

Investing in weather and climate services for development

INTEGRATED AFRICAN STRATEGY ON METEOROLOGY (WEATHER AND CLIMATE SERVICES)



AMCOMET

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FOREWORD

More than ever the winds of change are blowing rapidly across our beloved continent. Our countries have never been more vulnerable than at present to the impacts of weather and climate, forcing us to continually adjust our national development programmes, often at huge costs. Virtually every country or sub-region is increasingly prone to floods, droughts and food shortages. Water for economic activity, drinking and livestock is increasingly becoming scarce. Dust storms are increasing in frequency with attendant health problems. There has been a resurgence of diseases in some countries and an increase in the geographic spread of epidemics like malaria and cholera. In addition, the rift valley fever which was eradicated over fifty years ago is now reoccurring. These changes are occurring against the backdrop of increasing populations. With agriculture being the mainstay of most of Africa's economy, of which over sixty percent of our citizens directly depend on for their day- to- day living; our farmers, who mainly rely on rainfall, are now confused about what and when to plant as climate change and variability impact upon the effectiveness of the traditional agricultural and crop-weather calendars. The climate is changing and the past is no longer a reliable indicator of the future. We are now witnessing population movement in search of better pastures. For eastern and southern Africa, the wildlife are searching for new migratory routes and even encroaching into already populated areas resulting in inevitable conflicts.

I have deliberately dealt with the situation on our continent to highlight the need for AMCOMET to take cognisance of the magnitude of the problems and challenges facing us and reaffirm, as political leaders entrusted with the responsibility for Meteorological and Hydrological services in our respective countries, the vital role we can play in helping address some of these issues. It is becoming increasingly clear that weather and climate services have a strategic role to play in our countries and region. It is incumbent upon us to change the way we view the role of our National Meteorological Services by empowering and capacitating them so that they are able to help us address our societal and developmental concerns. This African Strategy on Meteorology (Weather and Climate Services) is aimed at laying the foundation for what we need to do to allow our communities to further benefit from the investment our governments make in meteorology. It is clear that there are gaps to be filled. For example, the weather observation stations in most countries are not of the required density to inform research, policy solutions and decisions at the detail that we as policy-makers require. Weather forecasts and climate predictions can be improved to meet the increasing demand from almost every socio-economic sector, including the transport sector, not least the Aviation sector that needs our urgent attention. Whilst the Global Framework for Climate Services (GFCS) provides a new and unique opportunity to help us address implementation of our Strategy, we are called upon to provide decisive leadership to help guide our respective National Meteorological Services to make a meaningful contribution in meeting the needs of users, not least us ministers, as policy-makers. By 1 December 2013 we need to demonstrate that our aeronautical meteorological personnel also meet international standards. These challenges and opportunities can only be met by us all working in concert, using our existing sub-regional mechanisms, such as the Regional Economic Groupings, to work in partnership. AMCOMET presents a great opportunity for us to work together as a collective to address our own challenges, agree on strategies, and funding mechanisms. Charity begins at home, we are often told. Thus, the creation of our own funding mechanism such as a Trust Fund will not only show our commitment to the AMCOMET process but will also provide a beacon for our technical and development partners to join in and support our efforts.

I wish to thank the World Meteorological Organization, the African Union Commission, the other AMCOMET Bureau Members as well as the AMCOMET Task Force for the support and input leading to the drafting of the African Strategy for Meteorology (Weather and Climate Services). I would like to dedicate this Strategy to the late founding Chair of AMCOMET, Honourable John N Michuki, MP, EGH, the illustrious and ambitious son of Kenya who tragically passed on 21 February 2012. I am sure where ever he is; he is resting in eternal peace and smiling at us as we forge ahead with the development of our National Meteorological Services. I would like to express my profound gratitude to all my colleagues for demonstrating your willingness to ensure that AMCOMET succeeds. I look forward to your suggestions on the way forward.

To quote a famous WMO scientist, "alone we can go fast, but together we can go far".



Hon. Minister N.T. Goche (MP)
Minister of Transport, Communications and Infrastructural Development of Zimbabwe and
Chair of AMCOMET

PREFACE

The African continent is witnessing increased weather and climate variability, and climate change. Natural disasters related to weather and climate have become all too frequent and more extreme in intensity. The continent is regularly experiencing alternation of floods and drought, high incidents of lightning and strong winds, sand or dust storms increasing desertification, scarcity of fresh water, changes in the weather patterns and disruption to agricultural production. These disasters are hindering economic development and threatening Africa's efforts to attain the Millennium Development Goals (MDGs).

The African Ministerial Conference on Meteorology (AMCOMET), was established as a high-level mechanism for the development of meteorology and its applications in Africa. Ministers in charge of meteorology unanimously committed to strengthen and sustain National Meteorological and Hydrological Services (NMHS) by providing them with the necessary resources and adequate institutional frameworks to enable them to fully perform their roles as a fundamental component of national development infrastructures. As a key joint initiative of the African Union and the World Meteorological Organisation (WMO), AMCOMET leads the planning and response efforts, through *the Integrated African Strategy on Meteorology (Weather and Climate Services)* (the Integrated African Strategy), to ensure that National Meteorological and Hydrological Services in Africa can better address climate variability and change. This will greatly contribute to security and sustainable development, particularly poverty reduction efforts, climate change adaptation, and disaster risk reduction. These contributions will be critical in light of the environmental, social and economic dimensions that will be addressed by the Sustainable Development Goals, building upon the MDGs and converging with the post 2015 development agenda.

As weather and climate patterns and behaviour do not recognise political boundaries, enhanced cooperation among African countries, is required to effectively meet government and societal needs through weather and climate information and services. The Integrated African Strategy, through its Strategic Pillars, underscores the necessity of increased political support and recognition of National Meteorological and Hydrological Services, the urgent need for enhanced weather and climate service delivery, the improved access to meteorological services for the aviation sector, the increased support for the provision of weather and climate services for climate change adaptation and mitigation, and the strengthening of partnerships with relevant institutions and funding mechanisms. Furthermore, it will provide a key support to the implementation of the Global Framework for Climate Services (GFCS) in Africa, including its priority areas, namely, agriculture and food security, health, water resources and disaster risk reduction.

The successful implementation of the Integrated African Strategy on Meteorology (Weather and Climate Services) will enhance the delivery of key sustainable development programmes in Africa. To this end, resources are required both through government funding and complementary support from development partners. The World Meteorological Organisation remains committed in supporting the AMCOMET process and its initiatives.



(M. Jarraud)
Secretary-General
World Meteorological Organization

LIST OF ACRONYMS

ACMAD	African Centre of Meteorological Applications for Development
AGRHYMET	Centre Regional de Formation et d'Application en Agrométéorologie et Hydrologie Opérationnelle
AMESD	African Environment for Sustainable Development
ASECNA	Agency for the Safety of Aerial Navigation in Africa
AUC	African Union Commission
CEMAC	Economic and Monetary Community of Central Africa
CLIMDev	Consultative Group to Review the Climate for Development Africa
COMESA	Common Market for Eastern and Southern Africa
EAC	East African Community
ECOWAS	Economic Community of West African States
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
GFCS	Global Framework for Climate Services
IATA	International Air Transport Association
ICAO	International Civil Aviation Organization
ICPAC	IGAD Climate Prediction and Applications Centre
ICT	Information and Communication Technology
IGAD	Intergovernmental Authority on Development
IPCC	Intergovernmental Panel on Climate Change
LDCs	Least Developed Countries
MASA	Meteorological Association of Southern Africa
MDGs	Millennium Development Goals
NEPAD	New Partnership for Africa's Development
NGOs	Non Governmental Organizations
NMHSs	National Meteorological and Hydrological Services
NMSs	National Meteorological Services
PR(s)	Permanent Representative(s)
RECs	Regional Economic Communities
RTCS	WMO Regional Training Centres
SADC-CSC	Southern African Development Community-Climate Services Centre
SWOT	Strengths, Weaknesses, Opportunities and Threats
UMA	Union du Maghreb Arabe
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNISDR	United Nations Strategy on Disaster Reduction
UNCCD	United Nations Convention to Combat Desertification
WIS	WMO Information Systems
WIGOS	WMO Integrated Global Observing Systems
WMO	World Meteorological Organization

TABLE OF CONTENTS

FOREWORD	1
PREFACE	2
LIST OF ACRONYMS	3
TABLE OF CONTENTS	4
INTRODUCTION	5
THE CONTEXT	6
SWOT ANALYSIS OF WEATHER AND CLIMATE SERVICES DELIVERY	9
STAKEHOLDER ANALYSIS	10
PURPOSE AND OBJECTIVE OF THE STRATEGY	10
INTENDED STRATEGY OUTCOMES	11
STRATEGIC PILLARS	11
SP1: Increase Political Support and Recognition of NMHSs and related WMO Regional Climate Centres	11
SP2: Enhance the Production and Delivery of Weather and Climate Services for Sustainable Development	12
SP3: Improve Access to Meteorological Services in particular for the Marine and Aviation Sectors.....	13
SP4: Support the Provision of Weather and Climate Services for Climate Change Adaptation and Mitigation	13
SP5: Strengthen Partnerships with Relevant Institutions and Funding Mechanisms	14
IMPLEMENTATION, RISKS AND ASSUMPTIONS	15
INSTITUTIONAL ARRANGEMENTS	15
RESOURCE MOBILIZATION.....	16
MONITORING, EVALUATION AND REPORTING	16
ANNEX 1: NAIROBI MINISTERIAL DECLARATION	17
ANNEX 2: MAJOR STAKEHOLDERS.....	20
ANNEX 3: MAJOR WEATHER AND CLIMATE RELATED HAZARDS IN AFRICA AND THEIR IMPACTS ON THE DEVELOPMENT OF THE CONTINENT	22
ANNEX 4: IMPACTS OF WEATHER AND CLIMATE ON VULNERABLE SECTORS.....	25
ANNEX 5: ROLE OF METEOROLOGICAL SERVICES AT THE NATIONAL, REGIONAL AND GLOBAL LEVELS.....	28
ANNEX 6: ADDIS ABABA DECLARATION.....	30
ANNEX 7: REFERENCES.....	37

INTRODUCTION

In April 2010, the Nairobi Ministerial Declaration (attached as Annex 1) from the First Conference of Ministers Responsible for Meteorology in Africa established the African Ministerial Conference on Meteorology (AMCOMET) as a high level mechanism for the development of meteorology and its applications in Africa. African Ministers recognized that weather and climate are central to the socio-economic development of any country, and as such deserve strong support at the highest possible level of government. Ministers further recognize that sound governance of the science of meteorology and its related applications must be streamlined in national development agendas to promote cooperation, security, socio-economic development and poverty eradication on a pan-African level. By establishing AMCOMET, the Ministers committed themselves to¹:

- Strengthen and sustain National Meteorological Services by providing them with the resources and appropriate institutional frameworks to enable them to execute their functions, particularly in observations, forecasting and applications;
- Recognise the role of meteorological services as a fundamental component of the national development infrastructure and ensure that meteorological information is a permanent parameter and feature in national current and future plans, programmes and policies in the key sectors of the country's economy;
- Regard national meteorological services as strategic national assets which contribute to national security, principal of which are transport, food, water, energy and health in addition to being vital to sustainable development particularly poverty reduction efforts, climate change mitigation and adaptation and disaster risk reduction; and
- Ensure that all sub regions of the continent are active and are adequately resourced.

Furthermore, they agreed to develop an African Strategy on Meteorology (Weather and Climate Services). This Strategy was developed in partnership with the World Meteorological Organization (WMO), which was engaged in the preparation of the Strategy through consultations with the African Union Commission (AUC), Regional Economic Communities (RECs), Member States, Regional Climate Centres, and other relevant stakeholders. Several consultations, iterations and inputs from relevant WMO scientific and technological departments led to a draft strategy which was discussed and finalised by the Expert Segment of the Second Session of AMCOMET held in October 2012 in Victoria Falls, Zimbabwe.

