

Regional Association I (Africa)

Sixteenth session

Praia

3–9 February 2015

Abridged final report with resolutions



**World
Meteorological
Organization**

Weather • Climate • Water

WMO-No. 1151



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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (agenda item 1)

1.1 At the kind invitation of the Government of the Republic of Cabo Verde, the sixteenth session of Regional Association I (Africa) was held in Praia, Cabo Verde, from 3 to 9 February 2015. It was opened at 10 a.m. on 3 February 2015 by His Excellency Mr Antero Veiga, Minister of Environment, Housing and Territorial Planning.

1.2 Dr Mamadou Lamine Bah, president of Regional Association I (Africa) welcomed the delegates to RA I-16 in Praia, Cabo Verde. He paid special thanks to the Minister of Cabo Verde Honourable Antero Veiga, Minister of Environment, Housing and Territorial Planning and Ms Ester de Brito, Permanent Representative of Cabo Verde with WMO for the excellent arrangements made for the sixteenth session of RA I, including the Regional Technical Conference (RECO) and the Third Session of African Ministerial Conference on Meteorology (AMCOMET-3). Through the Minister, he expressed his gratitude to the Government and people of Cabo Verde for the warm reception the delegates had received since their arrival in Praia.

1.3 The president of RA I, Dr L. Bah, reiterated the significant relevance of NMHSs today, more than ever before, citing current challenges facing the region, many of which are preventable or at least the impacts reduced. Looking back at the last four years, the president was pleased to note the progress made in key programmes such as WIGOS, GFCS, QMS and the WMO Capacity Development Strategy for LDCs, among others. He reported that the preparation and adoption of the Integrated African Strategy on Meteorology and Climate Services by AMCOMET was a major achievement during the intersessional period.

1.4 The president expressed his gratitude to all governments in the Region, development partners and various experts in the Region for the support in the achievement of the various tasks. In his concluding remarks, the president noted the need for the session to clearly formulate its priorities for inclusion in the WMO Strategic and Operating Plans.

1.5 Mr Jerry Lengoasa, WMO Deputy Secretary-General, on behalf of the Secretary-General of the World Meteorological Organization (WMO), was pleased to welcome Members to the sixteenth session of Regional Association I (Africa). Mr Lengoasa expressed his and WMO's gratitude to the Honourable Minister and the Government of Cabo Verde for hosting the session and for the warm welcome extended to all delegates and for the excellent arrangements made for the WMO meetings in Praia.

1.6 Mr Lengoasa thanked Dr Bah, president of Regional Association I, and Dr Amos Makarau, the vice-president, for their leadership and the successful implementation of the programmes and activities of the Association during the intersessional period. He further expressed WMO's appreciation to the Management Group, the chairpersons, and members of working groups for their key services during the intersessional period.

1.7 Mr Lengoasa reiterated that access to and delivery of specialized forecasts and warnings will require further improvement of the capabilities of NMHSs for service delivery, at national and regional levels. Additional efforts are indeed necessary to reduce risks and potential impacts of hazards caused by weather, climate, water and related environmental elements. He proposed that NMHSs should lead by reaching out to national partners and users to ensure the success of WIGOS, the GFCS, and DRR multi-hazard products and services. Mr Lengoasa stated that additional efforts were needed for the sustained development of NMHSs.

1.8 In conclusion, Mr Lengoasa, reiterated the appreciation of WMO to the Government of Cabo Verde for hosting the sixteenth session of RA I and the Third Session of the African Ministerial Conference on Meteorology. He wished the delegates a fruitful and successful session, as well as a pleasant stay in Praia.

1.9 His Excellency Mr Antero Veiga, Minister of Environment, Housing and Territorial Planning welcomed the delegates to the Republic of Cabo Verde and in particular to the beautiful city of Praia. On behalf of the Government of Cabo Verde, he was grateful that Regional Association I had selected Cabo Verde to host the meeting as well as the Ministerial Conference AMCOMET-3. He informed the delegates that Cabo Verde had an agenda for change through building a dynamic economy. The Minister reiterated that the RA I session is an opportunity for sharing knowledge in meteorology, which would contribute to economic and sustainable development in Africa.

1.10 The Minister observed that the environment is already undergoing stress and emphasized the need to use observed renewable energy to preserve the environment. He also pointed out that the increasing world population added to this environmental stress. The Minister also expressed solidarity with Mozambique as they experienced devastating floods in the northern and central parts of the country. He was optimistic that the Government of Mozambique would find a solution to this challenge.

1.11 The Minister declared the RA I-16 session officially open.

2. ORGANIZATION OF THE SESSION (agenda item 2)

2.1 Consideration of the report on credentials (agenda Item 2.1)

2.1.1 The representative of the Secretary-General presented reports on credentials taking into account the documents received prior to and during the session. The Association accepted the report and decided it would not be necessary to establish a Credentials Committee.

2.1.2 The session was attended by 81 participants from 36 Members of the Regional Association I (Africa), 5 observers from 2 Members from outside the region, 12 observers from regional and international organizations. The list of participants is given in the [appendix to the present report](#).

2.2 Adoption of the agenda (agenda Item 2.2)

In accordance with General Regulation 173, the provisional annotated agenda, as contained in RA I-16/Doc. 2.2(2), REV. 1, was adopted.

2.3 Establishment of committees (agenda Item 2.3)

2.3.1 The session was carried out in plenary sessions to deal with the various agenda items as follows:

- (a) The General Plenary, chaired by Dr Mamadou Lamine Bah, president of RA I, assisted by Mr Rob Masters, Director of the WMO Department of Development and Regional Activities;
- (b) The Plenary A, chaired by Dr Amos Makarau, vice president RAI assisted by Dr Joseph Mukabana, Director Office for Africa and Least Developing countries;
- (c) The Plenary B, chaired by Mr Abdalah Mokssit (Morocco) and Third Vice President of WMO assisted by Mr Felix Hounton, Senior Programme Manager Office of WMO Least Developing Countries programme.

Nomination Committee

2.3.2 A Nomination Committee was established composed of Mr Daouda Konate (Côte d'Ivoire); Mr Fetene Teshome (Ethiopia), Ms Samueline Rahariveloarimiza S. (Madagascar), Mr Daouda Konate was designated Chairperson.

Coordination Committee

2.3.3 A Coordination Committee was established composed of the president, the vice-president, the representative of the Secretary-General, the chairpersons of Plenaries A and B and secretaries of Plenary Sessions. A representative of the local organizing committee was also invited to participate in the meetings of the Committee.

2.4 Other organizational matters (agenda Item 2.4)

2.4.1 The Association established its working hours for the duration of the session. The Association agreed that no minutes of the Plenary sessions would be produced unless otherwise decided for specific items the Association specifically requested that it should be done for a particular item.

2.4.2 The Association designated Mr James Kongoti (Kenya) as rapporteur on agenda item 10 – Review of previous resolutions and recommendations of the Association and of relevant Executive Council Resolutions.

2.4.3 The Association agreed to waive the Regulation 109 for the duration of the session.

3. REPORT BY THE PRESIDENT OF THE ASSOCIATION (agenda item 3)

3.1 The Association noted with appreciation and satisfaction the report of its president, which provided an informed assessment of the major activities that the Association had undertaken since its fifteenth session. The Association welcomed South Sudan as a new Member of WMO. The president highlighted the issues that the Association would have to address, such as the implementation of the Integrated African Strategy on Meteorology (Weather and Climate), the enhanced future working mechanism of the Association and other priority activities, including the accelerated implementation of Quality Management System (QMS) in African NMHSs.

3.2 The Association noted with appreciation and satisfaction the implementation of the regional components of WMO major initiatives: the WMO Integrated Global Observing System (WIGOS), the Global Framework for Climate Services (GFCS), implementation of Quality Management Services (QMS) for aviation weather services, the Capacity Development Strategy and the WMO Programme for the Least Developed Countries (LDCs).

3.3 The Association further expressed its satisfaction to the AMCOMET Secretariat provided by WMO for the successful organization of the second session of the African Ministerial Conference on Meteorology in Victoria Falls, Zimbabwe from 15 to 19 October 2012, with the participation of 38 African countries, 27 Ministers and over 120 participants. The Association further expressed its appreciation and gratitude to the Government of Zimbabwe for financial support and hosting the Conference, and to the Secretary-General and the African Union Commission.

3.4 The Association noted that the Implementation and Resource Mobilization Plan for the Integrated African Strategy on Meteorology (Weather and Climate Services) had been approved by the AMCOMET Bureau and was ready for consideration and endorsement during the third session of AMCOMET. The Association also noted a validation of the Draft Implementation and Resource Mobilization Plan by Member States was conducted through Regional Economic Communities' meetings, where the AMCOMET Secretariat presented the plan and requested feedback from Member States. EAC, ECOWAS, ECCAS, CEMAC, AMU and SADC (through MASA), Member States were consulted. It was further noted that consultations were done with relevant stakeholders, including development partners.

3.5 The Association extended its appreciation to Members who hosted various regional events during the intersessional period and encouraged them to continue providing the necessary support to the activities of the Association.

3.6 The Association acknowledged the roles of the WMO Offices for Africa and LDCs including WMO Office for North, Central and West Africa and the WMO Office for Eastern and Southern Africa in various regional capacity development activities, facilitating implementation of WMO regional events, maintaining close contact with Members, providing support to meet Members requirements, and addressing WMO cross-cutting programmes, all being carried out in close collaboration with Members and relevant regional organizations.

3.7 Noting that there are still many challenges facing NMHSs in Africa in performing their mandates, the president proposed that priority be given to the following activities, working closely with the WMO and AMCOMET Secretariats:

- (a) To review the capacity of the WMO offices in the Region in order to serve Members more effectively;
- (b) To operationalize the Integrated African Strategy on Meteorology (Weather and Climate Services);
- (c) To harmonize the RA I Strategy and Operating Plan with the Integrated African Strategy on Meteorology (Weather and Climate Services) and its Implementation Plan;
- (d) To enhance regional integration in meteorological and hydrological development;
- (e) To accelerate the implementation of QMS for all NMHSs in Africa for all Meteorological Services.

3.8 The Association discussed the implementation of the above priorities under relevant agenda items.

4. PROGRAMME ACTIVITIES – REGIONAL ASPECTS (agenda item 4)

4.1 Service quality and service delivery (agenda item 4.1)

Public Weather Services

The WMO Strategy for Service Delivery

4.1.1 The Association recalled that the Sixteenth World Meteorological Congress (Cg-XVI, Geneva, May–June 2011) had adopted the “The WMO Strategy for Service Delivery” (herein referred to as “The Strategy”), and had consequently requested regional associations (RAs) to facilitate its adoption by Members. The Association further noted that the sixty-fifth session of the Executive Council (EC-65, Geneva, May 2013) had adopted Resolution 4 (EC-65) – “Implementation Plan of the WMO Strategy for Service Delivery”. The Association expressed its appreciation that the Public Weather Services (PWS) Programme had provided support in the development of “The Strategy” and its Implementation Plan (IP) through facilitating wide consultations with the presidents of RAs, presidents of technical commissions (TCs), experts from a number of National Meteorological and Hydrological Services (NMHSs), as well as other WMO Programmes. It welcomed the fact that the Strategy and its IP had been introduced to 28 participants representing 12 Members of RA I (Africa), who participated at the Seminar on Social and Economic Benefits and Delivery of Meteorological and Hydrological Services (Johannesburg, South Africa, November 2013). It further appreciated that the Strategy and its IP were in the process of being published in the WMO official languages. *The WMO Strategy for Service Delivery and Its Implementation Plan* (WMO-No. 1129), which was published in early 2014, can be freely accessed on the WMO website through the WMO Library: http://library.wmo.int/opac/index.php?lvl=notice_display&id=16002#.U_HhzPmSzyE. The Association therefore adopted [Resolution 1 \(RA I-16\) – Implementation of the WMO Strategy for Service Delivery in Regional Association I \(Africa\)](#), in which the Association requested its

appropriate working group to ensure a harmonized and synchronized implementation of the Strategy by Members of RA I.

Social and Economic-Benefits (SEBs) of Meteorological and Hydrological Services

4.1.2 The Association noted that EC-65 had strongly supported assisting NMHSs acquire capacities to assess and communicate the SEBs of their services to their respective governments and to other decisionmakers. It was pleased that the PWS Programme was leading the initiative of collaborating with the World Bank (WB) in the preparation of an authoritative publication on methodologies for the assessment of Socioeconomic Benefits (SEBs) of Meteorological and Hydrological Services to be published by early 2015. It noted that participants at the Johannesburg Seminar (mentioned in the above paragraph) had provided input into the content of the publication. During the Seminar, practical steps to conduct a SEB study, as well as how to communicate benefits to users were discussed. The Association underlined the importance of the publication, and urged its Members to use it as a practical guide in the design of assessment methodologies and the implementation of SEB activities in RA I. It welcomed the request by the sixty-sixth session of the Executive Council (EC-66, Geneva, June 2014) that training be provided to the senior staff of NMHSs and that pilot projects be developed on testing the methodologies. The Association requested that RA I be considered for such training and pilot projects.

The PWS component of the Severe Weather Forecasting Demonstration Project in RA I

4.1.3 The Association noted with appreciation the continued success of the implementation of Severe Weather Forecasting Demonstration Project (SWFDP) in Southern and Eastern Africa, benefiting 22 Members in the Region. It also noted the substantial progress in the implementation of the PWS component of the Project, and, in particular, the enhancement of service delivery skills in the Region through the SWFDP training workshops. It also welcomed the improvement of communication channels for the provision of weather forecast and warning services and the establishment of collaborative arrangements and feedback mechanisms with the disaster management authorities, media and the public.

4.1.4 The Association supported the SWFDP country visits and fact-finding missions in which PWS experts visited a number of NMHSs for in-depth consultations and to identify service delivery gaps. It noted that through this approach the Project had acquired useful country-specific information that had enabled it to direct resources that had been provided through the Norwegian Ministry of Foreign Affairs financed Project, to countries participating in SWFDP in a way that had impacted service delivery of Members positively. These included: (1) the construction of a new television (TV) weather presentation studio in Burundi; (2) renovation of an existing studio in Uganda and provision of equipment and training of presenters in both countries; (3) improvement of Internet, TV studio and website, as well as training of weather presenters in Madagascar, Malawi and Zambia; and (4) the introduction of social media weather forecast and warning services in Burundi and Rwanda. The TV weather presentation services that had ceased were resumed in Madagascar and Uganda as a result of this Project. The Association expressed its appreciation to the Government of Norway for the support to its Members. It also recognized the contribution of the United Kingdom Met Office for its support to these activities. It requested the Secretary-General to initiate similar projects in other Member countries participating in the SWFDP and stressed that such Members could greatly benefit from such support.

4.1.5 In September 2014, following the outbreak of the Ebola Virus Disease (EVD), it became evident that there was a need to disseminate weather forecasts to the public as well as the health authorities for planning purposes in order to carry out their activities with respect to the prevention of the spread of the disease. It also became clear that the means of such dissemination were limited in the country. In order to provide urgent short-term assistance, the PWS Programme sought collaboration from the Met Office (UK) and the Nigeria Meteorological Service to develop a website for the Sierra Leone Meteorological Service as well as possible assistance with television weather broadcasts. While short-term assistance measures were seen as particularly important during the Ebola crisis, the PWS Programme has offered long-term assistance to develop communication and dissemination capabilities in Sierra Leone as well as training of staff following

the model used in Southern and Eastern Africa. The Association requested the Secretary-General to provide support within available resources, as necessary, to achieve positive outcomes for this activity.

Improving Forecast and Warning Services

4.1.6 The Association noted that EC-66 had underlined that the forecasts and warnings traditionally issued by NMHSs were based on thresholds of environmental parameters such as temperature, wind speed, and rainfall, etc. Such information leaves the recipient to judge the impact of the predicted conditions on their activities, and the consequent risk to life, property and infrastructure. Impact-based forecast and warning services, on the other hand, combine prediction of the environmental conditions with an assessment of the vulnerability and exposure of the recipients to those conditions. Such information is more easily understood by those at risk and those responsible to mitigate the risks. The Association supported this approach which would enable NMHSs in RA I to provide advice that is tailored to specific users' needs and circumstances and therefore more relevant and actionable by them.

4.1.7 The Association noted the approval by CBS of the guidance material for NMHSs on multi-hazard impact-based forecast and warning services, which had been prepared by the Commission for Basic Systems Open Programme Area Group on Public Weather Services (CBS/OPAG-PWS). The guidance material, when published, will provide practical guidance to Members on the implementation of this new approach to forecasting and highlight the benefits as well as challenges involved in the provision of impact-based forecast and warning services. The guidelines will be enriched with examples of good practices from different NMHSs. The Association encouraged its Members to make use of the guidance materials once they were made available, in order to better respond to the needs of the users and, in particular the disaster reduction community.

4.1.8 The Association welcomed that WMO, through the PWS Programme had initiated a pilot project in Mozambique designed to ensure that the Instituto Nacional de Meteorologia (INAM) staff acquire the necessary skills in impact-based forecast and warning services and that the disaster community was fully engaged in a suitable collaborative role for successful delivery of such services. The Association requested the Secretariat to scale up this approach in the future so that more RA I Members could benefit.

Implementing the Common Alert Protocol (CAP) standard

4.1.9 The Association recalled that the Fifteenth World Meteorological Congress (Cg-XV, Geneva, May 2007) had recommended the implementation of the Common Alerting Protocol (CAP) standard for communicating all types of alerts through all media. It welcomed the initiatives that the PWS Programme had taken towards promotion of the implementation of CAP by NMHSs such as organizing regional CAP Jump-Start Workshops and CAP Implementation Workshops. The Association appreciated the fact that CAP training had been conducted at various SWFDP workshops in the Region thus introducing CAP to 22 countries of RA I. It noted further that in-country CAP training had been conducted in Burundi, Kenya, Rwanda and the United Republic of Tanzania, and that the United Republic of Tanzania had already implemented CAP warning services. It urged its Members to take up the CAP Jump-Start Offer, as described at the following web page: http://www.wmo.int/pages/prog/amp/pwsp/CAPJumpStart_en.html, and to visit the PWS CAP web pages, for more information and guidelines at: http://www.wmo.int/pages/prog/amp/pwsp/CommonAlertingProtocol_en.html.

4.1.10 The Association acknowledged the importance of the International Register of Alerting Authorities in promoting the "single official voice" status for NMHSs in issuing weather warnings. It noted that 25 out of the 57 Members in RA I had assigned editors for the Register. The Association encouraged the remaining 32 Members who had not yet joined the initiative to actively participate in the Register initiative by nominating editors to populate the web pages of the Register, with government departments and other institutions authorized to issue warnings in their respective countries. It encouraged Members to make full use of the PWS Technical Document entitled,

Administrative Procedure for Registering WMO Alerting Identifiers (PWS-20, WMO/TD-No. 1556). This publication is freely accessible at the following weblink: http://library.wmo.int/opac/index.php?lvl=etagere_see&id=41.

