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**MINISTRY OF TRANSPORT, WORKS, SUPPLY AND
COMMUNICATIONS**

ZAMBIA METEOROLOGICAL DEPARTMENT

NATIONAL METEOROLOGY POLICY

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FOREWORD

Meteorological services are multi-sectoral, although in the past they have been largely associated with and targeted for the aviation industry. Following Government's policy to diversify its economic base and promote others sectors such as infrastructure development, agriculture and tourism, demand for base-line climatic data for planning, execution and monitoring of developmental programmes has increased significantly. In addition, the apparent manifestations of the negative effects of climate variability and climate change, in terms of increased severity and frequency of floods and droughts, has underscored the need for integrating climate information in planning and decision making processes.

In recent years, there has been a significant increase in the demand for weather and climate data for environmental monitoring purposes, climate change and global warming issues. The relative high frequency of drought occurrence during the 1980s and the floods of the early 1990s has exerted further pressure on the meteorological service to provide extra baseline meteorological information for disaster preparedness and mitigation. There are however a number of constraints in the execution of the work, such as inadequacies in the station network to generate necessary data, lack of training facilities and other facilities to support data analysis and research.

The government realizes that the provision of meteorological services contributes greatly to the socio-economic development of the country. It realizes that the timely, accurate and proper application of weather and climate information and services brings evident social and economic benefits.

This policy aims at ensuring that the provision of accurate weather forecasts and climate information to all sectors of the economy is carried out in a proper, efficient, skillful and timely manner. My government shall also endeavour to enact a legal framework, which will facilitate the provision of meteorological services in the country.

YAMFWA MUKANGA, MP

**MINISTER OF TRANSPORT, WORKS, SUPPLY AND
COMMUNICATIONS**

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Charity Kande Ngoma (Mrs.)

Permanent Secretary (Transport and Communications)

**MINISTRY OF TRANSPORT, WORKS, SUPPLY AND
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WORKING DEFINITIONS

Atmospheric Pollution: This refers to natural constituents of the atmosphere, such as dust, gases, fumes, mist, odour, smoke and vapour, whose existence in the atmosphere is beyond their natural atmospheric composition. The term is normally used to refer to enhanced atmospheric emissions due to human activities such as industrialisation producing quantities of emissions injurious to human, plant and animal life or to property.

Climate: The aggregate of weather conditions of a place observed over a long time (normally for a period of at least 30 years).

Climate change: A measurable and irreversible change in climatic variables such as temperature or precipitation over time. The Intergovernmental Panel on Climate Change (IPCC) uses the term to refer to any change in climate over time, whether due to natural or as a result of human activity. The United Nations Framework Convention on Climate Change (UNFCCC) uses the term to mean a change of climate attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that in addition to natural climate variability observed over comparable time periods.

Climate system: This refers to the interactive processes in which the atmosphere, the Earth's surface (land and ocean) and the human enterprise affect and respond to one another.

Climatological station network: A network of stations that undertake weather observations for purposes of long-term climate record purpose.

Desertification: Refers to land degradation in arid, semi-arid and dry areas. It is the processes whereby dry ecosystems lose their capacity to revive or repair themselves. It takes form in several ways including reduction in vegetation cover leading to the rise in the soil reflective capacity, considerable and often permanent loss of perennial plants, especially woody shrubs and trees, and considerable soil erosion and impoverishment.

Drought: Refers to a prolonged and abnormally dry and hot period when there is scarcity of water for the normal needs of the affected community or ecosystem. Drought is failure of expected rainfall. For operational purposes this definition can be modified to suit specific applications such as meteorological, agricultural, hydrological and socio-economical droughts.

- **Meteorological Drought** is the inadequacy of precipitation, in comparison to a normal or average amount, and duration of a dry spell.
- **Agricultural Drought** is the shortage of precipitation for purposes of agricultural production.
- **Hydrological Drought** refers to a persistently low discharge and /or volume of water in streams and reservoirs, lasting for longer periods.
- **Socio-Economic Drought** refers to the deficiency of precipitation and water to meet social and economic activities.

Global Warming: refers to the increase in ambient air temperatures at global scales due to increase in greenhouse gases.

Impacts (of climate): Refers to the direct or indirect effects of climate (especially climate change) on humans and nature. Extreme weather events such as droughts and floods are good examples of the impacts of climate.

Main Analysis Centre: This is the central Office at which the plotting, analysis, interpretation and issuance of weather forecasts and related advisories are done. The office is at times be referred to as Central Forecast Office (CFO).

Meteorological data Processing: This is the process that refers to the collection, quality control and assurance, analysis, storage and archiving of meteorological data. This process transforms weather data from its raw form to a user-friendly form.

Meteorological data, information, and products: These are the various forms in which weather services are presented. Data refers to primary or unprocessed form e.g. weather observations; information and products refers to the secondary or processed form e.g. weather forecast or climate advisory that is ready for use.

Meteorological Observing System: This refers to both the human and instrumentation aspects of carrying out weather observations and their dissemination and exchange.

Meteorological services: This refers to the totality of services that a national, regional or world meteorological institution provides to society. The services include both the operational weather forecasting products and other related climate services.

