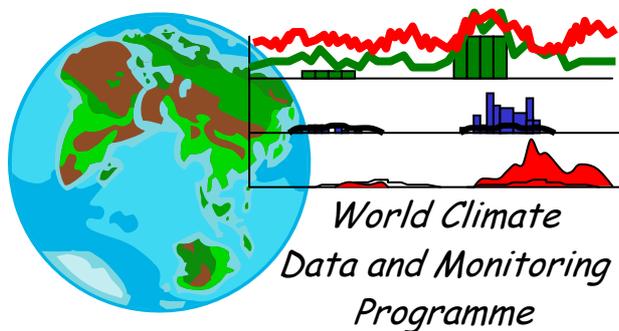


**REPORT OF THE RA I WORKING GROUP
ON CLIMATE MATTERS
(Dakar, Senegal, 22-24 February 2006)**

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**REPORT OF THE MEETING OF THE RA I WORKING GROUP
ON CLIMATE MATTERS
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Submitted by Dr Richard Mugara, Chairperson of the Working Group
On behalf of the Working Group Members

1. Introduction

WMO Regional Association I (Africa), at its Thirteenth Session in Mbabane, Swaziland, 20-28 May 2002, agreed to establish a Working Group on Climate Matters (see attached Annex 1). The resolution established the Working Group on Climate Matters (WG CM) with stated Terms of Reference and specified Rapporteurs and Focal Points from member countries of RA I. During the four-year period (2002 – 2006), the Chair of the working group relocated to WMO Headquarters. Because of the vacuum left as to who should organize the activities of the Working Group, the Working Group only met in February 2006 at the initiative of WMO to hold the meeting.

At the kind invitation of the Government of Senegal, the Working Group on Climate Matters held its first meeting in Dakar from 7-10 February 2006 (see Annex 2 for List of Participants). Dr Richard Mugara from Zambia was chosen as the acting Chair of the Working Group.

The meeting was opened by Mr Mactar Ndiaye the Permanent Representative of Senegal with WMO. Other speakers were Mr Omar Baddour Chief of the WMO World Climate Data and Monitoring Programme and Dr Richard Mugara, Acting Chair, RA I WGRCM. After the opening session, the meeting participants approved the Provisional Agenda as shown in Annex 3.

The main objective of the meeting was to provide WMO Regional Association I information, proposals and recommendations on how to strengthen, implement and improve regional climate activities/services for use by RA I members, including decision makers. This was with a view to enhance sustainability, risk management and disaster preparedness and response actions. The meeting was expected to have the following deliverables:

Recommendations on methods to strengthen and improve climate observations, data management and monitoring and provision of data sets in collaboration with Commissions of Climatology and Basic Systems OPAGs, Intergovernmental Oceanographic Commission, and other related regional programmes and organizations;

Advice on the various climate data and climate applications projects and methods to implement these projects in collaboration with other organizations;

Report on regional activities concerning climate extremes, indices and indicators for climate change detection;

Advice on climate related education and training needs in the region, status of on-going training programmes, and recommendations on meeting the needs not currently being met; and Recommendations/proposals on the way forward to the establishment of Regional Climate Centre(s) in RA I.

2. Observations, Data Management and Global Climate Observing System

Mr Epiphane D. AHLONSOU (Benin), the WMO RA I Rapporteur on Observations, Data Management and GCOS Activities, presented some important developments and challenges associated with the activities of observations, Data Management and Global Climate Observing System in RA I. An overview on the main issues related to Observations, Data Management and Global Climate Observing System (GCOS) activities, particularly in the context of African countries (WMO-RAI) was given. On the basis of experiences and evaluations conducted in most African countries, major problems associated with each activity have been identified.

The Rapporteur made general diagnostic of the main weaknesses in RA I as follows:

2.1 Observation Network

The declining station networks and obsolete data transmission systems as shown in the data gaps from the Region;

- The Management of the observing networks, including maintenance and inspection activities is not adequate due to lack of regular maintenance and inspection of the observing networks;
- Quality of observations is poor as a result of limited financial resources allocated to the management of the observing networks;
- Chronic shortage of consumable materials;
- Obsolete data transmission systems;
- Limited number of qualified human resources;
- Lack of regular maintenance and inspection of the observing networks;
- Poor computing facilities and their limited maintenance;
- Limited financial resources allocated to the management of the observing networks and database management activities;
- Continuous deterioration of current observing systems;

2.2 Data management

The WG noted that despite considerable efforts undertaken by WMO/WCDMP in moving from the obsolete CLICOM to new CDMSs and Rescuing data in RA I, it remains many other that were identified as being:

- Gaps in climatological data sets;
- Data collection and quality control process is poor due to poor computing resources and lack of maintenance of the computer systems;
- Functioning problems with existing / current data management systems in some countries still based on CLICOM software;
- There is limited data access / exchange and user services due to lack of access to efficient INTERNET facilities;
- Lack of sufficient qualified human resources for data rescue or archives management.

2.3 The Global Climate Observing System (GCOS)

The WG noted that climate monitoring, analysis and prediction and related decision-making rely on comprehensive observations of the climate system, reliable and long-term observational data. There is evidence that observing networks are declining, and obsolete transmission systems or poor communication means, data gaps and a lack of qualified human resources are major common problems in Africa. These challenges or shortcomings make it difficult for conducting climate monitoring, analysis, prediction, studies and research in the region. To solve these problems or to meet the requirements of observation, data management and GCOS activities in the region, there is a strong need to elaborate and implement strategic plans for the development of existing networks, transmission systems and human capacities and to mobilize financial resources through various sources to support national and regional efforts in this regard.

The WG noted the observations by the Rapporteur that the Global Climate Observing System (GCOS) aims to ensure that the observations and information needed to address climate-related issues are obtained and made available to all potential users. The main issues were highlighted as:

- The limited knowledge on the state of the current atmospheric, oceanic and terrestrial observing systems in RA I and regional needs for climate system monitoring, climate change detection, economic development and research activities;
- Lack of / limited Regional Action Plans for GCOS addressing GCOS activities due to the deterioration of current observing systems;
- The non-existence of national plans for GCOS activities in most of African countries
- Limited co-ordination of observational concerns and requirements with GCOS Office;
- Insufficient climate-related observations to meet the needs of the United Nations Framework Convention on Climate Change (UNFCCC) and the IPCC process.