Building on a Strengths-Weaknesses-Opportunities-Threat (SWOT) and stakeholder analysis, this Strategy focuses on five (5) interrelated strategic pillars:

- Increase Political Support and Recognition of NMHSs and related WMO Regional Climate Centres;
- Enhance the Production and Delivery of Weather and Climate Services for Sustainable Development;
- Improve Access to Meteorological Services in particular for the Marine and Aviation Sectors;
- Support the Provision of Weather and Climate Services for Climate Change Adaptation and Mitigation;
- Strengthen Partnerships with Relevant Institutions and Funding Mechanisms.

Priority areas of action of the strategic pillars are identified with a view to promoting the production and incorporation of science based weather and climate information and services into Africa development policy, planning and programmes. For purposes of commitment and deliverables, the Strategy has a time window of 2013 – 2017. It is envisaged that the implementation plan will be approved by the Third Session of AMCOMET in 2014, and be immediately operational. In the same vein, resource mobilisation should commence immediately.

¹ See Annex 1 for the Nairobi Ministerial Declaration

THE CONTEXT

Africa is most vulnerable to climate variability and change. Out of its 54 countries, 34 are categorised by the United Nations as Least Developed Countries (LDCs) which constitutes two-thirds of all LDCs in the world. Drought, desertification, floods, pests and Tropical Cyclones further increase the level of vulnerability of the region to weather, climate and hydrological hazards. The political disturbances and attendant civil strife in some of the countries further worsen the socio - economic development and slow the fight against poverty. The resulting effect is the slow development of many African countries and a negative implication in their achievement of the Millennium Development Goals.

There is an increasing need for the delivery of sector specific weather, climate and water services to ensure food security, improved water resource management, disaster risk reduction and better health. To enable the provision of these services, the density of the observation network in Africa must be improved as through capacity building efforts and technology transfer. Despite covering a fifth of the world's total land area, Africa has the least developed land-based observation network of all continents, and one that is in a deteriorating state, amounting to only 1/8 of the minimum density required by the World Meteorological Organization (WMO). Most services have a stagnant pool of human and financial resources, and obsolete technologies limiting their capabilities to produce the best services needed by policy makers and other decision-makers.

Accurate and timely weather forecasts and climate analyses and predictions will further improve human safety, prosperity and livelihood and preserve precious natural resources to the benefit of communities, especially the most vulnerable. This is the rationale behind the Global Framework for Climate Services (GFCS), developed by the WMO in conjunction with the broader United Nations system and other relevant partners.

It is also the rationale for the creation of AMCOMET, which aims to provide political leadership, policy direction and advocacy in the provision of weather, water and climate information and services that meet societal and sector specific needs, including agriculture, health, water resource management and disaster risk reduction to name a few. Its key objectives are to help promote security, socio-economic development and poverty eradication on a pan-African level through sound governance of the science of meteorology and its related applications.

Below is an overview of the challenges experienced which provides a rationale for the provision of accurate and timely weather and climate services:

- **Food security:** Many African economies rely on subsistence agriculture and fishing as a means of livelihood. Subsistence farmers and fishers are very vulnerable to external shocks, including natural hazards such as severe weather events and the impacts of climate change. Their thin margin for error can mean one event plunges them into catastrophic losses. People living at a subsistence level are easily trapped in poverty because they cannot recover from such shocks as readily as those with greater economic resources. Sound information on storms, extreme rainfall, floods and drought events can help reduce these impacts.
- **Health:** Most infectious diseases have seasonal cycles that include spatial and temporal changes in prevalence and the seasonality of the diseases is driven by changes in rainfall, temperature and humidity. The protection of public health from an increasingly variable and changing climate is a priority for the health sector. Partnering with the meteorological community to ensure that weather and climate information is available and appropriate for health decisions is a key step in the process to managing climate risks.
- **Water Resource Management:** Weather and climate forecasts and warnings are an essential ingredient for water resource management. The water sector is strongly influenced by, and sensitive to, changes in climate (including periods of prolonged climate variability). About 25% of the contemporary African population experiences high water stress while 69% of the population lives under conditions of relative water abundance. The impacts of climate change are expected to have severe consequences for the availability of water in Africa. A 3°C temperature increase could lead to 0.4 – 1.8 billion more people at the risk of water stress.
- **Coastal Environment:** The increase in water temperature has detrimental effects on the physiology of marine organisms and promotes the establishment of thermophilic species. These effects are especially noticeable on the breeding habits of certain species. Low-lying cities located on lagoons, estuaries, deltas or large river mouths, such as Alexandria, Cotonou, Dar es Salaam, Lagos, Maputo, Mombasa and parts of Cape Town, are particularly vulnerable to extreme weather events caused by climate change. They are likely to experience storm surges, sea-level rises, increased flooding, (semi-) permanent

inundation, coastal erosion, landslides, and the increase of water-borne diseases, which may all have devastating effects on human settlements. African cities will also experience more severe and frequent flooding and these flooded areas and ditches, latrines and septic tanks are key reservoirs that perpetuate cholera, malaria, dengue and yellow fever in urban areas.

- **Land Management and Biodiversity:** Many countries in Africa face major problems of land degradation, deforestation and bio-diversity, some as a result of climate variability and increasing human pressure on marginal lands. Application of weather and climate data, including emerging climate change scenarios is fundamental in the development of sustainable land and bio-diversity policies.
- **Urbanization:** Rapid rates of urbanization in Africa are associated with problems of poverty, inadequate water supply, increased vulnerability to diseases and natural disasters, as well as environmental degradation.
- **Disaster Risk Reduction:** Globally, ninety per cent of disasters are caused by weather-, climate- and water-related hazards such as cyclones, storm surges, extreme temperatures, landslides and wildfires. Between 1980 and 2010, some 9 600 disasters took the lives of over 2.5 million people and produced economic losses of US\$1.3 trillion². The financial cost of disasters caused by natural hazards, when calculated as a percentage of GDP, is 20 per cent higher in poorer than in richer countries³.
- **Vulnerability and resilience:** Africa is one of the most environmentally fragile regions on the planet, prone to natural disasters and the effects of climate change. There is an intrinsic relationship between poverty and the vulnerability of communities to natural disasters and climate variability. Timely information on extreme weather events (through early warning systems and climate outlooks) can support resilience through reducing loss of life and property.
- **Climate Change:** Climate variability, climate change and future sea level rise can have significant impacts in terms of food and fresh water security, human health and investment in infrastructure. As the region is very much affected by extreme events, there is a strong need for climate data / information, which raises the expectation that NMHSs will provide the required climate services, particularly to policy makers to enable them to take appropriate action.
- **Economic development and trade:** Key economic sectors such as agriculture, forestry, fishing, water resources, energy, transportation and tourism depend on reliable weather forecasts and climate services to manage their activities effectively. They are also highly vulnerable to natural hazards and the impacts of climate change. High quality and reliable weather information and forecasts, and seasonal to annual climate prediction are crucial for these sectors, in particular for aviation.

At the pan-African level, institutions exist that can support the objectives of AMCOMET. Regional Economic Communities (RECs)⁴ are the building blocks of the African Union Commission (AUC) and facilitate the sub-regional development and implementation of AUC supported programmes and mechanisms. As AMCOMET brings political support, it is critical to establish cooperation with the RECs, and to ensure that they are part of the AMCOMET process to harmonise the development of meteorology through regional approaches and minimise duplication of efforts among NMHSs. It is also necessary to imbed the Integrated African Strategy on Meteorology (Weather and Climate Services) within RECs operations to help promote inter-regional cooperation for socio-economic development within the context of climate and weather.

The investment and financial flows needed to support the delivery of weather and climate services to address the challenges of climate change in Africa are substantial. It is acknowledge that the African Development Bank, as the premier financial institution, will play great role in providing necessary financial support for the implementation of the Integrated African Strategy on Meteorology. As far as resource mobilization is concerned, there is a need to further consult and approach the Bank in order to tap into the existing funding mechanisms within the Bank.

² http://www.wmo.int/pages/publications/showcase/documents/1080_en.pdf

³ http://www.wmo.int/pages/publications/showcase/documents/1080_en.pdf

⁴ Arab Maghreb Union (UMA), Common Market for Eastern and Southern Africa (COMESA), Community of Sahel- Saharan States (CEN-SAD), East African Community (EAC), Economic Community of Central African States (ECCAS), Economic Community of West African States (ECOWAS), Intergovernmental Authority on Development (IGAD), Southern Africa Development Community (SADC), Comité permanent Inter-Etats de Lutte contre la Sécheresse dans le Sahel (CILSS), Commission de la Communauté Economique et Monétaire de l'Afrique Centrale (CEMAC), Indian Ocean Commission (IOC)

Other established institutions are the Regional and Sub-Regional Climate Centres⁵ which help NMHSs deliver better climate services, strengthen their capacity to meet local climate information needs, and improve their capability to deliver such services to their end-users, without replacing or duplicating the national mandate and authority of NMHSs.

⁵ African Centre of Meteorological Application for Development (ACMAD), AGRHYMET Regional Centre, IGAD Climate Prediction and Applications Centre (ICPAC) and Southern African Development Community Climate Services Centre (SADC- CSC)

SWOT ANALYSIS OF WEATHER AND CLIMATE SERVICES DELIVERY

The Strengths, Weaknesses, Opportunities and Threats of weather and climate services delivery by the National Meteorological Services of Africa are presented in Table 1 below:

Table 1: SWOT Analysis

<p><u>Strengths</u></p> <ul style="list-style-type: none"> - NMHSs are sole designated national authorities and chief advisers to governments on matters relating to meteorology, climatology and water resources; - NMHSs own and operate the basic observing systems according to international standards, which when exchanged, yield the information required for global, regional and national understanding of weather, water and climate phenomenon; - Availability of global, regional and sub-regional centres to help enhance product quality, human capital and infrastructural development; - Meteorology and hydrology play a key role in the national security (food security, water resources, energy) of a country; - Meteorological and hydrological information are essential part of National Plan; - Climate information at various time scales is required for adaptation. 	<p><u>Weaknesses</u></p> <ul style="list-style-type: none"> - Low funding of NMHSs from government and the development partners for development and maintenance of infrastructure, observing systems, forecasting tools, staff competencies, and service delivery mechanisms; - Low capacity of NMHSs to undertake the continuous modernization resulting from rapid advances in the science and technology; - Lack of a defined framework for mainstreaming meteorology in national development; - Limited recognition of the socio-economic value of NMHSs and their services; - Lack of effective mechanisms for collaboration between public and private sectors and across scientific disciplines and technical domains; - Lack of legal frameworks for establishment of NMHSs in many Member countries; - Lack of communication skills - 34 LDC's are in Africa and have the least capacity to deliver services.
<p><u>Opportunities</u></p> <ul style="list-style-type: none"> - Increasing relevance in the political and socio-economic development of the region (Millennium Development Goals, NEPAD, etc.); - Growing awareness of the public and the decision makers on the value added of and growing demand for weather and climate services; - Existence of development partners and funding agencies as a potential source of resources; - Climate change is a high level political and developmental issue at national, regional and international levels; - Existence of regional and sub-regional institutions to strengthen partnerships and coordination; - Emergence / existence of south-south cooperation and partnerships. 	<p><u>Threats</u></p> <ul style="list-style-type: none"> - Continued lack of visibility and inadequate financial support from governments; - Emergence of alternative sources that issue climate and weather information not built on international scientific consensus and the without contributions to the national observations infrastructure; - Globalization of weather issues through international media and research institutions without proper attention to national or local requirements; - Brain drain and high staff turn-over; - Political instability in some countries.

STAKEHOLDER ANALYSIS

The stakeholder analysis identifies the key partners that are directly or indirectly essential in the implementation of concrete activities of the Integrated African Strategy on Meteorology (Weather and Climate Services). Those partners also have important roles to play at the level of formulation of appropriate policies that are relevant to the goals and aspirations of Members. Partners are also critical at the level of facilitating the delivery of weather-, climate-, and water-related products and services. These partners include Regional bodies, Sub-Regional Economic Communities, research, training and policy related institutions, non-governmental organizations, academia, media and communications, parliamentarians and United Nations agencies operating in the Region. Development partners are also important given that resource mobilisation for implementing the Strategy remains a key requirement in the implementation plan.