Meteorological Telecommunications System: This system refers to both the human and equipment aspects of communications system

used for the collection, exchange and dissemination of meteorological data, information and products.

Ozone layer: The region of the upper atmosphere (stratosphere) that contains large amounts of Ozone, which shields the earth's surface from the Sun's damaging ultra-violet rays that cause adverse environmental effects. The layer extends from about 12 to 40 km, but maximum concentrations are within 20 to 25 km above the Earth's surface. However, it must be noted that Ozone in the lower atmosphere (troposphere) is a pollutant.

Ozone layer depletion: This refers to the depletion of Ozone found in the stratosphere. Examples of Ozone depleting substance include Chlorofluorocarbons (CFCs) used mainly in refrigeration and air-conditioning systems.

Regional Telecommunications Hub (RTH): This is an office designated by the World Meteorological Organisation to carry out regional responsibilities in terms of meteorological data collection, packaging, exchange, distribution and dissemination to and from countries within its jurisdiction.

ACRONYMS

Acronym	Definition
ACMAD	African Centre for Meteorological Applications and Development
AMSS	Automatic Message Switching System
CLICOM	CLimate COMputing system
COMESA	Common Market for Eastern and Southern Africa
CPC	Climate Prediction Centre
CWC	On-the-Air Crop Weather Conference
DMC	Drought Monitoring Centre
DMMU	Disaster Management and Mitigation Unit
DMTC	Disaster Management Technical Committee
GIS	Geographic Information System
HIV/AIDS	Human Immuno-deficiency Virus/Acquired Immune Deficiency Syndrome
ICT	Information Communications Technology
LIA	Lusaka International Airport
NMCC	National Malaria Control Centre
MCT	Ministry of Communications and Transport
MTEF	Medium Term Expenditure Framework

NEPPCMC	National Epidemic Preparedness, Prevention, Control and Management Committee
NEWS	National Early Warning System
NGOs	Non-Governmental Organisations
NMS	National Meteorological Services
NOAA	National Oceanic and Atmospheric Administration
NRDC	Natural Resources Development College
PRSP	Poverty Reduction Strategy Paper
PSCAP	Public Service Capacity Building Project
PSRP	Public Service Reform Programme
RANET	Radio and Internet
RTH	Regional Telecommunications Hub
SADC	Southern African Development Community
SADIS	Satellite-based Distribution System
SADC-NCJ	SADC - Network of Climate Journalists
SARCOF	Southern Africa Regional Climate Outlook Forum
SWOT	Strengths, Weaknesses, Opportunities and Threats
TNDP	Transitional Development Plan
UNDP	United Nations Development Programme
VAC	Vulnerability Assessment Committee
VSP	Voluntary Separation Programme
WMO	World Meteorological Organisation
WWW	World Weather Watch
ZASTI	Zambia Air Services Training Institute
ZMD	Zambia Meteorological Department
ZNFU	Zambia National Farmers Union

EXECUTIVE SUMMARY

The development and implementation of a National Meteorology Policy in Zambia will facilitate the application of weather and climate information in national development. In articulating the policy issues, focus is on the cross cutting nature of meteorological and climate applications. The policy seeks to achieve the following:

- i. Create a favourable political, socio-economic, legal and regulatory environment for the meteorology sector;
- ii. To progressively harness investment in the sector for purposes of generating meteorological data and information, and its application by the users in their everyday life;
- iii. Positively contribute to poverty reduction strategies, attainment of the Millennium Development Goals and sustainable social economic development among Zambians through the application of weather and climate information in all sectors;
- iv. Promote the use of Information Communication Technologies to effectively generate and disseminate weather and climate information;
- v. Layout a coordinated human resources development plans to support the meteorology structure for effective service delivery to clients;
- vi. Create institutional mechanisms to support the effective implementation of the National Meteorology Policy;
- vii. Strengthen the meteorological service delivery in terms of early warning systems and contribute to a climate resilient society and economy, thereby enhancing climate change adaptation and mitigation measures.

The policy also recognizes the need to holistically invest in the basic meteorological infrastructure across the country to support the provision of weather and climate services to the public. This shall contribute significantly to the creation of a climate resilient national economy and communities with a high climate change adaptive capacity.

The successful implementation of the National Meteorology Policy will require a legislative and regulatory framework that shall come into force through enactment of a Meteorological Act by Parliament. Equally addressed in this policy are the roles of government and stakeholders, and the need for monitoring and evaluation.

Cross cutting issues of information communication technology (ICT), Gender and HIV/AIDS are also considered.

CHAPTER 1: INTRODUCTION

1.1. Overview

The services offered by the Meteorological Department are multi-sectoral, although in the past, this sector was largely associated with the aviation industry. In the last 25 years or so the meteorological services have expanded to include sectors that previously were not considered to be affected by climatic variables.

The performance of the meteorological sector in Zambia has been unsatisfactory, mainly due to lack of a policy on meteorology. This has been exacerbated by poor maintenance of equipment, deteriorating observation infrastructure and shortage of professional and technical personnel. As a result of these problems the potential to derive maximum benefits from weather and climate information, products and services for sustainable development has not been fully realised.