The World Weather Information Service (WWIS)

4.1.11 The Association noted with appreciation the launch of the new version of the [World Weather Information Service \(WWIS\) website](#) which now has modern web tools and is available in ten language versions, namely: Arabic, Chinese, English, French, German, Italian, Polish, Portuguese, Russian and Spanish. WWIS is providing forecasts for over 1,700 cities and has cumulative page visits surpassing 1.3 billion. It was also pleased with the recent launch of the “MyWorldWeather” [iPhone](#) and [Android](#) applications. The Association noted that 44 Members of RA I had joined the WWIS initiative and were providing forecasts and/or climate information for uploading on the website. However, it was noted that the number of cities for which forecasts were provided could be considerably greater than at present. It therefore encouraged Members to increase the number of cities for which they provided forecasts, the lead time, as well as the frequency of updating the forecasts. It also urged Members to make use of the recently issued *PWS Guidelines on Participation of National Meteorological and Hydrological Services in the WMO World Weather Information Service* (PWS-25, WMO-No. 1096), to assist NMHSs enhance their participation in WWIS. This publication can be accessed at: http://library.wmo.int/opac/index.php?lvl=etagere_see&id=41.

Provision of weather forecast and warning services to megacities

4.1.12 Recognizing the existence of a number of megacities in Africa, such as Cairo, Lagos and Kinshasa, with populations exceeding 10 million, the Association welcomed the decision of EC-66 that focused consideration be given to service delivery for megacities in order for them to be resilient in withstanding the impacts of environmental hazards on all timescales related to floods, heat wave and cold spells, ultra violet (UV) radiation, ozone concentrations, haze and air quality, among others. It noted with interest that megacities and large complexes in RA I could greatly benefit from a focus on the specific problems of such cities as regards the provision of useful and user-friendly information, forecasts and advice. It agreed that NMHSs needed to improve in communication and client relations through a robust multi-channel system of dissemination and communication of information to all partners and the public in a megacity. In this context, the Association welcomed the work of the PWS Programme to address these challenges, including contribution to a set of guidelines for establishing weather, climate, water and related environmental services for megacities and large urban complexes. It further noted that Egypt was using high-resolution Numerical Weather Prediction (NWP) models to generate forecasts (for pollution forecasts produced by the Egyptian Meteorological Service, see <http://nwp.gov.eg/index.php/environment>) for air pollution warnings including ozone concentrations and other gases and that the warnings were transmitted to the public through different media channels. The Association appreciated the offer by Egypt to provide pollution forecast products for use by RA I Members who may need such information.

Capacity development and training

4.1.13 The Association stressed the need for organizing capacity-building activities for improvement of service delivery, including TV weather presentation workshops conducted by experts from advanced media channels; impact forecast and warning services; implementation of SEB studies and analyses by NMHSs; and improvement of warning services such as through the CAP standard. In this regard, the Association expressed pleasure with the various guidelines that the PWS Programme had produced during the intersessional period and which were freely available online at the following weblink: http://library.wmo.int/opac/index.php?lvl=etagere_%0Bsee&id=41.

4.1.14 The Association noted the work done to assist NMHSs in RA I to deliver weather and climate services in support of public health. It noted that the PWS Programme had led the effort for establishing partnerships between the NMHSs and the health sector where Climate and Health

Working Groups had been established or strengthened notably in Ethiopia, Madagascar and the United Republic of Tanzania. Staff of the meteorological services and of health institutions in those countries had been trained on how to use the application of weather and climate data to combat diseases influenced by environmental factors. The Association also noted that, since 2008, the Meteorological Service of Burkina Faso (DGM) had produced a bulletin on the prediction of the tendency of the frequency of cerebral spinal meningitis in Burkina Faso based on climate information provided by National Centres for Environmental Prediction (NCEP). The bulletin is jointly produced by specialists from the Meteorological Service of Burkina Faso, Ministry of Health, the Paris Laboratory of Ocean and Climate Science: Experimentation and Numerical Approach (LOCEAN-France) and the Research office of NCEP, Washington DC, USA. In the context of the HEALTHMET Project, a Climate and Health Working Group (CHWG) was formed and is now operational in Burkina Faso. DGM expertise in climate and health studies contributed to the creation of a CHWG in Mauritania. Niger and Mali as well as other countries should benefit soon from this experience as an extension of the HEALTHMET Project to other countries. The Association expressed its satisfaction with this approach and requested that similar projects be undertaken to assist other Members of RA I where weather related diseases are a challenge.

Competency Framework for PWS Forecasters and Advisors

4.1.15 With regard to the recommendation of Cg-XVI that all TCs define competency requirements for their core job-tasks, the Association was pleased that CBS, through its OPAG/PWS, had developed a competency framework for PWS forecasters, together with an additional competency framework for more specialized roles such as forecasters working in the media, with emergency management, and on the development of focused products for users. It noted that these competency frameworks would not have regulatory force as is the case with competency standards in aviation, but would serve to provide guidance to Members in establishing and demonstrating appropriate levels of competency among their forecast staff. The Association was informed that the 2014 extraordinary session of CBS (CBS-Ext.(2014)), Asunción, September 2014) had approved the competency requirements and that these would be presented to Congress to be established as a WMO Recommended Practice.

Aeronautical meteorology

4.1.16 The Association noted that aeronautical meteorology is one of the top priority service areas for Members in Region I. It was also noted that the arrangements for the provision of aeronautical meteorological service to international air navigation varied significantly from country to country. In addition, there was already a well-established regional approach to service delivery for aviation in some countries through the ASECNA. As highlighted during the Technical Conference “[Aviation Meteorology – Building Blocks for the Future](#)” (TECO-2014), which preceded the fifteenth session of the Commission for Aeronautical Meteorology (CAeM-15), a specific challenge for the RA I Members is related to the variety of the institutional and organizational arrangements, as well as the different level of capabilities of the national aeronautical meteorology service providers (AMSP), which in most cases are the NMHSs, in terms of technology, human and financial resources. In many countries, NMHSs which provide aeronautical meteorology service suffer from lack of information and direction and are still struggling to keep up with recent amendments to the ICAO Annex 3 / WMO Technical Regulations, in particular, the QMS and aeronautical meteorology personnel competence standards.

4.1.17 In view of the foregoing, the Association agreed that capacity development in the field of aeronautical meteorology focused on enhancing the compliance of the RA I Members with the requisite WMO and ICAO standards and recommended practices, should remain a top priority for the regional association in the next intersessional period. It was emphasized that achieving the necessary level of compliance for a service ensuring the safety, regularity and efficiency of the air transport in the Region was dependent on the understanding and support by the national policymakers and governments, as well as strong regional cooperation. This was even more important at the present stage in view of the foreseen developments related to the implementation of the ICAO Global Air Navigation Plan (GANP) through the Aviation System Block Upgrade (ASBU) methodology by the year 2028 and beyond. Therefore, the Association urged its Members

to strengthen the cooperation between the NMHSs, the meteorological authorities and meteorological service providers, and the respective Civil Aviation Administrations (CAA) to improve the mutual awareness and proper integration of the aeronautical meteorology in the national plans for enhancing air traffic management in accordance with the GANP.

4.1.18 The Association was aware that the improvement of the meteorological services for the aviation sector was included in the strategic pillars of the AMCOMET's Integrated African Strategy on Meteorology (Weather and Climate Services) – (IASM-WCS). However, it was noted there has been little practical action to implement the aviation component of the strategy so far. Therefore, the Association urged the AMCOMET stakeholders to support concrete actions and projects aimed at improving the meteorological services to aviation, in particular in the subregions and Members suffering from long-standing deficiencies of those services reflecting on the safety of flight operations. In this regard, to assist the Members in the implementation of SABU methodology in the region, ICAO informed the session of the establishment of a Cooperative Development of Aeronautical Meteorology (CODEVMET) Programme in the region that aims at:

- (a) Improving meteorological service for air navigation provided by SMHN/aeronautical meteorological providers;
- (b) Enhancing the capabilities of the States' regulators of aeronautical meteorology in safety oversight of aeronautical meteorology.

The Association therefore encourages Members in the Region to participate to the CODEVMET Programme.

Outcome of the Conjoint ICAO/WMO Divisional Meeting and the fifteenth session of CAeM

4.1.19 The Association noted that the Conjoint ICAO/WMO Meteorology Divisional Meeting and the fifteenth session of the Commission for Aeronautical Meteorology (CAeM) were held at ICAO Headquarters in Montréal, Canada, from 7 to 18 July 2014 (including a WMO Technical Conference "Aviation Meteorology – Building Blocks for the Future" on 7 and 8 July 2014). The Conjoint meeting discussed and outlined major changes in the future aeronautical meteorology services including service delivery models and related procedures. Supporting the ICAO "One Sky" concept through the enhancement of meteorological service for international air navigation was the main focus of the Conjoint meeting. The "One Sky" concept will be realized through a Global Air Navigation Plan (GANP) and the Aviation System Block Upgrade (ASBU) methodology, intended to bring sector-wide operational improvements needed to cope with the high demand for capacity and efficiency, while maintaining and improving the level of safety. The ASBU consists of 5-year blocks of planned Air Traffic Management (ATM) improvements with a horizon 2028 and beyond. Among the envisaged changes in the meteorological service provision is the transition from "product-centric" to "data-centric" services through the System-Wide Information Management (SWIM) approach. These changes will affect the traditional way of production and dissemination of information by the MET service providers and further regionalization of the service provision, with significant impacts on existing national and regional arrangements, including cost-recovery.

4.1.20 Noting the above emerging issues affecting the meteorological service for aviation, the Association agreed to establish a Task Team that would monitor all aviation-related activities of RA I Members in coordination with appropriate CAeM bodies and keep them abreast of the developments through its Management Group. The Task Team under the subsidiary bodies of RA I and its ToR were discussed under agenda item 5.3, paragraphs 5.3.1–5.3.11.

4.1.21 The Association also expressed concern of the possible significant implications of the numerous and complex ATM developments currently being planned at the global and regional level on future aviation MET service provision. Therefore, the Association agreed on the need to gain a greater understanding of these issues to better inform future decisions and requested the WMO Secretariat to organize as soon as possible in coordination with relevant international and regional partners, an appropriate regional conference that would build on the outcomes of the

Conjoint MET Divisional Meeting of July 2014. The Association adopted [Resolution 2 \(RA I-16\) – Future development of meteorological service provision to civil aviation in Region I \(Africa\)](#).

Quality Management System (QMS)

4.1.22 The Association noted the concern expressed by the Executive Council at its sixty-sixth session (EC-66, June 2014) regarding the achieved level of implementation of QMS with most of the Regions still below 30% with regard to ISO certification. For RA I, 14 Members (about 25%) have reported that the QMS implementation has been completed including ISO 9001 certification. The Association appreciated the WMO VCP-funded project for QMS implementation currently underway for Ghana and that three of its neighbours namely Guinea, Liberia and Sierra Leone benefited from this project in terms of QMS training. The Association noted further that recently ASECNA completed the QMS implementation and received an ISO 9001:2008 certificate for all services provided by them including the meteorological services at the airports under ASECNA responsibility in 17 RA I countries. With that, the number of RA I Members where aeronautical meteorological service is provided by ISO certified providers increased to 30, which forms 56% of RA I Members. While congratulating ASECNA for this achievement, the Association also recognized that the NMHSs in the ASECNA countries were still needed to improve the quality of the whole range of services to aviation, including the provision of core data from the national networks. Therefore, the Association encouraged those NMHSs to continue their efforts for QMS implementation and requested ASECNA to provide support for these efforts through appropriate arrangements.

4.1.23 The Association agreed with the conclusion by EC-66 that the delay in QMS implementation affects the credibility of the NMHSs and other aviation meteorological service providers and has a negative impact on their attempts to establish cost-recovery mechanisms. It was also noted that the ISO 9001 compliant QMS, once established, would require continuous effort to sustain and undergo regular checks and re-certification, thus, the NMHSs and other service providers should plan resources accordingly. The Association reaffirmed its strong encouragement to all Members to complete and sustain the QMS for the provision of aeronautical meteorological service and requested the Management Group to assign high priority to this task in the work programme for the next intersessional period. The Association requested the Secretary-General to continue and expand the WMO support in capacity development related to the QMS implementation including preparation to adopt the new ISO 9001:2015 in order to allow the Region to overcome the current lack of compliance.

Competence of Aeronautical Meteorological Personnel (AMP)

4.1.24 The Association noted that, as of 1 December 2013, Members should ensure that their aeronautical meteorological personnel (AMP), both forecasters and observers, meet WMO competence standards for aviation meteorological forecasting and observing personnel set in WMO *Technical Regulations* (WMO-No. 49), Volume I, Chapter 5. It was recalled that, to demonstrate compliance with these requirements, Members need to provide evidence of their aeronautical personnel's competence as part of their Quality Management System (QMS). Members also need to demonstrate that they have established an appropriate programme allowing their AMP to continue their professional development.

4.1.25 The Association expressed concern of the fact that only 25 (including 17 ASECNA) Members responded to the survey conducted by the Secretariat and the Commission for Aeronautical Meteorology on the status of implementation of the WMO competency standards. It noted with satisfaction that the WMO Secretariat had supported a MASA Competency Assessment workshop early August 2014 in Lusaka, Zambia that was attended by 14 Members from the SADC region. Therefore, the Association urged all Members to report to the Secretariat as soon as possible of the national plans and actions undertaken to achieve compliance with the competency standards for aeronautical meteorological forecasters and aeronautical meteorological observers.

4.1.26 In view of the urgency of achieving compliance with the WMO competency standards, the Association requested the Management Group to task an appropriate subsidiary body to follow

the national developments and provide assistance in establishing national programmes for competency assessment and continuous professional development of the AMP. In this regard, the Association appreciated the Competence Assessment Toolkit, developed by the Commission for Aeronautical Meteorology (CAeM), providing a cost-effective approach through mapping of required competencies to web-based and other training material, with a view to addressing any competency deficits detected by the assessments. The Association also noted with appreciation the offer by Egypt which is running competence courses in Cairo Regional Training Centre. The Association strongly recommended to its Members to make best use of the on-line material available on the CAeM website: <http://www.caem.wmo.int/moodle/>.

Qualifications requirements

4.1.27 The Association noted further that the qualifications requirements for the aviation meteorological forecasters (AMF) included in the WMO Technical Regulations (WMO-No. 49, Vol. 1) will become a standard practice on 1 December 2016. This will imply an obligation to Members to provide evidence of compliance for their AMF. Noting that the implementation deadline is during the next intersessional period, the Association strongly encouraged its Members to initiate respective action as soon as possible. Members were also reminded that the required qualifications for work areas and job functions of an AMF have to include the relevant elements of the Basic Instruction Package – Meteorology (BIP-M) at university degree level.

4.1.28 To facilitate the implementation of the qualification requirements, Members were strongly encouraged to advise the Regional Training Centres on their needs especially those identified through the competency assessment exercises, for remedial or additional training as soon as possible to allow sufficient time to develop options for meeting these requirements.

4.1.29 The Association strongly encouraged all Members to provide the Secretariat with regularly updated information on their compliance with the relevant technical regulations, in particular, those related to QMS, competences and qualification requirements, as major implementation areas in the next intersessional period. Having up-to-date information on attained compliance would allow the Secretariat to advise the RA I president and the Management Group on the necessary capacity development actions to resolve any deficiencies and enhance the compliance status.

Cost Recovery

4.1.30 The Association noted with concern that the majority of RA I Members were still in need of assistance for establishing an adequate cost-recovery mechanism for the provision of meteorological service to aviation. It was further noted that lack of, or inadequate, cost-recovery was affecting mostly those NMHSs poorly connected with the national aviation stakeholders due to administrative reasons (e.g., NMHS not under the Ministry of Transport). The Association agreed that the lack of cost-recovery affected not only the capability to serve the aviation sector but had an overall negative impact on the NMHSs and their basic infrastructure. Therefore, the Association requested the Secretary-General, assisted by the Commission for Aeronautical Meteorology, to intensify the efforts to assist Members to develop and implement cost-recovery mechanisms through focused projects, trainings and improved guidance material.

4.1.31 As a positive example, the Association welcomed the VCP-funded cost-recovery project in Botswana. It is aimed at promoting the best practices in cost-recovery and establishing the needed national agreement between the aviation stakeholders to enable the Department of Meteorological Services of Botswana to start recovering costs for the aviation services following the relevant ICAO and WMO guidance. The Association considered this VCP project as a good model for providing assistance and encouraged Members to consider it as a viable option. In addition, the Association requested the Secretariat to develop more guidance on appropriate cost-recovery mechanisms for those Members with low traffic volumes with due consideration of the specifics of the flight operations. The Association encouraged Members to share existing different cost-recovery mechanisms that would be beneficial for those Members in need of developing their own cost-recovery arrangements.

4.1.32 The Association noted that the cost-recovery issue was not unique for the developing countries. It was noted that some developed Members, whose NMHSs budget was highly dependent on revenue from the aviation sector, were also concerned with the ability to sustain those revenues in view of the expected changes in the business model for service provision including the trend for regionalization or even globalization of services. Therefore, the Association requested the CAeM, supported by the Secretariat, to accord high priority to the issue of cost-recovery in its future work programme and expand the existing guidance on the subject building on best practice of Members and risk analysis of changing service provision modalities.

4.1.33 The Association noted the tendency of establishing multinational service provision to gain efficiency and decrease costs of services through subregional cooperation (e.g., the recently established Northern Europe Aviation Meteorology Consortium (NAMCON)). The Association considered NAMCON as an example of possible multi-national cooperative arrangements that would allow Members to meet the future demands for high quality services. It was further noted that while in RA I, ASECNA was also a good example of multi-national service provision, such business models should consider that part of the resources collected through the respective cost recovery should be used to support the contributing core services, especially the basic observing and telecommunication networks of the NMHSs, as well as the implementation of QMS and competency standards to ensure compliance with international requirements.

Volcanic ash

4.1.34 The Association expressed appreciation to France for hosting the Toulouse Volcanic Ash Advisory Centres (VAAC) providing VA advisories to RA I Members' Meteorological Watch Offices (MWO) responsible for the issuance of VA SIGMET. Furthermore, the Association strongly supported the work of the Volcanic Ash Scientific Advisory Group (VASAG), co-sponsored by WMO and the International Union of Geodesy and Geophysics (IUGG), for advancing the scientific understanding of volcanic ash detection and forecasting in support of continued safe and efficient civil aviation operations.