The key issues to be dealt with, by and large, revolve around the following building blocks:

- Cooperation with national and international stakeholders to enable adequate delivery of weather, climate and water related information and services;
- Development of human and institutional resources in NMHSs;
- Engagement of relevant stakeholders especially policymakers, in the development of the multifarious infrastructure necessary for achieving the goals set forth in the Strategy, and
- The issues surrounding risk management, early warning, climate change and climate variability with greater emphasis on investing in the meteorological and climatological infrastructure, as well as products and services.

In order for weather and climate services in Africa to be effective and developed, there are important and critical players that must work together. Annex 2 illustrates, among others, the main stakeholders at national, regional and international levels and their relevance to the Strategy.

PURPOSE AND OBJECTIVE OF THE STRATEGY

The overall purpose of the strategy is to correctly position weather and climate services as an essential component in national and regional development framework and sustainable development in Africa, particularly in poverty reduction efforts, climate change adaptation and disaster risk reduction.

The objective of the Strategy is to enhance cooperation between African countries and to strengthen the capabilities of their National Meteorological Services.

The Strategy further aims to serve as a framework for integrated and coordinated mechanisms, which provides strategic direction to Member States and other stakeholders in streamlining policies that address challenges and opportunities associated with the development of adequate weather and climate services at the national and regional levels.

Guiding Principles of the Strategy

The Strategy should:

- › Be collectively owned by Africa;
- › Be programme-oriented as per identified regional and continental priorities;
- › Be focused on actionable policies with measurable outcomes and positive impacts on national economies as well as addresses societal and sectoral needs and challenges at regional, national and community levels; and
- › Concentrate on benefiting Africa while contributing to global efforts.

INTENDED STRATEGY OUTCOMES

The expected outcomes of the Strategy are as follows:

- › **Increased recognition of NMHSs role at political level.** It is vital for Africa's governments and policy makers to take on board the contribution of NMHSs to socio-economic planning and development, integrate them in national development programmes and accord the necessary financial support; In so doing, all weather dependent organisations, institutions and individuals have appropriate range and level of meteorological services as per their requirements;
- › **Improved climate risk management for the protection of life and property.** Increased and timely availability of meteorological information, warnings and forecasts leads to reduced loss of life, safer infrastructure and reduced vulnerability of society;
- › **Increased safety on land, on water and in the air.** Improved use of sector-specific meteorological products and services such as forecasts for road and rail transportation, lake navigation, ocean cruising and aviation industry to reduce associated risks;
- › **Enhanced quality of life.** Communities and institutions are better informed and educated on the societal values of meteorological information leading to sustained socio-economic growth, including reduced health problems, improved food security, reduced disaster and climate risk, and better quality of life;
- › **Enhanced cooperation among African countries** to strengthen NMHSs and address trans-boundary weather and climate impacts and contribute to regional and global initiatives, networks and climate change scenarios.

STRATEGIC PILLARS

The Strategy is a collective endeavour designed to address challenges and problems faced by Africa as identified by regional and continental organs and stakeholders. It focuses on five (5) Strategic Pillars (SP) that highlight feasible and actionable policies with measurable outcomes and positive impacts on national development and economy. The Strategic Pillars, their rationale and main areas of emphasis are as follows:

SP1: Increase Political Support and Recognition of NMHSs and related WMO Regional Climate Centres

In many African countries, the Ministers responsible for meteorology have a virtually hands-off approach to and have little interaction with their NMSs. This is one of the main reasons for the low level of visibility and funding of NMSs.

This pillar aims to increase the recognition of the role of National Meteorological and Hydrological Services (NMHS) within the political decision-making arena through the integration of meteorological services' contribution to various economic sectors and in national development programmes. It further aims to increase the active participation of relevant inter-governmental officials and other stakeholders in establishing adequate weather and climate services, both at the national and regional levels, aligned with policies that address development challenges and opportunities.

Below are the areas of action:

- Formulate policies and provide the necessary legislation to ensure that National Meteorological Services become more semi-autonomous and are adequately financed to fulfil their mandates and able to embark on, and benefit from, cost recovery beginning with aeronautical and where applicable, maritime services;
- Ensure that NMHSs develop strategic plans and service charters aligned with their governments' development agenda and priorities;
- Facilitate regular meetings with policy makers to inform them of NMHS activities and plans as well as demonstrate the relevance of their services to socio-economic development;
- Facilitate close cooperation from Regional Economic Communities (RECs) and other relevant African institutions to support the production and delivery of weather and climate services;
- Organise study tours of African countries with advanced NMHSs, beginning with AMCOMET Bureau and

Task Force members.

SP2: Enhance the Production and Delivery of Weather and Climate Services for Sustainable Development

Acknowledging that NMHSs are the main providers of weather and climate services in Africa, this pillar aims to improve the effectiveness and efficiency of the production and delivery of such services enabling appropriate responses to the changing needs of government, society and sectoral users through suitable structures and working mechanisms.

One of the fundamental elements to achieving this is to fill the weather and information observation gap as well as to facilitate data exchange and products among relevant institutions. Furthermore, there is an urgent need to strengthen NMHS scientific and technological capacities to improve the delivery of tailored products and services to communities, with a view to enhancing agricultural production, minimising the spread of climate-sensitive diseases, improving water resources management and improving disaster response, among others.

It has already been stated that African Nations have, on average, eight times fewer land-based weather stations than the minimum number recommended by the WMO, yet the continent is highly vulnerable to natural disasters and weather extremes such as floods, droughts, tropical cyclones and forest fires. The stations are so far apart that their data cannot be extrapolated to the local level as there are varying terrain and altitudes. In addition, there has to be continuous monitoring and appropriate forecasting of these events. Presently, Africa is utilising numerical weather prediction and satellite derived products provided from outside the continent with limited involvement in the design of these products. The continent should not only be a consumer of these products, but also an owner and an operator.

Below are the areas of action:

- Invest more in weather and climate monitoring infrastructure (observation networks), such as automatic weather stations, meteorological radars, and rain and water gauges;
- Collectively engage manufacturers of meteorological equipment, accessories and consumables for the lowering of costs, rendering the equipment more affordable in an effort to improve station density and sustainability;
- Enhance telecommunications systems, within and among the countries; including through the regional WMO Information Systems (WIS);
- Enable human capacity development necessary for Climate Research, Modelling and Prediction;
- Improve Service Delivery Mechanisms, particularly early warning and awareness systems, Climate Services Information Systems (CSIS) and Climate User Interface Programme (CUIP);
- Ensure that funding needed is provided to sustain and develop NMHSs and sub-regional climate centres through appropriate national and regional mechanisms, including their possible transition into semi-autonomous entities, where and when appropriate;
- Ensure that all sub-regions of Africa are equitably considered, including the establishment of a sub-regional climate monitoring institution for sustainable development in Central Africa;
- Improve channels of communication to enable prompt and informed decision making, taking into consideration the highly perishable nature of most weather products such as forecasts, warnings and advisories;
- Create national and regional fora that facilitate and encourage continuous interaction among meteorological experts, national meteorological advisers, sectoral stakeholders and government policy makers at the appropriate governmental levels;
- Engage with international partners on the design of numerical weather prediction and satellite derived products to better address African requirements;
- Ensure that the African meteorological weather requirements on satellite derived products are channelled through the regional WMO Integrated Global Observing System (WIGOS) and the WMO Space programme, in addition to the Communication Satellite (RASCOM) which is; and
- Explore the feasibility of launching an African Meteorology Space Programme taking note, and advantage, of the progress already being made by some African countries on this aspect as well as the already existing telecommunications satellite (RASCOM).

SP3: Improve Access to Meteorological Services in particular for the Marine and Aviation Sectors

The International Civil Aviation Organisation (ICAO) requires that meteorological authorities should supply operators, flight crew members, air traffic service units, search and rescue service units, airport management and related aviation stakeholders with meteorological information that meets the needs of international air navigation. The latest is the deadline for meteorological services to be certified by November 2012 leading to ISO-9000 certification. In addition, competences of personnel for these services should meet international standards by 2016. The equipment should also have calibration certificates and readings be regularly verified. AMCOMET is urgently required to facilitate the availing of national funds to ensure that the countries meet these deadlines and comply with ICAO requirements.

National Meteorological and Hydrological Services should further provide meteorological forecasts and warnings which are critical for safety of life and property at sea, integrated coastal management and societal impacts.

Below are the areas of action:

- Develop Quality Management Framework leading to ISO certification for certain sectors like aviation.
- Support the certification of NMHSs by November 2012, or soon after, leading to ISO-9000 certification;
- Ensure that competencies of relevant personnel meet international standards by 2013 and qualifications for the 2016 deadline;
- Ensure relevant equipment have calibration certificates and regularly verified readings for continuous compliance; and
- Facilitate to the extent possible, the availing of funds to ensure that the countries meet these deadlines and comply with ICAO requirements;
- Facilitate the deployment of buoys, where necessary, particularly in the Indian Ocean; and
- Facilitate the sustained provision of global and regional coverage of observational data, products and services to address the continued and expanding requirements of the maritime user community for met-ocean information and services.

SP4: Support the Provision of Weather and Climate Services for Climate Change Adaptation and Mitigation

Africa is one of the most vulnerable regions of the world to the impacts of climate change. The majority of the continent's disasters are meteorological and hydrological related. These disasters pose a serious threat to the continent's ability to attain the Millennium Development Goals and sustainable development. While impacts vary across the continent, it is generally agreed that the climate is becoming more extreme; and as such, the overall future of the African continent is bleak unless adequate preparations are made and sufficient mitigation as well as risk reduction measures are put in place against the anticipated droughts and sea-level rises.

Accordingly, it is crucial that AMCOMET, in collaboration with relevant African institutions, be actively involved in the African communities' position on climate change into the international negotiations, including the African Ministerial Conference on Environment (AMCEN), the African Ministers Conference on Water (AMCOW) and the Conference of African Heads of States and Government on Climate Change (CAHOSCC). In addition, AMCOMET will partner the African Ministerial Conference on Science and Technology (AMCOST) in the research design and operation of appropriate technology.

Below are the areas of action:

- Ensure that, at the national level, at least 5% of budgets allocated to National Meteorological Services and associated research institutions are for research and development;
- Formulate legislation designating the national meteorological services as the leading authority on climate change science-based projections. This is meant to ensure that country's climate –sensitive sectors do not use climate change scenarios that come from different sources with different projects and so creating confusion;

- Involve mainstream economic, trade and finance ministries and the development community,; comprising donors, research institutions and a broader range of stakeholders than environmental interests is essential. Thus, AMCOMET should galvanise greater engagement between the climate communities and the development community;
- Liaise with African Ministerial Conference on Environment (AMCEN), Conference of African Heads of States and Government on Climate Change (CAHOSCC), African Ministerial Council on Water (AMCOW), the African Ministerial Conference on Science and Technology (AMCOST), the African Climate Policy Centre (ACPC) and the African Group of Negotiators on climate change to craft a new African agenda and position on climate change. This enables Africa to articulate its position at international for such as the United Nations Framework Convention on Climate Change (UNFCCC)), the G77 and China and the African Group of Negotiators and the Intergovernmental Panel on Climate Change (IPCC);
- Ensure the implementation of a structured GFCS at regional (i.e. continental) level, based on the input provided in the Addis Ababa Declaration in Support of the Implementation of the Global Framework for Climate Service (GFCS) in Africa, attached as Annex 6 as well as WMO's Implementation Plan of the Global Framework for Climate Services⁶, on the understanding that the regional GFCS implementation will facilitate links between national and global GFCS implementation activities; and
- Ensure that AMCOMET and the NMHSs actively participate in international negotiations such as the Conference of Parties (COP) to UNFCCC, UNCBD, UNCCD and the IPCC.

SP5: Strengthen Partnerships with Relevant Institutions and Funding Mechanisms

The success of the Strategy is highly dependent on the strength of the partnerships AMCOMET is able to forge, both with existing institutions able to support its mandate as well as funding mechanisms able to provide the necessary financial resources to meet its goals. To be effective, the Strategy must be clearly linked with the work of other government departments and agencies, technical partners, the private sector, and other relevant stakeholders, and work in concerted effort with other global and regional frameworks. AMCOMET plays a vital role in harnessing and developing these relationships.