To achieve maximum benefit from weather and climate information, products and services, it is necessary to have in place a meteorological service with adequate capacity to generate, archive and distribute meteorological products and services. It should also ensure that the products are easily interpreted and effectively applied in the relevant sector. The policy aims at putting in place appropriate strategies, legal and institutional framework complimented by monitoring and evaluation mechanisms that address critical issues of resource base to make the sector self sustaining through cost recovery on some selected products and services.

The policy further aims at strengthening linkages with other sectors within the economy to strengthen national capacity and facilitate regional cooperation and compliance with international commitments.

1.2. Meteorology and Sustainable Development

The World Commission on Environment and Development defines sustainable development as “***development that meets the needs of the present without compromising the ability of future generations to meeting their own needs***”. The general consensus on the concept of sustainability is that there has to be a prudent management and conservation of the natural resources in order to ensure continued satisfaction of human needs for the present and future generations. The success of such development will depend on the harmonious and integrated use of land, water and air.

Issues that are central to environmentally sound and sustainable development include agriculture and agro-climatological practices, energy and water resource management, drought and desertification, degradation of forested lands and their management, natural disasters and pollution. Apparently, all these are significantly affected by meteorological factors.

Zambia is prone to extreme climate events, such as droughts and floods to the extent that there has been negative impact on the country's economy. Although such events are unavoidable, there is now general recognition that meteorology can provide the required weather and climate forecasts and warnings that could provide early warning information to minimize economic disruption and loss of life. Meteorology therefore plays a central role in developing the generation and application of weather and climate information and prediction services for sustainable socio-economic development. It is for this reason that the Zambia Meteorological Department (ZMD) plays a vital role in the National Early Warning System (NEWS) by providing weather forecasts and other climate advisories to the system.

In view of the foregoing, the role of meteorology has become more pronounced in topical environmental and developmental issues such as climate change, global warming and ozone layer depletion. Through the assessment and evaluation of weather and climate data, information can be derived on changes in atmospheric patterns, radiation budget, water balance and concentration of dissolved and suspended material in air and water. Future scenarios are then projected to inform government and the general public about impending climatic events that may affect some socio-economic activities and thereby impede sustainable national development.

Thus, the resolve by Government and other stakeholders to develop a national meteorology policy framework that enhances sustainable development.

1.3. Outline of the document

This document is divided into five chapters. Chapter One is an introduction, which outlines the major aims of the policy. Chapter Two is situation analysis outlining a brief history of meteorology in Zambia, sub-sectoral inadequacies and its linkages with other sectors. In Chapter Three the rationale and vision are elaborated, stating the need for a policy. Chapter Four outlines in detail the vision in terms of general goals and objectives, sub-sector objectives and strategies. Chapter Five discusses the implementation framework, which includes institutional arrangements, legal framework, resource mobilization and monitoring and evaluation.

CHAPTER 2: SITUATIONAL ANALYSIS

2.1 Background

Prior to 1967, the meteorological and climate services in Zambia were administered by the Federal Meteorological Services Office whose Headquarters was Salisbury, now Harare the capital of Zimbabwe. When Zambia established its own Department, expatriates filled most professional posts as there were no qualified Zambians. However, through a massive and well-organised training programme undertaken by the Government upon gaining independence in 1964, all key posts were Zambianised by 1982.

The performance of the sector has been less satisfactory over the years. This is due to a number of factors, which include:

- i. Absence of a meteorological policy and legislative framework;
- ii. Shortage of technical and professional personnel especially in research and development (R & D);
- iii. Poor conditions of service that has perpetuated high staff turnover;
- iv. Absence of specialised branches of meteorology such as marine meteorology and air pollution meteorology to facilitate effective provision of specialised and sector-specific related services;
- v. Sparse observation station network;
- vi. Irregular instrument repair, maintenance and calibration;
- vii. Obsolete/outdated and inadequate equipment;
- viii. Lack of incentives for voluntary rainfall station data collectors;
- ix. Failure by the Department to effectively play its role as a regional telecommunications hub (RTH), which has resulted in the Department being isolated among its regional stakeholders and partners.

These problems have negatively affected the Department resulting in, among others, resignations or early retirement that was worsened through the government voluntary separation scheme of 1999 and weak sector linkages.

2.1.1. Financing

The goal of meteorology and climatology is to ensure that the industry is provided with reliable weather and climate information whenever needed. To satisfy the demands of the industry adequate financial, material and human resources are needed. Since the 1980s, public funding for the meteorological sub-sector has been rapidly declining to extreme low allocation levels. So far, no tangible and permanent measures have been put in place for sustained recovery. As a proportion of Gross Domestic Product and the total national budget, expenditure on meteorology has remained considerably too low for any meaningful contribution of the sub-sector to the socio-economic development. In terms of efficiency and cost-effectiveness, there is very little money allocated for direct spending on items such as office requisites, equipment, staff training and field inspection visits.

The situation equally applies to Departmental transport. The Department faces acute shortage of transport countrywide for dissemination of weather and climate information, station inspections and maintenance of equipment. Local resources have been insufficient to buy vehicles for outlying stations in the country.

Other sources of funding for ZMD include external funding through mainly:

- World Meteorological Organisation (WMO) Voluntary Cooperation Programme (VCP); and
- Project based support from Cooperating Partners.

