance of pests and diseases (crops, livestock, wildlife, fisheries).	Medium	High	▪ Promotion of the use of locally adapted livestock (indigenous) strains/breeds. ▪ Promote Integrated Pest Management (IPM)	Livestock farmers, fishers and smallholder farmers.	Agriculture, Forestry, fisheries, livestock, Wildlife, Health	All provinces	I, II, III

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						▪ Characterisation and promotion of indigenous livestock strains/breeds ▪ Promotion of animal health delivery. ▪ Strengthen monitoring among fishers and fish farmers				
	Reduced water availability for various social activities	High- high evapotranspiration and limited ground water recharge.	Medium due to degraded water catchment areas.	Medium	High	▪ Investing in climate resilient water infrastructure ▪ Develop groundwater resource utilization and efficient use for different sectors	Livestock farmers, water utility companies,	Water, livestock, forestry	Southern, Western, Central, Lusaka	I, II
	Reduced productivity (land, ecosystem, fisheries).	High exposure of native biodiversity in ecosystems to high temperatures.	Medium adaptive capacity of ecosystems	Medium	High	▪ Rehabilitate aquatic environments around river mouths. ▪ Promote afforestation and reforestation of catchment area. ▪ Promote Assisted Natural Regeneration	Fishers, forest dependent communities and smallholder farmers.	Fisheries, Forestry and Agriculture.	All provinces	I,II, III
	Reduction in animal growth and productivity.	High exposure of wildlife and domestic animals and insufficient water to support growth and development of domestic and wildlife	Low adaptive capacity due to reduced access to water	Medium	High	▪ Provision of water points in water stressed areas including national parks (weirs, dams and reservoirs.	Livestock farmers and Department of National Parks and Wildlife	Livestock, wildlife	Western, Southern, Central, Lusaka and Eastern provinces	I, II
	▪ Drying of streams	High exposure of streams which is exacerbated by unsustainable land use practices.	Low adaptive capacity of streams coupled with degraded catchments	High	High	▪ Promote sustainable land management ▪ Integrate landscape approaches in land use planning in river catchments	Small scale farmers, livestock farmers, Water User Associations, Traditional leaders	Agriculture, livestock, wildlife, Forestry, Water	Western, Southern, Central, Eastern, Lusaka Copperbelt	I, II, III

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
	▪ Migration of fish to better micro-climates due to rising temperatures	High – high temperatures affecting aquatic ecosystems resulting to unfavorable conditions for native species.	Medium due to inability of fish to grow and reproduce under changing climatic conditions.	Medium	Medium	▪ Promote aquaculture development and other forms of alternative livelihood in fishing communities (utilization of fish cages and pens)Promote utilization of fishponds and fish cages ▪ Integrate landscape approaches in land use planning in river catchments ▪ Reforestation along river channels	Fisher at various stages of the value chain, Traditional leaders	Fisheries	Western, Southern, Central, Luapula Eastern, Lusaka Copperbelt	I, II, III
Social	▪ Disruption of livelihoods of smallholder farmer economic sources of income and loss of livestock.	High exposure of people due to high reliance on climate sensitive natural resources based livelihood strategies.	Low –Poor capacity (technology, information, finance, knowledge) of individuals and rural communities to adapt and limited livelihood options.	High	High	▪ Diversification in agriculture ▪ Characterization and adoption of indigenous livestock strains/breeds	Smallholder farmers and	Agriculture, Water	All provinces	I,II, III
Human	▪ Increased proliferation of pathogens ▪ Spatial and temporal widening of the vector populations	High exposure to increase incidences of climate sensitive diseases.	Low due to - low disease surveillance, Inadequate health promotion activities and limited access to health services.	Medium	Medium	Implement health promotion activities.	Communities in areas prone to heat stress and heat waves	Health	All provinces	I, II, III
	Increased heat stress for tourists	Medium exposure as tourism sites lack heat - relieving amenities	▪ No tourism heat - relieving amnesties to respond to heat stress.	Low	Low	▪ Provision of climate smart cooling facilities ▪ Reforestation around tourist camps and facilities ▪ Planting of trees around tourist camps and facilities	Tourist operators, wildlife managers, CRBs	Tourism, Wildlife, Forestry, Infrastructure	Western, Lusaka, Southern & Eastern	I, II

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Financial	Reduced income arising from low productivity and yield (agriculture, fisheries, livestock, and wildlife). Reduced or disruption of economic activities in the in mining and tourism sectors	High exposure Income from selling crops, livestock, fish, wildlife, and revenue from water	Low adaptive capacity due to lack of financial capacity to take adaptation actions or high temperature mitigation measures	High	High	▪ Adoption of alternative livelihoods by households in fish dependent communities ▪ Promotion of efficient reproduction capacity eg use of artificial insemination ▪ Promotion of improved grasses and legumes for ruminant feeding ▪ Adoption of alternative livelihoods by households that are dependent on natural resources ▪ Install adequate and energy efficient cooling facilities underground to protect the health and safety of workers	Smallholder farmers including youths and females, households livings in around GMAs and forest area	Agriculture, fisheries, livestock, forestry, wildlife	All provinces	I,II, III

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Sensitivity	Climate Risk Level	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Physical	Increased threat of loss of infrastructure to fires Increased cost of maintenance of infrastructure Increased fires in rangeland and forest	Medium exposure of infrastructure to high temperature resulting in compromised structural integrity of infrastructure (roads, buildings) Medium	Medium - ▪ Lack of risk mitigation measures ▪ Lack of building codes for green buildings ▪ Inadequate enforcement of building regulations ▪ Medium	Low Medium	Medium Medium	▪ Increased investments in the development of new climate resilient infrastructure i.e. roads, bridges, etc. ▪ Design and construct climate proofed infrastructure for health services ▪ Revision of building codes and standards ▪ Promote Insurance of property against loss to fires and other climatic hazards ▪ Revision of building codes and standards to include provision for fire resistant material ▪ Enforcement of building codes ▪ Building capacity by training stakeholders on the principles for green building designs	Entire populations, Insurance companies	Infrastructure, transport, health	All provinces	I,II III

4.4 Adaptation actions to windstorms

The windstorm or wind gust intensity and frequency is projected not to increase significantly with climate change. However, the absolute damages caused by windstorms will ultimately increase under future climate scenarios due to rising asset values as the economy grows and expands. Severe windstorms/or wind gust can cause widespread flying debris, damage to forests, properties, buildings, and transport and energy (power lines) infrastructure. Further, windstorms, wind gust and/or hailstones can damage roofs and tiles, dent vehicles, properties (buildings, agricultural structures, etc.), glasshouse and bring down vegetation. Strong winds can cause mechanical damage to crops which reduces income by affecting its growth and yield whist increasing pest and disease incidences. On the other hand, falling trees can block roads, damage fences and hedges and bring down utility lines as well as damage nearby buildings or vehicles. The windstorm, wind gust and hailstones affect all target groups, sectors, AERs and provinces.