4.1.35 The Association noted that further improvement of the coordination between the MWOs, volcano observatories and air traffic services (ATS) was necessary to ensure prompt VA SIGMET issuance immediately following a volcanic eruption. In this regard, the Association recalled that a joint circular letter by the Secretary-General of WMO and the Secretary-General of ICAO had strongly requested all Members to support and enhance the observation programmes that would allow to objectively determine the location, height and density of volcanic ash clouds. In this regard, the Association supported the recommendation by EC-65 that, as part of the WMO Integrated Global Observing System (WIGOS), an integrated observing system with both ground- and space-based segments would fulfil the requirements for resolution, coverage and reliability of observations of volcanic ash (as a specific form of litho-aerosols). To ensure an effective follow-up of these recommendations and initial actions, the Association emphasized that a relevant RA I subsidiary body should coordinate Members' actions aimed at enhancing volcanic ash monitoring capabilities as part of the RA I WIGOS Implementation Plan including improvements to communication facilities between the observatories and the VAAC in Toulouse, France.

Addressing critical deficiencies and future challenges

4.1.36 Concern was expressed about persisting deficiencies in the provision of meteorological service to international air navigation by some Members, which have been included in the ICAO regional lists of air navigation deficiencies, including: provision of MET observations and reports, SIGMET and Meteorological Watch Office (MWO) services, information on volcanic activity, and availability and use of World Area Forecast System (WAFS) products, non-implementation of QMS. Although some improvements have been achieved recently, the Association considered that the resolution of the safety-related deficiencies in the provision of aeronautical meteorological services should be addressed through coordinated subregional and national plans. The Association recommended that the regional subsidiary body dealing with aviation matters should coordinate closely with the ICAO Regional Offices in Cairo, Dakar and Nairobi regarding the

recorded MET-related safety deficiencies and respective advice should be provided to those Members that need to take action for their resolution.

4.1.37 The Association was informed that the Conjoint ICAO/WMO Meteorology Divisional Meeting (July 2014) adopted Recommendation 2/3 on the operation and further development of the aeronautical fixed service satellite distribution system (SADIS) and the related Internet-based services. It had been decided that the SADIS service will be extended beyond 2015 but would definitely cease in November 2019. However, the Association noted a recent information from the SADIS provider State that, due to the replacement of the Intelsat's satellite providing the SADIS downlink, the existing downlink service cannot be extended beyond 31 July 2016. Taking into consideration the importance of the SADIS for RA I, Members were strongly encouraged to start immediate planning to migrate to operational use of the Secure SADIS FTP service in time for the planned decommissioning of the satellite broadcast service. The Association requested the SADIS provider State and the WMO Secretariat to provide further advice to Members upon request.

4.1.38 The Association noted further that the planned migration to the digital OPMET exchange in XML/GML format should take place gradually until 2018/2019. During that period, the respective provisions on OPMET exchange in the ICAO Annex 3/WMO Technical Regulations, Volume II, will be upgraded to standards. Therefore, all Members, in particular those hosting OPMET Data Banks, should establish transition plans in close coordination with ICAO Regional Offices in RA I. The Association requested the Management Group to monitor these developments through its subsidiary body responsible for aviation.

Marine Meteorology and Oceanography

4.1.39 The Association took note of the resolutions and recommendations made at the fourth session of the Joint WMO-Intergovernmental Oceanographic Commission (WMO-IOC) Technical Commission for Oceanography and Marine Meteorology (JCOMM-4, Yeosu, Republic of Korea, 23–31 May 2012), which were approved by the WMO Executive Council at its sixty-fourth session through Resolution 2 (EC-64). The Association welcomed the newly elected JCOMM co-presidents, Dr Nadia Pinardi (Italy) and Mr Johan Stander (South Africa).

4.1.40 The Association noted with satisfaction the ongoing efforts and new initiatives of JCOMM responding to the priorities of WMO and UNESCO/IOC, including the development of a global framework for Marine Weather Forecasters Competence and quality management approach, and agreed that the JCOMM intersessional workplan (2012–2017) included contributing activities to all five WMO Strategic Thrusts. It encouraged the Members to actively conduct and participate in relevant national, regional and global activities.

4.1.41 The Association noted with appreciation the excellent developments with regard to the establishment of a Regional Marine Instrument Centre (RMIC) for the RA I in Casablanca, Morocco. Positive evaluation of the capabilities of the centre has been performed by JCOMM according to the agreed governance defined in Recommendation 1 (JCOMM-3). The Association particularly noted that JCOMM is being consulted in writing according to Regulation 77 of the WMO, and pending the outcome of such consultation a draft resolution will in principle be submitted to Cg-17 for the establishment of the RMIC. The Association thanked Morocco for its commitments in this regard, and noted that the operations of the future RMIC is expected to better integrate marine meteorological and oceanographic instrument best practices and related standards, provide capacity development for the Association in this regard, and enhance traceability of the marine observations produced in the Region.

Regulatory Framework and Guidance for Marine Meteorological Services

4.1.42 The Association noted the WMO *Manual on Marine Meteorological Services* (WMO-No 558) supported by the WMO *Guide to Marine Meteorological Services* (WMO-No. 471) for the globally agreed procedures and process for marine meteorological services. The Association noted the ongoing work of the JCOMM to review the Manual and Guide, and to provide up-to-date advice to the Joint IMO/IHO/WMO Manual on Maritime Safety Information (Joint

MSI Manual) to ensure the consistency along with the ongoing process for the review of the WMO Technical Regulations (Resolution 26 (EC-64), 2012). The Association agreed that the ongoing review and revision of the WMO-No. 558 and associated publications would greatly assist the Members to ensure consistent and streamlined service provision, and requested the Secretariat to regularly report on the progress made.

4.1.43 The Association, recalling the recommendation of Cg-XVI to all technical commissions to define competency requirements for their core job tasks, welcomed the ongoing development of the WMO Marine Weather Forecaster (MWF) Competence Standards Framework. It noted that this process has taken into account considerable variation in the legitimate functions of Marine Weather Offices worldwide, therefore, the MWF competencies proposed for adoption for the respective regional/national functions and priorities reflected this variety of functions. The Association noted that the draft Framework would be submitted to Cg-17 for approval, to become a part of the WMO Technical Regulations (recommended practices), and encouraged its Members to closely follow the process which would bear important implication in the practices for training and education of marine forecasters.

Support for Maritime Safety Information Services

4.1.44 The Association recalled that a World-Wide Met-Ocean Information and Warning Service (WWMIWS) had been implemented through the collaboration of WMO, the International Maritime Organization (IMO) and the International Hydrographic Organization (IHO), through technical advice from the JCOMM Expert Team on Maritime Safety Services (ETMSS). The Association encouraged its Members to actively link with the METAREA Coordinators of the respective region/area to enhance coordination among met services in the same METAREA to ensure seamless service of the meteorological Maritime Safety Information (MSI). In this context, the Association noted the successful results of the 2nd Maritime Safety Services Enhancement Workshop (<http://www.jcomm.info/MSS2>), held from 18 to 22 August 2014 in Wellington, New Zealand, in conjunction with the 6th meeting of the World-Wide Navigational Warning Service Sub-Committee (WWNWS-6) of IHO. Considering the importance of close coordination with the WWNWS at the national and global levels, as well as the need to enhance the collaboration within the Region for WWMIWS through METAREA Coordinators, the Association urged the Secretariat and the responsible Services for METAREA Coordination to plan relevant activities to be utilized as opportunities for necessary coordination and training on the meteorological Maritime Safety Information (meteorological MSI) services; for example, a planned workshop for Port Meteorological Officers in 2015. The Association requested the Secretariat to provide more information on this Workshop to Members in RA I and it encouraged Members to send participants to the Workshop.

4.1.45 The Association noted the current arrangement for the broadcasting of meteorological MSI/WWMIWS Coordination and expressed its appreciation to those Members acting as the METAREA Coordinators/Issuing Service for meteorological MSI in the Areas of the Region's interest; France for METAREA II, South Africa for METAREA VII, Mauritius / La Reunion for METAREA VIII (S), Pakistan for METAREA IX, and Greece for the Mediterranean METAREA III.

Marine Environmental Emergencies

4.1.46 The Association noted the ongoing work by the ad hoc Task Team on JCOMM Coordination for Marine Environmental Emergency Responses, pursuant to Recommendation 4 (JCOMM-4) to draft a proposed outline for Members/Member States to take a proactive and efficient role in responding to marine environmental emergencies including the maritime radioactive material discharge. The Association support the work of the ad hoc Task Team, and agreed that the process should be made in close liaison with other partners (such as IAEA, IMO, IHO, and IOC of UNESCO) with a clear concept and agreement on the user perspectives and requirements for the delivery of information regarding marine environmental emergency responses.

Services for Ocean Fisheries

4.1.47 The Association noted with satisfaction the joint effort by JCOMM and the Commission for Agricultural Meteorology (CAgM), through the Joint JCOMM-CAgM Task Team on Weather, Climate and Fisheries (TT-WCF: <http://www.jcomm.info/TT-WCF>), to enhance understanding and capabilities in marine climatology/oceanography and their impact on ocean fisheries. The Association noted that this initiative is the contribution in addressing the global food security and associated climate issues, and further noted its direct contribution to the GFCS implementation. It expressed appreciation to the contributing Members to the work of the Task Team through the work of experts, and encouraged all Members to engage in this type work with the regional organizations and centres.

4.1.48 The Association noted that the [Training Workshop on Marine Forecasting for the Gulf of Guinea and North Atlantic Region](#) was jointly organized by the Senegal Meteorological Service, the African Centre of Meteorological Applications for Development (ACMAD) and the Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM) (Dakar, Senegal, March 2014). Participants to the workshop came from 14 RA I Members, drawn mainly from West Africa. Experts came from France, Morocco, Senegal, USA, ACMAD, ECMWF and EUMETSAT. The Association further emphasized the importance to reach out to society, and noted the importance of roving seminars for outreach of marine meteorological services to fishermen and other stakeholders in order to improve the understanding of the technical language used in marine meteorological services. It further noted the benefit of roving seminars in optimizing the feedback mechanism of services to reach possible maximum impact into society (e.g. Farmers Field School for agricultural meteorology). In this context, the Association welcomed the initiative of CAgM and JCOMM of a series of roving seminars for fishermen in West Africa, and encouraged Members to extend this effort to other Regions within available resources.

4.1.49 The Association noted with satisfaction that a four year endeavour project Marine Meteorology (MARINEMET) pilot Project Monitoring and Services, under the Spanish-funded "West Africa Cooperation Programme", is at the final phase for completion. The countries participating in this Project are Mauritania, Senegal, Cabo Verde and The Gambia. Taking into account that an important part of the population of West African countries lives in coastal cities, with their economic activities in the coastal zones, thus having growing demand for marine meteorology services and an urgent need to enhance their operational capacity in this field, the Association recalled that since the beginning of the programme (WACP) a continuous request was received to expand the scope of the project to the Gulf of Guinea countries and to establish a feasibility study for a Marine Regional Meteorological Operational Service, and request the Secretary-General and donors to pursue the efforts to seek extrabudgetary resources to fund this important activity.

WMO Coastal Inundation Forecasting Demonstration Project

4.1.50 The Association recalled the joint efforts of JCOMM and CHy through the Coastal Inundation Forecasting Demonstration Project (CIFDP: <http://www.jcomm.info/CIFDP>), to demonstrate how integrated coastal inundation forecasting and warnings can be improved and effectively coordinated by the National Meteorological and Hydrological Services (NMHSs). The Association reaffirmed the importance of CIFDP to enhance capacity of NMHSs for coastal disaster risk reduction, and to improve interaction with users of the NMHSs information services.

4.1.51 The Association recognized the benefit of CIFDP implementation, particularly with its linkages to related programmes and projects such as the Storm Surge Watch Scheme (SSWS), Severe Weather Forecast Demonstration Project (SWFDP), Flood Forecasting Initiative (FFI), the WMO Working Group on Societal and Economic Research Applications (WG-SERA), IOC Working Group on Tsunamis and Other hazards related to sea level Warning and mitigation Systems (TOWS-WG) and many others. The Association requested JCOMM and CHy, with support from the Secretary-General, to ensure continuing and close coordination with these activities, and advise on possible ways to take maximum benefit from these ongoing practices for the Members of

the Region who have similar issues of coastal inundation and need for integrated seamless forecasting for coastal zones and encouraged Members to apply for similar initiatives if required.

Capacity Development

4.1.52 The Association noted that the JCOMM Capacity Development Principles were reviewed and acknowledged at the last JCOMM session. JCOMM capacity development activities must operate within the overall principles of its governing bodies, the WMO and IOC, with particular focus on assisting least developed countries and small island states. Each JCOMM capacity development activity (programme or project) should include a training component. The Association further noted that WMO has been working closely with other cooperative programmes (e.g., Ocean Teacher/IODE), and with other organizations dealing with ocean-related matters (e.g., IMO, IHO) and expects to undertake some joint activities under the Ocean Global Academy/WMO Global Campus umbrellas.

4.1.53 The Association recognized the efforts on capacity development undertaken in the Region and requested the Secretary-General and JCOMM to pursue these activities as a priority, encouraging the use of opportunities for collaboration in the areas of marine observations, maritime safety (IMO, IHO), data management training (IODE/WIS) as well as courses on Oceanography for Meteorologists and Meteorology for Oceanographers.

Agricultural Meteorology

4.1.54 The Association noted the new workplan of the [sixteenth session of the Commission for Agricultural Meteorology \(CAgM\)](#) with the revised working structure consisting of four Open Panels of Agricultural Meteorology Experts (OPAMEs) with the focus areas: Operational Agricultural Meteorology, Science and Technology in Agricultural Meteorology, Natural Hazards and Climate Variability/Change in Agriculture, and Capacity Development in Agricultural Meteorology. The Association encouraged its Members to nominate experts to these focus areas in order to provide the knowledge and expertise from the Africa Region in the use and promotion of weather and climate information for their agricultural communities.

4.1.55 The Association noted that one of the priorities of the Global Framework for Climate Services (GFCS) is agriculture and food security. The Association was encouraged that several agricultural meteorological activities related to drought and soil moisture were organized in the Region that were relevant to GFCS. The Association encouraged the Secretariat to continue to assist Members in RA I to implement the GFCS.

4.1.56 The Association was pleased with the outcomes of the METAGRI project (2009–2011) and thanked the Spanish State Meteorological Agency (AEMET) and the Government of Greece for their financial support which enabled several West African NMHSs to organize Roving Seminars on Weather, Climate, and Farmers in their countries. The Association noted with satisfaction that, under this project, a total of 160 seminars were organized and around 7,800 persons were trained, 7,000 of them farmers including 1,000 women. A total of 3,325 simple plastic raingauges were distributed.

4.1.57 The Association thanked the Ministry of Foreign Affairs of the Norwegian Government for providing financial support to the METAGRI OPERATIONAL project (2012 onwards). The Association was encouraged to note that about 190 additional Roving Seminars were organized in 16 countries with an additional 6,500 people trained and 3,800 simple plastic raingauges distributed.

4.1.58 The Association thanked the National Meteorological Service of Mali for their assistance to the project by fabricating raingauges for distribution to the farmers participating in the seminars and all Western African NMHSs for making available their experts and other local support to ensure the success of the projects. The Association was appreciative that experts from Western Africa were actively engaged in developing the various guidelines for the METAGRI projects and urged the Secretariat to continue this practice of using local experts for project activities.

4.1.59 The Association noted that the quality of rainfall measurements made by simple plastic raingauges under the METAGRI OPERATIONAL project will be assessed. The Association was encouraged that the Secretariat is investigating the standardization of the simple plastic raingauges in collaboration with the Commission for Instruments and Methods of Observation (CIMO), Commission for Hydrology (CHy), the Commission for Climatology (CCI) and CAgM. The Association also noted that this activity would contribute to the objectives of the WMO Integrated Global Observing System (WIGOS).

4.1.60 The Association encouraged the WMO Secretariat to expand activities similar to the METAGRI project to other African subregions. That would include assisting Members in developing mobile phone alerts and advice for farmers and fishermen, weather insurance indexes and tools to evaluate the socioeconomic benefits of weather and climate applications for agriculture. The Association requested the WMO Secretariat to explore ways to fund these expanded activities.

4.1.61 The Association noted that the World AgroMeteorological Information Service (WAMIS) (<http://www.wamis.org>) has products from over 55 countries, 15 in Africa, and provides tools and resources to help countries improve their bulletins and services. The Association urged Members to actively participate in WAMIS, through which their products can be disseminated to the global community. The Association recognized the importance of developing new technologies such as agrometeorological forecasts and applications based on NWP output, crop model output, remote sensing data and products and GIS technologies and welcomed the efforts of Members to assist the WMO Secretariat in developing projects incorporating these advances.

4.1.62 The Association was encouraged that a new aspect of the METAGRI OPERATIONAL project was the focus on training courses for the use of satellite products in agricultural meteorology in cooperation with EUMETSAT. The Association thanked EUMETSAT for their financial support, and the AGRHYMET Centre and various NMHSs for their logistical support. The Association recommended that such training courses be sustained and expanded to other RA I regions.

4.1.63 The Association was appreciative that WMO, several RA I RTCs and RTCs in other Regions supported training courses in Agricultural Meteorology for participants from RA I. The Association requested that WMO and the Members support the development of training courses at regional RTCs in agricultural meteorology on topics such as crop models, remote sensing and GIS.

4.1.64 The Association was appreciative that the Rockefeller Foundation supported the National Meteorological Agency of Ethiopia (NMAE) through a Grant Agreement with WMO on the project of Training of Trainers on Weather and Climate Information and Products for Agricultural Extension Services in Ethiopia and welcomed the training to agricultural extension agents and agricultural experts on providing better practical knowledge of agrometeorological services and applications to farmers. The Association encouraged Members and the Secretariat to explore opportunities to find funding to perform similar activities in other countries.

4.1.65 The Association noted that while developing climate services is important, there still needs to be an emphasis on better weather forecasting applications to the agricultural community. The Association noted the formation of a Severe Weather Forecasting Demonstration Project for Eastern Africa (SWFDP-EA) Agrometeorology Working Group which met in February 2012 to develop a list of weather forecasting products to assist agrometeorologists in providing better guidance to their users, to be supported by development and training on better use of these products. The Association encouraged Members to develop products and services for agriculture, livestock, forestry, rangelands and fisheries such as warnings on extreme weather and short-term forecasts to prevent loss of lives, damages to crops and to optimize food production practices.