Lack of cost recovery/sharing on meteorological services provided to other economic viable sectors has also contributed negatively to the financial problems that ZMD faces. Such sectors include aviation, agriculture, infrastructure development (especially construction), finance/banking, insurance and academia/research institutions.

2.1.2. Technical and professional personnel

From 1964 to early 1980s, the government made significant strides in the expansion of meteorological facilities and improvements to quality of services. Significant achievements were notable in increasing the number of trained staff. However, the accelerated socio-economic decline experienced from the mid-1980s slowed down the progress and has offset the earlier achievements in the sub-

sector. By the early 1990s, declining financial resources from the central Government resulted in the degeneration of meteorological products and services provided by ZMD.

The capacity to manage the meteorological system deteriorated due to lack of investment in human resource development for effective supervision of observation stations scattered across the country. The sector has not been able to attract and retain skilled personnel due to poor conditions of service and low salaries resulting in unsatisfactory meteorological service delivery.

The staff establishment at ZMD, is currently about 180; out of which only ten (10) are professional staff (Bachelor's degree and above), while the rest are technical staff (diploma and certificate holders).

2.1.3. Meteorological observing stations

Zambia with an area of about 752,614 sq. km has only 41 weather observing stations in about only 30 districts out of the more than 100 districts. This coverage is highly sparse and inadequate leaving most parts of the country without any weather observations. This implies that the current national weather information and resulting bulletins issued are not very representative and subject to high error margins. In addition, most of the current weather stations are in poor state with dilapidated old office buildings, obsolete equipment and inadequately staffed (with most of them manned by one (1) staff member).

2.1.4. Equipment

The outdated equipment and inadequate facilities are in form of:

- (a) **Obsolete meteorological equipment:** Out of the 41 stations, less than half are operational at any one time. This is due to obsolete equipment that has not been replaced for many years. Lack of data from these stations has a direct bearing on the accuracy of information that is generated.
- (b) **Obsolete telecommunications equipment:** The inadequacy of transport and communication systems has hindered efficient data collection and a wide range of normal daily activities. Equipment used for collection and exchange of meteorological data, information and products is obsolete and has not been replaced over the years. Lack of communications equipment and infrastructure has made it very difficult for the

meteorological Department to meet the demands of the stakeholders to the required standards.

- (c) **Inadequate facilities for effective data processing, archiving and dissemination:** At the main analysis centres, there is an acute shortage of tools and equipment for accurate analysis of weather and climate data. Due to lack of automation, the process is labour intensive which is time consuming and prone to human error. This has ultimately resulted in low quality of services being offered.
- (d) **Inadequate number of weather parameters being monitored:** Most of the stations are not monitoring sensitive climate variables such as evaporation and radiation.
- (e) **Lack of research and climate modelling facilities:** This has made it not possible for ZMD to carry out any meaningful sector-specific research and development products.

2.1.5. Absence of Meteorological Policy

Until the development and implementation of this current meteorology policy, the operations of ZMD have been based on ad-hoc guidelines' without any Cabinet approved policy and Parliament enacted legal framework. Consequently, ZMD did not have a clearly defined mandate, vision, authority and legal framework to discharge its functions. The trivialisation of the sub-sector was clearly manifested in its omission from the critical national development policy documents such as the Poverty Reduction Strategy Paper and the Transitional National Development Plan (TNDP) of the 1990s. However, the sub-sector was captured in the Fifth and Sixth National Development Plans.

2.2. Linkages with other sectors

Weather affects operations of most industries in Zambia. The demand for meteorological products and services in Zambia is increasing as awareness of the impact of weather on the operations and performance of industries increases. The farmers are interested in the rainfall and humidity forecast while macro-economic planners want medium to long-term weather forecasts to enable them make economic projections. The providers of hydroelectric power and health services want to know more about rainfall and temperature forecasts.

The Ministry of Agriculture and Livestock (MAL) need meteorological products and services in its extension messages to farmers. The frequent occurrence of droughts and occasional devastating floods also calls for more accurate weather forecasts. Insurance providers want accurate information on weather patterns to decide on types of insurance cover and premiums while architectural and construction companies want information on rainy days to determine work schedules and estimate construction schedules and costs. The aviation industry is greatly dependent on weather forecasts for its smooth operations.

Other sectors that require meteorological information include tourism; construction and civil engineering; education and research; sports and recreation; health; environment and natural resources management and disaster management among others. These examples indicate the extent of linkages, which the meteorology sub-sector has with other sectors and its critical role in the economy. Specific sector linkages are outlined below:

2.2.1. Agriculture and agri-business

Accurate and timely weather forecasts covering various periods in the year are an important input in the extension advisories, crop forecasts, food security assessments, marketing, input supplies as well as indicators for household food security. Stakeholders in the agriculture sector include farmers, policy makers, agribusinesses and researchers.

ZMD interacts in many ways with the various stakeholders in the agriculture sector. Both ZMD and MAL are members of the National Early Warning System (NEWS) Technical Committee, which initially was coordinated by the MAL and now has come under the Disaster Management and Mitigation Unit (DMMU) coordination structures in the Office of the Vice President (OVP).

The Department provides the following services to stakeholders in the agricultural sector:

- i. 6-monthly rain forecasts;
- ii. 10-day crop weather bulletins;
- iii. Monthly rainfall updates;
- iv. 7-day weather forecasts;
- v. Daily weather reports, technical reports and publications.
- vi.

