



REPUBLIC OF KENYA

MINISTRY OF ENVIRONMENT AND FORESTRY

DRAFT METEOROLOGY POLICY

SEPTEMBER 2020

FOREWORD

The Ministry of Environment and Forestry is committed to facilitating enabling policies, legal and regulatory reforms for promoting sustainability of the environment and forest resources, while at the same time, mitigating the effects of climate change. The Ministry is obliged and committed to providing the necessary monitoring, conserving and protective oversight role, while also ensuring that there is sustainable management of the environment for national development.

The Kenya Meteorological Department (KMD) which is the National Meteorological Service (NMS), is domiciled in the Ministry of Environment and Forestry is designated the single authoritative voice and source of weather, climate and hydrological alerts, warnings and advisories. KMD is also responsible for weather, climate, air quality, and tsunami warnings.

This Meteorology Policy proposes a broad range of measures and actions to address key meteorological issues and challenges. It further seeks to provide the framework for an integrated approach to planning and implementation of various measures and recommends a legal and institutional framework as well as governance measures to support the achievement of the desired goals and objectives.

Weather and climate play a critical role in the socio-economic sectors of any Country. The adverse effects of weather and climate have resulted in loss of lives as well as damage to property and the environment. On the other hand, good weather and climate has ensured that people are well fed, cost of production is lower in many economic sectors, transport and recreation activities are also undertaken without much hindrance or challenge.

This Policy Document presents a coordinated approach towards enhanced monitoring and evaluation, resource pooling, effective and efficient use of resources as well as governance of meteorology matters in the Country. It is envisaged that this Policy Document will enable Kenya Meteorological Department meet its mandate in a more structured, efficient and effective manner.

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Cabinet Secretary
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ACKNOWLEDGEMENTS

The development of the Kenya Meteorology Policy 2020 involved in-depth consultations with various stakeholders through consultative meetings. This policy is guided by the international best practices for provision of meteorological services and management in line with the Convention of the World Meteorological Organisation. The Ministry of Environment and Forestry (ME&F) would like to acknowledge individuals and organizations who dedicated their time and effort towards the development of this Kenya Meteorology Policy 2020. We appreciate the immense support from the office of the Cabinet Secretary. In a special way we also wish to convey our appreciation for the support received from the County governments.

We particularly wish to convey our gratitude to the team that worked tirelessly to ensure the successful completion of this document. The Ministry would like to thank the entire Ministerial Committee chaired by Ms. Stella Aura, MBS, the Director of Meteorological Services who is also the Permanent Representative of Kenya with the World Meteorological Organization (WMO), for their dedication to ensure the policy is finalized. The Committee which included, Dr. Charles Mutai, then Director, Climate Change Directorate; Dr. Ayub Macharia, Director, Environmental Education and Awareness, ME&F, Mr. Samuel Mwangi, Deputy Director KMD, Mr. Silas Gitari, then Director, Human Resource Management and Development, ME&F; Mr. John Olela, Chief Economist, ME&F; and Ms. Annie Syombua, State Counsel, ME&F is highly appreciated for the good work on this policy.

In addition, the Ministry would like to sincerely thank the Secretariat which worked overtime to deliver this Policy Document while adhering to strict timelines. The Secretariat was chaired by Mr. Nicholas Maingi, Deputy Director of Meteorological Services and comprised of Messrs. Bernard Chanzu, Peter Masika, Fredrick Etemesi, Moses Chito, Isaac Kangila, Reginald Mahonga, and Ms. Bahati Musilu.

We highly recognize the stewardship and guidance role provided by Mr. Joshua Laichena, Policy Analyst from Kenya Institute for Public Policy Research and Analysis (KIPPRA) and Ms. Olivia Simiyu, Legal Counsel at the State Law Office. We sincerely thank the World Meteorological Organization (WMO) Team for their in-depth review of the policy.

This policy marks a big milestone in the country's response to the growing need for meteorological services in all sectors of the economy. We urge all stakeholders to partner with the Ministry of Environment and Forestry in implementing it in order to not only mitigate the extreme weather and climate events which adversely affect humankind through loss of life, livelihoods and property, not only in Kenya, but the world over but also take advantage of the positive aspects due to climate variability and change.

Dr. Chris Kiptoo, CBS
Principal Secretary
Ministry of Environment and Forestry

LIST OF ABBREVIATIONS AND ACRONYMS

AMCOMET	African Ministerial Conference on Meteorology
AMDAR	Aircraft Meteorological Data Relay
ARSDRR	Africa Regional Strategy for Disaster Risk Reduction
AU	African Union
BEAHC	British East African High Commission
BEAMS	British East Africa Meteorological Society
CDACC	Curriculum Development Accreditation and Certification Council
CIDPs	County Integrated Development Plans
DRR	Disaster Risk Reduction
EAC	East African Community
EAMD	East African Meteorological Department
GDP	Gross Domestic Product
GHA	Great Horn of Africa
GIS	Geographical Information System
ICAO	International Civil Aviation Organization
ICPAC	IGAD Climate Prediction and Applications Centre
IGAD	Inter Government Authority on Development
IK	Indigenous Knowledge
IPCC	Intergovernmental Panel on Climate Change
JKIA	Jomo Kenya International Airport
KAA	Kenya Airports Authority
KBC	Kenya Broadcasting Corporation
KCAA	Kenya Civil Aviation Authority
KEFRI	Kenya Forest Research Institute
KIPPRA	Kenya Institute for Public Policy Research and Analysis
KLRC	Kenya Law Reform Commission
KMA	Kenya Maritime Authority
KMD	Kenya Meteorological Department
KMS	Kenya Meteorological Society
KNQA	Kenya National Qualification Authority
KV 2030	Kenya Vision 2030
ME&F	Ministry of Environment and Forestry
MTP	Medium Term Plan
NCCD	National Climate Change Directorate
NDMA	National Drought Management Authority
NGOs	Non-Governmental Organizations
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological Service
QMS	Quality Management Systems
RCC	Regional Climate Centre
RIMES	Regional Integrated Multi hazards Early Warning System
RSMC	Regional Specialized Meteorological Centre
SDGs	Sustainable Development Goals
TVET	Technical and Vocational Education Training
TVETA	Technical and Vocational Education Training Authority
UNEP	United Nations Environment Program

UNFCCC United Nations Framework Convention for Climate Change
UNISDR United Nations International Strategy for Disaster Reduction
WHO World Health Organization
WMO World Meteorological Organization