4.1.66 The Association supported the use of mobile phone technology as a useful dissemination method to deliver weather and climate information to rural farmers and fishers. The Association noted with satisfaction the successes of the pilot project on the use of mobile phones in Uganda. This project with the Ugandan Department of Meteorology and Grameen Foundation provided daily weather forecasts to fishermen over a selected area of Lake Victoria and to farmers

in Eastern Uganda. The Association encouraged the Secretariat, Members and donors to explore ways to support these activities in Uganda and other countries.

4.1.67 The Association took note of information provided by several Members and ACMAD on best practices in providing useful information and advisories to farmers and fishermen in Africa and encouraged Members to share such experiences by providing briefs on such best practices to WMO for dissemination among countries in RA I.

4.1.68 The Association noted that WMO and George Mason University (United States) are working on a project in South Africa to integrate MODIS satellite information with in-situ soil moisture measurements. The project aims to strengthen integrated and participatory early warning systems for weather and climate risks for sustainable agricultural production in Africa. The Association encouraged the Secretariat to evaluate the results and lessons learned from this project expand this activity, if appropriate, to other countries in the Region.

Tropical Cyclone Programme (TCP)

4.1.69 The Association recalled that the primary objective of the Tropical Cyclone Programme is to reduce the loss of life and damage caused by tropical cyclones to a minimum through establishment of national and regionally coordinated systems leading to delivery of forecasting, warnings services to users with multi-hazard approach. The Tropical Cyclone Programme is implemented in the Region through the RA I Tropical Cyclone Committee (TCC).

4.1.70 The Association recognized the important role of the RA I Tropical Cyclone Committee in improving regional coordination and collaboration of Members to deliver their improved tropical cyclone forecasting and warning services through the Committee's Operational Plan which is usually updated and approved by the Association every two years. In this connection, the Association expressed its appreciation to the RA I Tropical Cyclone Committee for the excellent work being done through their Tropical Cyclone Operational Plan and Coordinated Technical Plan, respectively, to promote the strengthening of the tropical cyclone, storm surge and flood warning services and related disaster risk reduction in the Region. Furthermore, the Association highly commended the RSMC La Reunion Tropical Cyclone Centre for its round-the-clock surveillance and timely provision of forecasting and warnings advisories of tropical cyclones for the Members during cyclone seasons.

4.1.71 The Association noted that the implementation of the Storm Surge Watch Scheme (SSWS) was still in progress. It highly commend the RA I Tropical Cyclone Committee and recognized such performance as one of the essential aspects of the Committee leading to improved capability in tropical cyclone forecasting and warning and related service delivery and disaster risk reduction. The Association requested the Committee to be instrumental in further implementation of SSWS in the Region and to ensure that it achieves its expected outcomes.

4.1.72 The Association recognized that ensemble prediction techniques had achieved a high level of accuracy in tropical cyclone track forecasting. It recommended that greater emphasis should be given to the use of ensemble techniques and probabilistic forecasting in tropical cyclone warning operations in order to improve their utility. The Association encouraged the RSMC La Reunion and NMHSs of RA I TCC Members to further exploit the use of ensemble techniques in tropical cyclone forecasting and probabilistic forecasts, and requested the Secretary-General to organize necessary training activities in this regard for the forecasters engaged in tropical cyclone forecasting and warning services in the Region.

4.1.73 The Association noted with appreciation that the sixth RA I Training Course on Tropical Cyclones and Public Weather Services had made a significant contribution to a sustained augmentation of the tropical cyclone forecasting and warning services provided by NMHSs in the Region. The training course was organized at RSMC La Reunion from 28 October to 8 November 2013. The Association also noted with satisfaction that the training course provided training topics addressing regional challenges in tropical cyclone forecasting and warning services, which are in high demand among the members of the RA I Tropical Cyclone Committee. The

Association stressed that such a training event should be continued, and requested the Secretary-General to continue to provide the necessary resources and any other support to the training activity.

4.1.74 The Association noted with pleasure that the TC Forecaster Website (TCFW) (<http://severe.worldweather.wmo.int/TCFW>) which was launched in April 2013 had been continuing to be updated since then. The TCFW is hosted by Hong Kong Observatory of Hong Kong, China, and serves as a vehicle to disseminate and transfer knowledge into operational application. It is easily accessible, and became an official WMO website open to the public. The Association expressed appreciation to the Hong Kong Observatory of Hong Kong, China for their dedicated work in developing and maintaining the website, and encouraged forecasters in the Region to utilize it to improve their knowledge, skill and competency leading to better delivery of tropical cyclone forecasting and warning services.

4.1.75 The Association noted that a version of the updated Global Guide to Tropical Cyclone Forecasting will be made available on the website, hosted by BoM, in early March 2015. The Association requested the WMO Secretariat to notify Members regarding the availability of the Global Guide.

4.1.76 The Association recognized challenges to many NMHSs in operational tropical cyclone forecasting, in particular intensity forecasting, and stressed that technology transfer and transition from research to operational forecasting was essential. The Association noted that the International Workshop on Tropical Cyclones (IWTC) and the International Workshop on Tropical Cyclones Landfall Processes (IWTCLP) serve as key fora to bring together forecasters and researchers to interact and maximize opportunities for transferring research results into operational application. It further noted with appreciation that several Members of the RA I TCC were represented in the IWTC-8 and IWTCLP-3, which were held in Jeju, Republic of Korea, from 2 to 10 December 2014, and encouraged RA I TCC Members to have broader representation in future IWTC and IWTCLP sessions.

4.1.77 Recognizing the important role taken by the Tropical Cyclone Committee in enhancing the capabilities of its members in producing better and improved tropical cyclone forecasting and warnings, the Association agreed that the re-establishment of the RA I Tropical Cyclone Committee be considered under agenda item 5.3 and adopted [Resolution 3 \(RA I-16\) – Tropical Cyclone Operational Plan for the South-West Indian Ocean](#), and [Resolution 4 \(RA I-16\) – Technical Plan of the Regional Association I Tropical Cyclone Committee for the South-West Indian Ocean](#).

4.2 Disaster risk reduction (agenda item 4.2)

Disaster Risk Reduction (DRR) Activities

Support to DRR Decision-making

4.2.1 The Association stressed that protection of lives, property and livelihoods is at the core of the priorities of the WMO Members and the National Meteorological and Hydrological Services (NMHSs). Furthermore, the implementation of the Hyogo Framework for Action (HFA) 2005–2015 through regional and national strategies in Disaster Risk Reduction (DRR) is leading to changes in national DRR policies, legal and institutional frameworks, with implications on the roles, responsibilities, and new working arrangements for the NMHSs in the Region. These changes provide opportunities such as increased recognition of the NMHSs by their governments and DRR stakeholders, strengthened partnerships and opportunities for increased resources. However, they are also leading to increasing demands and liabilities related to the provision of products and services to a larger and more diverse group of DRR stakeholders (e.g., government authorities, public and private sectors, NGOs, the general public, and media) who have direct responsibilities for DRR decision-making. To meet these new challenges, the Association recalled:

- (a) The overarching framework of the WMO DRR Programme for the development and delivery of products and services to support DRR decision-making, underpinned by national governance and institutional frameworks and partnerships and the needs and requirements of DRR users at the national level;
- (b) The ongoing activities and opportunities for further collaboration with experts in the following three areas:
 - (i) Hazard and Risk Analysis (HRA);
 - (ii) Multi-Hazard Early Warning Systems (MHEWS); and
 - (iii) Disaster Risk Financing and Insurance (DRFI);
 including the development of WMO guidelines in these areas of DRR;
- (c) The establishment of the Commission for Basic Systems (CBS) Task Team on the Provision of Operational Meteorological Assistance to Humanitarian Agencies, in coordination with the Commission for Climatology (CCI) and the Commission for Hydrology (CHy), with focus on development of requirements of the humanitarian community for meteorological and hydrological products and services for mitigating the impacts of meteorological-related hazards.

4.2.2 The Association recognized that DRR and climate change adaptation were very important to the Region and that a number of good practices in linking DRR and climate services existed in the Region, for example, the NAPA Programme of the Climate Change Early Warning Services (CCEWS) for DRR which is currently being implemented in 10 countries in Africa with two additional countries scheduled to join soon. It agreed that this programme should be further enhanced and expanded to other parts of the continent. The Association also noted that the Egyptian Meteorological Authority was providing meteorological and hydrological products and services in order to mitigate the effects of weather-related hazards related to flooding and dust storms, as well as to mitigate the effects of radiation on various sectors. The Association appreciated that the Egyptian Meteorological Authority offered its contribution in setting up an integrated approach in the preparation of programmes for monitoring and predicting risk. The aim was to prepare dependable services and products to support risk analysis and multi-hazard early warning systems. The Association urged its Management Group and other subsidiary bodies, in collaboration with the Secretariat, to ensure that the Strategic Operating Plan of the Association addresses DRR and climate adaptation and that the good practices of the Members were documented and shared within the Region and with other WMO Regions.

4.2.3 The Association was informed that a network of DRR Focal Points of WMO's technical commissions (TCs, including CBS, CCI, CHy, and the Commissions for Instruments and Methods of Observation – CIMO, Atmospheric Sciences – CAS, and Agricultural Meteorology – CAgM as well as the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology – JCOMM) and technical programmes (TPs, including the Tropical Cyclone Programme – TCP, WMO Integrated Global Observing System – WIGOS, and World Climate Research Programme – WCRP) had been designated through sessions of the TCs, nominations by the presidents of TCs, or relevant coordinating mechanisms of other TPs and inter-commission activities. In 2013, the DRR Focal Points of TCs and TPs carried out a review of activities and mechanisms of each respective TC and TP and developed recommendations for consideration of the 2014 Meeting of the PTCs (PTC-2014). These recommendations pointed to opportunities to support the Members in DRR through a more integrated approach in developing multi-hazard observation and forecasting platforms for seamless products and services to support risk analysis and MHEWS. PTC-2014 considered these recommendations and agreed that in principle such an integrated approach could benefit future DRR projects.

DRR Thematic Guidelines, Recommended Practices and Standards, and Related Training Modules

4.2.4 The Association noted plans to produce guidelines in the following three areas of DRR, as indicated in 4.2.1 (b), and agreed that it would provide guidance to Members to support the DRR-related activities of NMHSs in the Region:

- (a) WMO Guidelines for Hazard Definition, Classifications, Databases, Metadata, and Modelling to Support Loss and Damage Data Collection and Risk Analysis;
- (b) WMO Guidelines for NMHSs on the establishment of MHEWS to Support Emergency Preparedness, Response, and Early Recovery;
- (c) WMO Guidelines on Requirements for Weather and Climate Services to Support Disaster Risk Financing and Insurance.

4.2.5 The Association noted plans by the Secretariat to develop, in cooperation with a number of UN agencies and other partners, a set of training modules in DRR targeted at NMHSs' management, their staff, and stakeholders, using the above guidelines. The Association requested that training be provided to Members for applying these modules.

4.2.6 The Association noted plans to conduct a second survey to assess national and regional capacities of NMHSs to support DRR. The aim of this survey would be to measure the progress made since the first survey in 2006 as well as remaining challenges, opportunities, and gaps at national and regional levels in the DRR-related capacities of Members.

4.2.7 The Association noted the encouragement of EC-66 for the Secretariat to continue strengthening the collaboration with the African Union Commission (AUC), East African Community (EAC), United Nations Office for Disaster Risk Reduction (UNISDR), and the United Nations Economic Commission Africa (UNECA) in an effort to enhance development in Africa. In this connection, it particularly noted the importance of the 5th Africa Regional Platform on DRR that took place from 13 to 16 May 2014 in Abuja, Nigeria in which representatives of the African Ministerial Conference on Meteorology (AMCOMET) participated and WMO had a strong presence. The event served to further highlight the role of NMHSs in support of DRR.

National DRR and Climate Adaptation Capacity Development Projects with Regional Cooperation Frameworks Aligned with the Global Framework for Climate Services

4.2.8 Recognizing the fundamental importance of multi-hazard information and services provided by NMHSs in support of risk-informed and impact-based DRR decision-making, the Association encouraged its Members to actively participate in the national process for risk analysis, building partnerships and working arrangements with national agencies responsible for the collection of loss and damage data. In addition, the Association expressed the need for development of holistic and sector-driven national DRR and climate adaptation capacity development projects with regional cooperation frameworks, and therefore requested its Management Group to explore the possibility of developing such projects with support from the WMO Secretariat liaising closely with other relevant projects and organizations.

The Global Framework for Climate Services and DRR

4.2.9 The Association noted that a number of WMO DRR activities directly contributed to the development of all five components of the Global Framework for Climate Services (GFCS), namely the User Interface Platform (UIP), the Climate Services Information System (CSIS), Observations and Monitoring, Research, Modelling and Prediction, and Capacity Development. In this regard, the Association stressed that its activities pertaining to the implementation of the GFCS DRR priority area could be a critical contribution of the Association and subsequently that of the WMO to the implementation of the GFCS, including its other three priority areas (agriculture and food security, health, and water). The Association requested its Management Group, with support from the WMO Secretariat and the GFCS Office, to document the Region's initiatives for implementation of climate services for WMO DRR activities and to formulate concrete recommendations to WMO constituent bodies as input to the implementation of the GFCS.

Post-2015 Framework for DRR

4.2.10 The Association noted that the term of the Hyogo Framework for Action (HFA) 2005–2015 is drawing to an end, and was informed that the Third United Nations World Conference on Disaster Risk Reduction (WCDRR-III, 14–18 March 2015, Sendai, Japan) would consider for adoption the post-2015 framework for DRR. The Association further noted that regional and global consultations were held in 2014, facilitated by UNISDR and the regional socioeconomic groupings for drafting of the post-2015 framework for DRR. The Association highlighted the importance of one such event in the Region, namely the Second Arab Conference on DRR (14–16 September 2014, Sharm El Sheikh, Egypt), as well as the seven open-ended informal consultative meetings (5, 9, 18 September and 9, 10, 13 October 2014), the two Preparatory Committee Meetings (14–15 July and 17–18 November 2014), and the open-ended negotiation meetings (8–9 December 2014), all held in Geneva, Switzerland. It strongly encouraged its Members to participate in the WCDRR-III to showcase:

- (a) The importance of operational weather, climate, hydrological, and related environmental services in support of DRR decision-making; and
- (b) Technical capacities and challenges faced by Members in implementing impact-based forecasts and early warning systems in support of risk-informed decision-making.

4.2.11 The Association agreed on the need for suitable working arrangements to support DRR-related projects, proposals for further development and scaling up as well as coordination with regional DRR mechanisms related to the post-2015 framework for DRR and adopted [Resolution 5 \(RA I-16\) – Implementation of disaster risk reduction activities in Regional Association I \(Africa\)](#).

Post-2015 Development and Climate Change Agendas

4.2.12 The Association noted that also in 2015 a set of Sustainable Development Goals (SDGs) will supersede the Millennium Development Goals (MDGs) after the Special Summit on Sustainable Development on 28–30 September 2015 (tentative) and that the 21st Session of the Conference of Parties (COP) to the United Nations Framework Convention on Climate Change (UNFCCC) on 30 November–11 December 2015 in Paris, France, will adopt new agreements to address climate change mitigation and adaptation. There is consensus that coherence and mutual reinforcement between both agreements and the post-2015 framework for DRR needs to be promoted, e.g. through political recognition of this coherence and mutual reinforcement, linking mechanisms for monitoring and reporting, and cooperation in implementation. The Association noted further that WMO Members have actively engaged in the inter-governmental Open Working Group (OWG) consultations on the SDGs, with a report being submitted to the United Nations General Assembly for Member States' consideration. WMO also engaged in the Ad Hoc Working Group on the Durban Platform for Enhanced Action (ADP) that was established to develop a protocol, another legal instrument or an agreed outcome with legal force under the UNFCCC to be adopted at the COP 21 in 2015 and for it to come into effect and be implemented from 2020 onwards (Milestones: ADP sessions in 2014 and COP 20 in Lima, Peru, from 1 to 12 December 2015).

4.3 Data-processing and forecasting: weather, climate and water (agenda item 4.3)

Weather Issues

Global Data Processing and Forecasting Systems (GDPFS)

4.3.1 The Association recalled the five WMO high priorities established by Cg-XVI and committed to focusing its GDPFS work to support these priorities. In particular, it reaffirmed that the Global Data Processing and Forecasting System (GDPFS) contributes to many of the WMO high priorities: (i) through the Severe Weather Forecasting Demonstration Project (SWFDP) and the use of Ensemble Prediction Systems (EPS) for predicting severe and high-impact weather that

contributes to Disaster Risk Reduction and Capacity Development; (ii) through a network of centres that carry out global monthly and seasonal forecasts that are essential for the Climate Services Information System (CSIS) of the Global Framework for Climate Services (GFCS); (iii) through the use of applications of Numerical Weather Prediction/Ensemble Prediction Systems (NWP/EPS) such as atmospheric transport and dispersion modelling for environmental Emergency Response Activities (ERA), thereby contributing to Disaster Risk Reduction; and (iv) through the provision of benefits to other socioeconomic sectors, including aviation, agriculture, and marine safety.

4.3.2 The Association recalled that the GDPFS, including ERA, is a critical component of its end-to-end Basic Systems (from observing to delivering services), whose scope spans across multi-scales (space and time). The GDPFS includes a global operational forecasting infrastructure, operated by WMO Members that supports and contributes to their respective national programmes in weather, climate and water, including the production of meteorological warnings and services. The Association therefore encouraged Members running global, regional or limited-area meteorological prediction models, including those of RSMCs, to continue to make their products available on WIS for the benefit of all countries in RA I, who in turn are urged to contribute verification and feedback on their quality and usefulness, especially in forecasting meteorological hazards.

4.3.3 The Association acknowledged that significant progress has been made with NWP and EPS, resulting in new products for NMHSs to deliver high-quality services. It therefore requested Members to consider providing, within their training courses for forecasters, materials on the use and interpretation of their NWP products, including how to integrate Ensemble Prediction Systems (EPS) outputs into routine operational forecasting, especially for severe and high-impact weather forecasting. The Association also requested the WMO Secretariat and the Commission for Basic Systems (CBS) to assist NMHSs in the uptake, including in the interpretation and application, of such products for their national purposes. The Association noted that CBS has completed a set of [Guidelines on EPS and Forecasting](#) to aid forecasters in effective application of EPS. The Guidelines include links to other sources of guidance and learning, e.g., from the ECMWF User Guide, or the COMET on-line training programme.

Severe Weather Forecasting Demonstration Project (SWFDP)

4.3.4 The Association recalled that significant benefits have been realized from the Severe Weather Forecasting Demonstration Project (SWFDP), either underway or under development in five project regions around the world, of which two are from Africa (Southern Africa and Eastern Africa) with a total of 22 countries involved. The Association appreciated that the success of SWFDP relied on effective partnerships in the “Cascading Forecasting Process”, which provided improved access to high quality NWP/EPS outputs and facilitated an effective use by forecasters of existing and newly developed products and tools made available by advanced operational global and regional centres, thus contributing greatly to capacity-building of NMHSs. The Association stressed the important role the Global NWP Centres and Regional Specialized Meteorological Centres (RSMCs) play in the cascading process. While expressing appreciation to these Centres for the support provided so far, the Association encouraged them to continue providing this service to NMHSs.