2.2.2. Transport

The main form of transportation in Zambia is by land, air and water. Early warning of weather conditions is needed for airline operators, water transport (including fishing activities) and rail and road transport.

(a) Aviation Meteorological Services

Weather conditions determine flight paths, altitude, speed of aeroplanes and ultimately the safety of passengers, crew and cargo. It is estimated that 40% of fatal aviation accidents are attributed to weather. The Department provides the following services to stakeholders in the aviation industry:

- i. Area and route forecasts;
- ii. Aerodrome forecasts;
- iii. Landing and take-off forecasts;
- iv. Aerodrome and wind-shear warnings;
- v. Meteorological aviation reports.

(b) Quality Management Services

The effective and efficient provision of meteorological services to any sector demands that the service is provided with a framework that meets and complies to international standards at all nodes of the value chain/supply chain. Hence, the importance of the establishment and maintenance of the quality management system (QMS) in meteorological service delivery to all sectors. Currently, due to the safety implications of the aviation meteorological services, QMS is being established and implemented at all the airports. The emphasis is on: process documentation, competency assessments, continuous human resource development and instrument repair, maintenance and calibration. These are monitored and evaluated through external and external audits.

2.2.3. Insurance, Commerce and Industry

Insurance companies in Zambia provide various forms of insurance coverage. These range from motor and fire accident coverage to engineering, agriculture, life and pension. The weather patterns are critical in determining types of insurance cover offered in different areas as well as fixing premiums. Timely and accurate meteorological products and services are therefore critical to the business of insurance, commerce and industry. The information provided to insurance commerce and

industry companies is specific and demand-driven. Recently, the weather-index insurance has become handy amongst farmers in view of the prevalent impacts of climate variability and climate change especially on the agriculture sector.

2.2.4. Energy and Water Development

The most forms of energy used for lighting and heating in urban areas in Zambia include hydro and thermal electricity and charcoal. Since the motive power used in power generation is water, its levels at any one time of the year determine the amount of electricity generated. A hot and dry season may lead to less supply of electricity leading to load-shedding while good rains lead to over- supply and possibility of earning foreign exchange from exports of surplus electric power to neighbouring countries.

Meteorological forecasts and data to the energy and water sector is very important for water reservoir operations which include inflow forecasting, spillway gate's operations and early warning notices to downstream communities. The stakeholders in the energy and water sectors receive some of the following weather information from the Department:

- i. Six-monthly seasonal forecasts for purposes of dam operations;
- ii. Daily and 7-day weather forecasts for monitoring of river flows;
- iii. Climatological and related data and products for monitoring of energy and water resources.

2.2.5. Health

The health sector aims at promoting healthy practices through preventive and curative health services. Weather patterns determine the incidences and severity of diseases such as malaria, cholera, and other water and air borne diseases. For example, the National Malaria Control Centre (NMCC) works closely with ZMD for information on rainfall, temperature and humidity conditions for the latter to plan preventive programmes.

2.2.6. Disaster Management

It is estimated that 90% of all natural disasters globally are attributed to weather conditions. In Zambia, the most common natural disasters are associated with drought, floods and storms, and forest fires. ZMD

is a member of the Disaster Management Technical Committee (DMTC) and Vulnerability Assessment Committee (VAC) of the Disaster Management and Mitigation Unit (DMMU) under the Office of the Vice-President. The Department provides the DMMU regular weather and climate forecasts to enable the DMMU plan and manage impending disasters and reduce the impact of disasters whenever they occur.

2.2.7. Tourism and Sport

Meteorological information is very important to the tourism industry to enable millions of people worldwide plan their leisure activities. Further, weather and climate information helps the tourism planners, tour operators and the health planners to coordinate their efforts in mitigating and averting water borne diseases that could adversely affect the industry. Similarly, reliable weather and climate information helps in planning national, regional and international sport calendars and events.

2.2.8. Environment and natural resources management

In as far as preventing environment degradation is concerned, weather and climate information is necessary for sustainable development of the economy. The information is essential for effective management of environment and natural resources, including biodiversity for sustainable land use, prevention of air pollution and water conservation for agriculture and related industries.

2.2.9. Construction and Civil Engineering

Civil engineering systems and structures have to withstand extreme climatic conditions such as strong winds and cyclones. This requires reliable weather and climatic information to inform the architects and civil engineers to plan and design strong structures.

2.3. Meteorology and Gender

In the past, the meteorological sector has pursued non-gender responsive development strategies, which led to having very few female meteorological personnel in the service, and also having very few women beneficiaries of meteorological products and services. The

farmers, especially in the rural areas where the women are in the majority, shall need special attention from the meteorological sector. In this regard, the Department shall institute measures to correct and facilitate the process of removing existing gender barriers by integrating meteorological requirements of women into the mainstream of the provision of meteorological information. In addition, the Department shall strive to ensure equal opportunities for employment and training for men and women, to attain the 30% representation of the SADC region.

2.4. Meteorology and HIV/AIDS

In order to protect the lives of the workers, their families and the community around, there is need to have guidelines that will help the meteorology sector to reduce the spread of HIV/AIDS through sensitisation and support programmes. The guidelines will promote consistency and predictability of practice in places of work with the view to promote productivity.