The impacts of extreme winds could be reduced by implementing a range of adaptation actions, such as the development and implementation of enhanced windstorm-resilient standards and building codes as presented in *Table 6*. The *Table 6* shows vulnerability elements, vulnerabilities, and exposure by hazards, adaptive capacity, action actions, target groups and affected sectors, AERs and provinces.

Table 6: Vulnerabilities and adaptation actions to windstorms in geographical regions and sectors

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Environmental	▪ Severe windstorms cause widespread flying debris, damage to vegetation and livestock infrastructure e.g., trees, forests, livestock structures, etc.	▪ Medium - Increased exposure to windstorms that damages forests and trees	▪ Medium - lack of climate resilient infrastructure	▪ Medium -	▪ Medium	▪ Promote tree planting ▪ Plant trees and allow vegetation (grass included) to regenerate in areas that are not utilised ▪ Plant trees and allow vegetation to regenerate in areas that are not utilized	All groups	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism, Wildlife, Forest, Transport, Water	All provinces	All AERs
	▪	▪	▪	▪	▪	▪ Neutralise tailings in all tailings storage facilities to avoid bleaching in case of windstorms ▪ Sprinkle work areas with water in order to settle dust ▪ Install sprinklers in areas where dust is generated ▪ Undertake regular dust suppression measures				
	▪	▪	▪	▪	▪	▪ Design mine pits that are responsive to the threat of windstorms ▪ Design of tailings storage facilities should be changed to response to the threats of windstorms ▪ Tailings storage facilities should be located far from any human activity				