4.3.5 The Association noted with appreciation the success of the SWFDP – Southern Africa followed by the development of SWFDP – Eastern Africa during the intersessional period. It noted that, in subregions where the demonstration phase had been concluded, it would be necessary to pass into the operational phase and to rename the project appropriately as an operational activity. It recognized the contributions of various Members in supporting the project, and in particular of the UK Met Office (UKMO) in providing guidance through daily video-conferencing and training services to SWFDP-Eastern Africa lead forecasters, with support of RSMC Nairobi and RFSC Dar es Salam. This process greatly benefited participating Members in the new SWFDP-Eastern Africa. The Association expressed its appreciation to Norway for the instrumental support to its Members. It requested the Secretary-General to consider similar support services in new SWFDP implementation areas in the Region.

4.3.6 The Association noted the successful implementation of SWFDP and the positive contribution it made to NMHSs of the Region. In line with its request at XV-RA I for CBS to consider implementing a SWFDP in West Africa, the Association: (a) requested the WMO Secretariat to take the necessary measures to implement the project in Western Africa; (b) further requested the Secretariat to study possibility of extending this project to other parts of Africa; and (c) requested partners, governments and the WMO Secretariat to continue to provide support in the transition to the operational phase of the project after the demonstration phase has been completed to the developing countries and especially to Least Developed Countries (LDCs).

4.3.7 The Association noted the expansion of the SWFDP to include flash flood information, a system which was tested successfully in South Africa. It recognized the contribution of the United States Agency for International Development (USAID) in facilitating the integration of Flash Flood Guidance System (FFGS) into the SWFDP. The Association, therefore, requested the Secretary-General to consider expanding the integrated SWFDP/FFGS programme to the rest of the Region.

4.3.8 The Association recognized that advances made in NWP/EPS by global centres require product downscaling and tailoring for practical use by NMHSs. As a lesson from the SWFDP, the Association agreed that strengthening and sustaining WMO operational centres, particularly the RSMC(s) within the Region, through their operational linkages to national centres, will increase and sustain the benefits of the development of much needed capabilities at NMHSs of developing and least developed countries. To that end, the Association strongly supported the “*Mechanism to strengthen operational centres, build upon the lessons learnt through the SWFDP*” developed and adopted at CBS-Ext.(2014), which will be submitted to Cg-17.

Operational Forecasts

4.3.9 The Association encouraged Members to increasingly integrate outputs from ensemble prediction systems (EPS) into the process of forecasting to enhance the production of forecasts and warnings. It stressed that continuing support for capacity development in the use of EPS products was needed (for example, as achieved through the SWFDP), especially in developing countries.

Long-range Forecasts (LRF)

4.3.10 The Association noted with appreciation that the CBS/CCI Workshop on Operational Long-range Forecasting: Global Producing Centres (GPCs) and Regional Climate Centres (RCCs), in support of NMHSs and Regional Climate Outlook Forums (RCOFs) was held in Brasilia, Brazil from 25 to 27 November 2013, to identify priorities for strengthening cooperation and enhanced exchange of data, methods and tools between GPCs and RCCs, and ways to improve operational practice in long-range forecasting, including in support of NMHSs and RCOFs. The Association also noted the recommendations of the workshop on the steps needed to strengthen the process of generating long-range forecasts through increased capability for synthesis of prediction information on global, regional and national scales. It encouraged the continuation of this joint effort of CBS and CCI for the benefit of both RCC and RCOFs.

Emergency Response Activities (ERA)

4.3.11 The Association recalled that a number of major ERA events with significant impacts have occurred around the world since its previous session, including from volcanic eruptions, accidental release of hazardous chemicals into the atmosphere, and the catastrophic Fukushima Daiichi NPP accident in Japan triggered by the Great East Japan Earthquake and Tsunami of March 2011. The Association noted the significant additional workload imposed by these events on the operations of the network of RSMCs with activity specialization in the provision of atmospheric transport modelling for Environmental Emergency Response (EER) and/or backtracking. The Association also noted the need for public education to promote the public awareness on emergency response.

4.3.12 In the context of response to a nuclear accident, the Association noted a number of experiences reported not only by RSMCs and relevant international organizations, but also by NMHSs in many regions of the world, including the increasing need for related meteorological information on the spread of radioactivity from the accident for general public interest as well as specialized users. While acknowledging the existence of Environmental Emergency Response (EER) arrangements and standards for guidance products from the RSMCs, as stated in the Manual on the GDPFS (WMO-No. 485, Part II, Appendix II-7) and further documented in the WMO Technical Document No. 778 (documentation on RSMC support for EER targeted for meteorologists at NMHSs), the Association noted that there were other products available on the open Internet from other sources, which could cause misinformation. Therefore, the Association requested the Secretary-General and the Commission for Basic Systems (CBS) to promote the use of ERA-related products by NMHSs and assist them in the uptake, including in the interpretation and application of such products for their national purposes.

Climate Issues

4.3.13 The Association noted that the World Climate Programme (WCP) has been restructured to more optimally support the implementation of the Global Framework for Climate Services (GFCS). The Association urged its Members to closely align their operational climate service capabilities with the ongoing requirements of the GFCS.

4.3.14 The Association noted the outcomes of the sixteenth session of the Commission for Climatology (CCI-16) held from 3 to 8 July 2014 at Heidelberg, Germany, particularly its new working structure consisting of five Open Panels of CCI Experts (OPACEs). The Association further noted with satisfaction that RA I was adequately represented both at CCI-16 and in the new working structure of CCI (http://www.wmo.int/pages/prog/wcp/ccl/index_en.php).

4.3.15 The Association noted with appreciation that the *Guide to Climatological Practices* (WMO-No. 100) has been translated into all WMO official languages, available online at: http://www.wmo.int/pages/prog/wcp/ccl/guide/guide_climat_practices.php. The Association urged Members to actively use the Guide and provide feedback to CCI for improvements and updates.

4.3.16 The Association recalled the valuable contribution of WMO to the work of the United Nations Framework Convention on Climate Change (UNFCCC), mainly in the areas of adaptation and capacity-building. The Association requested the Secretary-General to continue facilitating provision of knowledge products through, inter alia, knowledge networks and national focal points, particularly in developing countries, to promote sound climate change-related policies and support adaptation.

Climate System Monitoring and Assessment

4.3.17 The Association noted with appreciation the work of the joint CCI/WCRP-CLIVAR/JCOMM Expert Team on Climate Change Detection and Indices (ET-CCDI), and its efforts in building NMHSs capacities in climate monitoring and assessment, in particular appreciating the positive impact of the regional workshops on climate indices held in Banjul, Gambia, in December 2011 and in the Arab region, in March 2012, for North Africa and the Middle East regions.

4.3.18 The Association welcomed WMO efforts to involve African climate experts in a number of events and seminars dealing with quality control and homogenization of climate data, including the Eighth Seminar for Homogenization and Quality Control in Climatology Databases and the Third Conference on Spatial Interpolation in Climatology and Meteorology, with the participation and valuable contribution of several North African experts to these events.

4.3.19 The Association appreciated the efforts by CCI in promoting and developing climate monitoring products and services based on remote sensing data. The Association noted the range of climate monitoring-relevant products and services for the African continent, provided by the EUMETSAT Satellite Application Facility on Climate Monitoring (CM SAF), hosted by Deutscher

Wetterdienst, Germany, and welcomed plans to hold a CM SAF training workshop in Africa in 2015.

4.3.20 The Association noted with appreciation the Workshop on Climate Monitoring including the Implementation of Climate Watch Systems (CWS) in RA I with focus on Eastern and Southern Africa, Pretoria, April 2013, organized by WMO in collaboration with the South African Weather Service (SAWS). It further noted the need for enhancing regional climate monitoring and climate watch functions of the RA I RCCs in order to help NMHSs to issue climate watch advisories. The Association emphasized the role of CWS in support of climate risk management and disaster risk reduction and the need to monitor the progress in CWS activities in Africa to identify gaps and challenges. The Association urged Members to provide regular information on CWS activities to the president of RA I and the Secretariat.

4.3.21 The Association was pleased to note the contribution provided by the Members to the publication “The Global Climate 2001–2010, A Decade of Extremes”, which received excellent attention by Members and the media. It urged Members to sustain and enhance their contributions to the WMO climate monitoring publications by providing relevant inputs.

4.3.22 The Association noted with appreciation the valuable and sustained contribution of RA I Members to the WMO Annual Statements on the Status of the Global Climate, issued annually in all official languages, which review climate conditions including extreme weather and climate events around the world. The Association noted the important role of the Statement in raising public awareness of climate change and agreed that these efforts should be sustained and enhanced. Furthermore, the Association noted that some members have launched annual national statements on the status of national climate that will contribute to the African annual statement.

4.3.23 The Association welcomed the WMO initiative to issue regional supplements to the annual statements on the status of the climate. The Association was informed of the efforts to develop the first edition of the Annual Statement on the Status of Climate in Africa in 2013 with support from ACMAD. The Association adopted [Resolution 6 \(RA I-16\) – Launching the annual Statement on the Status of the Climate for Africa](#) as a mechanism to encourage regional-scale climate assessments.

Climate Services Information System

4.3.24 The Association noted that WMO had already put in place, or identified, several entities to specifically support NMHSs climate operations, including the highly specialized centres designated by WMO based on standards and criteria. It further noted with satisfaction that these entities are appropriately highlighted in the GFCS implementation plan as part of its Climate Services Information System (CSIS) pillar, approved by the First Session of the Intergovernmental Board on Climate Services (IBCS-1). The Association urged its Members to enhance the Region’s contributions to the GFCS by strengthening the existing CSIS entities and also identifying and filling the gaps, both at regional and national levels.

4.3.25 The Association noted with appreciation that the RCC Africa, hosted by the African Centre for Meteorological Applications for Development (ACMAD), successfully completed its demonstration phase and was recommended by the Commission for Basic Systems (CBS) for formal designation as a WMO RCC. The Association further noted that RCC IGAD, hosted by the Intergovernmental Authority on Development (IGAD) Climate Prediction and Applications Center (ICPAC), has also been engaged in a demonstration phase, and urged it to expedite the process for formal designation. The Association noted with satisfaction that RCC-Network for the North Africa (RCC-Network-NA), coordinated by the National Meteorological Services of Morocco (DMN) started the demonstration phase in July, 2014. The Association highlighted the need to help forward the implementation of the RCC/RCC-Network for the Central Africa. It urged Members to actively support the operational activities of the RA I RCCs and RCC-Networks, as a valuable contribution to the implementation of the GFCS in the Region. The Association further urged the president of RA I to promote effective utilization and feedback by NMHSs of the RCCs products

and services. The Association adopted [Resolution 7 – Implementation of Regional Climate Centres and Networks in Region I \(Africa\)](#).

4.3.26 The Association noted the offer of Egypt to host training courses on climate and seasonal forecasting for North African countries in NA-RCC.

4.3.27 The Association appreciated the sustained and long lasting operation of Regional Climate Outlook Forums (RCOFs) in RA I, and noted with satisfaction that currently seven RCOFs successfully operate in the Region, namely RCOFs for: Sudano-Sahelian Africa (PRESASS), Central Africa (PRESAC), the Gulf of Guinea Countries (PRESAGG), Northern Africa (PRESANORD), and the Southwest Indian Ocean Countries (SWIOCOF) under the coordination of ACMAD; Southern African RCOF (SARCOF) coordinated by Southern African Development Community Climate Services Centre (SADC-CSC), and Greater Horn of Africa RCOF (GHACOF) coordinated by ICPAC. It urged RCOF stakeholders to seek efficiency through low-cost options and to seek stakeholder support to ensure their sustainability.

4.3.28 The Association noted with appreciation that a new cross-regional Mediterranean Climate Outlook Forum (MedCOF) launched in North Africa and coordinated by Spain had been established to cover the whole Mediterranean region encompassing northern African countries. The Association thanked the presidents of RA I and RA VI for their active encouragement to this initiative in the spirit of interregional collaboration.

4.3.29 The Association noted that National Climate Outlook Forums (NCOFs) and National Climate Forums (NCFs) are envisioned as key national platforms for promoting regular dialogue and inter-agency coordination in responding to climate variability and change, providing climate information at national level at relevant timescales through a regular and sustained multi-stakeholder dialogue between information provider(s) and users, and serve as an effective and sustained user interface platform for CSIS. The Association noted with appreciation, that a pilot NCOF was hosted by the Instituto Nacional de Meteorologia (INAM) Mozambique (Maputo) in March 2014 with the support of WMO. It urged Members to take up NCOF and NCF implementation as a key component of GFCS implementation at the national level, and requested the Secretary-General to facilitate the development of guidance to help NMHSs to set up and coordinate NCOFs and NCFs on a regular basis.

Climate Information for Adaptation and Risk Management

4.3.30 The Association urged its Members to support and promote user engagement through RCOFs, NCOFs, and NCFs by use or sector-driven climate forums (e.g., hydrological-, agricultural- or health-focused forums), interdisciplinary workshops and training, and field activities including roving seminars, a notable success in climate services for the agriculture sector.

4.3.31 The Association recognized the need for Climate Risk Management (CRM) approaches improved practical application of CRM at local levels, in order to reduce climate impacts, build resilience to climate variability and change and contribute to poverty reduction and development. The Association appreciated CCI guidance on CRM, and urged its Members to use the recommended CRM approaches, including development of case studies demonstrating good practices in CRM, and share the outcomes with CCI to help further improve the CRM concepts.

4.3.32 The Association noted with appreciation that a software package called “ClimPACT” was developed by the CCI Expert Team on Climate Risk and Sector-Specific Climate Indices (ET-CRSCI) with the aim of providing an easy and consistent way of generating sector-specific climate indices. Recognizing the added value of application-oriented climate information, the Association highlighted the need of conducting training workshops in RA I to promote wide use of the software.

4.3.33 The Association noted with appreciation the publication of the Guidance on Implementation of Heat Health early Warning Systems (HHWS), which is an outcome of collaborative efforts of experts from WMO and the World Health Organization (WHO). The

Association recognized the critical importance of the Guidance in view of increased frequency and intensity of heat waves during the last decades and urged Members to use it to implement integrated HHWS.

Drought Initiatives

4.3.34 The Association noted the successful organization of the High-Level Meeting on National Drought Policy (HMNDP) by WMO and other partners in Geneva, Switzerland in March 2013, and the HMNDP declaration. The Association supported the outcomes of HMNDP, and urged its Members to use them as guidance to facilitate development and implementation of national drought management policies.

4.3.35 The Association supported the establishment of the Integrated Drought Management Programme (IDMP) by WMO in collaboration with the Global Water Partnership (GWP). The Association expressed its interest in the work of IDMP and urged its Members to participate in it, especially in developing potential IDMP projects in the Region (<http://www.droughtmanagement.info/>). The Association noted that IDMP is an important contribution to GFCS.

4.3.36 The Association noted that the UN-Water Decade Programme on Capacity Development (UNW-DPC), WMO, UNCCD and FAO are collaborating on the National Drought Management Policies Initiative, which aims to develop capacities on this issue through four regional workshops during the period from March 2013 to December 2014. The Association appreciated the Regional Workshop for Eastern and Southern Africa, held in Addis Ababa, Ethiopia in August 2014 (<http://www.ais.unwater.org/droughtmanagement>). The Association urged the Secretary-General to harmonize, to the extent possible, the efforts of this initiative with the IDMP and to encourage WMO and other UN partners to organize workshops in other parts of Africa.

4.3.37 The Association noted that some West African countries (including Mali, Burkina Faso, Senegal and Morocco) implemented artificial rain programmes to reduce the negative impact of rainfall deficiencies on agricultural production and water resources. It noted that these countries found such initiatives useful, as well as the assessment methodologies of impacts of droughts.

4.3.38 The Association also noted that a Multidisciplinary Working Group in CILSS countries provides assistance to agricultural activities with a ten-day monitoring and outlook of rainfall and its impacts on agricultural production and water resources.

Water Issues

4.3.39 The Association noted that during the last intersessional period, the needs of Members in the Region were adequately addressed by the Hydrology and Water Resources Programme, as adopted by Sixteenth Congress.

Regional Association Working Group on Hydrology and Water Resources

4.3.40 The Association noted that although the RA I Working Group on Hydrology (RA I WGH) was re-established at RA I-XV, it has not been active. However, the Chairperson of the Working Group, who is also the Regional Hydrological Advisor, Mr Frigui Hassen Lofti (Tunisia), played an active role in representing the hydrological community of the Region in Hydrology and Water Resources activities of WMO. The Association took note of the participation of the Chairperson in EC sessions, the planning meeting of the Advisory Working Group of CHy and the WHYCOS International Advisory Group (WIAG). The Chairperson also developed a paper on the vision of Hydrology and Water Resources in Africa that identified the challenges NHSS and NMHSs face in delivering on their mandates.

4.3.41 The Association took note of the measures taken towards activation of the RA I WGH and the importance of Hydrology and Water Resources to the socioeconomic development of the

Region. The Association urged that the Secretariat should convene a meeting of the Group as soon as possible, should the RA I WGH be re-established.

4.3.42 The Association was pleased to learn of the several activities and projects implemented in the Region in Hydrology and Water Resources (HWR), including among others, capacity development and implementation of various HYCOS projects in Africa.

Capacity Development in Hydrology and Water Resources

4.3.43 The Association noted that a Training Course on Stream Gauging had been conducted (Accra, Ghana, 10–16 December 2012) for English-speaking West African countries, namely, Ghana, Liberia, Nigeria and Sierra Leone. The Association was pleased to note that a French version of the course was planned for French-speaking African countries in the first quarter of 2015.

4.3.44 The Association noted that a training workshop on a WMO open source database management software for management of Meteorology, Climate and Hydrology data (MCH) had been organized (Accra, Ghana, 13–17 August 2012) on a trial basis and was now being extended to other WMO Regions. Egypt offered to host future MCH training courses in both English and French, as well as training courses in hydrological modelling. There are plans to replicate the training in other countries in English and French in Africa. WMO is also promoting the adoption of MCH by NMHSs in all Regions and HYCOS Projects. It encouraged Members to take advantage of the availability of this open source software noting that MCH had been developed to enable transfer of data from CLICOM to MCH.