3. Climate system monitoring, CLIVAR analysis, Indices, and the IPCC Process

The WMO RA I Rapporteur on Climate System Monitoring, Indices and Indicators for Climate Change Detection, CLIVAR Analysis, and the activities of the IPCC Process, Dr Richard Mugara from Zambia, presented a report to the Working Group. It was emphasized that there are four main areas to consider. Two are dealing with climate system monitoring, indices and indicators for climate change detection, and the third is dealing with CLIVAR analysis. The fourth deals with the activities of the IPCC process.

3.1 Climate System Monitoring

The Working Group was informed of the observation that most of the climate system monitoring that is done at national level is not published but kept in the archives. Regional level climate monitoring is done as a reaction to some natural disasters, rather than as routine monitoring tool. Even where climate system monitoring is being done on a limited scale, concentration is on the atmospheric part of the climate system. Little is being done concerning other components of the climate system, which include the hydrosphere (including soil moisture), the land surface and the biosphere. In addition, the direct effect of human activities on the climate system needs to be considered.

As an example, it was mentioned that most rainfall in tropical Africa results from organized convection and is critical to the climate processes in Africa. But the physical and other processes of the African climate system has received little attention.

The WG was informed of the need for continuing regional initiatives such regional workshops on climate change detection and monitoring. Such workshops would provide an exchange of knowledge and information between scientists from RA I and other regions on methodologies of climate systems monitoring.

3.2 Indices and indicators for climate change detection

As regards climate change detection, the WG noted that very little is going on at regional level in the development of indices and indicators for climate change detection in the African region. Taking the lead in this area is the IPCC process. The development of indices and indicators for climate change detection crucially depends on the length of the available data sets. There is therefore need for development of capacity at national and regional levels to carry out climate detection activities.

3.3 CLIVAR Analysis

The WG was reminded that climate variability and climate change have a major impact on the national economies of RA I, but large gaps exist in the understanding of the many features of the African climate. The primary focus of CLIVAR Africa is the predictability of seasonal to inter-annual timescales. This would require a solid understanding of the space-time characteristics of the major climate processes of the region.

The WG was reminded of some of key issues to be considered in inter-annual and predictability of the African climate that include:

What are the local factors or indices that modulate the African climate?

What are the limits for the spatial distribution and predictability of the African climate?

How can forecasters merge multiple predictions in an optimal manner?

The Rapporteur informed the WG about the efforts of the International CLIVAR Africa Programme on Climate Research for Africa. This was an initiative of the WMO co-sponsored World Climate Research Programme (WCRP), and the recommendations put forward by the Programme, that included the following:

- Developing regional data and information systems for calibration of models over Africa and other uses;
- Characterization and understanding of the observed climatology of African climate;
- Developing regional research initiatives and capabilities towards a better understanding of the variability and predictability of the continental climate;
- Providing decision makers with a firmer scientific basis for regional strategic planning efforts leading to the development of useful products.

3.4 The IPCC process

It is noted that the process of producing the fourth assessment report started in 2005, but it is still unclear as to what extent are scientists from the RA I region are involved. The IPCC process selects the coordinating lead authors and lead authors. While geographical representation is sometimes taken into consideration, there is still need to enhance the participation of scientists from RA I in the IPCC process.

One of the weaknesses of scientists from the African region to participating in the IPCC process is lack of peer-reviewed papers from the scientists of the region. There is need to find a way of having the numerous internal publications that are available in the NMHSs published in some peer-reviewed journals.

4. CLIPS activities in RA I

A synopsis of CLIPS activities in RA I was presented by Mr Nacef Laamri from Algeria and Emmanuel Mpeta from Tanzania, focusing on Northern, Eastern and Southern Africa, respectively. The Group discussed the report; other information on CLIPS activities across the region was provided from invited experts and the WMO representative in particular regarding Climate Outlook Forums and the Capacity building efforts undertaken through CLIPS in collaboration with regional and international institutions. Summary of the discussions is provided in section 4.1 and 4.2

4.1 Regional Climate Outlook Forum

The Working Group noted the role of climate outlook forums that have taken place over the years in southern, Eastern, Western Africa and Central Africa. These have been organized by the DMC – Harare, DMC – Nairobi (now renamed IGAD Climate Prediction and Applications Centre (ICPAC) and ACMAD.

In ensuring that weather and climate information reaches the user community, the Working Group noted the efforts made by Regional Climate Outlook Forums (RCOFs) and the importance of involving the user community at these forums. As it has been the case since the inception of these gatherings, capacity building has always preceded climate outlook forums.

The Southern Africa Regional Climate Outlook Forum (SARCOF) has been held regularly in September/October since 1997 followed by an update meeting in December. Similarly, Climate Outlook Forum for the Greater Horn of Africa (GHARCOF) is held regularly in February and late August. The West African climate outlook forum (PRESAO) covers the West African domain and

includes as well Chad, Cameroon, Sudan, Ethiopia and Eritrea and focus on July-August-September Rainy season, It has been held regularly in late May-early June since 1998 with a forecast update made by ACMAD in July ACMAD also organizes at less regular basis the Central Africa Climate Outlook Forum PRESAC, for the Rainy Season September-October-November-December.

These Forums bring together producers of seasonal forecasts (Representatives from NMHSs and International centers) and users of weather and climate information from various sectors (e.g. Agriculture, Hydrology, Health, Insurance, Energy, disaster management and mitigation, media, etc.).

Based on the very positive outcome from these Forums A number of countries in RA I have held subsequently national workshops with the various stakeholders in an effort to educate users on how to use weather and climate forecasts in different sectors.

The WG noted that despite the advances made in information technology, it is still a big challenge in most countries in Africa to pass climate forecast and information to rural people.