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
Social	▪ Severe windstorms cause widespread flying debris, damage energy, & infrastructure, vehicles and causes personal injury & death, e.g. transport, livestock, energy, dwellings, etc. ▪ Compromised quality and strength of buildings	▪ Medium - Blocked roads, damaged fences, utility lines, buildings and vehicles ▪ Medium –	▪ Medium – lack of financial capacity ▪ Medium – lack of climate resilient construction codes	▪ Medium – lack of capacity to integrated alternative energy sources and climate resilient construction codes ▪ Medium - lack of climate resilient construction codes	▪ Medium ▪ Medium	▪ Promote use of alternative energy ▪ Promote provision of alternative sources of energy ▪ Strengthen early warning system ▪ Lobby government to implement off-grid power supply for households ▪ Revision of building codes and standards	All groups	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism, Wildlife, Forest, Transport, Water	All provinces	▪ All AERs
	▪ Strong winds can cause mechanical damage to crops, & livestock pasture which will affect growth, yields and pest and disease incidence	▪ Medium - Increased susceptibility to disease affects harvest quality, and crop may not meet the requirements of its intended market	▪ Medium – low adaptive capacity to prevent mechanical damage to crops due to strong winds	▪ Low – lack of finances	▪ low	▪ Promote planting of hedges and wind breaks ▪ Strengthen early warning system ▪ Enhancing market linkages for the produce	All groups	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Health	All provinces	▪ All AERs
	▪ Severe windstorms can cause widespread damage to buildings, and transport and energy (power lines) and water infrastructure	▪ Low – Damage infrastructure and buildings	▪ Medium – low adaptive capacity	▪ Medium – Increase maintenance costs	▪ Medium	▪ Promotion of climate resilient infrastructures ▪ Designing climate proof infrastructure ▪ Enhance surveys and trimming of problem trees ▪ Planting of grass, & trees as hedges and wind breaks	All groups	Energy, Health, Infrastructure, Livestock, Mining, Tourism, Wildlife, Transport, Water	All provinces	All AERs
Human	▪ Crop failure and food insecurity	▪ Medium - Reduced crop and pasture yield	▪ Medium - Formulate a disaster management plan to be used during windstorm events to mitigate loss of life or damage to	Medium – damage to crops, equipment and property	▪ Medium	▪ Weather-based crop, aquaculture, and livestock insurance ▪ Promotion of Climate Smart Agriculture ▪ Promoting agroforestry or	All groups	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Health	All provinces	▪ All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
			equipment and property			▪ Promote conservation agriculture (CA) ▪ Strengthen early warning system				
	▪ Power outages, damage to buildings and vehicles, and personal injury and death ▪ Compromised quality and strength of buildings	▪ Medium - Blocked roads, damaged fences, utility lines, buildings and vehicles ▪ Medium – damaged infrastructure & building	▪ Medium – lack of resources to maintain buildings and infrastructure ▪ Medium – lack of resources to maintain buildings	▪ Medium – power outages ▪ Medium - Designing climate proof infrastructure	▪ Medium ▪ Medium	▪ Promote use of alternative power that is locally accessible ▪ Provision of alternative sources of energy ▪ Lobby government to implement off-grid power supply for households ▪ Strengthen early warning system ▪ Maintain wind breaks and hedges ▪ Revision of building codes and standards ▪ Access to mechanization	All groups	Energy, Infrastructure, Transport, Health	All provinces	▪ All AERs
	▪ Damage to infrastructure & buildings such as health, residential, etc. ▪ Falling trees can block roads, damage fences and hedges and bring down utility lines as well as damage nearby buildings or vehicles	▪ Medium - Flying debris and falling trees are the primary cause of damage during a windstorm	▪ Low – insufficient climate information ▪ Medium – lack of research in wind-based climate indices	▪ Low – insufficient tree assessment surveys	▪ Low	▪ Carry out tree assessment surveys on a regular basis to identify and prune or remove problem trees prior to storms occurring. ▪ Strengthen early warning system	All groups	Agriculture, Energy, Tourism, Water, Health, Forest, Infrastructure	All provinces	▪ All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
	▪ High winds and hailstones can damage buildings, utilities, roads, water & livestock infrastructure and other farm structures.	▪ Low – Lack of research in climate change and wind-based climate indices	▪ Low – Lack of climate resilience infrastructure	▪ Low - Weak enforcement of construction codes	▪ Low	▪ Enforcement of construction codes ▪ Strengthen research in climate change and windstorm-based climate indices ▪ Improved accessibility to weather and climate information ▪ Strengthen early warning system	All groups including farmers	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism, Wildlife, Forest, Transport, Water	All provinces	▪ All AERs
	▪ Reduced agricultural productivity ▪ Increased livestock mortality ▪ Increased incidence of eye and respiratory diseases	▪ Medium - Soil erosion ▪ Medium - Reduced soil fertility and productivity ▪ Medium - High winds reduces crop quality & yields due to increased stem, and tissue damage and disease incidence ▪ Low -	▪ Medium - Poverty, limited infrastructure, illiteracy, weak institutions, lack of technology and climate information ▪ Low adaptive capacity	▪ Medium – Increased poverty and reduced household food security Medium	▪ Medium ▪ Medium	▪ Increase extension services ▪ Up-scaling on dissemination of climate services ▪ Promote insurance of property against loss to fires and other climate hazards ▪ Promote crop-livestock integration ▪ Promotion of the use of improved grasses and legumes ▪ Up-scaling on dissemination of climate services ▪ Promote improved manure management ▪ Planting of trees and vegetation to minimize dust ▪ Sprinkle work areas with water in order to settle dust	All groups including farmers	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Energy, Health	All provinces	▪ All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						▪ Install sprinklers in areas where dust is generated ▪ Undertake regular dust suppression measures				
▪ Financial	▪ Disruption of hydroelectric power supply to the mines ▪ Increased demand for green and climate resilient buildings ▪ Increased infrastructure maintenance costs e.g. Livestock, etc. ▪ Reduced income from rentals and agricultural land due to reduced livestock and crop productivity and yield	▪ Medium – lack of alternative energy sources ▪ Medium - Reduced income from damaged crops, rental houses and businesses, etc. ▪ Medium - Reduced income from business due to power outage ▪ Medium - Reduced income from business due to power outage	▪ Medium – lack of financial capacity ▪ Medium - Lack of financial capacity to implement climate change adaptation actions ▪ Medium - Limited financial & access to climate information and early warning system ▪ Medium - inadequate infrastructure and weak governance systems	▪ Medium – lack of capacity to integrated alternative energy sources and climate resilient construction codes ▪ Medium - lack of climate resilient construction codes	▪ Medium - lack of climate resilient construction codes ▪	▪ Build the capacity by training stakeholders on the principles for green and climate resilient building designs ▪ Develop maintenance schedule for every infrastructure ▪ Enhance increased investment in the development of new climate resilient infrastructure i.e., roads, residential house, water, lodges, etc. ▪ Development of alternative transport infrastructure i.e., airports and railways based on climate resilient infrastructure codes and standards ▪ Promote insurance for agriculture,	All groups, Insurance companies, Contractors, Government institutions responsible to infrastructure	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism, Wildlife, Forest, Transport, Water	All provinces	▪ All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						infrastructure and buildings				
▪	▪ Disruption of hydroelectric power supply to the mines	Medium – lack of power supply	▪ Medium – lack of financial capacity	▪ Medium -	▪ Medium -	▪ Promote use of alternative power that is locally accessible e.g., mini hydro power stations, setting up a solar power plant and geothermal utilization ▪ Revision of building codes and standards	All groups	Energy, Mining	All provinces	▪ All AERs
▪ Physical	▪ Damage to infrastructure and buildings such as residential, schools, health centres, etc. ▪ Reduced agricultural productivity ▪ Increased dust levels in mining areas	▪ Medium – Increased damage to property, buildings, utilities, roads and other structures ▪ Medium – Increase soil erosion & reduced soil fertility and productivity ▪ High winds can cause soil erosion leading to loss of soil nutrients	▪ Medium - Limited infrastructure ▪ Medium - Weak institutions ▪ Medium - lack of technology and climate information ▪ Medium - Poor windstorm adaptation actions	▪ Medium – lack of climate proof infrastructure design plans	▪ Medium	▪ Enhance designing and construction of climate proofed infrastructure ▪ Promotion of climate resilient infrastructures ▪ Maintain wind breaks and hedges ▪ Promotion tree grass & planting ▪ Strengthen early warning system	All groups, Traditional leaders, Government institutions responsible for infrastructure	Agricultural (Crops, Livestock, Fisheries, & Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism, Wildlife, Forest, Transport, Water	All provinces	▪ All AERs
▪	▪ Increased deterioration of road infrastructure ▪ Increased dust levels in mining areas ▪ Increased damage to water infrastructure	▪ Medium - Increased exposure to windstorms damage property	▪ Medium - lack of climate resilient infrastructure	▪ Medium – deterioration of infrastructure	▪ Medium	▪ Regular maintenance of existing road infrastructure ▪ Promotion of climate resilient infrastructures ▪ Designing climate proof infrastructure	All groups	Agricultural (Crops, Livestock, Fisheries, Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism,	All provinces	▪ All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						▪ Enhance revision of building codes and standards		Wildlife, Transport, Water		
▪	▪ Windstorms bring severe damage to properties, hailstones can damage roofs and tiles, dent vehicles, damage glasshouse and bring down vegetation.	▪ Medium - Blocked roads, damaged fences, utility lines, buildings and vehicles	▪ Medium - limited availability of data from observations & high degree of uncertainty associated with model projections of extreme wind speed	▪ Medium – increased damage to property	▪ Medium	▪ Enhanced verification and enforcement of revised road codes and standards ▪ Increase investment in the construction of climate-smart buildings ▪ Conduct research and produce an atlas of Zambia's windstorms	All groups	Infrastructure, Agriculture, Livestock, Tourism, Energy, Mining	All provinces	▪ All AERs
▪ Institutional	▪ Loss of access to social amenities ▪ Difficulty in transporting goods and services to different parts of Zambia ▪ Weak community structures to cope with windstorms	▪ Low – lack of social amenities ▪ Medium – damaged road infrastructure ▪ Low - Weak institutional structures	▪ Medium - Communities have weak structures to respond to windstorms ▪ Medium - Limited infrastructure ▪ Medium - illiteracy, technical and institutional capacity	▪ High - lack of technology and climate information	▪ Medium	▪ Develop access roads to social amenities such as clinics and schools based on climate resilient infrastructure codes and standards ▪ Utilization of alternative forms of transport such as rail and air in accordance with climate smart codes ▪ Development and implementation of enhanced windstorm-resilient standards and building codes	All groups, Traditional leaders, Government institutions responsible for infrastructure	Agricultural (Crops, Livestock, Fisheries, and Aquaculture sub-sectors), Energy, Health, Infrastructure, Mining, Tourism, Wildlife, Forest, Transport, Water	All provinces	All AERs