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1 INTRODUCTION

- 1.1 Meteorology is the science of the atmosphere and its interaction with the geosphere, biosphere, hydrosphere and society. Meteorological Services fall under three broad categories of weather and climate namely: Provision of historical weather information; present and future weather advisories, alerts and warnings; and research on meteorology. The main purpose of providing meteorological services is to facilitate actors in socio-economic sectors to make informed decisions, enhance efficiency and reduce risks in their operations and draw benefits associated with accurate and timely provision of weather and climate information and services.
- 1.2 All economies depend on accurate and timely provision of weather and climate information and services. Risks associated with climate variability and extreme environmental events create social and economic stresses that call for an innovative approach to meteorological, hydrological, and climate services. Responding to these risks in a timely and accurate manner is critical especially for the regions that are environmentally vulnerable to extreme weather events. The public and the policymakers require accurate and timely weather information and services for decision making so that they are better informed of the impact of meteorological services on humankind. It is recognised that weather, climate and related environmental conditions have a significant influence on the socio-economic development of countries world-wide.
- 1.3 The development of Kenya is affected by vagaries of weather, climate change, and climate variability and their resultant impacts, which costs the economy a significant amount of the country's Gross Domestic Product (GDP). The cumulative impacts of climate change, therefore, have the potential to reverse much of the progress made towards the attainment of the United Nations' Sustainable Development Goals, the country's development blueprint -Vision 2030 as well as the Big 4 Agenda.
- 1.4 As a member of the United Nations, Kenya has subscribed to the international development agenda 2015-2030 through commitments to deliver on the Sustainable Development Goals (SDGs). These goals address global challenges including those related to poverty, inequality, climate, environmental degradation, peace, prosperity and justice. Impacts of weather and climate cut across all SDGs hence positioning meteorological services in a central role on the delivery of the SDGs and more specifically SDG 13; 14 and 15 which bear direct actions on climate, oceanography and environmental conservation, respectively.
- 1.5 The Kenya vision 2030 outlines the national goals and development plans which are being implemented through Medium Term Plans (MTP) where the National Meteorological Service (NMS) is the lead implementing agency for two flagship programmes namely; the Modernization of Meteorological Services and Adventent Weather Modification Programme.

1.6 The mandate of National Meteorological Services (NMSs) emanates from the World Meteorological Organization (WMO) Convention adopted on 11 October 1947 (and revised in 2007), and which Kenya subscribed to on 2nd July 1964. The Convention reaffirms “The vital importance of the mission of the National Meteorological and Hydrological Services (NMHSs) in observing and understanding weather and climate and in providing meteorological, hydrological and related services in support of relevant national needs which should include the following areas:

- (i) Protection of life and property;
- (ii) Safeguarding the environment;
- (iii) Contributing to sustainable development;
- (iv) Promoting long-term observation and collection of meteorological, hydrological and climatological data, including related environmental data;
- (v) Promotion of endogenous capacity-building;
- (vi) Meeting international commitments; and
- (vii) Contributing to international collaboration.

1.7 In line with the WMO Convention, the National Meteorological Service (NMS) is designated the *single authoritative voice and source on* weather and hydrological warnings and is also responsible for climate, air quality, and tsunami warnings. In this respect:

- (i) The views of NMS are considered to be scientifically sound and impartial when advising the public and private sector, national and county governments.
- (ii) The NMS continuously monitors the earth’s environment, develops predictions of potential changes related to weather, climate and water, and issues as timely and accurate warnings as possible of most hydro-meteorological hazards.
- (iii) The NMS also generates and makes available essential environmental information, products, and services in support of air, land and sea transportation, urban and regional planning, development of new and renewable energy resources, sustainable agriculture, human health, Disaster Risk Reduction (DRR), management of water resources, including recreation, sports and tourism.

1.8 The World Meteorological Congress (WMC), which is the supreme body of the WMO, in its 13th Congress affirmed the importance of having national legal instruments that define the mission and mandate of NMSs to ensure clarity in the definition of the responsibilities and recognition of their contribution to the society to facilitate allocation of adequate resources.

1.9 The African Ministerial Conference on Meteorology (AMCOMET) established by the First Conference of Ministers responsible for Meteorology through the Nairobi Ministerial Declaration (in April 2010), is a high-level mechanism for the

development of meteorology and its application in Africa. During the 3rd Session of AMCOMET held in Praia, Cape Verde on 13-14 February 2015, it was noted that a number of NMHSs in Africa had transformed into autonomous agencies and/or authorities and that consequently, they had improved operations and service delivery.

- 1.10 The 12th meeting of the East African Community (EAC) Sectorial Council on Transport, Communications and Meteorology (TCM) held on 21-24 September 2015, urged Kenya and Burundi, the only Partner States that had not effected the transformation of their National Meteorological Services, to expedite their transformation from the main civil service to semi-autonomous Government Agencies.
- 1.11 Meteorological observations in Kenya date back to 1890 when the country established the then Mombasa Old Observatory. However, organized meteorological services were established in 1929 as part of the British East African Meteorological Service (BEAMS), which was an inter-territorial service covering Kenya, Uganda, Tanganyika and Zanzibar, and Northern Rhodesia (presently Zambia).
- 1.12 The BEAMS became a branch of the Meteorological Office of the Air Ministry of the United Kingdom in 1943 and was known as the Royal Air Force Organization (RFO). The main mandate of the Service was issuance of forecasts for military aviation. The facilities made available during the war, particularly with respect to communication and special observations by aircrafts, resulted in a significant increase in knowledge of weather conditions in East Africa. This increased understanding of weather phenomena and led to considerable improvement in the accuracy of forecasts. BEAMS became a department under the British East African High Commission (BEAHC) between 1947 and 1948 and renamed the East African Meteorological Department (EAMD).
- 1.13 In 1965, the EAMD was placed under the East African Common Services following the establishment of the East African Community (EAC). With the break-up of the then EAC in 1977, all the common services collapsed and their functions were transferred to the jurisdiction of the respective Partner States. In the case of Kenya, the Kenya Meteorological Department (KMD) was established, but without an Act of Parliament, as a department in the Ministry of Power and Communications.
- 1.14 Since 1977, KMD has been domiciled in various ministries including Power and Communications; Transport and Communications; Information, Transport and Communications; Transport; Environment and Mineral Resources; Environment, Water and Natural Resources; Environment, Natural Resources and Regional Development Authorities and currently under the Environment and Forestry.
- 1.15 The Department has been operating on Presidential Executive Order No. 1 of 5th June 2018 on the reorganization of the Government of the Republic of Kenya.

This Executive Order placed the Kenya Meteorological Department under the Ministry of Environment and Forestry.

- 1.16 It is, therefore, against this background that this Policy proposes a broad range of measures and actions to address key meteorological issues and challenges. It further seeks to provide the framework for an integrated approach to planning, implementation of various meteorological policy measures and recommends a legal and institutional framework as well as governance measures to support the achievement of the desired goals and objectives.

2 SITUATIONAL ANALYSIS

- 2.1 Meteorological services in Kenya have been provided without a policy to guide KMD's operations. In the absence of a policy, there has been lack of effective regulation of the provision of meteorological services and the subsequent clear guidelines on resource mobilization and revenue collection.
- 2.2 The increase in world population, and extension of settlement and life supporting activities, in areas vulnerable to the vagaries of extreme weather and climate events justifies the urgent need and requirement to improve the capacity of NMSs to provide better services to mitigate disaster risk, and support productive capacities of life supporting activities. The increase in the intensity of natural hazards due to climate variability and climate change poses critical challenges to the country with far reaching socio-economic devastations and miseries.
- 2.3 This policy will guarantee close monitoring to counter the proliferation of non-professionals or unqualified persons who are offering weather and climate services in the country. This will pre-empt the existence of an environment of uncontrolled and unregulated mushrooming of unauthorised service providers in the field of meteorology who are currently exposing the user to unreliable and unauthenticated services and products. It will ensure control and standardization in the installation of meteorological instruments, methods of observations, data quality control, processing and archiving in the country.
- 2.4 This policy will address all the challenges related to the organizations and non-professionals offering meteorological services by creating an Authority, and a Training School with respective mandate to address areas of concern in the provision of meteorological services.
- 2.5 Meteorological services are essential for disaster risk reduction, necessary for building resilience in the country against the adverse impacts of climate variability and climate change. The service cuts across all socio-economic sectors and hence, the need for an immediate remedial by establishment of an Authority with independent and flexible mandate to promote provision of timely, accurate, and effective climate information services delivery. This has been reiterated in the East African Community region, as a means of not only improving service delivery but streamlining meteorological policy in the region. The National Meteorological Services of Tanzania, Uganda, and Rwanda have attained autonomy in provision of meteorological services while those in Kenya, Burundi and South Sudan are yet to gain autonomy.
- 2.6 It is necessary to strengthen the country's capacity for research and development in the issuance of adverse weather forecasts (early warnings, alerts and advisories) and climate information (climatological statistics, trends and projections into the future) as well as product delivery to the end-users. This will promote sustainable development through

alleviation of poverty and at the same time create wealth through the improvement of livelihoods of communities, enhancement of safety of life and protection of property.