4.2 Capacity building

The WG was informed about the efforts being done by the CLIPS project in terms of capacity building in the region in collaboration with the regional centers in RA I namely ACMAD, ICPAC and DMC-Harare and various international institutions and organisations. These efforts led to a sustained process within NMHSs based on a well ACMAD/CLIPS designed capacity building package including 4 to 6 weeks training workshops for climatologists and provision of computer and software Licence to each participant to these workshops. Other back-to-back workshops were also organized for various users communities such as food security, agriculture, water resources and health. More efforts is supposed to be done by the meteorological community in trying educate different users on how to integrate weather and climate forecast as many complain that they do not understand these forecasts.

It was noted that CLIPS focal points have been identified in RA I and limited capacity building has been carried out.

Discussions focused on the need for moving toward new techniques than the widely used statistical methods in seasonal rainfall forecasting and for verification of the RCOFs forecasts and the need for more research to understand the climate variability in the region.

5. Climate-Related Education and Training needs

The Rapporteur on climate-related Education and Training needs in RA I, Mr Barnabas Chipindu from Zimbabwe presented the report to the WG. The Working Group took into consideration the content of the report and noted that training in all aspects of climate is vital if the National Meteorological and Hydrological Services (NMHS) are to provide high quality services and information to the public and private users.

The meeting was informed that some NMHS offer in-service training at the level of the World Meteorological Organization (WMO) Classes IV and III. Until recently, the region had very few institutions offering climate-related education and training at WMO Classes II and I levels.

5.1 List of RA I Education and Training Institutions

The meeting took note that WMO has redefined the classes of training modules. However, it was noted that most NMHS personnel were trained in developed countries, e.g. Australia, France, Germany, Russia, United Kingdom (UK), United States of America (USA), etc. There are now many institutions within the region offering climate-related education and training at various levels ranging from WMO Class IV – I. Some NMHS personnel are not aware of these institutions

resulting in them applying for training in developed countries at great cost to their countries. Some of the institutions that offer climate-related education and training in Africa are shown in Table 1.

Table 1: Institutions that offer climate-related education and training

INSTITUTION	LOCATION	LEVEL OF TRAINING
National Hydromet Institute, IHFR	Algeria	Under and Postgraduate
African School of Meteorology, EAMAC	Niger	Under and Postgraduate
Polytechnic School	Senegal	Postgraduate
Akure Training Centre	Nigeria	Under and Postgraduate
University of Ile Ife	Nigeria	Under and Postgraduate
University of Lagos	Nigeria	Under and Postgraduate
AGRIHYMET	Niger	Under and Postgraduate
University of Nairobi	Kenya	Under and Postgraduate
Institute of Meteorological Training and Research	Kenya	Diploma
University of Makerere	Uganda	Postgraduate
Sokoine University	Tanzania	Under and Postgraduate
University of Zimbabwe	Zimbabwe	Under and Postgraduate
Bindura University of Science and Education	Zimbabwe	Undergraduate
University of Pretoria	South Africa	Under and Postgraduate
University of Cape Town	South Africa	Under and Postgraduate
University of Orange Free State	South Africa	Under and Postgraduate
University of Zululand	South Africa	Under and Postgraduate
University of Witzwatersrand	South Africa	Under and Postgraduate
University of Yaonde	Cameroon	Under and Postgraduate
Eduardo Mondlane	Mozambique	Under and Postgraduate

The WG will work with the Rapporteur to build a list of training and education institutions in RA I.

5.2 Development of RA I Education and Training Catalogue

The WG endorsed the need to develop a questionnaire to be sent to Permanent representatives in order to make a detailed catalogue of these institutions including the curriculum, area of specialization and duration of training.

There were issues raised regarding the out of date of some training courses within RA I specialized training centres, for which there is a need for an update of their curriculum to take into account new technology, methods and needs in the field of meteorology.

6. Regional Climate Center(s)

6.1 WMO presentation on RCC

The WG took recognisance of and noted the presentation made by Mr Omar Baddour from the WMO Secretariat on the establishment of the RCCs in RA I based on the WMO/CCI Guidelines on the establishment of Regional Climate Centres which was published in 2003. The products and services of an RCC will be regional in nature, but defined and distributed by the NMHSs. It was emphasized that warnings and watches remain exclusive responsibility of NMHSs.

It was noted as well that Universities or other scientific organizations could provide some services. Some regions may choose to contract some work to private sector. Mr Baddour explained the various steps to follow in the process of establishing an RCCs as well as the formal designation of An RCC as described in the CBS Manual for GDPS if the region decided to go through formal designation process

6.2 Regional activities and achievements

The WG was briefed on the status of establishing RCCs in other regions of WMO and informed that the services and support that the RCCs will perform vary from region to region, depending on the needs of the Members. Possible functions of the RCCs being considered were:

- Operational production of Seasonal to Inter-annual Prediction (SIP) and climate products, etc;
- Coordination and communications support;
- Data management services;
- Training and capacity building;
- Research and development activities.

6.3 Status of RCCs in RA I

During the discussions, the Group recognised the presentation made by Mr Omar Baddour from WMO on Regional Climate Centers and noted the slowness of the process to establish RCCs in RA I compared to other Regions. Therefore the urgent actions should focus on:

- Develop and circulate as soon as possible among RA I Members a questionnaire with regard to the need and mode of establishing the RCCs and look for an optimal RCC structure for RA I among possible option:
 - Single, multi-functional RCC;
 - Distributed RCC (several centres, unique focus);
 - Multiple RCCs (several multi-functional centres);
 - Virtual RCC (several nodes, managed virtually)
- Consider the possibility of building upon existing regional climate entities such as ACMAD, DMC-Harare and ICPAC as the way forward to accelerating the process.

7. Climate Activities at sub-regional and national levels of Africa

The WG invited some experts who presented on the climate activities at sub-regional and national levels.