Below are the areas of action:

- Cultivate long-term partnerships with traditional financing mechanisms, such as development banks and aid agencies to ensure their involvement in the AMCOMET process paving the way for institutional and financial support;
- Remain abreast of the emergence of bilateral and multilateral funding mechanisms established to support developing and least developed countries in their development efforts including through improvement of meteorological infrastructure and services;
- Actively involve the private sector, especially within the agricultural, insurance, transport and tourism sectors, who represent a sustainable customer base for NMHSs and potential long term collaborators for the implementation of the Strategy;
- Strengthen partnership with international scientific and technical partners in order to ensure that African NMHS and RCCs can access and exchange scientific and technical information with these partners;
- Collaborate with existing Initiatives, such as ClimDev-Africa and the Monitoring of Environment and Security in Africa (MESA) programme as well as relevant African institutions, such as ACPC, ACMAD, RCCs, WMO Centre of Excellence on training, to ensure the convergence and complementarities of initiatives and programmes.

⁶ https://www.wmo.int/pages/gfcs/documents/2012.09.07GFCSImplementationPlan_FinalOrder.pdf

IMPLEMENTATION, RISKS AND ASSUMPTIONS

The thrust of AMCOMET will hinge on the need to acknowledge the strategic nature of National Meteorological and Hydrological Services, and the critical and inevitable role they play in national security, national stability and in the socio-economic development of any country. NMHSs are now more than ever, being called upon to urgently respond to the ever-increasing and varied needs of our societies, effects of climate variability and change as well as new opportunities arising from technological advances. AMCOMET should therefore commit to implementing the Strategy by not only according the visibility and recognition the value added of NMHSs within the country, but also by improving the sustainability, effectiveness, flexibility and efficiency of their structures and working mechanisms and practices. Once approved, the modalities of implementation for the Strategy need to be crafted in accordance with the priorities of AMCOMET as well the availability of financial resources. There are associated risks (R) and assumptions (A) which should be taken note of and considered. Among these are the following:

- Political disturbances in African countries (R);
- National resource allocations to national meteorological services are sufficient (A);
- Political realignment with the development partners (R) as some donor aid comes with political strings as pre-requisites;
- HIV/ Aids and epidemics like malaria, typhoid and cholera (R);
- High staff turnover, en-mass retirement and frequent staff changes (R);
- Appropriate skilled human resource is available (A), particularly in weather forecasting, data warehousing and data mining as well as quality control and climate modelling; and
- Environment for recruitment of women is conducive (A), more so in the context of adaptation and mitigation to climate change.

Task Forces

AMCOMET and partners will establish Task Forces as appropriate, in priority activities to

- (i) draft the Implementation Plan for the Integrated African Strategy on Meteorology (Weather and Climate Services) with detailed annual operational plans;
- (ii) draft the Resource Mobilization Strategy for the Implementation Plan;
- (iii) explore the feasibility of developing and establishing an African Meteorology Space Programme leading to the launch and operation of an African Meteorological Satellite

AMCOMET Members should be encouraged to pursue dialogue with other countries, especially with those with more advanced capabilities, to better understand of how best to organize and support climate and weather services in their respective countries.

INSTITUTIONAL ARRANGEMENTS

Related institutions and structures are already in place to support the implementation of the Strategy. The development of the Strategy has involved the participation of the African Union Commission, Regional Economic Communities, national authorities and development partners through a consultative process. This participatory approach will continue throughout the implementation of the Strategy. Specific roles and responsibilities will be defined in the Implementation Plan for the implementation of the Strategy at the continental, regional and national levels by key stakeholders (AUC, RECs and Member States).

The Strategy complements the Climate for Development in Africa Program (ClimDev-Africa) which is a joint initiative of the African Development Bank, the Commission of the African Union (AUC) and the United Nations Economic Commission for Africa (UNECA) that seeks ways of overcoming the lack of necessary climate information, analysis and options required by policy and decision-makers at all levels.

Other African stakeholders, including the private sector and civil society organisations should also be consulted and involved. International stakeholders, as partners, should participate in the implementation of the Strategy and align their support with the Strategic Pillars and identified needs of key stakeholders.

RESOURCE MOBILIZATION

To ensure a smooth implementation of the Integrated African Strategy on Meteorology (Weather and Climate Services), resource mobilization efforts are needed in alignment with the institutional arrangements and coordination modalities established in the Strategy. Resource mobilisation for the Strategy will mainly focus on:

- Aligning the Strategy's needs and requirements on available and potential financing sources;
- Partnering and coordinating with various resource partners, including multilateral funding mechanisms, bilateral development agencies and multilateral development banks, among others;
- Closely working with partners that already include the Strategy in their priority areas of focus, in particular Japan through the Fifth Tokyo International Conference on African Development (TICAD V) and the Africa-China Forum, as well as other potential resource partners such as the African Development Bank (AfDB), the World Bank, the European Union, the Africa-Caribbean-Pacific (ACP) Secretariat, to name a few;
- Identify funding trends and sources, as well as resource mobilization scenarios, in considering the challenges posed by the current global financial and economic crisis;
- Further considering mobilizing resources from African countries and institutions.

MONITORING, EVALUATION AND REPORTING

The implementation of the Strategy shall be reviewed in accordance with the planning cycle of AMCOMET. An appropriate Monitoring and Evaluation tool will be developed to ensure periodic reporting from focal points and stakeholders. It is expected that AMCOMET, the African Union Commission, Regional Economic Communities and National Governments will have key roles in the process.

To monitor the progress towards achieving the objectives of the Strategy, data and information will be collected from the following indicators:

- Enhanced cooperation among African countries;
- Increased involvement of NMHSs in relevant government agenda;
- Enhanced capacity of NMHSs and regional climate centres in providing sector-specific weather and climate services;
- Increased number of ICAO certified NMHSs; and
- Increased resources invested in the strengthening of NMHSs

ANNEX 1: NAIROBI MINISTERIAL DECLARATION

1. **We**, the Ministers and Heads of Delegation participating in the Ministerial Segment of the First Conference of Ministers Responsible for Meteorology in Africa held in Nairobi, Kenya on 15 and 16 April 2010;
2. **Noting** the increasing risks and threats to sustainable development associated with disasters of which 90% are due to or aggravated by meteorological or hydrological extreme events and that African countries are facing multi-faceted challenges of climate variability and change that require, among others, decision-making based on scientifically sound data and information by governments and communities in order to develop adaptation strategies and action plans as part of the ongoing development processes and policies at national, sub-regional and continental level;
3. **Recognizing** that weather and climate information, services and products are of key importance for supporting climate-sensitive social and economic development sectors, including in particular health; agriculture and food security; transport; disaster risk reduction; natural resource management and environmental protection; water resource management and development; energy generation and distribution; and tourism;
4. **Noting** the gaps in operational observation and telecommunication networks, including maritime networks and their negative impact on the reliability of weather and climate information and services, and in view of the need to collectively address this situation to enable the National Meteorological Services in Africa to fulfil their national, regional and international mandates:
5. **Considering** that weather and climate patterns recognize no boundaries and that no one nation can be entirely self-sufficient in the production of all its meteorological and climate services and the urgent need to work jointly and in synergy to contribute effectively and efficiently to the development of our countries, by exploiting the full potential of meteorology and related sciences;
6. **Taking into account** the African Union Summit Decision on climate change and development, adopted by the 8th General Assembly in 2007 whereupon the Assembly expressed strong concerns about the vulnerability of Africa's socio-economic sectors and productive systems to climate variability and change and further noting that African countries demonstrably require additional resources for adaptation towards meeting the Millennium Development Goals;
7. **Referring to** Resolution 26 of World Meteorological Organization (WMO) Congress XIII in 1999 on the Role and Operation of Meteorological Services which urges WMO Members to mandate the National Meteorological Services as the official voice in issuing weather warnings for public safety to help minimize risks to the health and safety of citizens as well as the primary national authority and official source of information and policy advice on the present and future state of the atmosphere and other aspects of national weather and climate, in support of policy development and the need to meet national, regional and international responsibilities in the effective implementation of the WMO programmes;
8. **Recognizing** the support provided to National Meteorological and Hydrological Services by the sub-regional and regional institutions, including the African Centre for Meteorological Applications for Development (ACMAD), the Centre for Training, Research and Applications of Agrometeorology and Operational Hydrology (AGRHYMET) the specialized institution of CILSS, the Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Centre (ICPAC), the Southern African Development Community (SADC) Drought Monitoring Centre (DMC) and the WMO Regional Training Centres in Africa.
9. **Recognizing** the need to ensure that all sub regions are adequately served by their subregional institutions on meteorology and climate services:
10. **Recognizing** the importance of programmes in Africa such as ClimDev Africa which is focused on climate observations, the African Monitoring of the Environment for Sustainable Development (AMESD) based on satellite observations and the African Early Warning and Climate Services (AEWACS); and particularly the support of the African Development Bank, UN Economic Commission for Africa, and the African Union;

11. **Recognizing** the socioeconomic benefits achieved in the use of meteorological information in various sectors in Africa such as transport, agriculture, health and water resources;
12. **Noting** with appreciation that the World Meteorological Organization (WMO), in collaboration with other UN System organizations, regional and subregional institutions and development partners, is assisting African countries to benefit from the scientific and technological progress made over the recent years, including access to satellite meteorological information to develop meteorological and climate products and services to support national and regional development planning, policy and programmes;
13. **Considering** the stringent and urgent requirements of the aviation sector for recommended and standard practices and the availability and provision of quality information to ensure safety of international air navigation;
14. **Recalling** the decision to establish a Global Framework for Climate Services (GFCS) made by the Heads of State and Government, Ministers and Heads of Delegation at the High-level segment of the World Climate Conference-3 held in Geneva, Switzerland, from 31 August to 4 September 2009, and;
15. **Having considered** the conclusions of the Expert Segment of the Ministerial Conference held in Nairobi from 12 to 14 April 2010, in particular its analysis of successful applications of weather, water and climate information, products and services to various sectors of social and economic development including for Disaster Risk Reduction and the recommendations on current and future programmes, projects and activities;

Commit ourselves to:

- a) Strengthen and sustain National Meteorological Services by providing them with all necessary resources and adequate institutional frameworks to enable them to fully perform their roles as a fundamental component of the national development infrastructure of our countries and of the continent and a contributor to security and sustainable development, particularly poverty reduction efforts, climate change adaptation and disaster risk reduction;
- b) Take all necessary steps to ensure that African National Meteorological Services meet the ICAO requirements regarding Quality Management Systems (QMS) by November 2012.

Agree to:

- a) Establish the African Ministerial Conference on Meteorology (AMCOMET) as a high-level mechanism for the development of meteorology and its applications in Africa with a Bureau composed of Kenya (Chair), Mali (First Vice-Chair), Zimbabwe (Second Vice-Chair), Congo (Third Vice-Chair) and Morocco (Rapporteur) representing the five African sub-regions. This Bureau will represent AMCOMET during the intersessional period;
- b) Designate during this Conference a Task Force of ten (10) members comprising the five Bureau members and Algeria (North Africa), Cameroon (Central Africa), Ghana (West Africa), Uganda (East Africa), and a representative of Southern Africa (to be designated)⁷. The Task Force, to be chaired by the AMCOMET chairperson, will define the institutional framework and internal arrangements of AMCOMET with WMO as the Secretariat with the support of AU. The Task Force should submit a proposal to the first session of AMCOMET which should meet regularly and at least every two years ;
- c) Take the necessary measures, within two years, to develop an African Strategy on Meteorology for enhancing cooperation between African countries to strengthen the capabilities of their National Meteorological Services and existing Regional and Sub-regional climate centres in Africa, so as to effectively meet government and societal needs and requirements for weather

⁷ Southern African ministers have assigned Zambia as a representative of southern Africa for the Task Force during the Meeting of the Committee of Ministers Responsible for Transport and Meteorology on the 28th of May 2010

and climate information and services, taking into account the statement of the expert segment of this Ministerial Conference and the planning for the Global Framework for Climate Services (GFCS);

- d) Establish, with the support of WMO and partners, a sub-regional structure for climate monitoring and adaptation to climate change for sustainable development in Central Africa;
- e) Involve the technical and financial partners, the international community and the United Nations system and its agencies to support AMCOMET and the preparation and the implementation of the African Strategy on Meteorology;
- f) Ensure that African National Meteorological Services and Regional and sub-regional centres have access to the Copenhagen Green Fund for Climate Change through the African Development Bank and other mechanisms;
- g) Ensure that NMS benefit from cost recovery with respect to aeronautical and maritime meteorological services and other mechanisms;
- h) Invite WMO to take note of this Declaration and bring it to the attention of the sixty second session of the Executive Council, fifteenth session of the WMO Regional Association for Africa and the Sixteenth WMO Congress and to take appropriate measures;
- i) Invite the African Union Commission to take note of this Declaration, to bring it to the attention of the next African Union Summit and take appropriate measures.