3 POLICIES AND INSTITUTIONAL FRAMEWORKS RELEVANT TO METEOROLOGICAL SERVICES

This section introduces policies and institutional frameworks including conventions and treaties that are relevant to meteorological services, which are to be complimented by the Meteorological Policy.

- 3.1 Kenya Constitution 2010:** Chapter 5 on Land and Environment (Part 2) gives provision for the state to ensure sustainable exploitation, utilization, management and conservation of the environment, work to achieve and maintain a tree cover of at least 10% of the land area; encourage public participation in the management, protection and conservation of the environment; protect generic resources and biological diversity; establish systems of environmental impact assessment, environmental audit and monitoring of the environment; eliminate processes and activities that are likely to endanger the environment. The NMS plays a crucial role in the provision of timely and effective weather information to achieve the above. In accordance with Article 2 (6) of the Constitution, any treaty or convention ratified by Kenya forms part of the Law of Kenya under the Constitution. Some of these Treaties and Conventions of significant importance to this Policy are given below.
- 3.2 World Meteorological Organization (WMO):** The WMO Technical Document No.947 notes that over half of the NMSs operated by Members of WMO have formal legal instruments covering their responsibilities, the establishment and operation of their facilities, and government regulation and legal responsibility. Other issues included in the legal instruments are the roles of NMSs in the prevention/mitigation of natural disasters, international cooperation, and supplementary provisions and funding.
- 3.3 International Civil Aviation Organization (ICAO) (DOCUMENT 8896 of 2017):** The Manual on meteorological practices states that meteorological service for international air navigation is provided by meteorological authorities designated by the states. Details of meteorological services to be provided for international aviation are determined by each state in accordance with provisions of ANNEX III to the Chicago Convention (1944) on ICAO) and with regional agreements which apply to specific areas designated as air navigation regions by ICAO. The information provided to aviation includes observations and reports of actual weather conditions at aerodromes as well as forecasts. It is made available at aerodrome meteorological offices and is disseminated as appropriate to aeronautical users, including operators, flight crew members, air traffic services units, search and rescue services units, airport management.
- 3.4 Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM):** worldwide marine meteorological and oceanographic communities work in partnership under the umbrella of the WMO/IOC-UNESCO Joint Technical Commission for Oceanography and Marine Meteorology, in order to respond to interdisciplinary requirements for meteorological and ocean observations, data management and service products. The meteorology policy will create an environment that improves collaboration in research and analysis of data for accurate maritime forecasts.

- 3.5 Intergovernmental Panel on Climate Change (IPCC):** the role of the IPCC is to provide policy makers with regular scientific assessments on climate change, its implications and potential future risks, as well as to put forward adaptation and mitigation efforts. This scientific assessment determines the state of knowledge on climate change. The National Meteorological Service is the scientific body that has the capacity to undertake such assessments and is the IPCC focal point.
- 3.6 UN Framework Convention on Climate Change (UNFCCC)** is a treaty adopted in 1992 whose objectives is to stabilize greenhouse gases concentration in the atmosphere at a level that would prevent dangerous anthropogenic interference with climate systems. The Paris Agreement (2015) under this convention has legal force applicable to all parties with the long term goals of capping global average temperatures at below 2⁰ C above preindustrial levels; to limit temperature increase to 1.5⁰ C; increase ability to adapt to adverse impacts of climate change and make finance flows consistent with a path way towards climate resilient development
- 3.7 UN Convention to Combat Desertification**
The UNCCD is particularly committed to a bottom-up approach, encouraging the participation of local people in combating desertification and land degradation. The UNCCD secretariat facilitates cooperation between developed and developing countries, particularly around knowledge and technology transfer for sustainable land management. The Convention addresses specifically the arid, semi-arid and dry sub-humid areas, known as the dry lands, where some of the most vulnerable ecosystems and peoples are found.
- 3.8 Convention on Biological Diversity**
A multilateral treaty with goals to conserve biological diversity, and the sustainable use of its components. The convention reminds decision makers that natural resources are not infinite and sets out a philosophy of sustainable use.
- 3.9 United Nations International Strategy for Disaster Reduction (UNISDR):** according to the UNISDR strategic framework 2016- 2021 there is a need to substantially reduce disaster risk and losses for a sustainable future in line with the Sendai Framework (2015-2030). Research indicates that 90% of natural disasters are weather and climate related. The prevention of new and reduction of existing disaster risks and strengthening resilience through multi-hazard disaster risk management is therefore necessary.
- 3.10 African Union (AU):** one of the goals of Agenda 2063 is modern agriculture for increased productivity and production. Weather and climate information therefore must to be sufficiently researched and improved to meet this goal. Embracing the blue economy in Africa is another goal to accelerate growth on the Continent. Marine meteorology is a key component of the Blue Economy.
- 3.11 African Ministerial Conference on Meteorology (AMCOMET):** AMCOMET, established by the First Conference of Ministers responsible for Meteorology in Africa through the Nairobi Ministerial Declaration (in April 2010), is a high-level mechanism for the development of meteorology and its application in Africa. The Declaration recognizes that weather and climate are central to the socio-economic development of

any country. The Ministers committed to strengthen and sustain the NMSs by providing them with all necessary resources and adequate institutional frameworks to enable them fully perform their roles as a fundamental component of the national development infrastructure contributing to security and sustainable development and particularly poverty reduction efforts, climate change adaptation and disaster risk reduction. Further, during the 3rd Session of the African Ministerial Conference on Meteorology (AMCOMET-3) held in Praia, Cabo Verde on 13-14 February 2015, it was noted that several NMHSs in Africa had transformed into autonomous agencies and/or authorities and that consequently, they had improved operations and service delivery. This policy will give an institutional framework to NMSs to address the envisaged issues as highlighted in the Integrated African strategy on meteorology which was created by the Nairobi Ministerial Declaration.

3.12 East African Community (EAC): The 12th meeting of the EAC Sectorial Council on Transport, Communications and Meteorology (TCM) held on 21-24 September 2015, urged Kenya and Burundi, the only Partner States that had not effected the transformation of their National Meteorological Services, to expedite their transformation from the mainstream civil service to semi-autonomous Government Agencies. This is expected to improve service delivery as well as expedite implementation of meteorological programmes in the region.

3.13 IGAD Regional Climate Centre: The Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC) has been designated as the World Meteorological Organization (WMO) Regional Climate Centre (RCC) of excellence for provision of climate services to countries in the Greater Horn of Africa (GHA). The Regional Climate Centre (IGAD-RCC) organizes Climate Outlook Fora for the Greater Horn of Africa for the three major rainfall seasons (March to May, June to August, September to December) in the region. These fora provide regional climate forecasts and other products that support regional and national climate activities, and thereby strengthen the capacity of WMO Member Countries in the Greater Horn of Africa region to deliver better climate services to users.