7.1 Climate Activities in Eastern Africa

Dr Ouma, from Kenya on behalf of IGAD Climate Prediction and Applications Centre (ICPAC) informed the WG of the activities regarding climate activities of Eastern Africa as presented:

The meeting was informed that rainfall is the most important climatic factor to many East African countries and its Inter-annual variability has a major impact on their national economies. Extreme rainfall anomalies result into droughts and floods, which are often associated with food and water shortages, loss of life and property and many other socio-economic disruptions;

The meeting was informed of the need for Monitoring, Prediction and Timely Early Warning of weather and climate information. Accurate seasonal to inter-annual climate monitoring and forecasting is crucial for proper planning and management of all climate sensitive activities;

The Centre carries out climate monitoring activities including the monitoring of glaciers at Mount Kilimanjaro, Kenya and Ruwenzori;

It was reported that the centre has a dynamical modelling unit with capacity to carry out regional dynamical climate modelling;
ICPAC works with the member countries to improve the climate observation network in the region in order to ensure availability of continuous high quality data that are required for climate change detection, attribution and other applications;
ICPAC uses the available database to develop some regional climate maps of climate change, current/future monitoring, modelling, detection, attribution, and impacts/vulnerability assessments;
Climate information and prediction services climate change capacity building are being carried out at the Centre;
ICPAC has strong education and awareness programmes that include organization of climate users' forum twice a year. Close links with the media sector - a regional network for the climate and the media experts;
Several pilot studies addressing various climate risk management challenges, and coping with climate variability and Changes have been carried out with a number of partners. These include partners from Agriculture and livestock sector, Water resources, Energy, Health, Transport (Air, road, and water systems), Tourism, Wildlife, Hotels, and recreation sectors, Infrastructure and Constructions, Environment management;
ICPAC has a section that is responsible for all matters related to acquisition, processing and safe repository of relevant data for climate monitoring, prediction and impact assessment activities for the region, including data rescue;

7.2 Climate Activities in Western Africa

The WG noted the climate activities being done in Western Africa as presented by Mr Kamga of ACMAD:

The meeting was informed of the challenges as regards climate activities at ACMAD to include insufficient infrastructure and skilled labour for operational production and dissemination of weather/climate information for Africa, research and Development of applications;
ACMAD carries out operational climatology (basic statistics, composite analysis, production of climate summary), seasonal climate prediction (basic statistics, PCA, SVA, statistical and dynamical tools for seasonal forecasting, AGCMs, CGCMs, CSMs), climate change detection and projection (Global/regional modelling, validation, installation and running of regional models, Analysis and interpretation of scenarios);
ACMAD also carries out research activities that include development of seasonal and intraseasonal climate prediction, research and applications, projects development and implementation of forecasts demonstration projects, validation of global climate models for impacts and adaptation studies, simulation and validation of regional climate models for downscaling seasonal forecast and climate change scenarios, and analysis of climate data for climate change detection;
Capacity building activities include climate outlook forums, workshops, training, etc;
It was noted that regional climate forums are replicated at nation level.

7.3 Climate Activities in Southern Africa

The WG was informed of the activities regarding climate activities of Southern Africa as presented by Mr B. Chipindu, Zimbabwe on behalf of the Drought Monitoring Centre, Harare:

The meeting was informed that the Drought Monitoring Centre (DMC) is an institution of Southern African Development Community (SADC) comprising 14 member states with well over 200 million inhabitants. The SADC countries experience recurrent climatic extremes such as droughts, floods, tropical cyclones, which often result in negative impacts on socio-economic development of the Member States;
The provision of early warning for the formulation of appropriate strategies to combat the adverse effects of climate extremes affords greater opportunity to decision-makers for development of prudent plans for mitigating the negative impacts on socio-economic. Since, establishment, the center has played an important and useful role in providing the sub-region with weather and

climate advisories and more importantly, timely early warning on drought, floods and other extreme climate events;

The carries out operational activities that include developing and archiving of global, regional and national quality controlled climate databanks, providing of climate monitoring, prediction and application services, conducting training and capacity building activities in the generation and application of climate products, organizing the climate and malaria outlook forums for the SADC region, and enhancing the interactions with the user through regional users workshops and application pilot projects;

The centre also carries out capacity building activities to develop climate monitoring and prediction techniques for developing the Southern Africa Region Climate Outlook Forum (SARCOF) products, providing training to SADC NMHSs staff through capacity building workshops and SARCOF;

Strengthening links with users from sectors such as health, food security (early warning systems), water resources management, media, tourism industry, etc;

SARCOF acts as a platform for interaction between the users and the climate scientists to enhance the application of meteorology to the reduction of climate related risks to food security, water resources and health for sustainable socio-economic development in the SADC region;

7.4 Climate Activities over Northern Africa

Mr Rachid Sebbari from Morocco informed the WG on the activities over northern Africa. The WG was informed of the Almassifa project that is being implemented in collaboration between Morocco, Algeria, Tunisia and France. Emphasis was laid on communication between meteorological personnel and users of climatic information. The main points discussed were:

Data acquisition and management is one of the main important activities in North Africa. CLICOM software has been used for several years and most countries have already moved to a new system based on RDBMS (Tunisia in 1998 and Morocco in 2002, Egypt in 2004, Libya currently). The Moroccan database management system is composed of a central database and four regional databases. It ensures the control and quality check of climatological data and the products of end-users products such as wind roses etc. The database is under Oracle.

To study climate change, a CCI/CLIVAR workshop to develop priority climate indices took place in Casablanca in 2001. A series of climate indices has been developed and are regularly updated at the Moroccan Meteorological Office. However many issues needs to be addressed at the international level like defining a unique homogenization method for monthly and daily data and evaluation of climate change impacts on agriculture and water resources on North Africa.

Through the seasonal forecast project Al Masifa, and with the collaboration of the Météo-France, Morocco, Algeria and Tunisia have explored and developed tools to make seasonal precipitation forecast. The studies led to a statistical model, which uses sea surface temperature anomalies over the tropical ocean pacific in October-November-December to make prediction of precipitation for February-March-April over Morocco. Also, the skill of the Arpege-Climate model has been evaluated and this model is now running since 1998 on the DMN super-Calculator (IBM) to make seasonal prediction every month using sea surface temperature anomalies over the oceans as forcing.

The precipitation forecasts are experimental and are disseminated to high authorities, public work ministry, hydrological services and agriculture services. The objectives are to develop and demonstrate applications, which address practical societal needs, and to establish interactive dialogue with primary users.