Good nutrition is vital for HIV/AIDS patients. Therefore, there is great need for food security and self-sufficiency to minimise the impacts of the disease. This will call for reliable and more accurate weather and climate information and forecasts, to be disseminated even to the most vulnerable in society for agriculture and agri-business planning and implementation.

CHAPTER 3: RATIONALE AND VISION

3.1 Rationale

The central role of meteorology in national development is well recognized and has been emphasized at several fora. This is so because it facilitates the application of information to aviation, shipping, water resources management, agriculture and other human activities. However, the development of the sector has remained slow compared to the demand for the services the sector provides due to lack of legal backing, policy guidance and budgetary constraints.

There is need, therefore, for a comprehensive policy to establish the direction meteorology ought to take in its quest to contribute to national development. Further, clear articulation of meteorology in the economy will provide justification for adequate resource allocation that should enable it play a significant role in development. Within this framework therefore the rationale for future development of meteorology revolves on three broad considerations, namely: the role of the government in meteorology, principles for the development of meteorology policy and practice, and the aims of the national, regional and international meteorology systems.

3.1.1. Role of Government

Meteorology plays an important role in enhancing the well-being and quality of life to citizens through its provision of meteorological products and services to the public and the user community. The government's role is embedded in its responsibility to foster social well-being and achievement of a good quality of life for every person through all embracing economic development. The government must therefore seek to educate, promote and support the conditions within which meteorology can realize its potential to facilitate production in the national economy. To this end, the underlying principle is on how well the national meteorology policy and practice will promote quality and efficiency in all socio-economic sectors.

3.1.2. Principles for development of meteorology policy and practice

Meteorology aims at enhancing quality of life for all through its significant contribution to national development. Industrial development in the country is guided by policies of liberalisation, equity, partnerships and accountability.

Liberalisation allows those with resources, particularly the private sector to establish and operate their economic activities according to their own principles though subject to stipulated rules and regulations. In doing so, liberalisation contributes to expansion of private sector driven economic activities that require meteorological services. These should be exploited by commercializing some of the meteorological services and products in order to generate the revenue needed for the rehabilitation and maintenance of infrastructure and procurement of modern meteorological and telecommunication equipment.

3.1.3. Aims of national, regional and international meteorological services

The Zambia Meteorological Department (ZMD) needs to set for itself goals of developing innovative ways of providing reliable meteorological services; fostering scientific and technological research aimed at building capacity for the provision of quality meteorological services, and creating necessary conditions for effective coordination of plans and programmes at national, regional and international levels.

There is need, therefore, for government to increase resources to the sector for efficient meteorological services to stimulate production in the economy.

3.2. Vision

The vision for the sector is ***“to excel in the provision of quality weather and climate services to various sectors of the economy for sustainable development of the country”***.

CHAPTER 4: GOALS, OBJECTIVES AND STRATEGIES

4.1 Broader goals and objectives

a) Goals

The goals of the meteorological sector at the national, regional and international levels are to:

- i. Provide timely weather and climate information and products for sustainable development in the various sectors of the economy;
- ii. Further the application of meteorology to agriculture, environment and natural resources, tourism, disaster management and mitigation, aviation, shipping, water resources management and other human activities; and
- iii. Introducing sound management practices through appropriate policies and institutions in the sector.

b) Objectives

The policy objectives are to:

- i. Establish an optimal network of stations for the making of meteorological observations as well as hydrological and other geophysical observations related to the sector;
- ii. Achieve international standards in the practice and application of meteorology;
- iii. Optimise the use of information communication technology (ICT) in the execution of weather and climate services; and
- iv. Enhance the participation of women in both the provision and use of weather and climate services.

4.2. Specific objectives and strategies

4.2.1. Meteorological Observation systems

A meteorological observation system is a coordinated system of methods, techniques and facilities used to observe the state of the atmosphere and oceans. The main purpose is to collect, collate and provide in a cost effective way, weather and climate observations from all parts of the country and beyond, as and when required for real-time preparation of weather and climate analyses, forecasts and warnings.

Methods of observations should be of international standards to ensure uniform publication and application of observations and statistics. With the view of ensuring required standardization of observational practices and procedures in meteorology, the services so needed should from time to time conform to regulations stipulated by regional and international organizations.

The Government should therefore focus on the provision of optimum weather observing network and quality baseline data management.

a) **Objectives**

In view of the above, the objectives are to:

- i. Ensure that meteorological services maintain an optimum number of weather observing stations;
- ii. Ensure that international standards of observation and instrumentation are adhered to by promoting co-operation among institutions;

b) **Strategies**

The above objectives will be achieved by:

- i. Building capacity for the provision of quality meteorological services;
- ii. Mobilising and investing sufficient resources in the sector;
- iii. Undertake regular maintenance and calibration of meteorological observing instruments; and
- iv. Ensure adequate, qualified and skilled personnel at weather observing stations.

4.2.2. Meteorological telecommunication system

Meteorological measurements and observations from the observing station are required to reach the Main Analysis Centre within prescribed time of observation as per internationally agreed standards. There is need therefore to formulate a policy and regulations that will improve the performance of the telecommunication system to maximize the benefits from weather and climate information.