3.14 Water Act 2016: This is the principal legal instrument for governance of water resources in the country; covering water resources, and water storage and sewerage services. The Water Act is in place to ensure effective management and use of water resources. The meteorology policy will complement the Water Act by providing weather and climate advisories for management of the water catchment under the Water Act.

3.15 Kenya Airports Authority (KAA) ACT 1991 established a fund known as Kenya Airport Fund that includes monies from the air passenger service charges according to the Air Passenger Service Charge Act of 2014 revised in 2018, for air navigation services. Air Navigation Services defined in the KAA Act 1991 includes meteorological services provided for the safety of aircraft, and efficiency and regularity of flight.

3.16 Kenya Civil Aviation Authority (KCAA): The Civil Aviation Act (No. 21 of 2013) on the civil aviation (meteorological Services for air navigation) regulation 2018, states that the National Meteorological Service shall in accordance with the regulation provide aeronautical meteorological services for flight information region, international waters and other areas which lie outside the Kenyan territory.

- 3.17 Climate Change Act No.11 of 2016:** To review and determine mechanisms for climate change knowledge management and access to information while strengthening approaches to climate change research and development training and technology transfer, the role of the National Meteorological Services is critical in meeting this goal of the climate change Act.
- 3.18 Forestry Conservation and Management Act No 34 of 2016:** established Kenya Forest Services charged with management, regulation and protection of all forests in the country while the Kenya Forest Research Institute (KEFRI) carries out research on all forests and seedlings. Weather and climate information is crucial to the operation of forest activities.
- 3.19 Kenya Maritime Authority (KMA) Act of 2012** provides for the State Corporation to enforce safety of shipping, conduct investigation into maritime casualties (wreck), ensure collaboration with other public agencies (Kenya Ports Authority, Kenya Navy, Kenya Meteorological Department), the prevention of marine source pollution, protection of marine environment and response to marine environment incidences.
- 3.20 National Drought Management Authority (NDMA) Act (2016):** Drought coordination institutional framework ensure that action taken by all stakeholders in response to drought and climate change risks is timely, harmonized and effective. Meteorological services are key stakeholders in provision of advisories and early warning information for drought episodes, hence the meteorology policy will complement the ACT of NDMA.

4 GOALS, OBJECTIVES AND GUIDING PRINCIPLES

4.1 Overall goal

The overall goal of the meteorology policy is to guide the provision of efficient and effective weather and climate services for the safety of life, protection of property and safeguarding the natural environment.

4.2 Policy Objectives

The objectives of the policy are to:

- (a) Strengthen the legal and institutional framework for the management and exploitation of meteorological services;
- (b) Improve meteorological infrastructure systems for timely data observations data transmission and exchange; data management; data processing, analysis and forecasting; and product dissemination;
- (c) Set transparently managed financial mechanisms in support of delivery of meteorological services;
- (d) Engage, strengthen and build partnership with all stakeholders to facilitate the integration of weather and climate information in the decision-making processes and enhance utilization of meteorological services;
- (e) Strengthen and promote training, public awareness, research and development in the field of meteorology and related sciences;
- (f) Promote domestication, coordination and utilization of benefits from international conventions and protocols on meteorology.

4.3 Guiding Principles

- (a) **Right to information:** Every citizen in Kenya has a right to have easy access to weather and climate information and a duty to apply this information for social and economic benefits.
- (b) **Good Governance:** Rule of law, effective institutions, transparency and accountability, access to information and non-discrimination will be integrated in meteorological management.
- (c) **Public Participation:** A coordinated and participatory approach in the provision of meteorological services will be enhanced to foster participation of relevant government agencies, county governments, academia, private sector, civil society and communities in planning and implementation and ensure informed decision making is undertaken in the utilization of the services.
- (d) **International Cooperation:** International Standards and best practices will be domesticated and implemented cooperatively for effective, efficient and quality meteorological services.
- (e) **Subsidiarity:** The provision of meteorological services will be through national and decentralized authority and responsibilities to the grassroots level.
- (f) **Research, education and knowledge:** Key decisions on meteorological management shall be informed by climate science, founded on appropriate knowledge derived from

research, professionalism and based on international standards and recommended practices.

- (g) **Indigenous knowledge:** Indigenous knowledge related to the science of weather and climate will be harnessed and integrated with the scientific knowledge for improving service delivery.
- (h) **Commercial meteorological services:** Some meteorological services shall be provided in a commercial manner.
- (i) **Non-discrimination:** meteorological services shall be provided non-discriminatively in terms of gender, ethnicity, religion or race.

5 POLICY THEMES FOR METEOROLOGY

The infrastructure that is necessary for provision of early warning weather and climate services includes the following:

- a) Observation networks
- b) Telecommunications networks
- c) Data Processing, Analysis and Forecasting systems
- d) Database Management systems and archival
- e) Meteorological applications and dissemination systems:
 - i. Aeronautical Meteorological Services
 - ii. Marine Meteorological Services
 - iii. Land transport services
 - iv. Hydrometeorological Services
 - v. Agriculture and food security services
 - vi. Bio-meteorological services for Health
 - vii. Energy sector services
 - viii. Climate information services
 - ix. Disaster Risk Reduction services
 - x. Public Weather Service
 - xi. Wildlife, Sport, Recreation and Tourism
- f) Human Resource Capacity Development and Management
- g) Meteorological Education & Training, Research and Development
 - i. Education and Training
 - ii. Research and Development

The goal of this policy is to provide a framework for the provision of meteorological services for safety of life, protection of property and safeguarding the natural environment for socioeconomic development and posterity. This policy has been formulated to address several challenges in the areas mentioned above.

5.1 Observation networks

5.1.1 Meteorological observation encompasses weather and climate monitoring stations on land, weather buoys on oceans and inland water lakes, upper air observations using radiosondes and pilot balloons, meteorological radars and satellites and other devices that collect and transmit meteorological parameters.

5.1.2 The data, weather and climate patterns that these networks provide is invaluable for planning in the agriculture, food security, health, aviation, water resources and marine sectors of Kenya. There exist inadequacies in siting, installation, methods of observation, calibration and maintenance of instruments and equipment. There is therefore need to foster and strengthen collaborative management of observations and networks among all the actors involved.

- 5.1.3** Life depends on a healthy environment, but the interwoven systems of the atmosphere, oceans, watercourses, land and biosphere, which form the natural environment, are threatened by human activities. The National Meteorological Service (NMS) provides reliable scientific data and information on aerosols, greenhouse gases, selected reactive gases, ozone, ultraviolet radiation and precipitation chemistry (or atmospheric deposition).

Policy Statements

The Authority will:

- a) *Ensure adherence to the Guide to Meteorological Instruments and Methods of Observations (WMO No. 8) which is the authoritative reference for all matters related to instrumentation and methods of observation;*
- b) *Ensure increased investment in meteorological instruments and observations systems and a coordinated development network;*
- c) *Promote multi-sectorial collaboration in meteorological and environmental data observation.*

5.2 Telecommunications networks

- 5.2.1 Effective and reliable telecommunication networks for weather and climate for the exchange and facilitation of the flow of data in a timely and cost-effective manner ensuring that all Member States of the WMO have access to timely data and products in accordance with approved procedures to make real time forecasts.
- 5.2.3 The National Meteorological Services (NMSs) establish and operate telecommunication networks that together form the WMO Global Telecommunication System that facilitates rapid exchange of data and products to enable the NMSs worldwide meet their national, regional and international obligations.
- 5.2.4 The challenges facing transmission of Meteorological Telecommunication are coordination and information exchange.