Vulnerability Elements	Description of vulnerabilities	Exposures by hazards	Adaptive capacity	Climate Risk Level	Sensitivity	Adaptation actions	Target Groups	Affected areas		
								Sectors	Provinces	AER
						▪ Strengthen early warning system				

5.0 SYNERGIES BETWEEN ADAPTATION OPTIONS AND DISASTER RISK REDUCTION

The Government of the Republic of Zambia is strongly committed to the implementation of the transformative 2030 Agenda for Sustainable Development. The country's first Voluntary National Review (VNR) underscores this commitment. Integrating the SDGs into the National Planning Framework and putting in place strong coordination and reporting mechanisms, further demonstrates the country's resolve to anchoring its development trajectory on the 2030 Agenda. Presently, the Government of Zambia is seeking partnerships to accelerate synergy between climate change adaptation and SDGs.

Addressing the climate emergency requires effective adaptation and Disaster Risk-Reducing (DRR) actions. It is critical to guard against risk-blind planning, particularly to avoid maladaptation and creating new risks. A comprehensive approach to risk management is required. There are several factors to wittingly strengthen synergies between climate change adaptation and DRR, identifying mutually beneficial opportunities across policies, projects and programmes.

Synergy is achieved if the outcome from interactions between the two interventions is greater than that gained from having the interventions act independent of each other. The synergies between adaptation actions and DRR are crucial for building resilience to climate change and reducing the impact of disasters. Adaptation actions identified in this NAP focus on reducing vulnerability and enhancing the ability of sectors, geographical regions, and communities to cope with climate change impacts, such as extreme weather events, floods, droughts, higher temperatures, heat waves and heat stress. Meanwhile, DRR strategies aim to identify, assess, and manage the risks associated with climate hazards. By combining the two approaches, sectors, geographical regions, and communities can implement effective measures to mitigate the impact of disasters and enhance their adaptive capacity. Synergies between the climate adaptation action and DRR can include the generation, analysis, and interpretation of climate science information (at different temporal and spatial scales), implementing early warning systems, improving infrastructure, strengthening social networks, and promoting ecosystem-based adaptation approaches that help protect against climate hazards.

6.0 INTEGRATION OF CLIMATE CHANGE ADAPTATION AND GENDER IN ANNUAL BUDGETING

For annual budgeting Ministries, Provinces, and Spending Agencies (MPSAs) prepare and implement annual budgets in accordance with policy and ceilings from the MoFNP which capture their key sectoral objectives and activities for the budget year. The MPSAs then develop their budget priorities as well as the total amount of budgets for the prioritized programmes. This identification of annual priorities and budget preparation should serve as an entry point for the alignment of NAP priorities into the sectoral plans and programmes. Consequently, the MPSAs may:

- Adapt and screen identified sectoral/district priorities against climate vulnerabilities described in the NAP.
- Incorporate short- and medium-term adaptation priorities described in the NAP that are relevant to the sector/district's priorities.
- Reference the sector-specific indicators and targets included in the NAP Monitoring, Evaluation and Learning framework; and
- Invest in human capacities to review climate-change adaptation considerations in budgetary review processes.

As part of the NAP development process tools have been identified for use in screening against climate vulnerabilities and adaptation priorities identified in the NAP. MPSAs may adapt these templates to achieve alignment with climate targets and national priorities of key climate change policy documents and frameworks.

Since the budget process is the gateway for resource allocation for the government, it is important to ensure that gender is integrated in the planning and budgeting processes. The gender responsive budgeting takes into consideration gender concerns and ensures that the different needs and priorities of men and women are incorporated in the process. The Gender Division under the office of the President in Zambia is finalizing the guidelines and checklist for gender responsive planning and budgeting which will guide government ministries and agencies in mainstreaming gender perspectives in the budgeting process. This means that in the process of preparing and implementing the budgets, Ministries, Provinces and Spending Agencies (MPSAs) would commit resources to identified gender priorities at various levels including implementation, analysing, monitoring and evaluation. Further, this includes budgets allocated for adaptation.

7.0 STRATEGIES FOR IMPLEMENTING ZAMBIA NAP

7.1 Implementation Plan

The implementation of identified adaptation priorities in the NAP, will be achieved through stakeholder participation at national and subnational levels, civil society organizations (CSOs), Non-Governmental Organisations (NGOs), Faith Based Organisations (FBOs), cooperating partners, media, private sector, research and academic institutions among others. Government line ministries will coordinate actions within their sectors but will leverage on the capacities and experience of stakeholders to ensure effective implementation. The adaptation actions will be implemented in the medium and long-term. Appendix 1 shows detailed implementation plans using the Monitoring, Evaluation and Learning (MEL) approach. The implementation of adaptation actions will require funding, technical support, and regular monitoring and review to ensure effectiveness of actions.

7.1.1 Integration of adaptation actions at all levels

Integration of adaptation actions entails their incorporation in policies, projects and programmes across sectors. This approach ensures that adaptation strategies and actions are consistent, mutually supportive, synergised, and coherent across all levels of government, promoting more effective and efficient responses to climate change impacts. Integration is done both horizontally and vertically.

Horizontal / Sectoral integration

Horizontal/sectoral integration is key for smooth implementation of adaptation actions. The process requires inclusion of climate change adaptation priorities in national and sectoral policies, strategies, plans, budgets, projects and programmes. This helps to leverage resources and catalyse actions to minimise unnecessary expenditure and avoid duplication of efforts.

Vertical integration

Vertical integration require the involvement of various stakeholders at sub-national level among them public sector, communities, civil society organizations (CSOs), Non-Governmental Organisations (NGOs), Faith Based Organisations (FBOs), cooperating partners, media and private sector. By bringing these actors together, it allows for the exchange of information, good practices, sharing of resources, and collaborative decision-making, enabling a holistic and comprehensive approach to adaptation planning and implementation.