4.3.45 The Association noted that a training course was organized (Pretoria, South Africa, 24–26 February 2014) to operationalize the Southern Africa Region Flash Flood Guidance System (SARFFGS) funded by USAID OFDA in seven countries: Botswana, Malawi, Mozambique, Namibia, South Africa, Zambia and Zimbabwe. With the operationalization of SARFFGS in the Southern Africa Region, the seven countries have been equipped to predict, track and warn of occurrence of flash floods in the region. USAID OFDA, along with WMO, the South African Weather Service (SAWS) and the Hydrologic Research Center (HRC), are launching a project in 2015 to integrate the SARFFG system with the SWFDP so that both systems can be used by Regional Forecasters at the SAWS, as well as forecasters at the 7 NMHSs, to produce forecasts using all available data and resources. The upgraded system will also deliver warnings to meet the Disaster Management requirements of maximizing response time to mitigate humanitarian losses.

4.3.46 The Association noted that, in cooperation with the International Office for Water (OIEau) and the Congo-Oubangui-Sangha Commission (CICOS) WMO organized training courses on the management of national hydrological services (Kinshasa, Democratic Republic of the Congo, 10–13 April, 2012); hydrological network design, quality assurance and Integrated Water Resources Management (Kinshasa, Democratic Republic of Congo, 5–7 June 2013); and design and management of hydrological information systems (Yaoundé, Cameroon, 25–29 November 2013).

4.3.47 The Association noted that a Distance Learning Course was organized by WMO in collaboration with COMET, the National Oceanic and Atmospheric Administration (NOAA) and the Institute for Meteorological Training and Research of Kenya in Basic Hydrological Sciences for the African Region from 15 April to 31 May 2013 for 55 successful participants from 18 African countries and also noted that a second course will be organized by WMO in the first half of 2015.

4.3.48 The Association noted that WMO, in collaboration with the Global Water Partnership (GWP), plans to organize training workshops on Integrated Flood Management and on IWRM as a tool for Climate Change Adaptation by the end of the year.

4.3.49 The Association noted that WMO had recently published the [*Guidelines for Hydrological Data Rescue* \(WMO-No. 1146\)](#), and encouraged Members to use the document as appropriate.

Progress on WHYCOS

4.3.50 The Association noted the progress that had been achieved in various WHYCOS components and the continued technical support of WMO towards implementation of these components in Africa. After successful implementation of SADC-HYCOS phases I and II, SADC, with the support of WMO, have secured funds for implementation of phase III.

4.3.51 The Niger-HYCOS phase I project, for which WMO is the supervising agency, has been successfully implemented with funding from the French Development Agency and the African Water Facility. WMO is assisting with the technical direction of phase II for which funds have been secured for its implementation.

4.3.52 WMO, after guiding the implementation of the initial phase of the Volta-HYCOS project, handed over the responsibility for execution of the project to the Volta Basin Authority (VBA). This project is funded by the French Development Agency and the African Water Facility with WMO as the supervising agency.

4.3.53 The implementation of the IGAD-HYCOS project has taken off in earnest with WMO as the executing agency and financial support from the European Union (EU). The first phase is expected to end in March 2015 with the possibility of a no-cost extension.

4.3.54 The Association expressed its gratitude to the French Development Agency/Fonds Français pour l'Environnement Mondial, the African Water Facility and EU in providing financial support for the implementation of these HYCOS projects.

4.3.55 In response to requests from the Commission Internationale du Bassin Congo-Oubangui-Sangha (CICOS) and the Senegal River Development Organization (OMVS), WMO has developed (in cooperation with AFD and CNR) project documents for Congo-HYCOS and Senegal-HYCOS. WMO is providing technical guidance to CICOS for the preparatory phase of Congo-HYCOS which is currently ongoing. The second steering committee meeting of the Congo-HYCOS project was held in September 2014. Upon a request from the Lake Chad Basin Commission (LCBC), WMO is in the process of updating a project proposal for Lake Chad HYCOS and will assist in securing funds for its implementation when the proposal is accepted and approved by development partners. WMO will provide technical guidance for these projects when they materialize. Egypt requested WMO to explore the possibility of developing a Nile-HYCOS project for the Nile basin.

IWA Congress

4.3.56 The Association noted that WMO participated in the 3rd IWA Development Congress (Nairobi, Kenya, 14–17 October 2013) and organized a Workshop on 'Climate services for risk assessment and reduction of hydrometeorological events' that focused on partnerships between meteorological services and water operators, dam managers and river basin managers in Africa.

Fifth African Water Week

4.3.57 The Association noted that WMO participated in the 5th African Water Week organized by AMCOW (Dakar, Senegal, 26–31 May 2014) at which a keynote address was delivered by the Secretary-General in his capacity as Chairperson of UN-Water and also as a lead discussant on "Post-2015 Agenda on Water and Sanitation in Africa". WMO also co-convened a sub-theme with GWP and UNESCO on Water and Disaster Risk Management and mounted an exhibition to showcase WMO's contribution in addressing water and sanitation challenges in Africa. It commended the Secretary-General on his active participation in the week.

DEWETRA platform

4.3.58 The Association noted that at CHy-14, Italy had offered to make the DEWETRA platform freely available to Members. The DEWETRA platform is a real-time integrated system for

hydrometeorological and wildfire risk forecasting, monitoring and prevention. It has the capability to ingest data from different sources and produce several types of integrated maps for risk-management decision-makers. The Association was pleased to note that as a follow-up to the offer, WMO organized a workshop in Rome (28–30 October 2013) for 15 countries, from all RAs, including three from Africa (Tunisia, Senegal, Zambia), that introduced the system and the procedures to be followed to implement it. A Cooperation Agreement between WMO and the Italian Department of Civil Protection (“owner” of the software) has been signed. The Association thanked the Government of Italy for making the DEWETRA platform available to Members and encouraged Members to take advantage of this offer according to their needs.

Associated Programme on Flood Management (APFM)

4.3.59 The Association noted that the APFM, in partnership with the Global Water Partnership, continues to compile and produce guidance documents and tools in support of Integrated Flood Management. It noted with satisfaction that seven more are being developed. To date the APFM has developed 21 tools covering different topics related to technical, social, economic, environmental, legal and institutional aspects of the Integrated Flood Management. Currently, the basic APFM documents are available in English and French and there are plans to translate the tools into French. The Association noted that the HelpDesk on Integrated Flood Management has reached a peak in terms of requests for rapid guidance or for the development and support of pilot projects. The Association encouraged Members to take advantage of, and make use of, the guidance documents and tools produced by the APFM in their flood management plans and also encouraged Members to volunteer translating the tools into French.

Flood Forecasting and Warning

4.3.60 With the funding support of USAID, a project had been undertaken to establish a Flood Forecasting and Early Warning Strategy for the Lower Zambezi River Basin in Mozambique and Malawi, as part of a basin-wide Strategy for the development of Zambezi River Basin Flood Forecasting and Early Warning System (FFEWS) involving all the riparian states in the basin. The WMO Secretariat also assisted in the preparation of a Flood Forecasting and Warning Strategy for the Limpopo River Basin.

WMO Commission for Hydrology

4.3.61 The Association was informed about the outcome of the fourteenth session of the Commission for Hydrology (CHy). It took note that the Commission had re-established an Advisory Working Group (AWG) composed of ten members and had identified four Open Panels of CHy Experts (OPACHEs) to deal with five thematic work areas: Quality Management Framework – Hydrology (QMF–Hydrology); Data Operations and Management; Water Resources Assessment; Hydrological Forecasting and Predictions; and Water, Climate and Risk Management. The Association was pleased to note that Mr Harry Lins (USA) was elected as president of CHy and that Mr Johnson Maina (Kenya) was appointed AWG member co-responsible for Hydrological Forecasting and Predictions. The session encouraged Members to nominate experts to the OPACHEs set up for each thematic area, and to contribute actively to the work programme.

4.3.62 The Association commended the number of manuals and guidelines which have been published or are under development in the framework of the QMF-H and their usefulness in support of day-to-day activities of NHSs. It was pleased to note that the extensive training material on the *Manual on Stream Gauging* (WMO-No. 1044) had been translated into French. The French version of the *Manual on Flood Forecasting and Warning* (WMO-No. 1072) is currently being finalized. It encouraged the Secretariat to translate other QMF-H publications into French to ensure wider use and benefits and encouraged Members to volunteer translating those more relevant for the Region into French.

4.3.63 The Association learned with interest the development of the CHy Communities of Practice (<http://www.wmo.int/chy/communities/>), in particular the one for the MCH database management system and that for the Stream Gauging Training Material for Instructors. It

welcomed the increasing material in French and encouraged its Members to appoint experts in the related fields to actively participate in the activities undertaken in those communities.

4.4 WMO Integrated Global Observing System and WMO Information System (agenda item 4.4)

WMO Integrated Global Observing System (WIGOS)

The WIGOS Framework Implementation

4.4.1 The Association considered the WIGOS implementation actions to be undertaken by its Members and subsidiary bodies. In this consideration, the Association took into account decisions of Cg-XVI, EC-64, CBS-15, EC-65 and EC-66 on the WIGOS implementation.

4.4.2 The Association recalled Resolution 50 (Cg-XVI) – Implementation of the WMO Integrated Global Observing System, in which the regional associations were requested: (a) to develop their regional WIGOS implementation plans; (b) to coordinate WIGOS implementation activities with the WMO Information System in their operating plans and work programmes; and (c) to promote capacity-building and outreach activities to assist Members in the implementation of WIGOS. The Association agreed that WIGOS would provide a framework for improved collaboration and coordination across WMO Programmes, across WMO observing systems and between NMHSs and relevant national, subregional/regional and international organizations.

4.4.3 The Association emphasized that strong support and close collaboration among Members are needed to advance scientific knowledge and technical infrastructure to meet the regional WIGOS requirements. Therefore, it would be desirable to strengthen cooperation and partnership through Region-wide organizations or subregional groupings overseeing the integration of the WIGOS component observing systems. It also encouraged enhanced cooperation among meteorological, hydrological, marine/oceanographic and environmental institutions/services where those are separated at the national and regional levels.

4.4.4 The Association recalled Resolution 10 (EC-64) – WIGOS Framework Implementation Plan (WIP) and noted the WIP ten Key Activity Areas that must be tackled in order to implement the WIGOS framework. The Association expressed its concern that the timely completion of WIGOS implementation in the Region would directly depend on the available resources in terms of expertise and funds. The Association further underlined that WIGOS implementation at national and regional levels would require initial investment, specifically for improvement of coordination and technological infrastructure. This investment should be a significant component of the WIGOS implementation plans of the individual NMHSs. In this regard, the Association urged Members to allocate the necessary resources to support the implementation of WIGOS in the Region.

4.4.5 The Association also urged its Members to continue providing resources, through the WIGOS Trust Fund and seconded experts or Junior Professional Officers, to help support the implementation of WIGOS.

4.4.6 The Association noted that CBS-15 endorsed the new “Implementation Plan for the Evolution of Global Observing Systems” (EGOS-IP), which was subsequently approved by EC-65. In this regard, the Association requested its Members to: (a) nominate national focal points tasked with monitoring the implementation of the EGOS-IP at the national level, report on implementation issues, and provide feedback to CBS through the Secretariat; and (b) address the actions listed in the EGOS-IP in collaboration with partner organizations and agents identified in the EGOS-IP. It also encouraged Members to mobilize additional resources to drive these activities forward. It further requested the relevant RA I subsidiary bodies to address the actions listed in EGOS-IP in their work programmes, and promote its effective implementation. The Association also noted that EGOS-IP builds on the analysis and guidance from the WMO Rolling Review of Requirements (RRR) process, and that it provides a substantial contribution to WIGOS Key Activity Area 3 on design, planning and optimized evolution of WIGOS component observing systems.

4.4.7 The Association noted with great appreciation that in response to the request from Cg-XVI, the Regional WIGOS Implementation Plan for RA I (R-WIP-I) had been developed by the RA I Task Team on WIGOS (RA I/TT-WIGOS), and subsequently updated based on the outcomes from a series of Workshops on WIGOS and WIS Implementation organized in all RA I subregions. The Association expressed its appreciation to RA I/TT-WIGOS for the development of R-WIP-I and thanked Dr M. Bah and Dr A. Makarau for their outstanding work and leadership. In this regard, the Association thanked the governments of Congo, Cote d'Ivoire, Kenya, Morocco, United Republic of Tanzania and Zimbabwe for hosting the TT-WIGOS meetings and the five Subregional Workshops on WIGOS, and it expressed its appreciation of the leadership in the implementation of WIGOS in the Region shown by the Permanent Representatives of these Members.

4.4.8 The Association accordingly adopted [Resolution 8 \(RA I-16\) –WMO Integrated Global Observing System Implementation Plan for Regional Association I \(Africa\)](#). The Association agreed that the implementation of R-WIP-I should be supported by all the Members of the Region, and that it should be guided, supervised and monitored by the Management Group of RA I, with periodic reports from appropriate subsidiary bodies in charge of WIGOS. In this regard, the Association emphasized that commitment by Members to WIGOS is essential and urged its Members to support the implementation of WIGOS in their territory, including the provision of sufficient resources. In particular, the Association urged Members to make experts available to contribute to relevant regional working groups.

4.4.9 The Association further agreed that R-WIP-I should be further revised to accommodate new projects which would be submitted by Members, and authorized the president to approve any necessary revisions of R-WIP-I during the intersessional period in consultation with the Management Group. In this regard, the Association agreed that the list of regional WIGOS projects should be expanded to accommodate also subregional and national projects.

Regional Basic Synoptic Network (RBSN) and Regional Basic Climatological Network (RBCN)

4.4.10 The Association noted that owing to Members' efforts, the RBSN and RBCN have demonstrated somewhat improved performance. However, the Association recognized that further effort must be made by Members to improve sustainability, data availability and overall performance to a satisfactory level to meet service requirements. Regarding CLIMAT messages, it noted that greater efforts by Members must be made to ensure that their operational observing stations compile and transmit the climate-related messages according to existing WMO regulations. The Association also recalled that quality management is a key activity area of the WIGOS framework Implementation Plan and noted that improved monitoring is a significant element of this activity.

4.4.11 By adopting [Resolution 9 \(RA I-16\) – Regional Basic Synoptic Network and Regional Basic Climatological Network in Region I \(Africa\)](#), the Association approved the update of the RBSN and RBCN stations as given in [Annexes 1 and 2](#) to this resolution. The Association noted that the concepts behind the RBSN and RBCN are becoming outdated as Members implement a wider range of observing systems in integrated composite networks serving multiple purposes. The Association noted further that an aim of WIGOS is to develop the definition of an integrated Regional Basic Observing Network (RBON) together with a new database of station information which will more completely describe the WMO observing capabilities assembled collectively by Members. It requested that CBS and other relevant Technical Commissions, the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS), with the support of WIGOS Project Office, give priority to making progress on the development of the RBON concept and that keep WMO Members and this Regional Association well informed of developments in this regard.

GCOS Reference Upper Air Network (GRUAN)

4.4.12 These issues are addressed under agenda item 4.4, paragraphs 4.4.49–4.4.67.

Marine and Oceanographic Observations

4.4.13 The Association noted that implementation of marine observing networks in the Region has remained relatively stable in the last four years thanks to global efforts and to the prominent role of Members in the Region. The Association noted with interest the valuable data provided by the Tropical Moored buoy arrays in the Equatorial Pacific (TAO) and Atlantic (PIRATA) Oceans, the Pacific part of which is a central component of the ENSO Observing System, and deployed specifically for research and forecasting of El Niño and La Niña. These networks also contribute valuable upper-ocean and surface meteorological data for Numerical Weather Prediction and tropical cyclone forecasting.

4.4.14 However, the Association expressed concerns that data availability for both the moored buoy arrays in the Tropical Pacific (TAO, now complete with 67 units) and Atlantic oceans (PIRATA: complete with 18 units) is not at its optimum (reduced to 50% only) due to vandalism on the data buoys, and difficulties to assure maintenance due to the cost of ship time, and piracy. The Association urged its Members to contribute to the JCOMM Observations Programme Area Implementation Goals (see http://www.jcomm.info/index.php?option=com_oe&task=viewDocumentRecord&docID=8930) and thereby invest additional resources in the further development of ocean observing systems in order to address the increasing needs for climate applications and services. The Association recommended that its Members work closely with the Data Buoy Cooperation Panel (DBCP), the Global Drifter Programme, and the Argo programme for providing opportunities for the deployment of drifting buoys and profiling floats in the equatorial and south sectors of the Eastern Pacific and Western Atlantic Oceans. The Association urged its Members to install barometers on all drifters they are planning to deploy in the Region.

4.4.15 The Association noted with great appreciation that the MARINEMET project funded through the AFRIMET initiative of the Spanish Cooperation has made possible the acquisition of tidal gauges and equipment to monitor water levels in coastal areas of Cabo Verde, Mauritania, Senegal, and Gambia. The association further noted that a meteorological/oceanographic buoy has recently been deployed in Senegal coastal waters to support both research and operational applications in the framework of the ECLAIRS programme.

4.4.16 The Association invited its Members to investigate providing the infrastructure for establishing WMO-IOC Regional Marine Instrument Centre(s) (RMIC) in the Region in order to assure traceability of the marine observations, improve data quality, permit bias correction, and facilitate adherence of observational data, metadata, and processed observational products to higher level standards. The Association also noted with concern the end of satellite coverage over the data-sparse Indian Ocean in 2016 when the Indian Ocean Data Coverage (IODC) programme ends. The Association urged the WMO Space Programme to facilitate discussions with satellite service providers in order to ensure continued coverage of this ocean region.

Aircraft Observations

4.4.17 The Association noted that expansion of the AMDAR Programme in Region I would provide a cost-effective way of addressing the continued challenges faced by the upper-air parts of the RBSN. It further noted that the current coverage over much of the African continent is mainly through the collaboration between the South African Weather Service and South African Airways, British Airways and Lufthansa. The Association encouraged other Met services to form similar collaborations with airlines to enhance observations, particularly in data sparse regions of the continent to assist with the development of the RA I AMDAR system.

4.4.18 The Association was advised that a new programmatic structure for the development and maintenance of aircraft-based observations and the WMO AMDAR observing system had now been established within the WMO Technical Commissions, CBS and CIMO. The Association furthermore urged the participation of Members in the two upcoming Africa AMDAR Regional implementation workshops viz. AMDAR workshop in Kenya from 22–23 April 2015 and Africa AMDAR Workshop in Morocco scheduled tentatively in the fourth quarter of 2015.

4.4.19 The CBS Expert Team on Aircraft-based Observing Systems, in line with the global actions on Aircraft Meteorological Stations listed in the Implementation Plan for Evolution of the Global Observing System (EGOS-IP), has offered to collaborate with each WMO Regional Association towards the development, maintenance and application of regional aircraft-based observations implementation plans.