ANNEX 2: MAJOR STAKEHOLDERS

Stakeholder(s)	Relationship and/ or contribution to the development of weather and Climate Services
At a Pan-African Level	
African Union (AU)	Political leadership and support by Heads of State for policy formulation
Other AU Specialised Technical Organs (such as AMCOW (Water), AMCEN (Environment), AMCOST (Science and Technology))	The specialised governmental bodies were created to address emerging issues crucial to the development of Africa. The areas of attention (the environment, water, science and technology and climate change) are all highly sensitive to weather and climate variability and climate change.
African Center of Meteorological Application for Development	ACMAD's mission is the provision of weather and climate information and for the promotion of sustainable development of Africa (notably within the context of national strategies for poverty eradication), in the fields of agriculture, water resources, health, public safety and renewable energy.
United Nations Economic Commission of Africa (UNECA) / African Climate Policy Centre (ACPC)	Mobilisation of resources from various donors for social and economic development. ACPC was established by the UNECA as ClimDev Africa Secretariat responsible for delivering programmatic activities to develop climate policy capacity through knowledge generation, advocacy and advisory services.
At Sub-continental level	
Regional Economic Communities (SADC, IGAD, ECOWAS, CEMAC, UMA)	Regional coordination of economic development of member states by way of protocols (including meteorology and hydrology) in various sectors. This includes allocation of financial resources.
River Basin Organisations (Congo, Zambezi, Niger, Nile, Limpopo), plus Inland lake Authorities (Lake Chad, Lake Victoria, etc.)	Trans-national management of water demand at river basins. They need weather forecasts for river control, apportionment and levying (water rights) and dam level monitoring (disaster preparedness).
WMO Regional Training Centres (RTCs)	These Centres have a mandate to contribute to capacity building of Members of the Region, complimenting training programmes at the national level.
WMO Regional Climate Centres (RCCs)	These institutions are being created to serve the sub-regional groupings with a mandate to handle regional datasets, monitor regional weather variability, develop regional scale climate products and information after downscaling them from the global producers
Regional Meteorological Development Institutions (ICPAC, AGRHYMET, SADC-CSC.)	The Institutions were established to spearhead the development and applications of meteorology at the at sub-regional level. The centres are conduits through which international development partners and donors support weather and climate projects and programmes, in addition to bilateral support. Some of them are expected to become RCCs in Africa
At National level	
National Governments	Political and financial support and inter-ministerial collaboration. This has an impact on the visibility of, and level of relevance of NMHSs at national level. NMHSs provide information essential to address issues affecting all citizens, particularly those that are vulnerable to climate and weather vagaries, plus climate change.
National Ministries (Environment, Finance, Health, Agriculture, Energy, Transport, Tourism, Water)	These represent meteorologically- related national interests and responsibilities to cushion all citizens from diseases, poverty alleviation, natural disasters, pollution, etc. Some of these Ministries are parent ministries of NMHSs. They also translate climate information into policy matters.
NMHSs	NMHSs are national designated authorities responsible for, among others, maintain and operate needed basic meteorological observational infrastructure in supporting services towards safety of life and property, national security and sustainable development.
National Universities and	These are sources of skilled manpower. They also provide academic

Technical Colleges	environment for meteorological and hydrological research.
NGOs	Work with local communities and addressing specific and varied interests. They work with/ are essential to NMHSs to help communities to mitigate against and/ or adapt to climate change and extreme weather variability.
Private Sector	The involvement of the private sector is important as they represent a sustainable customer base for NMHSs. Developing long-term partnerships with the private sector that place emphasis on achieving impact and scale is highly valued. Identify relevant potential partners, within the agricultural, insurance, transport and tourism sectors, to name a few, that would greatly benefit from improved weather and climate services, and develop a mutually beneficial approach to a long-term collaboration. This will create an enabling environment whereby the private sector can eventually play a major role in implementing the Strategy as well as providing them a platform where they can help shape climate-resilient policies beneficial not only for the businesses but also for the countries' long term economic growth as well as the well being of communities served.
Stakeholders operating at global level	
WMO, including its Technical Commissions (hydrology, climatology, Basic Systems, Atmospheric Sciences, Marine Aeronautical and Agricultural Meteorology)	United Nations Specialised Organisation on Weather, Climate and Water. It is currently the Secretariat to AMCOMET and pivotal to the capacity (human and infrastructural) development of meteorology world wide. The Technical Commissions are responsible for implementing the programmes of WMO as agreed to by Members.
United Nations Organizations (such as UNEP, UNESCO, WHO, FAO, OCHA, WFP, WWF)	These are development partners at national, regional and international levels with specific mandates (social, environment, health, food security, disaster risk reduction and management, etc.).
Partners in global Earth observations such as the UN-led GCOS, the inter-agency GEO and the UNESCO/IOC-led GOOS	These organisations have cross-cutting responsibilities and were formed through inter-agency joint initiatives with the purpose to providing integrated monitoring and observing services
ICAO, IATA	Represent air transport users and providers. They require meteorological forecasts and in-situ observations for operational purposes and flight planning. They represent an important source of revenue for NMHSs.
EUMETSAT, NOAA, ECMWF, NECP, etc.	Provides satellite-based meteorological information to NMHSs
Service providers at a Global Level	
Meteorological satellite operators in some countries (Korea, USA, Japan, China, India, Iran, etc)	The meteorological satellite provide coverage in different regions, but whose products are accessible by, relevant to, and being used in, Africa. The countries have made satellite derived products for free and have also offered scholarships and training courses programmes to Africa.
Joint WMO / IOC UNESCO Technical Commission for Oceanography and Marine Meteorology	JCOMM is an intergovernmental body of experts that provides the mechanism for international coordination, regulation and management of oceanographic and marine meteorological observing, data management and services systems.
Global climate research institutions	These operate at the global level using Numerical weather prediction models. Their meteorological products include weather forecasts (short- and medium- range) and climate predictions and future climate scenarios including those covering Africa.
Private Media with global outreach	They provide global weather forecasts. They are a threat to NMHSs. However, as of now, the forecast are of coarse resolution and hardly useful at local level.
Development Banks	
African Development Bank World Bank, sub-regional development banks e.g. Development Bank of Southern Africa (DBSA)	The Banks provide financial support through the African Union and its Regional Economic Communities for meteorological research and applications, particularly climate change related programmes. Banks place high priority on mainstreaming climate risk reduction into economic development.

ANNEX 3: MAJOR WEATHER AND CLIMATE RELATED HAZARDS IN AFRICA AND THEIR IMPACTS ON THE DEVELOPMENT OF THE CONTINENT

Meteorologically related natural disasters are increasingly retarding the pace of the socio- economic development of Africa, over two-thirds of which are Least Developed Countries (LDCs). Their magnitude, frequency and duration vary considerably across the vast continent. This segment briefly indicates some the major disasters and how they stifle Africa's endeavours to meet the Millennium Development Goals (MDGs) and uplift the wellbeing of its citizens.

Droughts

All types of droughts originate from a precipitation deficiency but other parameters come into play in the severity and resultant impacts of the phenomenon on development. In Africa, the frequency and severity of droughts have increased over the past 30 years, particularly in Eastern Africa. The East African drought of 2011 is proving to be one of the worst that Ethiopia has faced in 50 years. In Central Africa and the Sahel region, droughts have become more frequent since the late 1960s. In sub-Saharan Africa, increased exposure to drought is of particular concern as 10 million people are affected by the phenomenon.

Floods (including heavy rain, storm surges, coastal phenomena, flash floods)

Floods are episodic and are often triggered by severe storms, tropical cyclones, and tornadoes. Increases in precipitation intensity, in the frequency of rain days, in heavy rains and in rainfall extremes has been observed for southern Africa and the Guinean coast and are often accompanied by severe and devastating flooding, such as the events in southern Nigeria. In sub-Saharan Africa, 2 million were affected by flooding. Flooding is also a phenomenon of the coastal zone of many African countries. In Egypt, about 38% of the coastal population is at risk of flooding. In Djibouti and Gambia the population under such risks is 41%, and 38% respectively. The floods have the potential of rendering agricultural lands unproductive or making rural settlements inhabitable, which in turn affects the livelihoods of rural residents, forcing them to migrate to the urban areas.

Landslides

Landslides are displacements of earth, rock, and debris caused by heavy rains, floods, earthquakes and volcanoes. Most common types of mass movements, such as landslides, in Africa result from intense or prolonged rainfall, i.e. when the water pressure in the ground is high, or when there are sharp fluctuations in the groundwater level (Sekhar et al., 2009). In the last 25 years, many of the landslides that have occurred in the greater Durban region of South Africa took the form of mudflows and were responsible for some of the worst damage which has occurred in the region. Based on an annual standard inflation rate of 10%, the current annual landslide associated expenses in southern Africa would be ~\$163 million (Diop, 2012). Landslides caused by heavy rains are frequent in eastern Uganda where scores of residents were buried alive in a landslide that occurred on 1 March 2012,; At least 23 people were killed in a similar disaster in 2011 after mounds of mud buried their homes. On 25 June 2012, more than 100 people were missing and about 30 confirmed killed in eastern Uganda after a landslide triggered by heavy rain buried villages in a coffee-growing area on the slopes of Mount Elgon.

Tropical cyclones

Tropical cyclones are some of the major weather bearing systems affecting Africa, particularly islands in the South West Indian Ocean and mainly coastal countries in eastern and southern Africa. They emanate from the equatorial regions of the Indian Ocean and, depending on their movement and tracks, can bring extreme weather either in the form of heavy rains, high winds or extremely dry and hot weather to these countries. They are highly destructive, causing infrastructure such as bridges and power lines to collapse and even loss of life. The costs associated in their wake are immense and often runs into billions of United States Dollars. Meteorological forecasts and warnings are essential in minimising their impacts.

Dust and sand storms

A dust or sand storm is a meteorological phenomenon common in arid and semi-arid regions and they arise when a gust front or other strong wind blows loose sand and dirt from a dry surface. When winds are strong

and other near-surface atmospheric conditions, such as turbulence level, stability and soil moisture are favourable, large amounts of sand and dust can be lifted from bare, dry soils into the atmosphere. Every year 1.5 tons of sand and dust are emitted from deserts into the atmosphere. Suspended sand and dust generates semi-permanent patterns of local and regional scales that persist in the atmosphere for several days. Moreover dust can be transported downwind affecting regions hundreds to thousands of kilometers away. The distance of transport is mainly depending on the meteorological conditions in the free atmosphere.

Heat waves

Recently, a withering heat wave of unprecedented intensity and areal coverage smashed all-time high temperatures in Africa. Chad and Niger have all set new records for their hottest temperatures of all time. Also Sudan recorded its hottest temperature in its history when the mercury rose to 49.6°C (121.3°F) at Dongola. The previous record was 49.5°C (121.1°F) set in July 1987 in Aba Hamed. In October 2011, temperatures topped 43OC (110OF) amid a heat wave gripping much of southern Africa. Zimbabwe, Mozambique, Botswana, Zambia and Malawi have all seen widespread daytime temperatures above 38OC (100OF) during the same period. In the Zimbabwe capital, Harare, a high of 36OC (97OF) was highest for October since 1925. About 5,000 feet above sea level, Harare normally has warm, not hot, daytime temperatures with typical October highs of about 28OC (82OF). In southern Zimbabwe, Chiredzi reached a fiery of 45OC (113OF).