As examples for the use of seasonal information in Morocco, in the water resource management sector, two useful forecasts information's for the management of the Al Wahda Dam were elaborated. When the reservoir was full, the decision to turbine was based on seasonal forecast.

7.5 Climate Activities in Senegal, Cape Verde and Sao Tome and Principe

Dr Mariane Diop- Kane and Mr Bamar Diagne presented the methods used in seasonal rainfall forecasting in Senegal. The WG was also informed about the user assessment survey conducted by the DMN of Senegal and its implications on agricultural activities in the country.

Mr Francisco Correia informed the WG on the activities of the National institute of Meteorology and Geophysics of Cape Verde. The main challenge facing the country was the dwindling observation network. Efforts are being made to convert seasonal forecasts into a range of probable rainfall values.

The WG was informed by the participant from Sao Tome and Principe that the country had 20 climate stations but these have since reduced to less than five, resulting in the none production of climate products. It is included in the NAPA project to re-establish five more stations.

8. Recommendations

The RA I working Group on Climate Related Matters issued the following Recommendations On the Main Items In the Agenda

8.1 Observations, Data Management and GCOS Activities

The Working Group on Climate Matters urged Member countries of RA I to support their National Meteorological and Hydrological Services (NMHS) and recommended:

- 8.1.1** Strengthen, rehabilitate, modernize and integrate observation and data transmission networks (Action by NMSs, WMO);
- 8.1.2** Adopt and implement new data management systems, that are compatible with different databases, including data rescue systems (Action by NMSs);
- 8.1.3** Consider creating a pool of consumables for surface and upper air observations (Action by NMSs) and
- 8.1.4** Develop plans for implementation of GCOS activities (Action by NMSs).

8.2 Climate System Monitoring, Analyses, Indices and IPCC Process

The Working Group on Climate Matters recommends that there is a need to:

- 8.2.1** Expand/broaden climate system monitoring to include other climate components such as the hydrosphere and ecosystems; (Action- NMHS, Universities, RCCs);

Analyse climatological data and develop indices and climate change scenarios. (Action- NMHS, Universities, RCCs);

- 8.2.2** Publish research results nationally, regionally and internationally; (Action- NMHS, Universities, RCCs);
- 8.2.3** Build capacity at national and regional level in order to ensure increased participation by regional scientists in the IPCC process. (NMHS, WCP, WCRP/CLIVAR, Universities, RCCs).

8.3 CLIPS Activities

- 8.3.1** The group appreciates efforts on capacity building activities in the region and would hope for an expansion of the activities to the whole region, in particular more focus is required on forecast verification and product dissemination to the end users; (Actions – NMHS, WMO/CLIPS, RCCs);

8.3.2 Research on improved seasonal to inter-annual prediction methods should be carried out, e.g. investigation on the combination of statistical and dynamic methods, (Actions – WMO/CLIPS, RCCs, Univs, NMHS);

8.3.3 The CLIPS national focal point should also act as a focal point on climate matters. (Action – WCP/NMHS).

8.4 Climate-related Education and Training Needs in the Region

8.4.1 A catalogue of institutions offering climate-related education in the region should be compiled and disseminated to the NMHS in the region; (Action – Rapporteur/ WMO-ETD);

8.4.2 The education and training programmes on climate-related issues need to be updated in order to ensure comparable standards; (Actions- Training institutions, WMO-ETD);

8.4.3 Climate-related education and training programmes should include training of NMHS specialized personnel on how to downscale, disseminate and market climate-related information;(Actions- Training institutions, WMO-ETD, NMHS).

8.5 Regional Climate Centres (RCCs)

Considering the existing Regional Climate activities within RA I and the existing institutions such as ACMAD, ICPAC and DMC-Harare which carry out several climate activities, and recognizing the vast domain of the region and its climatic diversity; considering the increasing need in climate information and services to tackle climate variability and change issues and the need to incorporate climate information and services within national development policies, considering the recent development in IT on the continent, the working group recommended:

8.5.1 To establish an ad hoc Task Team on RCC issue with the following terms of references:

- Establish refined questionnaire to be submitted to members in order to identify the requirements for RCCs and activity priorities;
- Advise the RA I on functions and structure of RCCs which take into account the existing structures, and any other specialized centres or UNIVs;
- Advise RA I on appropriate coordination mechanisms of RCCs;
- Submit follow- up reports to the President of RA I before the fourteenth session of RA I.

8.5.2 To propose the following experts as Task Team members:

Ouma, Chipindu, Epihane, Sebbari, and Mariane Diop-Kane. The Task Team will be chaired by the Chairman of the RA I WG on Climate-related Matters.

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Invited Experts	
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WMO Secretariat	
<p>Mr Omar Baddour Chief, World Climate Data and Monitoring Programme World Climate Programme Department World Meteorological Organization 7bis, avenue de la Paix Case postale No. 2300 1211 GENEVA 2 Switzerland Tel: (41 22) 7308268 Fax: (41 22) 7308042 E-mail: obaddour@wmo.int</p>	

AGENDA

Official Opening Ceremony

Organization of the meeting

Chair of the Working Group – *R. Mugara*

Assisted by WMO Secretariat Personnel – *O. Baddour*

Adoption of the Agenda

Working Arrangements

Observations, Data Management and Global Climate Observing System activities - *Epiphane. D. AHLONSOU*

Climate System Monitoring, Indices and Indicators for Climate Change Detection, CLIVAR Analysis, and the activities of the IPCC Process – *Richard Mugara*

Implementation of CLIPS Activities in RA I – *N. Lamri, Emmanuel J. Mpeta, A. Nascimento*

Climate-Related Education and Training Needs in RA I – *Barnabas Chipindu*

Regional Climate Activities

ACMAD – *A. Kignaman-Soro and A. Kamga*

North Africa – *R. Sebbari and N. Lamri*

Southern Africa – *Barnabas Chipindu (on behalf of Brad Garanganga)*

Eastern Africa – *G. O. Ouma*

Western Africa – *Mariane Diop-Kane*

Cape Verde – *Francisco Correia*

Organization and Implementation of Regional Climate Centres

General Presentation – *Omar Baddour, WMO*

Recommendations for the Organization and implementation of Regional Climate Centres in RA I – *Plenary*