To promote and strengthen adaptation planning and implementation in Zambia, the Local Climate Adaptive Living (LoCAL) mechanism was designed to increase climate change resilience in communities and economies. This increases

investments in Climate Change Adaptation (CCA) at the local level through implementation of performance-based climate resilience grants (PBCRG). Ultimately, this contributes to the achievement of the Paris Agreement, the NAP process and the Sustainable Development Goals (SDGs), particularly the specific goals of poverty eradication (SDG1) and climate action (SDG13).

In order to effectively undertake horizontal and vertical integration, Zambia will leverage on relevant tools including the integrative framework for NAPs and SDGs (NAP-SDG iFrame) developed by the LEG, to better explore interlinkages within sectors to optimise the implementation of adaptation activities. The NAP-SDG iFrame makes it easy to build and manage the synergies between development and adaptation goals, allowing for more integrated and cost-effective planning, implementation, monitoring and evaluation (Figure 2).

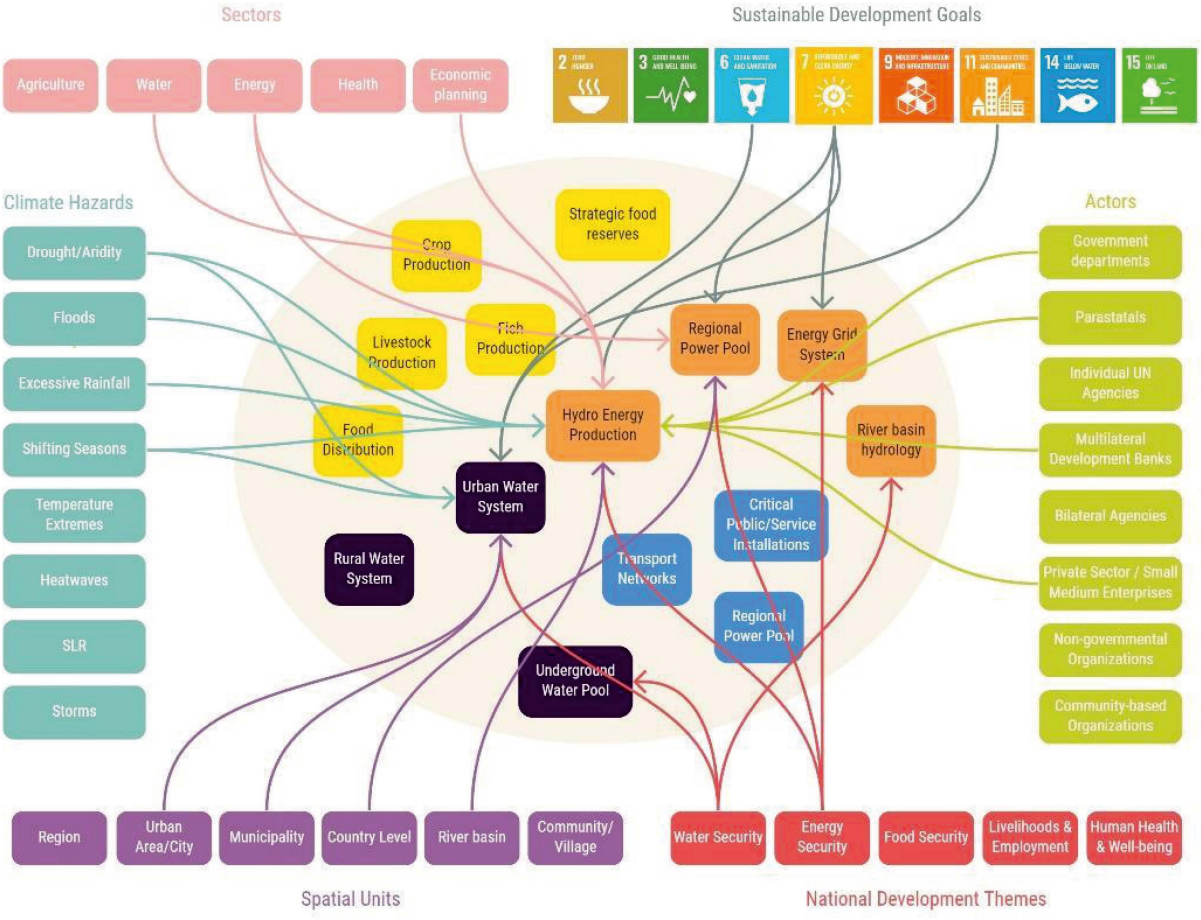

Figure 2. Integrative framework for NAPs and SDGs – example on selected systems. Source: UNFCCC Least Developed Countries Expert Group (2022)

7.2 How to implement the NAP

Implementing the NAP involves translating the national-level strategies and actions into specific measures that address the unique vulnerabilities and adaptation needs at different levels (provinces, districts, wards). This will entail aligning the adaptation actions proposed in the NAP with the Integrated Development Plans (IDPs) at district level and the provincial plans that would have been developed from the National Development Plan. In order to optimize the implementation of the NAP at district and sub-district level, there is need to take into consideration the following context:

- *Understand the district's context as provided in the IDPs*: Conduct a thorough assessment of the district's climate risks, vulnerabilities, and adaptation needs. Consider factors such as geographic location, topography, socio-economic characteristics, natural resources, and existing development plans and priorities. These aspects may have been identified in other strategic documents developed by the local authorities such as the IDPs.

- *Align local plans with the NAP and NDP*: stakeholders at local level, should be familiar with the NAP and NDP as the identified adaptation priorities in the NAP will relate to the abridged activities identified in the NDP at local level. Further, the district-level adaptation efforts should align with the overall goals, objectives, and strategies outlined in the national and local plans (NDP and IDPs). Using these, documents the relevant priorities and actions in the NAP that relate to the local needs, can then be implemented at the district level.

- *Adaptation planning*: The district-level adaptation plan can be integrated in the IDPs and develop a local plan that outlines the specific strategies, actions, and targets for building resilience to climate change. The plan should consider the unique characteristics, adaptation priorities and needs, and resources of the district and should address sectors such as agriculture, water, infrastructure, health, and livelihoods, among others. It should also integrate with existing district-level development plans, policies, and programmes.