4.4.20 The Association suggested that a regional working body for AMDAR could take on the role of coordinating and overseeing the further development of the aircraft-based observing systems in the Region.

Cryospheric Observations and Global Cryosphere Watch (GCW)

4.4.21 The Association expressed its interest in the on-going development of the Global Cryosphere Watch (GCW) as reported to EC-66, the recent availability of the GCW Implementation Plan and a need for the engagement of experts from RA I in GCW activities. Members were urged to provide comments on the GCW Implementation Plan and to indicate those activities in which they would like to be engaged. It urged those Members that routinely measure solid precipitation and snow and ice parameters to consider the establishment of GCW reference sites as part of GCW's CryoNet initiative. The Association urged interested Members to nominate national focal points for GCW activities and to review and provide the EC Panel of Experts on Polar Observations, Research and Services (EC-PORS) with information on how GCW could help them.

WMO Polar Activities

4.4.22 The Association acknowledged the importance of WMO polar initiatives and the need for on-going coordination of activities with the regional associations and technical commissions. It urged Members to review and comment on the International Polar Partnership Initiative (IPPI) Concept for follow-on activities in the Polar Regions and to provide their guidance on what the role of WMO could be in IPPI.

Evolution of Global Observing Systems

4.4.23 The Association, noting the adoption by the Executive Council of the Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP), urged its Members, in collaboration with partner organizations and identified agents in the EGOS-IP, to address the 115 actions listed in the Plan that are relevant to the Region.

4.4.24 The Association recognized the need to monitor the implementation of the EGOS-IP actions, and requested its Members, who have not yet done so, to nominate National Focal Points tasked to monitor the implementation of the EGOS-IP nationally, report on regional implementation issues, and provide feedback to the CBS through the Secretariat.

4.4.25 The Association invited its Members to consider using funding mechanisms such as the WMO Voluntary Cooperation Programme (VCP) and those of GCOS to address easy to resolve observing system implementation and operations problems in the short term, on the model of what was successfully done during the African Monsoon Multidisciplinary Analyses (AMMA) project.

Observing Systems Experiments

4.4.26 The Association agreed on the importance of having impact study results for the tropical region in RA I in order to improve engagement with the relevant countries with regard to the implementation of the observing system.

Atmospheric Chemical Composition and UV Measurements of the GAW Programme

4.4.27 These issues are addressed under agenda item 4.5, paragraphs 4.5.26–4.5.44.

Terrestrial observations – Water cycle

4.4.28 The Association noted the importance of information exchange standards such as WaterML 2.0 and supported the potential adoption of WaterML 2.0 as a WMO standard for information exchange managed by WMO (supported by the WMO/OGC MOU), subject to the successful implementation of the testing programme proposed.

4.4.29 The Association encouraged further work by WMO in the evaluation of the usefulness and suitability of the HY_Features model to WMO applications.

4.4.30 The Association noted further that CHy-14 had invited Members that had developed good practices in the use of radar data for nowcasting in operational hydrology to support the AWG member responsible for Data Operations and Management (Tony Boston (Australia)) in providing guidance, advice and training in this regard. The Commission also recommended better communication with the satellite community in order to understand the capabilities and limitations of satellite data and to make satellite-based information and products for hydrological purposes available to National Meteorological and Hydrological Services (NMHSs).

4.4.31 The Association was informed that the president of CHy has nominated Mr Silvano Pecora (Italy) to assist the AWG member responsible for Data Operations and Management to, among others, test the implementation of WaterML2.0 in the Niger-HYCOS and SADC-HYCOS Projects with the possibility of extending to the IGAD-HYCOS Project. Other test areas under consideration are the Sava River Basin, the Arctic region, Latin America, China and New Zealand.

4.4.32 The Association was informed of the progress in the development of plans for the implementation of a number of HYCOS components in the Region, namely, the Lake Chad HYCOS, Congo-HYCOS and Senegal-HYCOS.

Space-based Observations

4.4.33 These issues are addressed under agenda item 4.4, paragraphs 4.4.45–4.4.58.

Instrument Standards and Best Practices

4.4.34 The Association recalled that Cg-XVI had stressed that Regional Instrument Centres (RICs) should provide effective support to Members in ensuring the traceability of their standards, and it reaffirmed the need to regularly assess their capabilities making use of the evaluation scheme developed for this purpose. The Association noted that Regional Radiation Centres (RRCs) should provide support to Members for the traceability of radiation measurements. The Association requested those Members hosting RICs and RRCs to reaffirm their willingness to provide these facilities and their compliance with the relevant Terms of Reference of these centres at the latest by December 2014 as they play a crucial role in ensuring traceability of measurement to the International System of Units (SI), and in the capacity-building which is fundamental for the development of WIGOS.

4.4.35 The Association noted the support expressed by Congress and the Executive Council to the further development of the siting classification for observing stations on land, published in the *Guide to Instruments and Methods of Observations* (WMO-No. 8), as a common ISO-WMO standard. The Association urged its Members to implement this classification and to share any experience gained in this process.

4.4.36 The Association noted that had CIMO proposed to carry out an extensive revision and update of the *International Cloud Atlas – Manual on the Observation of Clouds* (WMO-No. 407, Volume I and II), parts of which constitute Annexes to WMO *Technical Regulations* (WMO-No. 49). This would make it the undisputable web-based global reference standard for the classification and reporting of clouds and hydrometeors. The Association noted that sources of funding still had to be identified for this activity, as the document had not been updated since 1975 (Volume I) and 1987

(Volume II) and no technical commission had been in charge of this document since then. In view of the importance of this document to Members, in particular for developing countries that still make extensive use of human observers, the Association strongly supported this proposal and recommended that funding possibilities be explored.

4.4.37 The Association expressed its appreciation for the on-going Solid Precipitation Intercomparison Experiment (SPICE) activity under the lead of CIMO, within which substantial progress is expected to be made in the understanding and calibration of solid precipitation measuring equipment. It further stressed that the measurement and exchange of cryospheric data at synoptic and climate stations, where appropriate, but particularly in mountain and other high elevation regions, would be especially useful to meet the operational, research and service needs of weather, climate, hydrology and environmental science nationally, regionally and globally.

4.4.38 The Association recognized the particular importance of long-term observations including those from observing stations that provide continuous data for 100 years or more (centennial observing stations). Such data and metadata – carefully treated in terms of quality assurance and archiving – are essential for documenting and studying climate variability and change on decadal to centennial timescales, thereby providing useful input to relevant climate research and services, and beyond. The Association further noted the strong recommendation made by the Commission for Instruments and Methods of Observations during its sixteenth session that Members continue to make time series of observations in the current locations of the stations, by maintaining the observational environment as much as possible and by avoiding changes to the locations of the observation stations of all classes.

Radio Frequency Coordination

4.4.39 The Association recalled Resolution 11 (EC-64) on radio frequencies for meteorological and related environmental activities. It noted that its Members, both individually and through the participation in the CBS Steering Group on Radio Frequency Coordination (SG-RFC), had contributed significantly to the WMO success at the International Telecommunication Union (ITU) World Radiocommunication Conference 2012 (WRC-12) in protection of the existing and providing additional radio-frequency spectrum employed by meteorological and Earth observation systems and applications. However, there is increasing pressure to share (or in some cases reallocate) radio-frequency bands used for meteorological purposes, and this could have an impact on Members' operations, in particular their observing systems.

4.4.40 The Association noted that EC-66 agreed to keep as a priority Resolution 9 (EC-65) relating to the ITU World Radiocommunication Conference 2015 (WRC-15) to be held in November 2015. It further noted that according to the [WMO Preliminary Position Paper on WRC-15 Agenda](#), there are many WRC-15 agenda items that may affect the operation of systems/applications of NMHSs. It noted that most countries in RA I are members of the African Telecommunication Union (ATU) and some are members of the Arab Spectrum Management Group (ASMG), which are two (out of six) regional telecommunication organizations participating in the ITU preparation to WRC-15. It also noted that some Members participate in the newly formed African Spectrum Working Group (AfriSWOG) established in March 2013. The Association emphasized the necessity of appropriate representation of meteorological requirements/interests in the relevant national and ATU, ASMG and AfriSWOG activities. It further noted that Permanent Representatives in RA I should endeavour to ensure that the WMO Position on radio-frequency matters is made known to their national and ATU/ASMG/AfriSWOG representatives and that they advise CBS through the Steering Group on Radio Frequency Coordination (SG-RFC) on relevant activity within national and regional frequency management groups.

4.4.41 The Association noted the continued pressure to share frequencies presently allocated to radiolocation, meteorological-satellite and Earth observation radiocommunication services and used by systems/applications for meteorological and related environmental observations with International Mobile Telecommunications (IMT) and RLAN systems, which are widely used for fixed, semi-fixed (transportable) and portable computer equipment for a variety of broadband applications, as well as for fixed, nomadic and mobile wireless access applications. The

Association expressed its concern that the initiatives to allocate C-Band frequency range 5350–5470 MHz to the mobile service and RLAN could impact on RA I's current and future use of these remote sensing systems for improved environment monitoring, disaster prediction and warning systems, especially in remote areas.

4.4.42 The Association noted that the 3.400–4.200 MHz frequency band is used by the meteorological community to distribute meteorological data through commercial satellite systems. It is also used for telecommunications and Internet access. Any detriment to these services would seriously reduce NMHSs access to the information.

4.4.43 In order to protect present and future services provided by NMHSs for timely warning of impending natural and environmental disasters, accurate climate prediction and detailed understanding of the status of global water resources, it is essential that WMO Permanent Representatives ensure that national positions on radio-frequency matters recognize the results of studies related to sharing of frequency bands allocated for meteorological and related environmental activities with other radiocommunications systems.

4.4.44 The Association supported the need for all Members to participate actively in national, regional and international activities on radio-frequency spectrum regulatory and use issues in order to defend radio-frequency bands used for meteorological and environmental activities. Noting the draft "[WMO Strategy on Radio-Frequency Protection for Meteorology](#)" developed by the SG-RFC and provided to EC-65 as an information document (EC-65-inf04-4(2)-Draft-Strategy-RFP_en.doc), the Association encouraged all Members to utilize the "Guide to NMHS Participation in Radio-Frequency Coordination" available in the *Abridged Final Report with Resolutions and Recommendations of the Extraordinary Session (2014) of the Commission for Basic Systems*, Recommendation 13 (CBS-Ext.(2014)). It noted that this guidance is essential to informing Members on how to effectively participate in this important activity.

WMO Space Programme

Space-based Observations

4.4.45 Geostationary coverage of the Region through the EUMETSAT Meteosat-10 stationed at 0°E provides full disk imagery every 15 minutes in 13 Visible or Infrared channels. Meteosat-10 will be replaced by Meteosat-11, planned for 2015. EUMETSAT also provides coverage of the Indian Ocean area from 57.3°E with the first-generation spacecraft Meteosat-7 as a gap-filler, on a best effort basis. Limited coverage of the eastern part of the Region is provided by the INSAT-3D satellite of India, stationed at 82°E, and the FY-2D satellite of China, at 86.5°E.

4.4.46 The Association noted that by the end of 2016, operations of Meteosat-7 over the Indian Ocean will cease since this 17-year old satellite has to be de-orbited. Satellite observations of this area are addressing essential WMO requirements, as the Indian Ocean modulates climate variability over Africa and is a source of severe weather systems affecting Indian Ocean islands and Eastern and Southern Africa. The Association noted that the sixty-fifth session of the Executive Council strongly encouraged potential contributors and in particular China, EUMETSAT, India and the Russian Federation to develop a coordinated plan to secure the continuation of Indian Ocean data coverage. In this regard the Council had noted that CMA and EUMETSAT had agreed on an arrangement to ensure the continuity of the Indian Ocean coverage after 2016, and had invited the Coordination Group for Meteorological Satellites (CGMS) to support these plans and to present a report through the WMO Space Programme prior to the Seventeenth WMO Congress.

4.4.47 The Association acknowledged the polar-orbiting satellite systems deployed by China (FY-3B, 3C), EUMETSAT (METOP-A,B) and the United States of America (NOAA-19, Suomi-NPP) to maintain operational atmospheric sounding capabilities in morning and afternoon orbits, respectively, and noted the intention of China to deploy a future FY-3 satellite on the early morning orbit.

Satellite data access and exchange

4.4.48 The Association expressed its appreciation to EUMETSAT for maintaining a powerful data dissemination capacity over the whole Region with the EUMETCast C-band service, which meets a wide range of application needs for satellite data and products as well as for other data types such as NWP model outputs.

4.4.49 The Association recognized the value of the established technical dialogue between the satellite user community in Africa and EUMETSAT through the Regional Association I Dissemination Expert Group (RAIDEG), jointly established by WMO and EUMETSAT in 2010. RAIDEG regularly identifies and documents requirements for satellite data access and exchange in support of meteorological, oceanographic and environmental applications, raises users' awareness of available datasets, fosters the expression of new user requirements, and thus helps improve access and exchange of satellite and related data (such as NWP model output) in the Region mainly based on the EUMETCast service. It underlined the particular role to be played by RAIDEG in the preparation for the use of future satellite systems, which will offer new and improved performances but will also pose data access and data management challenges since they will generate new types of data with significantly increased data volumes.

4.4.50 Recalling EC-65 Resolution 12 – Regional Requirements for Satellite Data Access and Exchange, the Association agreed to consider RAIDEG as a technical advisory body of the RA I Working Group on Observations and Infrastructure as elaborated in the RAIDEG Terms of Reference given in the [Annex I to the present report](#). It encouraged all Members to nominate points of contact as an interface to the RAIDEG representative of their respective subregion.

4.4.51 The Association noted with appreciation the online resources maintained by the WMO Secretariat to inform users about satellite systems (OSCAR/Space, <http://www.wmo.int/oscar/space>) and access to satellite data and products (the Product Access Guide, <http://www.wmo-sat.int/product-access-guide>).

Satellite utilization and training

4.4.52 The Association expressed its appreciation to EUMETSAT for organizing biennial User Fora in Africa (the eleventh forum was held in September 2014 in Benoni, South Africa), as an important mechanism to increase satellite user awareness and for the exchange of experience among EUMETSAT, Members, and other relevant institutions in Africa.

4.4.53 The Association expressed its appreciation to the four Centres of Excellence for Education and Training in Satellite Meteorology (Nairobi, Kenya; Niamey, Niger; Pretoria, South Africa; Casablanca, Morocco), implemented with the support of EUMETSAT as part of the Virtual Laboratory for Education and Training in Satellite Meteorology (VLab). The Association thanked EUMETSAT for its continuing support to capacity development and encouraged the Centres to respond to the training needs of Members in their areas of responsibility. The Association noted the insufficient availability of online training modules in languages other than English, particularly on satellite imagery and product interpretation.

4.4.54 To raise the capacity of operational forecasters in using satellite data, the Association encouraged all Members to participate in online monthly Regional Focus Group discussions established by the South African Centre of Excellence; it encouraged the other Centres to establish similar mechanisms. The Association however noted with concern persisting poor telecommunication connectivity of some Members, hampering their participation in online VLab training events. It urged Members and their partners to resolve this issue and in the interim encouraged the use of training modules disseminated via the EUMETCast training channel.

4.4.55 The Association thanked the European Union, the African Union Commission and EUMETSAT for enabling the Monitoring for Environment and Security in Africa (MESA) project, which builds on the achievements of the PUMA and AMESD projects in enhancing infrastructure and stimulating satellite-based applications and services. It welcomed the establishment of the

Global Monitoring of Environment and Security for Africa (GMES-Africa) as an initiative that should provide a new framework and increased support for the development and implementation of space-based environmental applications.

4.4.56 The Association noted the importance of local capacity in information and communication technology (ICT) which is essential to maintain data flows and operational use of satellite data, and to maximize the impact of application-oriented projects such as MESA. It strongly encouraged Members to ensure the availability of competent ICT staff in NMHSs.

Preparing users to new generation of geostationary satellites

4.4.57 The Association noted the EUMETSAT plan to launch in 2019 the next-generation geostationary imager within the MTG Programme. Recalling the CBS Guideline for Ensuring User Readiness for New Generation Satellites and noting the potential challenges in introducing the new data streams into operations, the Association stressed the need for timely and concerted satellite user readiness activities by Members throughout the Region, in partnership with EUMETSAT. The Association commended the efforts by EUMETSAT in introducing MTG at the User Forum in Africa, and the work by WMO in establishing the online Satellite User Readiness Navigator (SATURN) (<http://www.wmo-sat.info/satellite-user-readiness/>).

Concept for WMO/AMCOMET Regional Space Programme for Africa

4.4.58 The Association welcomed the discussions being held in AMCOMET on a WMO/AMCOMET Regional Space Programme for Africa. It recommended that the proposed Programme builds on existing satellite-related programmes and activities in the Region, and focuses on key gaps identified by Members. The Association held that the prospective Programme should put emphasis on the further development of applications of space-based observations to weather prediction, climate and environment monitoring, and disaster risk reduction. The Association subsequently adopted [Resolution 10 \(RA I-16\) – WMO/AMCOMET Regional Space Programme for Africa](#).

Global Climate Observing System (GCOS)

4.4.59 The Association recalled that undertaking the actions identified in the 2010 updated Implementation Plan for the Global Observing System for Climate in Support of the United Nations Framework Convention on Climate Change (UNFCCC) would address many of the needs for climate observations in support of the Global Framework for Climate Services (GFCS). The Association was reminded of the importance of a strengthened Global Climate Observing System to the successful implementation of the Global Framework for Climate Services (GFCS), recognizing that observations and monitoring constitute one of the essential pillars of the GFCS. The Association reiterated its urgent call to Members to assist and advise international and national organizations in the implementation of the global observing systems for climate.

4.4.60 The Association was informed on the next steps of the GCOS improvement and assessment cycle. At the thirty-seventh session of the Subsidiary Body for Scientific and Technical Advice of the UNFCCC in November 2012, GCOS was invited to submit an assessment of the adequacy of the global observing system for climate to SBSTA in 2015, and a new Implementation Plan in 2016, with a draft of the latter encouraged to be provided one year before. The Association noted the recommended planning and requested that the GCOS Secretariat report back on the process at the next Association session.

GCOS Expert Panels for Land, Atmosphere and Oceans

4.4.61 The Association noted that the GCOS/GTOS/WCRP Terrestrial Observation Panel for Climate (TOPC) had held its sixteenth session from 10 to 11 March 2014, at JRC, in Ispra, Italy. TOPC reviews the climate-observing components of terrestrial global observing systems and is managed by the GCOS Secretariat. This year's meeting focused on discussing the status of terrestrial ECVs in light of the next GCOS assessment cycle, as well as in regard to the adequacy

of the global observing system on climate in the next two years to come. TOPC-XVI focused on discussing the status of terrestrial ECVs in light of the next GCOS assessment cycle, as well as in regard to the adequacy of the global observing system on climate.