The Government will therefore ensure that the system is well developed to meet the demands of the stakeholders.

a) Objective

The major objective will be to improve a meteorological telecommunication system that will enhance the effective collection, exchange and dissemination of weather and climate information and other related products at national, regional and international levels.

b) Strategies

Based on the policy objective the strategies are:

- i. Putting in place a modern telecommunications network for timely collection and exchange of meteorological data, information and products at national, regional and international levels; and
- ii. Ensure adequate, qualified and skilled personnel in meteorological telecommunications system.

4.2.3. Meteorological data processing and dissemination

The vulnerability of Zambia's economy to fluctuations in weather and climate is generally recognised and has to be effectively taken into account when planning any programmes and activities for sustainable development. In particular, Zambia's agriculture is highly vulnerable to weather and climatic factors. As such there is need to deliver in advance accurate information and data to the users. To ensure the provision of reliable and accurate information, upgrading of meteorological data processing and distribution facilities is essential.

a) Objectives

The objectives of upgrading the meteorological data processing and dissemination facilities are to:

- i. Generate accurate meteorological data for weather and climate trend analysis;
- ii. Generate accurate and user-friendly meteorological information for end users; and
- iii. Ensure timely dissemination of weather and climate information to users.

b) Strategies

In order to achieve the stated goals and objectives aimed at improving the meteorological data processing, storage and distribution of products to end user, the following strategies shall be pursued:

- i. Maintaining the national climate data base;
- ii. Establishing a national climate data processing centre;
- iii. Establishing more centres at provincial level for the provision of meteorological services;
- iv. Enhancing the public awareness in the interpretation and use of weather and climate information;
- v. Establishing a mechanism of cooperation with local and international institutions that are engaged in the generation, processing and dissemination of weather and climate information;
- vi. Improve facilities for the processing of data and preparation of information and products for the application by user communities;
- vii. Establishing a system of marketing and pricing meteorological services and products that would ensure a reasonable return on investment;
- viii. Ensure that meteorological information reaches even the most rural areas, and especially the womenfolk;
- ix. Developing and establish mechanisms for applied meteorological services;
- x. Maintain close liaison with the media in the process of dissemination of weather and climate information; and

- xi. Ensure adequate, qualified and skilled personnel in meteorological data processing and dissemination system.

4.2.4. Training and Research

The variety of fields of human endeavour that benefit from the science of meteorology is so wide that no one meteorologist can be expected to acquire the knowledge which would enable one to give expert advice in all areas. Consequently, there is need for training in all branches of meteorology.

Furthermore, the balance of evidence suggests that there is a discernible human influence on the global climate. It is for this reason that the present knowledge of natural variations in weather and climate should be increased through research and training. Issues related to global warming, climate change, desertification and ozone layer depletion and their impact on Zambia's economic and social activities need further research.

a) Objectives

The objectives for training and research are to:

- i. Develop a sufficient human resources capacity in the meteorological sector;
- ii. Strengthen research; and
- iii. Promote gender balance in training and research in the field of meteorology and applied sciences.

b) Strategies

The following strategies will be pursued:

- i. Carry out periodic needs assessment;
- ii. Develop a human resources development plan;
- iii. Promote meteorological science and technology through research and training;
- iv. Promote and encourage research into the impact of weather and climate on Zambia's socio-economic activities;
- v. Encourage collaboration between the ZMD and other institutions;
- vi. Train staff in both operational and applied research; and
- vii. Train in planning and resource management, as well as monitoring and evaluation.

CHAPTER 5: IMPLEMENTATION FRAMEWORK

5.1 Institutional Arrangements

Currently, the ZMD falls under the Ministry of Transport, Works, Supply and Communications (MTWSC). Its prime function is to provide meteorological services to various sectors of the economy involved in national development as well as for general and specialised applications regionally and globally. To this effect, the meteorological sector shall be structured in line with the political, social and economic orientations of the nation but taking into account the regional and global considerations. ZMD shall be the sole authority in the country for the provision of efficient meteorological services, information and other related products to the public.

It is evident that the applications of weather and climate information cover a wide range of areas. The cross-cutting nature of meteorological applications, therefore, may require that the ZMD be placed centrally so that all sectors of the economy have easy and unrestricted access to it. However, in this regard, the most important issue is not necessarily the ministry placement of ZMD but rather the adequate funding and investments of the Department.

To improve the delivery of meteorological services in the country the ZMD shall strive to undertake the following:

- i. Strengthening the weather and climate monitoring systems;
- ii. Improving the public and specialised weather services;
- iii. Promoting sustainable development by putting more emphasis on climate change issues and protection of the environment;
- iv. Strengthening meteorology research capacity in the country;
- v. Increasing liaison with users and increasing their capability to tailor, package and deliver services;
- vi. Training and educating users to ensure effective utilisation of services;
- vii. Introducing new delivery system and technology;
- viii. Introduce cost recovery mechanisms for the services provided; and

- ix. Foster partnerships with institutions involved in providing weather and climate information at the national, regional and international levels.