- *Mainstream adaptation into district planning processes*: mainstream adaptation considerations in the NAP into district development planning processes, policies, and programmes to ensure it becomes a crosscutting issue. Some of the plans in which adaptation should be mainstream include land-use planning, infrastructure development, disaster risk reduction, and other relevant policies and programmes.

- *Implement adaptation actions*: Implementation of the identified adaptation actions at district-level include infrastructure upgrades, ecosystem-based approaches, awareness campaigns, early warning systems, livelihood

diversification, and capacity-building initiatives. Engage local communities and stakeholders in the implementation process to ensure their ownership and participation.

7.3 Resource mobilization strategy

To successfully implement the NAP, Zambia requires substantial local and international support in form of finance, investments, technical, and technology development and transfer. Resource mobilisation will therefore be imperative in securing the requisite resources to enable its effective implementation. The process will involve identifying, securing and allocation of financial, technical and other resources to implement the identified adaptation actions.

Resource mobilisation will require collaboration among stakeholders including government, civil society, private sector and development partners. Other funding sources will include bilateral and multilateral climate funds. Additionally, as one of the 46 LDCs, Zambia will use its resources under the Least Developed Countries Fund to implement relevant priorities from the NAP. The GCF National Designated Authority and the GEF Operational Focal Points and related entities will be critical in this regard to ensure success. Zambia will also use the NAP to inform the GCF country programme, which prioritises climate investment areas.

To effectively mobilise resources, the NAP resource mobilisation strategy will be formulated. The Strategy will guide financing of identified adaptation priorities from various innovative sources such as green bonds, Public-Private Partnerships (PPP), blended financing, nature debt swaps and credit enhancement.

To ensure transparency, accountability and performance measurement, a tracking and reporting mechanism on resources mobilised and utilised will be developed.

7.4 Institutional Arrangements for Coordinating NAP Implementation

Climate change affects all sectors of the economy, demanding a multi-sectoral, well-coordinated mechanism in order to achieve adaptation and mitigation targets. The Ministry responsible for climate change, being the focal point for the UNFCCC, will provide overall coordination of implementation of the NAP.

Coordination of the implementation of the NAP will be undertaken at national and sub-national levels and will make use of the existing mechanisms outlined in the National Policy on Climate Change. At national level, focal point ministries/departments will coordinate the implementation of the NAP within their respective sectors and will feed into the Technical Committee of Permanent Secretaries and the Council of Ministers on climate change through the ministry responsible for climate change. Below is the description of the roles of Council of

Ministers and Technical Committee in the coordination of the implementation of the NAP.

The Council of Ministers

The Council of Ministers, chaired by the Vice President of the Republic of Zambia, will i) provide overall policy direction on adaptation in the country; ii) the mainstreaming and integration of adaptation activities in national and sector plans and policies; iii) mobilize resources for adaptation programmes and projects; iv) promote adaptation programmes that positively impact the economy and the livelihoods of people; and v) monitor the implementation of climate change adaptation programmes and projects.

The Technical Committee on Climate Change

The Technical Committee of Permanent Secretaries is the main advisory body that feeds in the Council of Ministers on all matters relating to climate change programmes. Some of the key roles of the Technical Committee include; i) approve climate change adaptation programmes and projects; ii) oversee the development, revision and implementation of appropriate policies, legislation, programmes and projects, plans and strategies on adaptation; iii) oversee the monitoring and evaluation of the implementation of climate change adaptation programmes and projects; iv) facilitate the implementation of international adaptation obligations under the Convention; and v) provide technical direction on adaptation and means of implementation to the various sectors.

The Ministry responsible for climate change is the secretariat of the Technical Committee and the Council of Ministers. In this regard, it will receive M&E reports from sectors, and will compile and submit reports to the Technical Committee of Permanent Secretaries and Council of Ministers. Additionally, it will coordinate the preparation and submission of country reports on adaptation to the UNFCCC.

Coordination at sub-national level will be undertaken by WDCs at community level, DDCCs at district level and PDCCs at provincial level. Below is the description of the roles of WDCs, DDCCs and PDCCs.

Ward Development Committees

Coordination of implementation adaptation actions at community level will be undertaken by the WDCs. This will involve mainstreaming of adaptation in the ward and constituency development plans and budgets and will report to the DDCCs.

District Development Coordinating Committees

The DDCCs will coordinate implementation of adaptation actions at district level and will ensure that state and non-state actors operating in the district collaborate on the implementation of adaptation actions. They will mainstream adaptation in the Integrated Development Plans (IDPs) and will report to the PDCCs. Additionally, the DDCCs will provide oversight to the WDCs regarding the execution of adaptation actions at that level.

Provincial Development Coordinating Committees

The PDCCs will facilitate the participation of state and non-state actors in the implementation, monitoring and reporting on progress made in the implementation of the NAP at provincial level. They will mainstream adaptation in provincial level plans. The PDCCs will also provide oversight to the DDCCs regarding the execution of NAP. In addition, the PDCCs will feed into the Cluster Advisory Groups (CAGs) at sectoral level as well as the NDCC at national level.

Table 7 below provides a list of stakeholders and their responsibilities in the implementation of the NAP.

7.5 Capacity building

The capacity gaps for planning, coordination and implementation of adaptation actions were identified at national and sub-national levels. The assessment of capacity gaps for adaptations was undertaken at three levels, namely (a) individual level- skills/expertise and/or (b) institutions and organizations level, (c) system level. The capacity gaps identified were categorised according to the following main themes; Leadership; Information, Data and Analysis; Resource Mobilization; Knowledge Management; Implementation and management; Monitoring, Learning and Accountability; Research and Technical Capacities; Social and Cultural; and Multi-Stakeholder Dialogue Processes.

Refer to Table 10 presenting capacity gaps identified and proposed capacity-building actions.