Locust Invasions

Normally, the desert locust is a solitary insect that occurs in desert and scrub regions of northern Africa and the Sahel. During the solitary phase, locust populations are low and present no economic threat. When vegetation flushes occur in major desert locust breeding areas, rapid population build-ups and competition for food occasionally result in a transformation from solitary to gregarious behaviour on a regional scale. Following this transformation, locusts often form dense bands of flightless nymphs and swarms of winged adults that can devastate agricultural areas. A locust outbreak or upsurge is the vaguely defined transition from the innocuous solitary phase to the plague stage which can be localized or cross-regional. During plagues, locust swarms and bands are found on an interregional scale and originate from a number of breeding areas as part of a widespread but interrelated locust breeding and migrating dynamic that can continue for years. A single swarm of locusts can be small (hundreds of square meters) or huge, composed of billions of locusts, with up to 80 million per square kilometer over an area of more than 1,000 square kilometres. In one day, a swarm of locusts can fly 100 km in the general direction of prevailing winds. Bands of nymphs can march about 1.5 km per day. Plagues often involve hundreds of swarms, and the locusts' recession area can expand to envelop the sub-Sahel from Guinea to Tanzania.

Desert locusts can consume the approximate equivalent of their body mass each day (2g) in green vegetation. Nearly all crops, and non crop plants, are at risk, including millet, rice, maize, sorghum, sugarcane, barley, cotton, fruit trees, date palm, vegetables, rangeland grasses, acacia, pines, and banana. Locust inflicted damage, in addition to occurring very sporadically, is geographically patchy, owing to the nature of swarms. That is, where swarms do not land, losses do not occur. Where swarms do land and feed, losses can be 100% within hours at the local level. Such losses can occur to impoverished subsistence farmers in the Sahel, or to high value export growers in the Maghreb. Crop loss as a result of desert locust infestation is difficult to characterize, but it will be important for developing intervention strategies on a demonstrably cost-effective basis.

Diseases (Malaria, Cholera, Meningitis, etc)

Malaria: The distribution and seasonality of malaria are closely related to seasonal characteristics of the climate and may be found where and when the climatic conditions are favourable for transmission between the mosquito vector and its human host. The climatic conditions considered suitable for the development and transmission of the Plasmodium falciparum species through its life cycle are temperatures within the range 18°C to 32°C. At temperatures below 18°C, parasite development decreases significantly. Above 32°C the survival of the mosquito is compromised. Relative humidity greater than 60% is also considered as a requirement for the mosquito to survive long enough for the parasite to develop sufficiently to be transmitted to its human host stage. Rainfall and surface water is required for the egg laying and larval stages of the mosquito life cycle and monthly rainfall above 80mm is considered as a requirement.

Cholera: Cholera is caused by vibrio cholera bacteria that live in water bodies. Temperature, salinity, rainfall and plankton have been shown to be important factors in the ecology of V. cholera. To date major regional cholera epidemics in Africa have been associated with climate variability events such as strong El Niños.

Large scale epidemics occurred in Eastern Africa in 1983 and 1997 during strong El Niño events associated with significant temperature anomalies and rainfall. Late cholera has become commonplace in southern Africa, with Zimbabwe being the latest in which over 4000 people died and over 200 000 people affected in 2011. Climate change will increase marine temperature and alter the ecology in ways that may favour the reproduction of vibrio. Some simulations from climate models suggest that the frequency of anomalous weather is increasing leading to an increase in the risk of cholera around large water bodies unless public health and hygiene are improved.

Meningitis: Meningococcal disease is an air-borne disease and about 50% of the global cases of the disease occur in the Sahelian belt in Africa. The risk of the disease is associated with high temperatures and low humidity although other non-climatic factors are involved.

Rift Valley Fever: Rift Valley Fever is a viral disease transmitted by mosquitoes mainly affecting livestock but also humans. The virus survives in the eggs during the dry period of Aedes mosquitoes and proceeds to the larval stage and finally into the adult female. When the female bites, the host gets infected. The virus is also transmitted by Culex, Mansonia and Anopheles species during the rainy or flooded season. The disease is strongly associated with flooding and the immunity of the host. In Eastern Africa where Rift Valley Fever epidemics have become frequent, flooding is driven by the interaction between the El Niño Southern Oscillation (ENSO) and the Indian Ocean Dipole Moment (IOD).

Climate Variability and Change

The observations of climate-related variables on national and global scales have made it possible to document and analyze the behaviour of earth's climate. The Intergovernmental Panel on Climate Change (IPCC) periodically reviews and assesses the most recent scientific, technical and socio-economic information produced worldwide relevant to the understanding of climate change. The recent IPCC report, projects increased severity and frequency in droughts, floods, tropical cyclones in Africa. Information about these impacts of climate variability and change is needed by communities and resource managers to adapt and prepare for larger fluctuations as global climate change becomes more evident. The impacts of climate change are treated in the section 2.2 that follows below.

ANNEX 4: IMPACTS OF WEATHER AND CLIMATE ON VULNERABLE SECTORS

Introduction

There is no socio-economic sector which weather and climate do not have an impact. However, some sectors are much more sensitive to weather and climate variability and climate change. This Annex is aimed at illustrating the vulnerability of these sectors by indicating the linkages. The list is not exhaustive. The most vulnerable is the agricultural sector which is the mainstay and backbone of most African economies.

Agriculture (including livestock, rangelands and Fisheries) and Food Security

Weather and climate are critical for agriculture in risk assessment (for example, the spread of plant and animal pests and diseases and extreme events like frost) and agricultural production management systems (crop planning and irrigation scheduling, for example). Climate change affects rainfall, temperature and water availability for agriculture in vulnerable areas. For example, drought affected areas in sub-Saharan Africa could expand by 60–90 million hectares, with dry land zones suffering losses of US\$26 billion by 2060 (HDR 2007-2008). By 2100, parts of the Sahara are likely to show agricultural losses of between 2 and 7% of GDP. Degradation of arable soils and loss of fertility due to high exposure to climatic stress and human pressure on forests and other vegetation cover under a changing climate will lead to a 50% drop in agricultural production in Africa by 2030. Climate models for Northern Kordofan in Sudan suggest that possible impacts on agriculture include a 70 percent drop in yields of sorghum. Periods of droughts and floods will have an impact on food availability, food access, and on nutrient access. It is predicted that the impacts of climate change such as sea-level rise, droughts, heat waves, floods and rainfall variation could, by 2080, push another 600 million people into malnutrition and increase the number of people facing water scarcity by 1.8 billion.

Coastal Resources

In some coastal areas of Africa, coral bleaching and mortality are on the increase. The increase in water temperature has detrimental effects on the physiology of marine organisms and promotes the establishment of thermophilic species. These effects are especially noticeable on the breeding habits of certain species. Low-lying cities located on lagoons, estuaries, deltas or large river mouths, such as Alexandria, Cotonou, Dar es Salaam, Lagos, Maputo, Mombasa and parts of Cape Town, are particularly vulnerable to extreme weather events caused by climate change. They are likely to experience storm surges, sea-level rises, increased flooding, (semi-) permanent inundation, coastal erosion, landslides, and the increase of water-borne diseases, which may all have devastating effects on human settlements. African cities will also experience more severe and frequent flooding and these flooded areas and ditches, latrines and septic tanks are key reservoirs that perpetuate cholera, malaria, dengue and yellow fever in urban areas.

Forests, Wildlife and Biodiversity

Mountain ecosystems in Africa appear to be undergoing significant observed changes likely due to complex climate-land interactions and the climate change. The ice cap on Mt. Kilimanjaro could disappear by 2020. The mountains of Cameroon and the island-like Afromontane habitats that stretch from Ethiopia to South Africa at altitudes above about 2,000 meters are also threatened by increase in temperature. Around 5,000 African plant species and over 50% of bird and mammal species will be seriously affected or even lost by the end of this century. Typical large mammal migrations are sensitive to climate change; they involve regular movement between dry-season and wet-season grazing areas. Persistent drought due to increase in temperature and unreliable rainfall pattern in Tanzania, for example is expected to affect the lifestyles of most of the migratory wild species, in particular the wildebeest (in the Serengeti area of Tanzania and the Masai-Mara region of Kenya) and some bird species. Increasing temperatures, in combination with changes in rainfall and humidity, may have significant impacts on wildlife, domestic animals and human diseases.

Water Resources

Weather and climate forecasts and warnings are an essential ingredient for water resource management. The water sector is strongly influenced by, and sensitive to, changes in climate (including periods of prolonged climate variability). About 25% of the contemporary African population experiences high water stress while 69% of the population lives under conditions of relative water abundance. The impacts of climate change are expected to have severe consequences for the availability of water in Africa. A 3°C temperature increase could lead to 0.4 – 1.8 billion more people at the risk of water stress. Reduction in water quantity will lead to a reduction in water quality and associated impacts on health, biodiversity, etc.

Human Health

Most infectious diseases have seasonal cycles that include spatial and temporal changes in prevalence and the seasonality of the diseases is driven by changes in rainfall, temperature and humidity. For example most mosquito borne diseases cannot be transmitted below 14°C because the larval stages die and parasites cease to develop. On the other hand total thermal mortality of the adult mosquitoes occurs at 40°C (Githeko et al., 2000). In the case of malaria the mosquitoes can develop at temperatures above 16°C. However, below 18°C the malaria parasite development time exceed the lifespan of the female mosquitoes thus transmission is not possible at this temperature. Climate change and variability can drive the temperature above the threshold (18°C) and enable transmission. This situation is the main cause of malaria epidemic in the Eastern African highlands (Githeko and Ndegwa, 2001). About 20% of the human populations living in East Africa are at a risk of malaria epidemics.

Across Africa, 45% of the urban population lacked access to improved sanitation in 2000. In Eastern Africa in 2006, open defecation was the only sanitation practice available to 33% of the population. This contributes to the contamination of water and land within cities as well as many of the waterborne diseases prevalent in slums. Under climate change this situation will be exacerbated.

Human Settlements and Security (including energy, transport, etc)

Approximately 80% of African households use biomass fuels (e.g. wood and vegetation) for cooking and water heating. Unsustainable harvesting of forests coupled with climate change and variability threatens biomass users with dwindling supplies. According to most of the African UNFCCC NAPAs, biomass as a major energy source for households in Africa is highly vulnerable to negative impacts of climate change. The resilience and regeneration capacity of forests resources are negatively affected by extreme climate conditions. On the other hand, the hydroelectric generation which represents the promising source of energy faces a lot of challenges apart from the fact that less than 4% of Africa's hydropower potential is currently utilized. It has been repeatedly stated in the NAPAs that hydro-electric power generation has been negatively affected by droughts and floods (Lesotho, 2007; Malawi, 2006; Zambia, 2007 – UNFCCC NAPAs). Increased climate variability and change can also impact on the functioning of key energy infrastructures (e.g. refineries, rigs, hydro-electric plants) within countries.

Interrelating issues between climate change and human security include water stress, land use and food security, natural disasters and environmental migration (Scheffran and Battaglini, 2011). The most direct link between climate change and threats to human security is probably the aspect of environmental security. Access to clean water resources and air pollution are considered to be the greatest environmental threats. The nature of impacts on economic security as one aspect of human security is manifold. The ultimate damages of climate change may significantly affect economic growth (Lecocq and Shalizi, 2007). The effects of global warming could lead to increased border tensions, and conflicts over food and water. Distributional conflicts will arise due to the degradation of natural resources as a result of over-exploitation and global warming. Populations will be forced to migrate internally or cross borders (Gleditsch et al., 2007). Environmental migration due to the effects of climate change is closely related to the concept of human security.