5.2.1. Role of Government

The Government shall:

- i. Create adequate and efficient institutional and organisational framework for delivery of meteorological services. This shall be done through allocation of sufficient resources to the ZMD to ensure cost effective and efficient provision and delivery of meteorological services.
- ii. Ensure that the planning and management of meteorological services are improved through enhanced human resource planning and training.

In order to sustain the maintenance of existing infrastructure and also provision of these services, a cost recovery system through commercialisation of some of the services provided by the ZMD need to be introduced.

5.2.2. Role of ZMD in provision of climate services to support national climate change agenda (resilience building, adaptation and mitigation strategies)

For purposes of contributing to national efforts on climate change adaptation and mitigation, the ZMD as a national custodian of climate data and responsible for the science of climate change shall undertake the following:

- i. Expand the observation station network in order to improve climate data coverage across the country;
- ii. Increase the number of climate parameters measured at meteorological stations in order to meet the data needs for climate change modeling and projections;
- iii. Strengthen the capacity of departmental staff in conducting research, climate change modeling and related climate data analysis; and
- iv. Collaborate with academia, research and other stakeholder institutions in enhancing the understanding of climate science and its applications to socio- economic development.

- v. Continue to consolidate its provision of climate services at regional and international levels through active participation in the Global Framework for Climate Services (GFCS), Intergovernmental Panel for Climate Change (IPCC), United Nations Framework Convention on Climate Change (UNFCCC) and other related climate change programmes.

5.2.3. Role of the Stakeholders

a) Local sector stakeholders:

Other than the voluntary rainfall observers who provide rainfall observation data in areas where the Department has no physical presence, the local stakeholders are mainly client institutions that require meteorological information in their decision making processes and in carrying out some of their activities. Therefore their direct bearing in the improvement of the sector shall come through project support on some of the meteorological development activities.

ZMD t will continue to depend on volunteer observers for rainfall observations in the areas it has no physical presence. To continue taking rainfall observations on behalf of the Department the role and working arrangements with volunteers will be enhanced through closer cooperation and exploring ways of motivating them.

ZMD recognises the need for close collaboration and liaison with the media in the process of dissemination of weather and climate information to the user community.

b) Regional stakeholders:

The policy on regional cooperation revolves around the creation of an institutional arrangement aimed at exchanging weather and climate information, data and other related products and services for optimal utilisation of the information provided.

To achieve the above aims within the context of regional cooperation and through partnerships with institutions such as the media, necessary measures shall be taken to strengthen and rehabilitate the infrastructure.

c) International stakeholders:

To achieve the above aims and objectives, the government shall closely monitor the developments at international level and domesticate those agreements that the country appends her signature to. In particular, the role of the World Meteorological

Organisation (WMO), in this case shall be to coordinate, standardise and improve world meteorological and related activities. It will also provide a forum for an efficient exchange of meteorological and related information by member countries. ZMD shall also work closely with other key aviation stakeholder institutions to ensure that the provision of aviation meteorological services adhere to International Standard Organisation (ISO) Quality Management System (QMS) and the guidelines of the International Civil Aviation Organisation (ICAO). At regional level, ZMD shall collaborate with other National Meteorological Services (NMSs) through active participation in the Meteorological Association of Southern Africa (MASA).

5.2.4. Legal Framework

There is currently no legal framework in place for the management of meteorological sector. Notwithstanding this, the Ministry of Transport, Works, Supply and Communications through ZMD is responsible for the provision of meteorological services.

To effectively implement the meteorological policy the Government shall:

- i. Enact an appropriate legal framework for the meteorological sector in order to develop a supportive working environment;
- ii. Commission a study aimed at exploring the feasibility of transforming the Zambia Meteorological Department into a semi-autonomous body in order to make it more efficient;
- iii. Legislate on the exposure of weather observing instruments in terms of protecting the exposure site from intrusion and obstructing developments; and
- iv. Enact an appropriate legislation for cost recovery and commercialisation of Meteorological services.

5.3. Resource Mobilisation

ZMD shall be funded through:

- i. Government funding;
- ii. Revenue collected through cost recovery and commercialisation of some specialised meteorological services; and
- iii. Public Private Partnership funding programmes.

To improve efficiency through better management of the sector, therefore, a number of interrelated measures shall be introduced to

address the problems of financing. These include the management of human resources, avoiding superfluous and costly undertakings and better budgeting. To achieve the above set goals of the sector, the Government shall ensure that adequate annual budgetary allocations are provided for the maintenance of infrastructure, purchase of equipment and other necessary institutional requisites.

Where counterpart funding on donor supported programmes are sought, the government shall take appropriate measures to provide the required counterpart funds to ensure accelerated implementation of projects and programmes.

5.4. Monitoring and Evaluation

The guiding principles in the implementation of the policy are constant supervision, monitoring and evaluation to ensure effectiveness and accountability at every stage of its implementation. The Department shall establish a monitoring and evaluation system that shall ensure effective policy implementation by doing the following:

- i. Developing a medium-term strategic plan based on well elaborated policy implementation process to guide the implementation;
- ii. Developing performance indicators to monitor effectiveness and efficiency at national and local levels: and
- iii. Implementing a regular and consistent reporting system – monthly, quarterly and annual report based on annual budgets, work plans, medium term expenditure frameworks (MTEF) and national development plans (NDPs).

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