*Table 7. Capacity gaps and actions**

Capacity Gaps	• **Capacity building action**
Knowledge Management	• Training in data collection, analysis and information dissemination • Training in the generation and interpretation of climate information services and products including climate data rescue and archives • Expansion of the hydro-met network for collection and timely disseminating weather and climate information • Training of sector leads, WDC, PDCC, DDCC and civil society on climate change, NAPs and Nature-based Solution (NBS) • Strengthen disease control in crops production, livestock and fisheries • Training of Extension staff in climate smart agriculture, climate finance, small scale organic fertilizer production, postharvest handling, preservation, utilization, value addition, food processing and marketing

Capacity Gaps	• Capacity building action
	• Training of Extension staff in integrated water resource management, water harvesting technics and irrigation technologies • Exchange visits to appreciate best practices in different AERs • Development and disseminate of guidelines for NBS activities (e.g., beehives, small ruminants, seedlings for agro-forestry, development of infrastructure for disease control, purchase of fisheries materials) • Training media houses and other relevant stakeholders in documenting and communicating (in an understandable manner) the climate science in the NAP • Information exchange between producers (climate science experts) and users of climate information • Orientation of civil society, NAIS and media houses on capturing and dissemination NAP implementation progress and impacts • Enhance in-service trainings
Leadership	• Strengthen coordination for the implementation NAP for HQ, WDC, PDCC, DDCC and civil society • Training planners in resources mobilization and tracking • Recruit a NAP Champion to help with dissemination of the NAP actions
Information, Data and Analysis	• Orienting key stakeholders to the platform for information sharing system for monitoring NAP implementation
Resource mobilization	• Training planners and stakeholders in accessing climate finance and resource mobilization and project development for NAP implementation • Develop systems and tools and undertake training of stakeholders in tracking and reporting climate finance for adaptation
Implementation and management	• Training of planners in strategic planning and policy reviews • Training the DDCC in project management • Develop and train stakeholders in the application of climate smart construction codes for infrastructure and roads • Enhanced provision of early warning systems, surveillance, climate services • Strengthen the institutional and human resource capacity in order to effectively and efficiently address all aspects of climate change at national, provincial, district and local levels • Mainstream climate change issues, including finance, into national and sub-national budgets and plans • Support capacity strengthening of SMEs to adopt green technologies along various value chains • Support mechanization and irrigation with increased access to financing
Monitoring, Learning and Accountability	• Training of stakeholders in data capturing, monitoring and reporting on MEL and MRV systems at national and sub-national levels
Research and Technical Capacities	• Re-characterization of AERs • Organize a national symposium for disseminating evidence-based research from pilots for upscaling • Strengthen capacity in development climate resilient crop, fish and livestock varieties/breeds • Strengthen the technical capacity of relevant Government personnel in Carbon Markets

Capacity Gaps	• Capacity building action
	• Strengthen the capacity of local technological innovation centers to help strengthen institutional technology generation and transfer through a learning-by-doing approach
Gender, Social and Cultural	• Organize training for the implementation of the climate change Gender Action Plan (ccGAP, 2018) • NAP orientation workshop for Gender Focal Points (GFP) in ministries and leaders in non-state actors • Training workshop of GFP in setting monitoring gender and social inclusion NAP indictors and gender budgeting • Training of planners in gender transformative methodologies and approaches
Multi-stakeholder Dialogue Processes	• Strengthen coordination for multi-stakeholder engagement at all levels using existing structure; i.e., WDC, PDCC, DDCC, and NDCC • Strengthen the participation of women, children, youth and persons with disability in the negotiation process • Encourage/Promote stakeholder's participation and partnerships in climate actions;

*Details of the capacity gaps and actions are in the NAP Capacity Needs Assessment Report, 2023

8 MONITORING AND REVIEW OF THE NAP IMPLEMENTATION

Monitoring and reviewing of the NAP implementation at national and sub-national levels will involve tracking and reporting progress of adaptation actions using key performance indicators derived from the NAP MEL framework[1] in Appendix 1. This framework contains adaptation actions, key performance indicators, baseline, targets, frequency of monitoring and reporting, and responsible institutions.

At national level, the lead institutions will be responsible for monitoring progress on the implementation of the NAP within their respective sectors. At sub-national level, implementation of the NAP will be monitored through the PDCCs, DDCCs and WDCs structures. These monitoring reports will be submitted to the ministry responsible for climate change for consolidation and submission to the Technical Committee of Permanent Secretaries and the Council of Ministers on Climate Change. The approved reports from the Council of Ministers will be shared with state and non-state actors at national and international levels.

[1] For more details, please refer to the NAP MEL framework, 2023

9.0 COMMUNICATING AND REPORTING ON THE NAP

9.1 Communicating the NAP

Communicating the NAP is guided by the already existing communication strategy for NAP (2022) which augments the National Climate Change Communication Strategy. Successful implementation of the National Adaptation Plan requires a proactive communications strategy, aimed at promoting ownership of the National Adaptation Plan among the public and development partners. The NAP Communication Strategy is based on a development communications approach, with key principles geared toward creating awareness; Inspiring behaviour change; encouraging practice; disseminating information and knowledge and ensuring inclusiveness and involvement (specific emphasis on gender equity, equality, and parity); and promoting transparency and accountability.

9.2 Reporting on the NAP

This NAP communicates identified adaptation priorities, implementation, and support needs, plans and actions, key performance indicators and their reporting systems established through a robust MEL framework. It serves as the first Adaptation Communication for Zambia pursuant to Article 7.10 of the Paris Agreement.

Reporting on adaptation actions for Zambia will follow a two-tier-reporting system at national and international levels and follow existing mechanisms and guidelines.

At national level, reporting will be through the NAP Monitoring and Evaluation framework from the WDCs, DDCCs and PDCCs. The PDCCs will in turn submit reports to the Ministry responsible for climate change. Theinistry responsible for climate change will receive and consolidate sectoral reports on the implementation of the NAP for submission to the Technical Committee of Permanent Secretaries and the Council of Ministers on Climate Change. Reports on the NAP will be shared with stakeholders including civil society organizations and the private sector to ensure transparency and accountability.

At international level, reporting on adaptation actions will be in accordance with the reporting obligations as outlined in the Convention and the Paris Agreement. This will be through the Biennial Transparency Report (BTR), the NDC reporting mechanisms and the National Communication.

The subsequent reporting of the NAP will be at two indicator levels, the first based on the outputs in the NAP MEL framework while the second based on outcome aggregate indicators listed below as provided for in the NDC (2021):

- The level of resilience of natural or physical systems achieved.

- The level of adaptive capacity of human system attained.
- The level of knowledge base for adaptation planning and response; and
- The level of capacity of human resource-base for addressing climate change.