Any Other Business

Resolution of the RA I on the Creation of the Working Group on Climate Matters: Regional Association I (Africa)

NOTING:

- (1) The reports of its Rapporteurs on climate matters,
- (2) The Fifth WMO Long-term Plan,
- (3) Commission for Climatology, Thirteenth Session (2001) – Abridged Final Report with Resolutions and Recommendations (WMO-No. 938),
- (4) The discussions on climate-related issues in Thirteenth World Meteorological Congress (1999) – Abridged Final Report with Resolutions (WMO-No. 902);

Executive Council, Fifty-Third Session (2001) – Abridged Final Report with Resolutions (WMO-No. 929); and by the fifty-fourth session of the Executive Council (2002),

CONSIDERING the need for the Association to strengthen its activities in climate activities of particular importance to the Region,

DECIDES:

- (1) To establish a Working Group on Climate Matters with the following terms of reference:
 - (a) To provide advice on methods to strengthen and improve climate observations, data management (including Climate Computing (CLICOM) and Climate Database Management System (CDMS), data rescue, monitoring and provision of data sets; and to coordinate observational concerns and requirements with the Global Climate Observing System (GCOS) office;
 - (b) To provide advice on and assist in regional activities concerning climate monitoring, indices and indicators for climate change detection in RA I, especially as related to disaster reduction and extreme events and keep abreast of the Intergovernmental Panel on Climate Change (IPCC) activities and the regional involvement in the IPCC process;
 - (c) To provide advice on and assist in the implementation of various seasonal and inter-annual climate prediction and climate application projects in RA I, including Climate Information and Prediction Services (CLIPS), CLIVAR and especially in agricultural meteorology, renewable energy, bioclimatic indices, urban and building climatology, air quality and health;
 - (d) To provide advice on and assist in identifying climate-related education and training needs in the Region, including Information Technology (IT) management training;
 - (e) To evaluate the role of, and provide suggestions to the Association on the implementation of, Regional Climate Centre (RCC) functions within the Region;
- (2) To select the following experts to serve on the Working Group in the capacities indicated:
 - A. Epiphane (Benin) to serve as Rapporteur on Observations, Data Management and GCOS Activities;
 - R. Mugara (Zambia) to serve as Rapporteur on Climate System Monitoring, CLIVAR Analyses, Indices and the IPCC Process Within the Region;
 - M. Nacef Lamri (Algeria), E.J. Mpeta (United Republic of Tanzania) and A. Nascimento (Sao Tome and Principe) to serve as Focal Points for CLIPS Activities for RA I;
 - S. Veerasamy (Mauritius) to serve as Rapporteur on Climate Support to Disaster Reduction, with Special Emphasis on Extreme Meteorological Events;
 - B. Chipindu (Zimbabwe) to serve as Rapporteur on Climate-Related Education and Training Needs in the Region;
 - M. Kadi Mohamed (Algeria) and Carlos Moniz (Cape Verde) to serve as Co-Rapporteurs on RCC Implementation;
- (3) To select O. Baddour (Morocco) to act as chairperson the Working Group;
- (4) That Members may nominate other experts to serve on the Working Group as required;

REQUESTS:

- (1) The Working Group chairperson and Members to liaise with the chairpersons of related Open Programme Area Groups (OPAGs) of the Commission for Climatology (CCI), Commission for Basic Systems (CBS) and other WMO technical commissions, GCOS and relevant regional groups; and,
- (2) The Working Group chairperson to submit annual progress reports to the president of the Association and a final report not later than six months before the fourteenth session of the Association.

REPORTS PUBLISHED IN THE

WORLD CLIMATE DATA PROGRAMME (WCDP)/

WORLD CLIMATE DATA AND MONITORING PROGRAMME (WCDMP) SERIES

- WCDP-1 WMO REGION III/IV TRAINING SEMINAR ON CLIMATE DATA MANAGEMENT AND USER SERVICES, Barbados, 22-26 September 1986 and Panama, 29 September 3 October 1986 (available in English and Spanish) - (WMO-TD No. 227)
- WCDP-2 REPORT OF THE INTERNATIONAL PLANNING MEETING ON CLIMATE SYSTEM MONITORING, Washington DC, USA, 14-18 December 1987 - (WMO-TD No. 246)
- WCDP-3 GUIDELINES ON THE QUALITY CONTROL OF DATA FROM THE WORLD RADIOMETRIC NETWORK, Leningrad 1987 (prepared by the World Radiation Data Centre, Voeikov Main Geophysical Observatory) - (WMO-TD No. 258)
- WCDP-4 INPUT FORMAT GUIDELINES FOR WORLD RADIOMETRIC NETWORK DATA, Leningrad 1987 (prepared by the World Radiation Data Centre, Voeikov Main Geophysical Observatory) - (WMO-TD No. 253. p. 35)
- WCDP-5 INFOCLIMA CATALOGUE OF CLIMATE SYSTEM DATA SETS, 1989 edition (WMO-TD No. 293)
- WCDP-6 CLICOM PROJECT (Climate Data Management System), April 1989 (updated issue of WCP-I 1 9) - (WMO-TD No. 299)
- WCDP-7 STATISTICS ON REGIONAL NETWORKS OF CLIMATOLOGICAL STATIONS (based on the INFOCLIMA World Inventory). VOLUME II: WMO REGION I - AFRICA (WMO-TD No. 305)
- WCDP-8 INFOCLIMA CATALOGUE OF CLIMATE SYSTEM DATA SETS - HYDROLOGICAL DATA EXTRACT, April 1989 - (WMO-TD No. 343)
- WCDP-9 REPORT OF MEETING OF CLICOM EXPERTS, Paris, 11-15 September 1989 (available in English and French) - (WMO-TD No. 342)
- WCDP-10 CALCULATION OF MONTHLY AND ANNUAL 30-YEAR STANDARD NORMALS, March 1989 (prepared by a meeting of experts, Washington DC, USA) - (WMO-TD No. 341)
- WCDP-11 REPORT OF THE EXPERT GROUP ON GLOBAL BASELINE DATASETS, Asheville, USA, 22-26 January 1990 - (WMO-TD No. 359)
- WCDP-12 REPORT OF THE MEETING ON HISTORICAL ARCHIVAL SURVEY FOR CLIMATE HISTORY, Paris, 21-22 February 1990 - (WMO-TD No. 372)