Tourism

Climate is a principal resource for tourism, as it codetermines the suitability of locations for a wide range of tourist activities; is a principal driver of global seasonality in tourism demand, and has an important influence on operating costs, such as heating-cooling, snowmaking, irrigation, food and water supply, and insurance costs. Thus, changes in the length and quality of climate-dependent tourism seasons (e.g., sun-and-sea or winter sports holidays) will negatively impact the sector. Increases in the frequency or magnitude of certain weather and climate extremes (e.g. heat waves, droughts, floods, tropical cyclones) will affect the tourism

industry through increased infrastructure damage, additional emergency preparedness requirements, and higher operating expenses. Changes in water availability, biodiversity loss, reduced landscape aesthetic, altered agricultural production (e.g., food and wine tourism), increased natural hazards, coastal erosion and inundation, damage to infrastructure and the increasing incidence of vector-borne diseases will all impact tourism to varying degrees. National or international policies to mitigate GHG emissions are likely to lead to an increase in transport costs and may foster environmental attitudes that lead tourists to change their travel patterns (e.g., shift transport mode or destination choices). Climate change is thought to pose a risk to future economic growth and to the political stability of some nations. Any such reduction of global GDP due to climate change would reduce the discretionary wealth available to consumers for tourism and have negative implications for anticipated future growth in tourism.

Disaster Risk Reduction

The causes for disasters, displacement, and migration, are manifold, however, climate change is one of the interlinking issues. Sudden-onset climate-related disasters, i.e. disasters such as floods and storms which climate change can influence both in terms of frequency and severity are responsible for most of displacements in Africa. The number of displaced people in Africa has increased from 697,066 in 2008 to 1.1 million in 2009 and 1.7 million in 2010. It is likely that many more will be displaced due to the other climate change-related drivers, including slow-onset and pervasive disasters, such as drought and sea level rise.

ANNEX 5: ROLE OF METEOROLOGICAL SERVICES AT THE NATIONAL, REGIONAL AND GLOBAL LEVELS

Introduction

The World Meteorological Organisation (WMO), its Regional Associations as well as National Meteorological Services collectively endeavour to ensure that, through their respective mandates and areas of jurisdiction, weather and climate services fully address the diverse needs of users and contribute to development. This Annex highlights their roles at various levels.

National, Regional and Global roles

Most National and Regional Meteorological Services in one way or the other, provide some information on drought situation in the country or region of jurisdiction. Drought watch and early warning systems exist but are least developed, operational and utilized at the optimum level. The FAO's Global Information and Early Warning System on Food and Agriculture (GIEWS) provides drought information, together with an interactive map of countries in crisis. In addition, the WMO provides useful global meteorological information, such as precipitation levels, cloudiness, and weather forecasts, which are visualized on a clickable map on the WMO website. It is difficult for many Services in Africa to access these websites. This is mainly due to inadequate communication capacity (internet, narrow broadband, etc.). Existing approaches for drought early warning must be improved. Due to the complex nature of droughts, a comprehensive and integrated approach that would consider numerous drought indicators is required for drought monitoring and early warning.

There is inadequate coverage of flood warning and monitoring systems in Africa and those available do not provide public access to information. The National Meteorological Services of Morocco and Nigeria have some flood warning systems. Technologies and tools that are useful in monitoring floods include orbital remote sensing equipment used to detect and map major floods. In particular, polar orbital and geostationary satellite data are used for flood observation. Satellite microwave sensors can monitor, at a global scale and on a daily basis, increases of floodplain water surface without cloud interference. These existing technologies for flood monitoring are not easily and widely available in most African countries due to financial, institutional and human capacity constraints. The technologies must also be improved to increase prediction capabilities and flood warning lead times. Global flood monitoring systems exist and these include the Dartmouth Flood Observatory and the WMO monitoring system, which provide public access to major flood information, satellite images and estimated discharge. National and Regional Meteorological Services that have the capability can access the products from these global services to improve their national warning systems.

National Meteorological Services and the Disaster Management Agencies have a lot of public awareness and sensitization to carry out on landslides and other sudden-onset disasters.

The WMO Regional Specialized Meteorological Centres (RSMC) monitor tropical cyclones globally and issue official warnings to the National Meteorological Services of countries at risk. These bodies have adopted standardized WMO-TCP operational plans and manuals which promote internationally accepted procedures in terms of units, terminology, data and information exchange, operational procedures, and telecommunication of cyclone information. Using the June-July meteorological information of the stratospheric quasi-biennial oscillation (QBO), West African rainfall, the El Niño-Southern Oscillation (ENSO) as well as sea level pressure anomalies (SLPA), and the upper-tropospheric zonal-wind anomalies (ZWA) in the Caribbean basin as predictors, it is now possible to issue seasonal forecasts of Atlantic basin tropical cyclone activity by August (see Gray et. Al., 1993).

The WMO and the Meteorological Services of some member states are working towards improvement of the capabilities for more reliable sand and dust storm forecasts. This led to the establishment of the SDS-WAS programme in 2007 with the mission to achieve comprehensive, coordinated and sustained observations and modelling capabilities of sand and dust storms in order to improve the monitoring of sand and dust storms to increase the understanding of the dust processes and to enhance dust prediction capabilities. The SDS-WAS programme contains many research and/or operational institutes performing daily forecasts of sand and dust. Research and forecasting products from atmospheric dust models may substantially contribute to risk reduction in many areas of societal benefit. More than 15 organizations currently provide daily dust forecasts in different geographic regions. There is the need for real-time delivery of products.

Monitoring locust populations during recession periods to anticipate the onset of gregarious behaviour and to

locate locust bands and swarms for control operations during outbreaks and plagues is a difficult task that has become increasingly technologically sophisticated. In most countries, the monitoring is done by the Pest Control Office under the Ministry of Agriculture. National and Regional Meteorological Services can contribute information generated from model-generated forecasts of locust population events and general patterns of swarm movement during outbreaks and plagues. These services use weather and vegetation index information gathered from satellite platforms, meso-scale and synoptic-scale weather patterns, soil mapping, and probabilities based upon historical knowledge about locust population dynamics throughout the recession and plague distributions.

ANNEX 6: ADDIS ABABA DECLARATION



ADDIS ABABA DECLARATION

IN SUPPORT OF THE IMPLEMENTATION OF THE GLOBAL FRAMEWORK FOR CLIMATE SERVICES (GFCS) IN AFRICA

Addis Ababa, 30 September 2012

DECLARATION D'ADDIS ABABA

EN SOUTIEN A LA MISE EN ŒUVRE DU CADRE MONDIAL POUR LES SERVICES CLIMATOLOGIQUES EN AFRIQUE

We,

Nous,

Representatives of the African Union Commission (AUC), the Regional Economic Communities (CEMAC, ECOWAS, IOC, IGAD, SADC) and the Secretariat of the African, Caribbean and Pacific (ACP Secretariat) Group of States, on the invitation of the Minister of Water and Energy of the Federal Democratic Republic of Ethiopia, in the presence of the representatives of the World Meteorological Organisation (WMO), the European Organisation for the Exploitation of Meteorological Satellites (EUMETSAT), the United Nations Economic Commission for Africa (UN-ECA), the African Centre for Meteorological Application for Development (ACMAD) and the European Union (EU),

Représentants de la Commission de l'Union Africaine (CUA), des Communautés Economiques Régionales (CEMAC, CEDEAO, COI, IGAD, SADC) et du Secrétariat du Groupe des États de l'Afrique, des Caraïbes et du Pacifique (Secrétariat ACP), à l'invitation du Ministre de l'Eau et de l'Energie de la République fédérale démocratique d'Ethiopie, en présence des représentants de l'Organisation Météorologique Mondiale (OMM), de l'Organisation Européenne pour l'exploitation des Satellites Météorologiques (EUMETSAT), de la Commission Economique pour l'Afrique des Nations Unies (UN-CEA), du Centre Africain pour les Applications de la Météorologie au Développement (ACMAD) et de l'Union Européenne (UE),

Convened in Addis Ababa, on the basis of our respective

mandates and responsibilities to address climate change and climate variability to enhance regional integration, on the eve of the opening of the 10th EUMETSAT User Forum in Africa,

Réunis à Addis-Abeba à la veille du 10^{ème} Forum des Usagers d'EUMETSAT en Afrique, sur la base de nos mandats et responsabilités respectifs visant à renforcer l'intégration régionale en réponse aux changements et aux variations climatiques,

Recalling the African Union Assembly Decision, Assembly/AU/Dec.134 (VIII), of January 2007, which expressed grave concern on "the vulnerability of Africa's socio-economic and productive systems to climate change and variability and to the continent's low mitigation and response capacities";

Rappelant la décision de l'Assemblée de l'Union Africaine , Assembly/AU/Dec.134 (VIII), de janvier 2007, qui exprime de graves préoccupations quant à "la vulnérabilité des systèmes socioéconomiques et de production au changement et aux variations climatiques de l'Afrique et aux faibles capacités d'atténuation et de réponse";

Referring to the IPCC 4th Assessment Report: Climate Change 2007, which states that "Africa is one of the continents most vulnerable to climate change and climate variability";

Se référant au 4^{ème} Rapport d'Evaluation du GIEC: Changements climatiques 2007, qui stipule que «l'Afrique est l'un des continents les plus vulnérables aux variations et aux changements climatiques»;

Noting that climate change is a major threat to sustainable growth and development in Africa, and that changing rainfall patterns are projected to have further negative impact on agriculture and food security, water availability and distribution, and that the frequency, magnitude and duration of extreme weather and climate events, such as severe storms, droughts and floods is likely to increase;

Notant que le changement climatique est une menace majeure pour la croissance et le développement durables en Afrique, et que l'évolution des régimes pluviométriques devraient avoir davantage d'impact négatif sur l'agriculture et la sécurité alimentaire, la disponibilité et la distribution de l'eau, et que la fréquence, l'ampleur et la durée des phénomènes météorologiques et événements climatiques extrêmes tels que les tempêtes, les sécheresses et les inondations sont susceptibles d'augmenter;

Also noting that the adverse effects of climate change and sea-level rise present significant risks to the sustainable development of Small Island Developing States (SIDS), and the long term effects of climate change may threaten the very existence of some SIDS;

Notant également que les effets néfastes des changements climatiques et de l'élévation du niveau des mers compromettent gravement le développement durable des Petits États Insulaires en Développement (PEID) et que les effets à long terme du changement climatique peuvent menacer l'existence même de certains petits États insulaires;

Recognising the coordination by the Conference of African Heads Of States and Government on Climate Change (CAHOSCC) lead by the late Prime Minister Meles Zenawi and the African Ministerial Conference on the Environment (AMCEN) on the African common position on climate change at international negotiations;

Reconnaissant la coordination par la Conférence Africaine des Chefs d'Etat et de Gouvernement sur les changements climatiques (CAHOSCC), dirigée par le défunt Premier Ministre Meles Zenawi, et de la Conférence Ministérielle Africaine sur l'Environnement (CMAE) sur la position africaine commune sur le changement climatique lors des négociations internationales;

Recalling that through the Declaration on Climate Change and Development in Africa, at the 8th Ordinary Session of the African Union Assembly, in January 2007

Rappelant que dans la Déclaration sur les Changements Climatiques et le Développement en Afrique, lors de la

(Assembly/AU/Decl.4 (VIII)), the Heads of State and Government of the African Union commit to “foster and strengthen cooperation between National Meteorological and Hydrological Services (NMHSs), Regional Climate Centres (RCCs), Regional Economic Communities (RECs) and institutions on matters of climate variability and climate change”, and “to strengthen current African Regional and sub-regional climate centres of excellence to address climate change and variability prediction as well as in the development of climate applications decision tools”;

Reiterating that a better understanding of climate variability and climate change is required to support the decision making process in Africa, so that investments for climate risk management, mitigation and adaptation actions are based on reliable climate information;

Recognising the decision of the Heads of State and Government at the 3rd World Climate Conference (WCC-3) to establish a Global Framework for Climate Services (GFCS), spearheaded by the World Meteorological Organization (WMO);

Also recognising that the GFCS will “enable better management of the risks of climate variability and change and adaptation to climate change, through the development and incorporation of science-based climate information and prediction into planning, policy and practice on the global, regional and national scale”;

Noting that the WMO Extraordinary Congress plans to approve in October 2012 the GFCS Implementation Plan and its governance mechanism;

Taking into account that the First Conference of Ministers responsible for Meteorology in Africa agreed in April 2010, in Nairobi, to establish the African Ministerial Conference on Meteorology (AMCOMET) and to take the necessary measures to “develop an African Strategy on Meteorology (weather and climate services)”, which will be discussed and adopted at the second session of AMCOMET in October 2012;