Full version of the NAP can be found here:

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Appendix 1: Roles and responsibilities of key stakeholders

Stakeholder	Role
Public	
Finance and National Planning	Responsible for resource mobilization
Agriculture	Collaborate in the implementation climate smart agriculture and provision of training for farmers in climate smart agriculture.
Justice	Drafting of legislation related to green economy and climate change
Infrastructure, Housing and Urban Development	Promote green and climate resilient infrastructure
Energy	Responsible for the development and promotion of green and climate resilient energy sources
Technology and Science	Develop affordable and appropriate green growth, adaptation and mitigation technologies.
Health	Mainstreaming and strengthening of the climate resilience of the healthy systems
Education	Promote the mainstreaming and training of the public in green growth and climate change
Gender	Engendering implementation of the NAP
Green Economy and Environment	Provision of climate and early warning information and services The Minister also hosts the National Designated Authority to the GCF, serving as the interface between the Government of Zambia and the GCF
Disaster Management and Mitigation Unit	Disaster risk reduction (DRR) and management
Local Government and Rural Development	Promote green and climate resilient practices and interventions in all local development sectors of the district
Tourism	Promote green and climate resilient tourism
Fisheries and Livestock	facilitate and support the development and implementation of climate smart fisheries and livestock practices
Mines and Mineral Development	Promote green and climate resilient mining and mineral explorations practices
Water Development and Sanitation	Responsible for management and provision water to enhance climate change adaptation and mitigation
Commerce, Trade and Industry	Enhance the coordination of public and private sectors to facilitate their participation in green and climate resilient trade
Lands and Natural Resources	Promote conservation of natural resources and ecosystems
Small and Medium Enterprises	Responsible for creating and promotion of green and climate resilient business opportunities
Community and Social Services	Mobilization of local communities in green and climate resilient programmes
Youth, Sports and Arts	Mobilization of youths in green and climate resilient programmes
Non-state actors	
Academia and Research Institutions	Conduct Research and development to inform green growth, adaptation and mitigation interventions
Private sector	Promote and enhance private sector participation in green and climate resilient business practices; Provision and mobilization of financial and other resources, technical assistance as well as capacity building for green and climate change interventions; Promote the accessibility and provision of climate finance and insurance to stakeholders for green and climate change interventions

Stakeholder	Role
Private Media	Facilitate disseminating of the policy to the general public.
Civil society	Promote awareness, campaigns, advocacy and adoption of green and climate change interventions; Implementation of adaptation actions, monitoring, evaluation and reporting
Traditional and Indigenous Leadership	Enhance community participation including traditional, local and indigenous, and preservation of indigenous technical knowledge to facilitate the implementation of green growth and climate resilient interventions
Faith-based organizations	Awareness creation, lobbying and advocacy; Implementation of adaptation actions, monitoring, evaluation and reporting
Cooperating partners	
Donors, multilateral and bilateral partners	Providing technical, technology and financial support

Appendix 2: Capacity gaps and actions*

Capacity Gaps	Capacity building action
Knowledge Management	• Training in data collection, analysis and information dissemination • Training in the generation and interpretation of climate information services and products including climate data rescue and archives • Expansion of the hydro-met network for collection and timely disseminating weather and climate information • Training of sector leads, PDCC, DDCC and civil society on climate change, NAPs and Nature-based Solution (NBS) • Strengthen disease control in crops production, livestock and fisheries • Training of Extension staff in climate smart agriculture, climate finance, small scale organic fertilizer production, postharvest handling, preservation, utilization, value addition, food processing and marketing • Training of Extension staff in integrated water resource management, water harvesting technics and irrigation technologies • Exchange visits to appreciate best practices in different AERs • Development and disseminate of guidelines for NBS activities (e.g., beehives, small ruminants, seedlings for agro-forestry, development of infrastructure for disease control, purchase of fisheries materials) • Training media houses and other relevant stakeholders in documenting and communicating (in an understandable manner) the climate science in the NAP • Information exchange between producers (climate science experts) and users of climate information • Orientation of civil society, NAIS and media houses on capturing and dissemination NAP implementation progress and impacts • Enhance in-service trainings
Leadership	• Strengthen coordination for the implementation NAP for HQ and PDCC • Training planners in resources mobilization and tracking • Recruit a NAP Champion to help with dissemination of the NAP actions
Information, Data and Analysis	• Orienting key stakeholders to the platform for information sharing system for monitoring NAP implementation
Resource mobilization	• Training planners and stakeholders in accessing climate finance and resource mobilization and project development for NAP implementation • Develop systems and tools and undertake training of stakeholders in tracking and reporting climate finance for adaptation
Implementation and management	• Training of planners in strategic planning and policy reviews • Training the DDCC in project management • Develop and train stakeholders in the application of climate smart construction codes for infrastructure and roads • Enhanced provision of early warning systems, surveillance, climate services • Strengthen the institutional and human resource capacity in order to effectively and efficiently address all aspects of climate change at national, provincial, district and local levels • Mainstream climate change issues, including finance, into national and sub-national budgets and plans • Support capacity strengthening of SMEs to adopt green technologies along various value chains • Support mechanization and irrigation with increased access to financing
Monitoring, Learning and Accountability	• Training of stakeholders in data capturing, monitoring and reporting on MEL and MRV systems at national and sub-national levels
Research and Technical Capacities	• Re-characterization of AERs

	• Organize a national symposium for disseminating evidence-based research from pilots for upscaling • Strengthen capacity in development climate resilient crop, fish and livestock varieties/breeds • Strengthen the technical capacity of relevant Government personnel in Carbon Markets • Strengthen the capacity of local technological innovation centers to help strengthen institutional technology generation and transfer through a learning-by-doing approach
Gender, Social and Cultural	• Organize training for the implementation of the climate change Gender Action Plan (ccGAP) • NAP orientation workshop for Gender Focal Points (GFP) in ministries and leaders in non-state actors • Training workshop of GFP in setting monitoring gender and social inclusion NAP indictors and gender budgeting • Training of planners in gender transformative methodologies and approaches
Multi-stakeholder Dialogue Processes	• Strengthen coordination for multi-stakeholder engagement at all levels using existing structure; i.e., PDCC, DDCC, and NDCC • Strengthen the participation of women, children, youth and persons with disability in the negotiation process • Encourage/Promote stakeholder's participation and partnerships in climate actions;

*Details of the capacity gaps and actions are in the NAP Capacity Needs Assessment Report, 2023