Policy statements

The Authority will:

- a) *Build capacity for the National Meteorological Service provider to become a global meteorological and environmental information exchange centre;*
- b) *Ensure uninterrupted connectivity to public and dedicated communication networks at a capacity that is adequate and supports appropriate level of availability and capacity necessary to meet the requirements of meteorological telecommunications.*

5.3 Data Processing, Analysis and Forecasting

- 5.3.1 The observations and data gathered by NMSs are processed to generate products that can support decision making. The quality of the products is dependent on the adequacy of the processing facilities and human resources. All NMSs contribute to these products

through the sharing of observations which are the basis for generating the forecasts and warnings.

- 5.3.2 WMO has designated some NMSs as Regional Specialized Meteorological Centres (RSMC) which provide forecast products to all other NMSs within a geographical region. The NMSs utilize the RSMC products to develop forecasts and warnings of severe weather and extreme climate events for their respective countries to support socio-economic development activities.

Policy statements

The Authority will:

- a) Upgrade the severe weather modelling infrastructure for the RSMC;*
- b) Support provision of adequate facilities for the processing of data to produce products;*
- c) Support capacity building for generation of weather and climate products.*

5.4 Database Management and archival

- 5.4.1 Paper registers that hold meteorological data can easily be damaged by wear and tear, fire, water, dirt, and pests. It can also be misplaced, stolen or mutilated. Every effort is therefore made to minimise these risks through data rescue processes that involves repairing, reconstructing, making electronic copies of the paper registers and storing them in well-organized computerised climate documents management system, where they can easily be managed, protected, accessed and preserved for posterity.

- 5.4.2 In the wake of improved data collection infrastructure, the volume of data received at the NMS will increase exponentially. Data management and archival systems are necessary for storing and retrieving of *big data*. Thus, a climate data management system that facilitates effective archival, management, analysis, delivery and utilisation of a wide range of climate data would be critical for managing the big data.

- 5.4.3 To ensure data security and safety, the NMS established by this Policy will require a data recovery centre at a remote location.

Policy Statements

The Authority will:

- (a) Support development of a national meteorological data policy;*
- (b) Establish a national meteorological climate database management system;*
- (c) Facilitate data rescue in efforts to discover and recover climate data; and*
- (d) Establish a data recovery centre at a remote area.*

5.5 Meteorological Applications and Dissemination

Weather, climate and water impact on agriculture, livestock and fisheries, energy, transport, health, insurance, sports, tourism and most of the socio-economic sectors in any Country. The NMS promotes the application of meteorological, climatological, hydrological and

oceanographic information for all human activities. This Policy will address the following areas as listed in 5.0(e):

5.5.1 Aeronautical Meteorological Services

5.5.1.1 The NMS provides data, products and services that contribute to the safety of military and civil aviation sectors and the economic operation of the sectors both nationally and internationally. By increasing the efficiency of aviation operations, NMSs also contribute to a reduction in aircraft emissions and their resulting impacts on global climate change and stratospheric ozone.

5.5.1.2 According to the reference manual of WMO No. 958, the Aircraft Meteorological Data Relay (AMDAR) system utilizes the existing aircraft on-board sensors, computers and communication systems to collect, process, format and transmit meteorological data to ground stations via satellite or radio links.

5.5.1.3 The economic and social benefits that can be derived from air transport make it one of the world's most important industries. Air transport is a critical factor in the world trade and plays a major role in global development. Advances in air transport require that the delivery of services to the sector are improved with a view to promoting safety, regularity and efficiency of international air navigation. Such improvement requires competent staff and appropriate infrastructure.

5.5.1.4 The implementation of Quality Management Systems (QMS) for aeronautical meteorological services for international air navigation comprising procedures, processes and resources necessary to facilitate quality management of the meteorological information supplied to users is of paramount importance as is the demonstrating of competencies for aeronautical meteorological personnel as provided in ICAO Annex III.

5.5.1.5 According to ICAO Annex III, each Member State designates a Meteorological Authority to provide meteorological service for international air navigation on its behalf.

Policy Statements

The Authority will:

- (a) Support and maintain the aeronautical meteorological infrastructure at all airports in line with the WMO technical Document NO. 49 part II and ICAO Manual of Aeronautical meteorological practice (Document 8896);*
- (b) Develop guidelines to implement and provide support to Quality Management Systems for aviation;*
- (c) Ensure adherence to Quality Management Systems for the provision of meteorological services in air safety navigation;*
- (d) Designate the National Meteorological Service as the Meteorological authority as defined in ICAO Annex III;*

5.5.2 Marine Meteorological Services

5.5.2.1 The world's oceans – their temperature, chemistry, currents and life – drive global systems that make the earth habitable for humankind. Our rainwater, drinking water, weather, climate, coastlines, much of our food, medicines and even the oxygen in the air we breathe, are all provided and regulated by the oceans.

5.5.2.2 Marine conditions significantly influence the weather affecting, safety of life, economic development and management of important coastal resources. NMSs have a public responsibility to protect their populace from adverse weather and climate events over the oceans and inland water bodies.

5.5.2.3 The oceans also provide convenient transport routes for food, fuel, construction materials, chemicals and household items. Equipping of ships for weather observations and the support of drifting or fixed buoys observations can improve marine forecasts and warnings. Where tidal gauges have been installed, these and related meteorological observations should be provided to the NMSs. On the other hand, support to the marine transportation and offshore resource industries for oil, gas and energy may be funded through cost recovery or as a commercial service by the NMS. Past and present weather information is necessary to enable search and rescue operation, water sports, tourism, fishing activities and security operations.

5.5.2.4 Pollution in the oceans and lakes caused by oil spills, plastic waste and solid waste requires wind and under currents information. NMSs provide the relevant data as required to manage the pollution.

Policy Statements

The Authority will:

- a) Promote partnerships with stakeholders in the maritime transport sector.*
- b) Strengthen technological and infrastructure capacity for timely provision of marine weather information*
- c) Strengthen marine meteorological observations network, create marine meteorological research centre*

5.5.3 Land transport services

5.5.3.1 Meteorological information is crucial for early warning purposes to road and rail users and aims at reducing accidents and associated impacts, while assisting operators manage safety, planning economy of operations and regulations. Among the weather and climate challenges associated with surface transport is reduced visibility due to fog, smog, storms and dust-storms; infrastructure damage as a result of, flooding, slippery wet surfaces and strong winds.

5.5.3.2 Climate information is key in the design and planning of roads, railways and bridges although the uptake of weather information by the road and railway operators is still low in Kenya.

Policy Statements

The Authority will:

- (a) Promote partnerships between the NMS, road and railway stakeholders to ensure proper designing and efficient operation in the sector;*
- (b) Enhance monitoring of weather and issuance of early warnings for road and rail networks;*
- (c) Facilitate NMSs to install necessary weather sensors to monitor weather changes along highways and railways for early warning;*
- (d) Facilitate road transport authorities to mount appropriate signage for hazardous weather warning;*
- (e) Support research in surface transport operations in relation to weather and climate.*

5.5.4 Meteorological Services for Agriculture and Food Security

5.5.4.1 Timely and accurate forecasts of the onset, cessation, distribution and amount of seasonal rains are required to improve agricultural productivity. Seasonal rainfall forecasts and quantitative predictions are used to advise on the time to prepare land, cultivate, types of crops to plant, and transplant, application of fertilizer, including spraying against pesticides and harvest.