WCDP-13 REPORT OF THE MEETING OF EXPERTS ON CLIMATE CHANGE DETECTION PROJECT, Niagara-on-the-Lake, Canada, 26-30 November 1990 - (WMO-TD No. 418)

Note: *Following the change of the name of the World Climate Data Programme (WCDP) to World Climate Data and Monitoring Programme (WCDMP) by the Eleventh WMO Congress (May 1991), the subsequent reports in this series will be published as WCDMP reports, the numbering being continued from No. 13 (the last "WCDP" report).*

WCDMP-14 REPORT OF THE CCI WORKING GROUP ON CLIMATE CHANGE DETECTION, Geneva, 21-25 October 1991

WCDMP-15 REPORT OF THE CCI EXPERTS MEETING ON CLIMATE CODE ADAPTATION, Geneva, 5-6 November 1991 - (WMO-TD No. 468)

WCDMP-16 REPORT OF THE CCI EXPERTS MEETING ON TRACKING AND TRANSMISSION OF CLIMATE SYSTEM MONITORING INFORMATION, Geneva, 7-8 November 1991 - (WMO-TD No. 465)

WCDMP-17 REPORT OF THE FIRST SESSION OF THE ADVISORY COMMITTEE ON CLIMATE APPLICATIONS AND DATA (ACCAD), Geneva, 19-20 November 1991 (also appears as WCASP-18) - (WMO-TD No. 475)

WCDMP-18 CCI WORKING GROUP ON CLIMATE DATA, Geneva, 11-15 November 1991 (WMO-TD No. 488)

WCDMP-19 REPORT OF THE SECOND CLICOM EXPERTS MEETING, Washington DC, 18-22 May 1992 - (WMO-TD No. 511)

WCDMP-20 REPORT ON THE INFORMAL PLANNING MEETING ON STATISTICAL PROCEDURES FOR CLIMATE CHANGE DETECTION, Toronto, 25 June, 1992 (WMO-TD No. 498)

WCDMP-21 FINAL REPORT OF THE CCI WORKING GROUP ON CLIMATE DATA AND ITS RAPPORTEURS, November 1992 - (WMO-TD No. 523)

WCDMP-22 REPORT OF THE SECOND SESSION OF THE ADVISORY COMMITTEE ON CLIMATE APPLICATIONS AND DATA (ACCAD), Geneva, 16-17 November 1992 (also appears as WCASP-22) - (WMO-TD No. 529)

WCDMP-23 REPORT OF THE EXPERTS MEETING ON REFERENCE CLIMATOLOGICAL STATIONS (RCS) AND NATIONAL CLIMATE DATA CATALOGUES (NCC), Offenbach am Main, Germany, 25-27 August 1992 - (WMO-TD No. 535)

WCDMP-24 REPORT OF THE TENTH SESSION OF THE ADVISORY WORKING GROUP OF THE COMMISSION FOR CLIMATOLOGY, Geneva, 20-22 September 1995 (also appears as WCASP-34) - (WMO-TD No. 711)

- WCDMP-25 REPORT OF THE FIFTH SESSION OF THE ADVISORY COMMITTEE ON CLIMATE APPLICATIONS AND DATA (ACCAD), Geneva, 26 September 1995 (also appears as WCASP-35) - (WMO-TD No. 712)
- WCDMP-26 REPORT ON THE STATUS OF THE ARCHIVAL CLIMATE HISTORY SURVEY (ARCHISS) PROJECT, October 1996 (prepared by Mr M. Baker) - (WMO-TD No. 776)
- WCDMP-27 SUMMARY REPORT OF THE MEETING OF THE THIRD SESSION OF THE CCI WORKING GROUP ON CLIMATE CHANGE DETECTION, Geneva, 26 February - 1 March 1996 - (WMO-TD No. 818)
- WCDMP-28 SUMMARY NOTES AND RECOMMENDATIONS FOR CCI-XII FROM MEETINGS CONVENED TO PREPARE FOR PUBLISHING THE FIFTH AND SIXTH GLOBAL CLIMATE SYSTEM REVIEWS AND FOR A PUBLICATION ON THE CLIMATE OF THE 20TH CENTURY, July 1997 - (WMO-TD No. 830)
- WCDMP-29 CLIMATE CHANGE DETECTION REPORT - REPORTS FOR CCI-XII FROM RAPORTEURS THAT RELATE TO CLIMATE CHANGE DETECTION, July 1997 (WMO-TD No. 831)
- WCDMP-30 SUMMARY NOTES AND RECOMMENDATIONS ASSEMBLED FOR CCI-XII FROM RECENT ACTIVITIES CONCERNING CLIMATE DATA MANAGEMENT, July 1997 (WMO-TD No. 832)
- WCDMP-31 REPORTS FOR CCI-XII FROM RAPORTEURS THAT RELATE TO CLIMATE DATA MANAGEMENT, July 1997 - (WMO-TD No. 833)
- WCDMP-32 PROGRESS REPORTS TO CCI ON STATISTICAL METHODS, July 1997 (prepared by Mr Christian-Dietrich Schönwiese) (WMO-TD No 834)
- WCDMP-33 MEETING OF THE CCI WORKING GROUP ON CLIMATE DATA, Geneva, 30 January - 3 February 1995 - (WMO-TD No. 841)
- WCDMP-34 EXPERT MEETING TO REVIEW AND ASSESS THE ORACLE-BASED PROTOTYPE FOR FUTURE CLIMATE DATABASE MANAGEMENT SYSTEM (CDBMS), Toulouse, France, 12-16 May 1997 - (WMO-TD No. 902)
- WCDMP-35 REPORT OF THE ELEVENTH SESSION OF THE ADVISORY WORKING GROUP OF THE COMMISSION FOR CLIMATOLOGY, Mauritius, 9-14 February 1998 (also appears as WCASP-47) - (WMO-TD No. 895)
- WCDMP-36 REPORT OF THE MEETING OF THE CCI TASK TEAM ON CLIMATE ASPECTS OF RESOLUTION 40, Geneva, Switzerland, 10-11 June 1998 - (WMO-TD No. 925)
- WCDMP-37 REPORT OF THE MEETING OF THE JOINT CCI/CLIVAR TASK GROUP ON CLIMATE INDICES, Bracknell, UK, 2-4 September 1998 - (WMO-TD No. 930)
- WCDMP-38 REPORT OF THE MEETING OF THE WMO COMMISSION FOR CLIMATOLOGY (CCI) TASK GROUP ON A FUTURE WMO CLIMATE DATABASE MANAGEMENT SYSTEM (CDMS), Ostrava, Czech Republic, 10-13 November 1998 and FOLLOW-UP WORKSHOP TO THE WMO CCI