Noting that African countries, at the fifteenth session of WMO Regional Association for Africa (WMO RA-I) in

8^{ème} session ordinaire de l'Assemblée de l'Union Africaine, en Janvier 2007 (Assembly/AU/Decl.4 (VIII)), les chefs d'État et de Gouvernement de l'Union africaine s'engagent à “promouvoir et renforcer la coopération entre les Services météorologiques et hydrologiques nationaux (SMHN), les centres climatologiques régionaux (CCR), les Communautés économiques régionales (CER) et les institutions sur les questions de la variation du climat et du changement climatique”, et “de renforcer les centres d'excellence régionaux et sous-régionaux africains actuels pour s'occuper des prévisions du changement et de la variation climatique ainsi que du développement d'outils de décision appliqués au climat”;

Rappelant qu'une meilleure compréhension de la variation et du changement climatiques est nécessaire pour appuyer les processus décisionnels en Afrique, afin que les investissements pour la gestion et l'atténuation des risques climatiques et les mesures d'adaptation soient basés sur des informations climatiques fiables;

Reconnaissant la décision des Chefs d'Etat et de Gouvernement lors de la 3^{ème} Conférence Mondiale sur le Climat (CMC-3) d'instaurer un Cadre mondial pour les services climatologiques (CMSC), sous l'égide de l'Organisation météorologique mondiale (OMM);

Également conscient que le CMSC “permettra une meilleure gestion des risques liés à la variation et au changement climatiques et de l'adaptation au changement climatique, à travers le développement et l'intégration des informations et prévisions climatologiques scientifiquement fondées pour la planification, les politiques et les pratiques aux échelles mondiale, régionale et nationale”;

Notant que le Congrès extraordinaire de l'OMM en Octobre 2012 envisage d'approuver le Plan de mise en œuvre du CMSC et son mécanisme de gouvernance;

Prenant en compte que la première Conférence des ministres responsables de la météorologie en Afrique, tenue en Avril 2010 à Nairobi pour établir la Conférence ministérielle africaine sur la météorologie (AMCOMET) à recommander de prendre les mesures nécessaires pour “développer une stratégie africaine sur la météorologie (services météorologiques et climatologiques)”, qui sera discutée et adoptée lors de la deuxième session de l'AMCOMET en Octobre 2012;

Marrakech, November 2010, reaffirmed their intent to establish Regional Climate Centres (WMO RCCs) to serve the climate information needs in Africa;

Further noting that the WMO RA-I expressed the need to establish one RCC in each of the Regional Economic Communities (RECs) and a pan-African RCC at ACMAD, with a coordinating role;

Also taking into account that Climate for Development in Africa (ClimDev Africa), a joint initiative of the African Union Commission (AUC), the United Nations Economic Commission for Africa (UNECA) and the African Development Bank, aims at addressing “the need for greatly improved climate information for Africa to also strengthening the use of such information for decision-making, by improving analytical capacity, knowledge management and dissemination activities”;

Further taking into account that climate related activities are important elements of the Joint Africa EU Strategy (JAES) and its related Action Plans, in close links with the Global Climate Change Alliance (GCCA);

Considering that the Monitoring of Environment and Security in Africa (MESA), a project funded by the European Development Fund (EDF), includes efforts to support development and strengthening of operational regional climate services in Africa;

Recognising the efforts of African institutions on addressing climate change and climate variability, in particular the Regional Economic Communities and other intergovernmental organisations;

Convinced that the implementation of GFCS in Africa will:

Notant que les pays africains, à la quinzième session du Conseil régional pour l'Afrique (OMM CR-I) à Marrakech, en Novembre 2010, ont réaffirmé leur intention d'établir des centres climatologiques régionaux (CCR OMM) pour répondre aux besoins d'information climatique en Afrique;

Notant en outre que l'OMM CR-I a exprimé la nécessité d'établir un CCR dans chacune des Communautés économiques régionales (CER) et un RCC panafricain à l'ACMAD, avec un rôle de coordination;

Tenant compte également que le “Climat pour le développement en Afrique” (ClimDev Afrique), une initiative conjointe de la Commission de l'Union africaine (CUA), la Commission économique pour l'Afrique des Nations Unies (UN-CEA) et la Banque africaine de développement, vise à répondre à “la nécessité d'améliorer considérablement l'information climatique pour l'Afrique et aussi de renforcer l'utilisation de ces informations pour la prise de décision par l'amélioration de la capacité d'analyse, de gestion des connaissances et d'activités de diffusion”;

Prenant en outre en compte que les activités liées au climat sont des éléments importants de la Stratégie Commune Afrique-UE (SCAU) et de ses plans d'action connexes, en relation étroite avec l'Alliance mondiale contre le changement climatique (AMCC);

Considérant que la Surveillance de l'environnement et de la sécurité en Afrique (MESA), un projet financé par le Fonds européen de développement (FED), vise à contribuer au développement et au renforcement de services climatiques opérationnels régionaux en Afrique;

Reconnaissant les efforts des institutions africaines relatifs au changement et la variation climatiques, en particulier les Communautés économiques régionales et d'autres organisations intergouvernementales;

Convaincus que la mise en œuvre du CMSC en Afrique :

- **further enable** African institutions to contribute to and benefit from the results of the international cooperation efforts in the area of Climate Services particularly through better access to knowledge and technologies in climate monitoring, prediction and projection;
- **further enable** Africa to develop a Climate Risk Management Strategy taking into the account the specificity and vulnerability of its Small Island Developing States;
- **provide** a framework for facilitating the coherent development and provision of climate services in Africa at continental, regional and national levels;
- **further organise** climate activities in Africa to ensure an efficient mobilisation and use of resources;
- **facilitate** synergies and harmonisation between existing and upcoming climate related projects in Africa (e.g. ClimDev Africa, MESA, etc.);
- **permettra** aux institutions africaines de contribuer et de bénéficier des résultats des efforts de la coopération internationale dans le domaine des services climatologiques, notamment par un meilleur accès aux connaissances et aux technologies de la surveillance du climat, de la prévision et des projections climatiques;
- **permettra** à l'Afrique de développer une stratégie de gestion des risques climatiques en tenant compte de la spécificité et de la vulnérabilité de ses petits États insulaires;
- **fournira** un cadre pour faciliter le développement cohérent et la fourniture de services climatologiques en Afrique au niveau continental, régional et national;
- **structurera** les activités du climat en Afrique pour assurer une mobilisation et une utilisation efficace des ressources;
- **facilitera** les synergies et l'harmonisation entre les projets existants et futurs liés au climat en Afrique (par exemple ClimDev Afrique, MESA, etc.);

Solemnly agreed to:

- **Support** the implementation of the Global Framework for Climate Services in Africa to ensure that the African Union Commission, the Regional Economic Communities and their Member States are enabled to establish and strengthen climate services;

Convenons solennellement de:

- **Soutenir** la mise en œuvre du Cadre mondial pour les services climatologiques en Afrique pour faire en sorte que la Commission de l'Union africaine, les Communautés économiques régionales et leurs États membres soient capables d'établir et de renforcer des

services climatologiques;

- **Support** the efforts of AMCOMET to adopt, at its second session, the "African Strategy on Meteorology (weather and climate services)" taking into account the mandate and experience of the existing regional climate centres in Africa (ACMAD, AGRHYMET, ICPAC, SADC-CSC), as well as the overall GFCS implementation structure;
- **Provide** support to CEMAC and IOC in the establishment of Regional Climate Centres in the Central African and Indian ocean regions;
- **Request** AMCOMET and the WMO Regional Association for Africa (RA-I) to expeditiously implement the Strategy through the RECs and their Member States;
- **Request** the European Union and the African Union Commission to include the GFCS implementation in Africa within the Partnership on Climate and Environment of the Joint Africa EU Strategy and to identify funds for its implementation (for example, through the European Development Fund and Global Climate Change Alliance) at continental, regional and national levels;
- **Request** the African Union Commission to reinforce its leading role in reaching a common African position in climate change negotiations and in the implementation of GFCS in Africa;
- **Soutenir** les efforts de l'AMCOMET pour adopter lors de sa deuxième session, la "stratégie africaine sur la météorologie (services météorologiques et climatiques)" en tenant compte du mandat et de l'expérience des centres climatiques régionaux existants en Afrique (ACMAD, AGRHYMET, ICPAC, SADC-CSC), ainsi que de la structure globale de mise en œuvre du CMSC;
- **Fournir** un appui à la CEMAC et à la COI dans la mise en place de centres climatologiques régionaux dans les régions d'Afrique centrale et de l'océan Indien;
- **Demander** à AMCOMET et au Conseil régional pour l'Afrique (CR-I) de mettre rapidement en œuvre la stratégie à travers les CER et leurs États membres;
- **Demander** à l'Union européenne et à la Commission de l'Union Africaine d'inclure la mise en œuvre du CMSC en Afrique au sein du Partenariat sur le climat et l'environnement de la Stratégie conjointe Afrique-EU et d'identifier les fonds pour sa mise en œuvre (par exemple, par l'intermédiaire du Fonds européen de développement et l'Alliance Mondiale contre le Changement Climatique) aux niveaux continental, régional et national;
- **Demander** à la Commission de l'Union Africaine de renforcer son rôle moteur dans la construction d'une position africain commune dans les négociations liés aux changements climatiques et dans la mise en œuvre du CMSC en Afrique.

- **Request** the international community to provide resources for the implementation of GFCS in Africa;
- **Demander** à la communauté internationale de fournir des ressources pour la mise en œuvre du CMSC en Afrique;
- **Urge** WMO to strengthen the African Regional Climate Centre in the provision of climate services to Africa through the Regional Climate Outlook Forums;
- **Inciter** l'OMM à renforcer les Centres climatologiques régionaux africains pour la fourniture de services climatologiques en Afrique par le biais des forums régionaux de prévision climatique;

Kindly request:

- H.E. Ato Alemayehu TEGENU, Minister of Water and Energy of the Federal Democratic Republic of Ethiopia to bring this Declaration to the attention of the 2nd session of the AMCOMET meeting and to the WMO Extraordinary Congress on GFCS in October 2012;
- the African Union Commission to bring this Declaration to the attention of the international community and the European Union in particular.

Invitons:

- S.E. Ato Alemayehu Tegenu, Ministre de l'Eau et de l'Energie de la République fédérale démocratique d'Ethiopie de porter la présente Déclaration à l'attention de la 2e session de la réunion AMCOMET et au Congrès Extraordinaire de l'OMM sur le CMSC en Octobre 2012;
- la Commission de l'Union Africaine de porter la présente Déclaration à l'attention de la communauté internationale et l'Union européenne en particulier.

Done in Addis Ababa, Federal Democratic Republic of Ethiopia= on Sunday 30 September 2012.

Fait à Addis-Abeba, République démocratique fédérale d'Ethiopie, le dimanche 30 Septembre 2012.

ANNEX 7: REFERENCES

Inputs into the Strategy were sourced from a variety of sources, the following some which are:

The World Meteorological Organisation

UN Istanbul Programme of Action for LDCs (2011-2020)

ISDR Extended Programme of Action for the Implementation of the Africa Regional Strategy for DRR (2006-2015)

International Committee of the Red Cross

World Economic Forum Climate Change Initiatives

Rio +20

Global Climate Observing System

United Nations Environment Programme (UNEP)

World Bank

World Resources Institute

Food and Agriculture Organisation (FAO)

UN-Water

International Civil Aviation Organisation (ICAO)

G8, G20 and BRICS strategies on climate change

African Union Commission (Climate Change Strategy)

African Ministerial Council on Water (AMCOW)

African Ministerial Conference on Environment (AMCEN)

African Ministerial Conference on Science and Technology AMCOST ()

WMO RA I Strategic Plan

Regional Economic Groupings (IGAD, SADC, ECOWAS, ECCAS (Libreville), Union of Maghreb Arab - UMA) plus Indian Ocean Commission (IOC)

ClimDev Africa (ECA, AfDB and AUC) implemented by ACPC (Secretariat of ClimDev)

Maputo Convention

Multilateral Environmental Agreements

AMESD (Regional Implementation Centres) followed by MESA

AU-EU Africa Strategy

China-Africa Partnership



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