5.5.4.2 During rainy seasons, accurate short-term forecasts of rainy days and no-rainy days are required to assist farmers and other decision-makers to determine the appropriate times to apply pesticides and herbicides as well as other cultivation practices. The forecasts help prevent the application of chemicals or use of other practices at ineffective times. There are many benefits of this information, among them increased production, savings on chemical costs, reduction of pollution of ground water and streams, among others. Lack of awareness leads to limited intake of climate early warning services.

5.5.4.3 National Meteorological Services meet the needs of farmers, herders and fishermen to develop sustainable agricultural systems, improve agricultural production and quality, reduce losses and risks, increase efficiency in the use of water, conserve natural resources.

5.5.4.4 Climate information is used mainly for agricultural planning purposes, while recent weather data and weather forecasts are used mostly in current agricultural operations.

Policy Statements

The Authority will:

- (a) Strengthen NMS internal capability to provide relevant meteorological services to agriculture;*
- (b) Promote a better understanding by farmers and other end users in the agricultural sector of the value and use of meteorological information in planning and operational activities; and*
- (c) Promote partnerships in agriculture and food security.*

5.5.5 Hydro-meteorological Services

5.5.5.1 Communities and socio-economic sectors have varying degrees of vulnerability to extreme hydro-meteorological events such as floods, landslides and droughts which may cause injuries and deaths and damage to infrastructure negatively impacting economic growth. For sustainable economic development, management of resources and reduction of vulnerabilities to related disasters, reliable, accurate and timely hydro-meteorological information is essential. Forecasting plays a very important role in decision making when addressing mitigation, preparedness and response strategies and plans.

5.5.5.2 In view of the above, it is necessary to build capacity for generating timely, accurate and reliable hydro-meteorological information for high-impact weather and climate events, including early warning in order to contribute to the reduction of societal and economic vulnerabilities. Specialized hydro-meteorological information is required for decision making.

Policy statements

The Authority will:

- a) *Support capacity building for a national-integrated Multi-Hazard Early Warning System (MHEWS) for information and to support decision making in hydro-meteorological forecasting; and*
- b) *Strengthen partnerships with other institutions to ensure an effective hydro-meteorological monitoring, forecasting, prediction and hazards early warning system is in place for disaster risk reduction.*

5.5.6 Bio-meteorological Services

5.5.6.1 Temperature and precipitation trends influence the seasonality and distribution of infectious diseases. Extreme weather events threaten the lives, livelihoods and food security of vulnerable populations. Climate and hydrological cycles influence life-bearing food security as well as drinking water and sanitation. Air quality and atmospheric conditions determine human exposure to hazardous elements, including natural and anthropogenic air pollutants, ultraviolet (UV) and other forms of radiation.

5.5.6.2 The WHO/WMO Joint Office for Climate and Health, established mid-2014, provides WMO with new technical expertise in public health, and strengthens WMO collaboration with WHO and other health partners. It takes the lead in the implementation of health sector activities under the Global Framework for Climate Services (GFCS) to accelerate health sector access to and use of relevant climate, weather and environmental information for health risk management.

5.5.6.3 The services required for the good health, safety and well-being of the country's population can be significantly improved by enabling the NMS to develop early warning and response systems.

5.5.6.4 The essential components of bio-meteorological early warning systems are identification of weather events that adversely affect human health, monitoring of weather forecasts, mechanisms by which warnings are issued, and public health activities to reduce or prevent weather related illness and death.

Policy statement

The Authority will:

- (a) Support the NMS to develop bio-meteorological early warning systems, including air quality forecasting;*
- (b) Explore technological options for the design and delivery of appropriate bio-meteorological infrastructure, information and advisories to the public;*
- (c) promote research to establish relationship between weather and human health and derive climate thresholds that result in outbreaks*
- (d) Implement health sector activities under the Global Framework for Climate Services to accelerate health sector access to and use of relevant climate, weather and environmental information for health risk management.*

5.5.7 Energy sector

5.5.7.1 Energy systems are the engine of economic and social development. Energy is essential to practically all aspects of human welfare – access to water, agricultural productivity, health care, education, job creation and environmental sustainability. Energy investments represent a sizeable portion of Gross Domestic Product but, at the same time, energy sector emissions account for the largest share of anthropogenic greenhouse gas emissions.

5.5.7.2 Decarbonisation of the energy sector requires an accelerated uptake of weather/climate-dependent renewable energy generation, particularly for wind, solar, geothermal, biomass and biogas which are already increasing their market share of the renewable energy sector each year. Further integration of more renewable energy requires the use of weather and climate information for optimally balanced energy production and demand patterns. Specific climate services are being developed towards this goal. This includes a set of climate-based tools for assessing the adequacy of future energy distribution in line with the Paris Agreement and the Sustainable Development Goals.

5.5.7.3 A major challenge for managers of hydroelectric facilities is to match energy generation to seasonal and long-term water supplies, and often to competing water demands for human use and irrigation needs. During periods of drought, the demand for electricity has to be balanced against the need to conserve scarce water supplies. Long climatic records on the year-to-year variability and the duration and intensity of past drought events are essential to the design process and are crucially important in the effective operation of reservoirs. Utilization of weather and climate information as provided by the National Meteorological Service is key in the growth and development of the energy sector.

Policy statements

The Authority will:

- (a) Develop the necessary infrastructure for production of weather and climate information required by the energy sector;*
- (b) Promote investment in exploitation of the renewable energy sector;*
- (c) Promote partnerships between NMS and energy stakeholders in the use of weather and climate information for design, planning and management of the various energy resources;*
- (d) Build capacity for the sustainable generation of industry-specific weather and climate information for the energy sector.*

5.5.8 Climate information services

5.5.8.1 Climate information services helps individuals and organizations make climate smart decisions. Climate services equip decision makers in climate-sensitive sectors with better information to help society adapt to climate variability and change. The NMS contributes to the science of climate change in negotiations relevant to Kenya in the United Nations Framework Convention on Climate Change (UNFCCC).

5.5.8.2 Climate services involve systematic observation, monitoring and detection of climate change as a contribution to scientific basis in the understanding of the changing climate in order to build resilience of communities and the economy against the associated adverse impacts through adaptation and mitigation.

5.5.8.3 The NMS also monitors environmental pollution, greenhouse gases, and other atmospheric constituents including ozone and aerosols over the Kenyan atmosphere as a contribution on issues relevant to the Montreal Protocol and Vienna Convention on substances that deplete the ozone layer.

5.5.8.4 The NMS maintains the WMO Global Atmosphere Watch Station (GAWS) on Mt Kenya to systematically measure background (baseline) pollution in the tropical cross-equatorial airmasses and the associated chemical composition (climate variables, gases, aerosols, UV radiation) in an effort to monitor and detect climate change.