- TASK GROUP MEETING ON A FUTURE WMO CDMS, Toulouse, France, 30 March-1 April 1999 - (WMO-TD No. 932)
- WCDMP-39 REPORT OF THE MEETING OF THE CCI WORKING GROUP ON CLIMATE DATA, Geneva, Switzerland, 30 November-4 December 1998 - (WMO-TD No. 970)
- WCDMP-40 REPORT OF THE MEETING ON CLIMATE STATISTICS, PRODUCT DEVELOPMENT AND DATA EXCHANGE FOCUSING ON CLICOM 3.1, Geneva, 25-29 January 1999 - (WMO-TD No. 971)
- WCDMP-41 PROCEEDINGS OF THE SECOND SEMINAR FOR HOMOGENIZATION OF SURFACE CLIMATOLOGICAL DATA, Budapest, Hungary, 9-13 November 1998 (WMO-TD No. 962)
- WCDMP-42 REPORT OF THE MEETING OF EXPERTS ON THE CLIMATE OF THE 20TH CENTURY, Geneva, 26-30 April 1999 - (WMO-TD No. 972)
- WCDMP-43 REPORT OF THE TRAINING SEMINAR ON CLIMATE DATA MANAGEMENT FOCUSING ON CLICOM/CLIPS DEVELOPMENT AND EVALUATION, Niamey, Niger, 03 May-10 July 1999, (WMO-TD No. 973)
- WCDMP-44 REPRESENTATIVENESS, DATA GAPS AND UNCERTAINTIES IN CLIMATE OBSERVATIONS, Invited Scientific Lecture given by Chris Folland to the WMO Thirteenth Congress, Geneva, 21 May 1999 - (WMO-TD No. 977)
- WCDMP-45 WORLD CLIMATE PROGRAMME - WATER, DETECTING TREND AND OTHER CHANGES IN HYDROLOGICAL DATA, Zbigniew W. Kundzewicz and Alice Robson (Editors) - (WMO-TD No. 1013)
- WCDMP-46 MEETING OF THE WMO CCI TASK GROUP ON FUTURE WMO CLIMATE DATABASE MANAGEMENT SYSTEMS (CDMSs), Geneva, 3-5 May 2000 (WMO-TD No. 1025)
- WCDMP-47 REPORT ON THE ACTIVITIES OF THE WORKING GROUP ON CLIMATE CHANGE DETECTION AND RELATED RAPPORTEURS, 1998-2001 (May 2001, updated from March 2001) (WMO-TD No. 1071)
- WCDMP-48 REPORT OF THE FIRST SESSION OF THE MANAGEMENT GROUP OF THE COMMISSION FOR CLIMATOLOGY (Berlin, Germany, 5-8 March 2002) (also appears as WCASP-55) (WMO-TD No. 1110)
- WCDMP-49 1. REPORT ON THE CLICOM-DARE WORKSHOP (San José, Costa Rica, 17-28 July 2000); 2. REPORT OF THE INTERNATIONAL DATA RESCUE MEETING (Geneva, 11-13 September 2001) (WMO-TD No. 1128)
- WCDMP-50 REPORT OF THE CLIMATE DATABASE MANAGEMENT SYSTEMS EVALUATION WORKSHOP (Geneva, 11-13 September 2001) (WMO-TD No. 1130)

- WCDMP-51 SUMMARY REPORT OF THE EXPERT MEETING FOR THE PREPARATION OF THE SEVENTH GLOBAL CLIMATE SYSTEM REVIEW (7GCSR) (Geneva, 16-19 September 2002) (WMO-TD No. 1131)
- WCDMP-52 GUIDELINES ON CLIMATE OBSERVATION NETWORKS AND SYSTEMS (WMO-TD No. 1185)
- WCDMP-53 GUIDELINES ON CLIMATE METADATA AND HOMOGENIZATION (WMO-TD No. 1186)
- WCDMP-54 REPORT OF THE CCI/CLIVAR EXPERT TEAM ON CLIMATE CHANGE DETECTION, MONITORING AND INDICES (ETCCDMI) (Norwich, UK, 24-26 November 2003) (WMO-TD No. 1205)
- WCDMP-55 GUIDELINES ON CLIMATE DATA RESCUE (WMO-TD No. 1210)
- WCDMP-56 FOURTH SEMINAR FOR HOMOGENIZATION AND QUALITY CONTROL IN CLIMATOLOGICAL DATABASES (Budapest, Hungary, 6-10 October 2003) (WMO-TD No. 1236)
- WCDMP-57 REPORT OF THE RA V DATA MANAGEMENT WORKSHOP (Melbourne, Australia, 28 November-3 December 2004) (WMO-TD No. 1263)
- WCDMP-58 GUIDELINES ON CLIMATE WATCHES (WMO-TD No. 1269)
- WCDMP-59 REPORT OF THE MEETING OF THE RA I WORKING GROUP ON CLIMATE MATTERS (Dakar, Senegal, 22-24 February 2006) (WMO-TD No. 1351)