Policy statement

The Authority will:

- a. Employ climate information and knowledge for appropriate evidence-based decision-making;*
- b. Support development of a National Framework for Climate Services;*
- c. Facilitate access to climate data by different individuals and organizations; and*
- d) Support operation and maintenance of the WMO Global Atmosphere Watch Station on Mt. Kenya as a contribution to international effort in climate change monitoring, detection and attribution.*

5.5.9 Disaster Risk Reduction

5.5.8.1 Disaster risk reduction is achieved by concerted efforts between the various stakeholders, where the National Meteorological Service provides disaster early warning information. There is need for systematic efforts to analyse and manage the causal factors of disasters, through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and environment and improved preparedness for adverse events.

5.5.8.2 Enhancing the contributions of NMS to disaster risk reduction at all levels in a more coordinated, cost effective, systematic and sustainable manner

Policy Statements

The Authority will:

- a. Increase availability of and access to Multi-Hazard Early Warning Systems and information for disaster risk reduction*
- b. Promote partnerships and service delivery agreements between the NMS and different users of products and services.*
- c. Promote cooperation and collaboration with other national, regional and global specialized agencies in Disaster Risk Reduction issues.*

5.5.10 Public Weather Services

5.5.9.1 The core business of the NMS is to serve the public by providing reliable and timely weather, climate and related information to the community at large. These services have an essential role to play in bringing about disaster reduction through delivery of quality public weather services, including provision of weather forecasts, early warnings and hazardous weather, advocacy and outreach activities to enhance public awareness of weather hazards, interpretation and use of weather information, as well as collaboration with disaster relief agencies and organizations to minimize loss of life and property.

5.5.9.2 The NMS is designated as the national authority for weather and climate forecasting in Kenya, whereas several other players offering weather and climate information acquire weather data and information from unauthenticated sources, which they disseminate to end users. The quality of such information may not be up to the required standards.

5.5.9.3 The County Weather and Climate Information Centres operated by the NMS provides weather and climate information services to vulnerable communities in their local language to mitigate against severe weather events.

5.5.9.4 In recognition of the role of Indigenous Knowledge (IK) at the community level it is necessary for NMS to harness and integrate IK and the scientific knowledge with a view to improve service delivery.

Policy Statements

The Authority will:

- (a) Put in place a regulatory framework for the dissemination of weather and climate information and products;*
- b) Support the development and enhancement of dissemination structures to improve the uptake and usage of the weather and climate information and products;*
- (c) Promote partnerships with stakeholders in disseminating good quality weather and climate information;*
- d) Promote awareness and preparedness to help citizens make best use of forecasts and warnings;*
- e) Support integration of indigenous and scientific knowledge with a view to improve service delivery to user communities; and*
- f) Support operation and use of radio, television, and social media platforms to communicate hydro-meteorological information and services to user communities.*

5.6 Human Resource Capacity Development and Management

5.6.1 The advances in scientific knowledge and technology have led to more accurate forecasts and general improvement of the quality of meteorological services. This has enabled NMSs to respond appropriately to the increased demand for weather and climate information in the face of negative impacts of adverse weather and extreme climate events on various socio-economic sectors. Demand for sector specific weather information, as opposed to generalized weather forecasts, has underscored the need for specialized skills. Consequently, there is need for continuous human capacity development to not only to keep abreast with technological changes, but also to ensure that the users access accurate, relevant, timely and quality weather and climate information.

5.6.2 Building a critical mass of professionals in the National Meteorological Service is an investment that requires short- and long-term approach. The short-term training and targeted courses are important for development of knowledge, attitudes, skills and other competences as well as managerial development, while the long-term training in various thematic areas enhances specialisation.

Policy Statements

The Authority will:

- (a) Ensure staff undergo continuous professional development through training in line with the national and international standards;*
- b) Ensure that the Authority will have adequate staff equipped with necessary skills; knowledge and competencies;*

5.7 Meteorological Education & Training, Research and Development

5.7.1 Education and Training

5.7.1.1 Education and training is offered to assist National Meteorological Services in developing and delivering weather climate and water related services required for safety and wellbeing of the population and to become a partner in global collaborative efforts in the development of human resources.

5.7.1.2 In Kenya, education and training in Meteorological science is done at Universities and at the Institute for Meteorological Training and Research (IMTR). IMTR is a training institution within the Kenya Meteorological Department (KMD) and is designated as a component of the World Meteorological Organization (WMO) Regional Training Centre (RTC), for English-speaking countries in Africa.

5.7.1.3 There are twenty-eight (28) WMO-RTCs in the world, of which, eight are in Africa. The IMTR/WMO-RTC Nairobi has over the year's been ranked number one (1) in Africa and Number three (3) in the world. The Institute undertakes Education and Training in Meteorology, Climatology, Aeronautical Meteorology (Civil and Military), Agricultural Meteorology, Marine Meteorology and Physical Oceanography, Satellite Meteorology and GIS, Hydrometeorology, Climate Change, Instruments Maintenance and Calibrations, Meteorological Coding and Methods of Observations.

5.7.1.4 It is a constant challenge to increase the capacity of the WMO education and training community to meet initial education needs as well as the requirement for ongoing continuous professional development. As demand expands for weather, climate and water services to include disaster risk reduction in forecasting, the challenge gets even greater. The WMO Global Campus, which builds upon the existing network of WMO RTC's helps members to meet this need by making more opportunities available through increased cooperation and collaboration between the centers and affiliated training institutions.

5.7.1.5 Though its training programs have played a significant role in the development and strengthening of the National Meteorological Services (NMSs) both local, regional and International, IMTR lacks an institutional legal framework to train, examine and award certificates on WMO and ICAO standards and recommended practices in line with the requirements of Technical and Vocational Education Training Authority (TVETA), TVET-Curriculum Development Accreditation and Certification Council (CDACC) and Kenya National Qualification Authority (KNQA).

Policy Statements

The Authority will:

- (a) Enact a Bill to establish the Kenya Institute for Meteorological Training and Research*
- b) Ensure the National and International Curricula Standards are maintained in accordance with TVET-CDACC, WMO and ICAO requirements;*

- (c) Support modernization of the Institute's facilities in line with the current International Operating Standards, Practices and Procedures (WMO Manual No 1083);*
- d) Develop human resources through training, provision of educational material and awarding fellowships*
- e) Foster collaboration and cooperation between the Institute and other Training institutions in the field of Meteorology*

5.7.2 Research and Development

5.7.2.1 Research and development is a key area of the NMSs whose main objective is to understand the dynamics and processes of the earth – atmosphere – ocean systems in order to improve observations, predictions, service delivery of weather and climate information.

5.7.2.2 Research improves the quality and accuracy of weather, climate and environmental forecasting and prediction by facilitating analysis and prediction of variability and change in Earth systems which is critical to the needs of the United Nations Framework Convention on Climate Change (UNFCCC) and the Intergovernmental Panel on Climate Change (IPCC) Assessment Reports. The NMS is the IPCC focal point for coordinating scientific assessments on the state of knowledge on climate change and climate scenarios.

5.7.2.3 There is a need to strengthen structured systems for peer review, research ethics, and publications of research findings, open access to research reports and collaborative research with other specialised institutions for a deeper understanding of the earth atmosphere systems.

Policy statements

The Authority will:

- (a) Enact a Bill to establish a professional body to coordinate meteorological research and publication;*
- (b) Promote science for service operational research and development programs and projects that transfer knowledge and technologies for sustainable development;*
- (c) Foster collaborative research among relevant institutions;*
- (d) Support infrastructure development for research and application of research findings; and*
- (e) Support the patenting of NMS research findings and innovations.*

6 IMPLEMENTATION STRATEGIES AND ACTIONS

The implementation of a policy requires operationalization through an effective legal framework consisting of an Act of Parliament and through other relevant policies, which reflect and advance the principles contained in the policy. Existing legislation should also be reviewed to streamline them with the policy in addition to international agreements, conventions, and treaties to which Kenya is a party.

6.1 Legislative Framework

6.1.1 For a long time, meteorological services in Kenya have been provided without a legal framework for regulating meteorological services in the country. In this regard, there is an urgent need for a legislative framework that will enable the creation of a body corporate to operationalize this Policy.

Policy Statement

The Government will:

- (a) Enact a Meteorology Bill;*
- (b) Establish Kenya Meteorological Authority to implement this Policy.*
- (c) Establish the Kenya Institute for Meteorological Training and Research.*

6.2 Institutional Framework

6.2.1 The success of this policy is highly dependent on the strength of linkages and partnerships that the National Meteorological Service is able to forge both with existing institutions and related sectors able to support its mandate as well as funding mechanisms. To be effective, this policy must be clearly linked with the work of other government departments and agencies, technical partners, the private sector and relevant stakeholders and operate in concerted efforts with other global and regional frameworks.

6.2.2 Weather and climate patterns recognize no boundaries and no nation can be entirely self-sufficient in the production of all its meteorological and climate services. There is urgent need to work jointly and in synergy, to contribute effectively and efficiently to the development of countries by exploiting the full potential of meteorological and related sciences. NMSs therefore need to foster cooperation and build partnerships with other countries and international, regional or global organization to promote cooperation in the provision of meteorological services.

Policy statement

The Government will:

- a) Promote partnerships and collaboration of all partners/institutions in the meteorology sector; and*

b) *Identify appropriate structures to synchronize various sector policies that address weather and climate.*

6.3 Regional and International Obligations

6.3.1 Kenya has regional and international responsibilities designated by the World Meteorological Organization (WMO) and the International Civil Aviation Organization (ICAO).

These responsibilities are as follows:

- (a) The Director of Kenya Meteorological Department is Permanent Representative of Kenya with the World Meteorological Organisation and hence the only link between the government of Kenya and WMO on technical matters concerning meteorology;
- (b) Regional Telecommunication Hub (RTH) to facilitate the rapid regional exchange of meteorological data and products through the WMO Information System Data Collection and/or Production Centre (WIS/DCPC);
- (c) Regional Specialized Meteorological Centre (RSMC) to facilitate research in satellite meteorology, monsoonal flows and tropical cyclones prediction and tracking in the south-western part of the Indian Ocean;
- (d) Regional Instruments Calibration Centre (RIC) to maintain the standards of meteorological instruments in Africa through measurement, instrument inter-comparison and calibration;
- (e) Regional Training Centre (RTC), responsible for conducting meteorological education, training and skills development as well as carrying out research and development;
- (f) Regional Specialized Meteorological Centre for severe weather forecasting demonstration project for East Africa.
- (g) Monitoring of global atmospheric chemical composition and background air pollution related to the quality of air and climate change at the Global Atmosphere Watch (GAW) station on Mt. Kenya; and
- (h) ICAO Meteorological Watch Office at Jomo Kenyatta International Airport (JKIA) responsible for the Flight Information Region (FIR) to monitor meteorological hazards and issue SIGMET warnings on severe weather, volcanic eruptions and tropical cyclones for air navigation services to enhance safety of Kenyan airspace in line with Annex 3 of the Chicago Convention.

Policy statement

The Government will support the Kenya Meteorological Authority in fulfilling its Regional and International obligations

6.4 Affiliation

6.4.1. In fulfilment of Kenya's national, regional and international service obligations, Kenya is a signatory to a number of international conventions and treaties, under which it cooperates

with various organizations. In this regard, the NMS is obligated to make annual subscriptions to some of these organizations. These organizations are:

- (i) World Meteorological Organization (WMO);
- (ii) International Civil Aviation Organization (ICAO);
- (iii) African Centre of Meteorological Applications for Development (ACMAD);
- (iv) Kenya Meteorological Society (KMS);
- (v) African Ministerial Conference on Meteorology (AMCOMET);
- (vi) Intergovernmental Panel on Climate Change (IPCC);
- (vii) IGAD Climate Prediction and Application Centre (ICPAC).
- (viii) Regional Integrated Multi-Hazard Early Warning System (RIMES) for Africa and Asia;
- (ix) Aircraft Meteorological Data Relay (AMDAR)
- (x) Data Buoys Cooperation Programme
- (xi) West Indian Ocean Marine Sciences Association (WIOMSA)

Policy statement

The Government will ensure adequate budgetary allocation to the NMS to facilitate payments of annual subscriptions to national, regional and international institutions.

6.5 Financing of National Meteorological Services

6.5.1 Various options exist for funding the provision of meteorological services and for charging for the information provided. The basic infrastructure and general forecasts, warnings and alerts have public good properties of non-rival consumption and high costs of exclusion. These, therefore, require direct government funding that favours free provision at zero prices to all.

6.5.2 The sources of funding for the NMS shall be as spelt out in the Exchequer allocations for recurrent and development expenditure for public good services. Other sources of revenue for the NMS shall be through generation of revenue through specialized services, aeronautical meteorological services, maritime services, Service Level Agreements, royalties, licenses, fees, projects, donations and grants.

Policy statements

The Government will:

(a) Support the NMS through direct budgetary allocation from the Exchequer for public good services;

(b) Establish resource mobilization mechanisms and strategies to augment the NMS's funding for private good services.

6.6 Institutional Coordination

- 6.6.1 It is recognized that weather, climate, water and related environmental conditions have a significant influence on the socio-economic development of countries worldwide. This Policy recognizes the role of the two levels of government in the country.
- 6.6.2 The increase in world population, and extension of settlements and life supporting activities in areas vulnerable to the impacts of weather-, climate- and water-related disasters makes it necessary to improve the capacities of NMSs, especially in developing and least developed countries, to provide better services to reduce disaster risks, and support national development and life supporting activities. The increase in the frequency and intensity of natural hazards due to climate variability and climate change poses critical challenges to many countries.

Policy Statements

The Government will:

- (a) Put in place an enabling institutional framework for effective coordination of this Policy.*
- (b) Streamline and strengthen the capacity of the NMS to provide meteorological services at the National and the County levels in order to make them more effective and participatory.*

7 MONITORING AND EVALUATION

- 7.1 The National Meteorological Service will develop strategies for monitoring the implementation for this policy with the participation of local, regional and international stakeholders in the meteorology sector. It will also designate the roles and responsibilities of all parties and include a set of performance indicators and measures to assess progress towards the achievement of the set goals in this policy. In addition, the NMS shall develop a monitoring and evaluation framework to assess the impact of the policy on the set targets.
- 7.2. The National Meteorological Service shall develop an implementation plan with the participation of all partners and stakeholders in the field of weather and climate at both national and county levels. The implementation plan will designate the roles and responsibilities of all parties. The implementation plan will also include a set of performance indicators and measures to assess progress towards the effective coordination of all weather, climate and environmental observations, telecommunication, processing, data management, archival and dissemination.

8 REVIEW OF THE POLICY

- 8.1 Given the dynamic change in the science of meteorology, this Policy will require to be reviewed periodically to respond to changes in observation technology, data transmission, weather and climate forecasting techniques increased interest in the uptake of weather and climate information at local, regional and international level and to integrate best practices.