4.4.62 The Association noted the most recent outcomes of the GCOS/WCRP Atmospheric Observation Panel for Climate (AOPC), which met for its 19th session from 9 to 11 April 2014, at JRC, in Ispra, Italy. Members commended the Panel's work as an efficient platform for discussions on the climate-components of existing research and operational atmospheric observing systems and the related programmes, including important cross-cutting links to the World Climate Research Programme (WCRP) as well as to the Global Atmosphere Watch (GAW) Programme. The Members appreciated in particular the Panel's work on the GCOS Surface Network (GSN), the GCOS Upper-Air Network (GUAN) and the GCOS Reference Upper-Air Network (GRUAN). The Association requested the Panel in its future sessions to continue to advise explicitly on climate-observing elements of the WMO Integrated Global Observing System (WIGOS), and to ensure that there is full cooperation between GCOS, WIGOS and WIS as they develop. It was noted that the AOPC was preceded by an expert meeting from 7 to 8 April 2014 which discussed the principal design and quality criteria of the GCOS surface and upper-air networks.

4.4.63 The Association was informed that following the approval of the Framework for Ocean Observations the panels of the Global Ocean Observing System (GOOS) have been reorganized. GOOS will now be overseen by a steering committee and three panels for Ocean Physics (OOPC), Biogeochemistry (the International Ocean Carbon Coordination Project will expand to include nutrients and oxygen) and a new Biology Panel. At the sixteenth session of the OOPC, a workplan for the coming five years was developed. Key tasks included coordinating an evaluation of the Tropical Pacific Observing System, reducing uncertainty in air-sea flux estimates and identifying requirements for observations of western boundary currents. The panel is also expected to expand its focus to the coastal oceans and shelf seas. The Evaluation of the Tropical Pacific Observing System was the first priority of the panel: in particular, due to the challenges in sustaining the TAO/TRITON mooring array across the Tropical Pacific: the backbone of the El Niño-Southern Oscillation (ENSO) monitoring system. A Tropical Pacific Observing System (TPOS) 2020 workshop was held at Scripps Institution of Oceanography, San Diego, 27–30 January 2014, involving both scientists and agency representatives with an interest in the Tropical Pacific region. The seventeenth session of the OOPC was held in Barcelona, 22–24 July 2014.

4.4.64 In the context of the GCOS Panels' work, the Association noted the importance of liaising closely with space agencies on dedicated space-based observations for climate, in particular through the Committee on Earth Observation Satellites (CEOS), the Coordination Group for Meteorological Satellites (CGMS), the WMO Space Programme and their development of the architecture for climate monitoring from space. The Association recommended that progress and future needs in the development of the architecture for climate monitoring from space be addressed in the next GCOS Adequacy Report and requested the GCOS Secretariat to remain engaged in the next stages of development and implementation of the architecture.

GCOS Reference Upper-Air Network (GRUAN)

4.4.65 The Association noted that the implementation of GRUAN has progressed steadily over the past years and initial GRUAN-quality data can be accessed at NOAA's National Climatic Data Center (NCDC). The GRUAN currently consists of 16 initial reference sites, which are predominantly located in the Northern Hemisphere mid-latitudes. There is no GRUAN station located in RA I. The Association encouraged its Members to support GRUAN operations, in particular in arctic and tropical regions, and also to collaborate with scientific institutions to reach better global coverage over major climatic zones. The Association also noted that criteria for site assessment and certification, and the process for implementation, had been developed. It encouraged those Members maintaining GRUAN sites to undergo the formal GRUAN certification and assessment process. The Association welcomed that representatives of the WMO Technical Commissions (CBS, CIMO, CAS and CCI) are now officially represented at the Working Group on GRUAN. It was recognized that whilst good progress has been accomplished in implementing the GRUAN, funding the operation of reference sites was an ongoing challenge. The Association

urged its Members to work with GRUAN and the GCOS Secretariat to identify operational services and research institutions in RA I, capable to ensure the long-term sustainability of a GRUAN station.

GCOS Cooperation Mechanism

4.4.66 The Association recognized that the cooperation mechanism of the GCOS programme to improve climate observation networks, most recently focused in RA I and parts of RAs III & V, has made good progress in improving the coverage and performance of the networks. In addition, good progress was made in obtaining CLIMAT reports from the Regional Basic Climatological Network (RBCN) stations. The Association noted that strengthening of such networks was an important requirement for an effective GFCS. The GCOS Steering Committee had noted in its last session that many Members of WMO were not preparing and sending CLIMAT reports from all of their listed RBCN stations. The Association recalled the recommendation of Congress that Members were encouraged to expand these networks and urged Members to take appropriate actions.

4.4.67 The Association emphasised the importance of the GCOS for the Region, especially given the vulnerability of many Members to the impact of climate change. The Association thanked Germany, Japan, Switzerland and the United Kingdom who have contributed to the GCOS Cooperation Mechanism in the past 4 years. In particular, the Association thanked the Government of the United Kingdom (Department of Energy and Climate Change) and the UK Met Office which have supported the position of the GCOS Implementation Manager in the GCOS Secretariat since 1 March 2013. The Association urged Members and the GCOS Secretariat to continue efforts to mobilize additional resources to maintain an effective and sustainable GCOS network in the Region.

WMO Information System

WIS Implementation Plan

4.4.68 The Association expressed its appreciation to the ad hoc team that had prepared the Region I WMO Information System (WIS) Implementation Plan (see the [annex to Resolution 11 \(RA I-16\)](#)) for WIS. It thanked South Africa for hosting the meeting of the ad hoc team in Pretoria, 22–26 September 2014. It noted that the plan aims to assist RA I Members to implement WIS functionality in their National Meteorological and Hydrological Services (NMHSs) and other identified National Centres (NCs) or Data Collection or Production Centres (DCPCs) in order to become effective WIS users in a timely and harmonized manner.

4.4.69 Noting the objective set by the Sixteenth WMO Congress (Cg-XVI) for achieving the implementation of WIS in all NMHSs national centres by 2015, the Association highlighted the important role the National WIS Focal Points (for terms of reference, see http://www.wmo.int/pages/prog/www/CBS/Lists_WorkGroups/CBS/cross-cutting/fp%20wis/tors) have in the coordination and monitoring of WIS implementation, as well as authorizing access to WIS. The Association emphasized that all Members should have clearly identified National Focal Points for WIS and should keep the WMO Secretariat informed of any changes of the status and operation of their centres and/or changes of their focal points information.

4.4.70 The Association highlighted that the implementation of WIS functionality can be achieved internally by upgrading a Member's current information management and message switching systems or by making use of the remote WIS services offered at the Global Information System Centres (GISCs) to complement their current GTS and Internet connectivity. The Association encouraged its Members to ensure that WIS functionality was taken into consideration in future information management and message switching systems. The Association highlighted that regardless which technical solution is chosen by centres for implementing WIS, a major effort will be required by centres to ensure staff are appropriately trained in the skills required to use WIS effectively in their activities. It noted the progress in the work of CBS in identifying a WIS Competencies and Learning Guide (in development; see <http://wis.wmo.int/file=687> and

<http://wis.wmo.int/file=689>, respectively) and encouraged Members to take advantage of this information in the implementation and sustainability of their WIS functionality.

4.4.71 The Association reminded its Members that, in order to derive benefits from WIS, accurate WIS Discovery Metadata records describing the information provided through the WIS needs to be ensured. This includes registering data and products available for national usage. It further encouraged its Members to enable their national web pages to include remote search of their Principal GISC metadata catalogues to facilitate national users' access to all WIS data and products.

4.4.72 The Association noted that creating and maintaining an effective telecommunications infrastructure in RA I remained a challenge, with many Members unable to implement a national telecommunications network capable of digital exchange of information. It noted that the technologies used in WIS could also be applied at a national level, and requested GISCs Casablanca and Pretoria, together with the Regional Telecommunications Hubs and ASCENA to provide mechanisms to share experiences with techniques for national telecommunications of observations and products. The Association adopted [Resolution 11 \(RA I-16\) –WMO Information System Implementation Plan for Regional Association I \(Africa\)](#).

WIS Discovery Metadata

4.4.73 The Association agreed that the WIS Discovery Metadata allows users to find out what information is available through the WIS, and entries within metadata records control how GISCs serve information to users in response to requests for subscriptions or ad hoc delivery. The initial WIS Discovery Metadata records for information exchanged on the GTS were derived from Volume C1 using an automated tool. The Association urged its Members to review the WIS Discovery Metadata records that correspond to information the Members generate and to correct the records, if needed, to reflect more accurately the information provided. The Association reminded its Members that metadata records describing information that Members are willing to share but that are not exchanged as a matter of routine could also be provided.

Migration to Table Driven Code Forms

4.4.74 The Association noted with appreciation that from September 2014, the NMCs of the 17 Member States of ASECNA had implemented the conversion into BUFR codes of the weather reports represented in traditional alphanumeric format. The same goes for the RTHs of Dakar, Brazzaville and Niamey, who automatically convert weather reports from their NMC which are attached to the RTHs of non-ASECNA States. The Association noted the progress made in migrating to Table Driven Code Forms (TDCF) was well behind that required for the November 2014 deadline. Emphasizing the deadline, the Association reminded Members of the need to prioritize preparation for the migration. It noted that the Members need to consider their ability to display non-TAC data and products as well as their ability to transmit in TDCF, in particular observations in BUFR.

4.4.75 The Association reminded Members that some information cannot be represented in TAC. In particular, CBS-Ext.(2014) was expected to recommend an extended range of station identifiers, but that reports taking advantage of these could only be represented in TDCF.

World Weather Watch Quantitative Monitoring

4.4.76 The Association noted with concern that the World Weather Watch Annual Global Monitoring (2014) showed that, compared with the requirements of the Regional Basic Synoptic Network in Region I, fewer than 60 per cent of surface reports and fewer than 30 per cent of upper-air reports were reaching the Regional Telecommunications Hubs and, by implication, the global numerical weather prediction centres. The Association stressed the importance of Members investigating why their reports are not being distributed successfully and working to address the causes. To identify and locate the issues linked to the unavailability of core data, the Association

recommended the Region's RTHs to apply, in coordination with the relevant NMCs and WMO, the special monitoring according to the operating procedures of the World Weather Watch.

Climate Data Management and Applications

Climate Data Management Systems

4.4.77 The Association was informed of the outcome of the WMO survey on the status of Climate Data Management Systems (CDMS) by Member's National Meteorological and Hydrological Services (NMHSs). The survey reveals that more than half of the 137 responding Members world-wide do not have a proper or fully operational CDMS in place. The Association agreed that concerted efforts are needed to improve the availability of, and access to, quality controlled and long-term climate data that is needed for research, applications and climate services.

4.4.78 The Association welcomed the Commission for Climatology's (CCI) Expert Team on CDMS efforts in developing a CDMS Specifications publication. The publication provides guidance for developing and acquiring suitable CDMSs in compliance with new and evolving technological requirements and standards. CCI-16 endorsed the WMO *Climate Data Management System Specifications* publication (WMO-No. 1131).

4.4.79 The Association appreciated the enthusiastic engagement of Members including Zimbabwe, Kenya, UK, as well as ACMAD and WMO in further developing CLIMSOFT CDMS, and assisting in its implementation on the African continent and beyond. It noted the advantages of CLIMSOFT as one of the few license-free databases, which can be used at outstations, but also as powerful NMHS-central CDMS for smaller countries.

4.4.80 The Association welcomed recent training regarding, and implementations of, powerful CDMSs across the African continent, such as MCH (Meteorological, Climatological and Hydrological Database Management System) financed by Spain and developed and offered for free to WMO Members by Mexico and Spain (Spain is cooperating in the update of the software, and an improved version will be released soon), CLIDATA (provided and maintained by the Czech Republic) and CLISYS (provided and maintained by France). The Association welcomed plans of AGRHYMET to assist CILSS and ECOWAS countries in further CLIDATA implementation and installation upgrades including supply of software, servers and PCs as well as training. It also recognized the implementation of a project "Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL)" in Southern African countries, initiated and largely funded by the German government, which data collection and management component aims at improving data availability in the participating countries. At the request of African NMHSs, ACMAD is proceeding to organize workshops and on-the-job training to use ClimSoft, a climate database management software. Furthermore, ACMAD, several NMHSs and the UK Met Office are working at improving ClimSoft.

4.4.81 The Association noted with concern the induced relative costs for upgrading CDMSs or acquiring new ones, which poses financial challenges to some countries due to incurred relatively high fees related to software licenses, installation and training. The Association further encouraged Members to create, or participate in, CDMS user groups as a cost-effective means of CDMS modernization, maintenance and information sharing.

Data Rescue (DARE)

4.4.82 The Association recalled WMO Resolution 16 (Cg-16) on climate data requirements which decided that priority be given to accelerating rescue and digitization of climate records and promoting global and regional initiatives to collaborate on Data Rescue and the exchange of related scientific knowledge and technological advances. It further recalled that accelerating data rescue is one of the priority projects of the GFCS implementation plan. The Association urged Members to work individually, and collectively, to make all possible efforts and mobilize the required financial and human resources to accelerate the preservation, recovery and digitization of

all climate records, hence preventing climate observations from unrecoverable deterioration. With the support of its partners, including IEDRO, UNDP and WMO, ACMAD has been conducting for the past few years a climate data rescue project (data available at the Centre on microfilms) which consists in transforming data in picture files and then later in discrete data. The second phase of the project will consist in generating products from rescued historical data.

4.4.83 The Association appreciated the progress made in Data Rescue activities carried out in the Region with the WMO support and guidance from the CCI and the enhanced cooperation of the NMHSs in implementing Data Rescue projects. It further noted with interest the increasing international and regional collaboration amongst several institutions and projects such as ACMAD, IEDRO and ACRE. It welcomed the progress made in activities within the MEDARE (Mediterranean Data Rescue) initiative as well as the establishment of the Indian Ocean Data Rescue Initiative (INDARE). It urged RA I Members to collaborate enthusiastically within the frame of these important initiatives.

4.4.84 The Association welcomed CCI's plan to develop an International Data Rescue portal (I-DARE) to inform on data rescue activities worldwide and provide information services on data inventories, best practices and technologies that will help Members in carrying out data rescue more effectively and efficiently.

4.4.85 The Association urged Members to work closely with WMO and CCI on I-DARE with provision of suitable expertise, infrastructure and financial resources that the project may require during its implementation phase. A white paper has been produced by the CCI Task Team on Data Rescue and is available at: http://www.wmo.int/pages/prog/wcp/wcdmp/documents/IDARE_wcdmp83.pdf.

International Climate Assessment and Dataset (ICA&D)

4.4.86 The Association welcomed CCI and Member's efforts to extend the concept of the European Climate Assessment and Dataset (ECA&D) to a more International Climate Assessment and Dataset initiative under WMO auspices (ICA&D) to support GFCS product generation and services. ICA&D aims at providing access to high-quality station data sets with a daily resolution and producing climate monitoring and climate change information. The Association appreciated the implementation of this system in West Africa, namely the West African Climate Assessment and Data Rescue initiative (WACA-DARE), which is hosted by ACMAD in close collaboration with West African Member countries, with technical support provided by KNMI. While encouraging West African countries to collaborate enthusiastically within WACA-DARE, the Association invited other WMO RCC hosts and candidates in RA I to consider implementing ICA&D as a tool for generating relevant products of the WMO RCC mandatory functions on data services and climate monitoring.

World Weather Records

4.4.87 The Association recalled Resolution 16 (Cg-XVI) on climate data requirements and subsequent Resolution 14 (EC-64) on the submission of the ten year World Weather Records of the period pertaining to 1991–2000 and 2001–2010, and the shift from the ten year to an annual submission, which should apply to the World Weather Records of 2011 and onwards. It urged Members who have not yet submitted their World Weather Records to do so as soon as possible.

WMO Climate Normals

4.4.88 The Association took note of a proposal for amending the WMO Technical Regulations concerning the provision and updates of Climate Normals. The new model, endorsed at EC-65 and CCI-16, comprises: (i) a varying 30 year period updated every 10 years (Climatological Standard Normal); and (ii) a fixed reference period (1961–90) for long-term climate variability and change assessment. This reference period should be applied until such time as there is a compelling scientific case for changing it.

Global Data Management Framework for Climate

4.4.89 The Association welcomed the CCI plan to work closely with other Commissions and programmes to set up a high-quality global data management framework for climate. The aim of this initiative is to establish a global infrastructure for ensuring that climate-relevant data are consistently managed, at global, regional and national levels, using a commonly agreed and well described minimum set of procedures, regulations and system specifications.

Training and capacity development

4.4.90 The Association reiterated the need for climate data related capacity-building, including training in the Region, to further raise the profile of its Members' NMHSs as well as to underpin climate service capabilities where required. In this regard, the Association welcomed the multitude of capacity-building activities in the Region in the domains of climate data management, CDMS implementation data rescue as well as climate monitoring and assessment.

4.4.91 While appreciating these efforts and encouraging Members and donors to further collaborate for meeting an exponential increase of the needs of NMHSs in Africa for training and infrastructure development on climate data aspects, the Association urged Members and donors to seek sustainability and continuity of systems when designing projects that deal with climate observation and related data management infrastructure. In this regard, WMO as a framework for collaboration on technical aspects relevant to climate observation and related data management systems, provides a formidable platform for seeking and ensuring sustainability, complementarity and interoperability of the systems that the various projects intend to implement.

4.5 Research and technology development (agenda item 4.5)

World Climate Research Programme (WCRP)

4.5.1 The Association noted with satisfaction the wide array of activities WCRP is conducting globally and in the Region. The Association recalled with appreciation that WCRP organized the very successful Open Science Conference (OSC) entitled "Climate Research in Service to Society" [<http://conference2011.wcrp-climate.org>] (Denver, Colorado, USA, October 2011) and attracted over 1900 participants including a significant number of researchers from Africa. A major emerging theme from the OSC was the science support to climate-reliant decision-making. The highlight of regional WCRP activities since the fifteenth session of the Association has been the WCRP/ACPC Conference on the African Climate System [<http://www.africaclimateconference.org>] (Arusha, United Republic of Tanzania, October 2013) hosted by the University of Dar Es Salaam. The first of its kind, the conference brought together more than 300 participants representing a wide range of stakeholders: an interdisciplinary group of scientists; policy-makers; climate data and information providers; climate knowledge users from the public and private sectors; and research funding agencies.

4.5.2 The Association was pleased to note that as the result of an extensive community consultation culminated at the OSC in Denver, the WCRP JSC has identified six Grand Science Challenges, as follows:

- (a) Provision of skilful future climate information on regional scales;
- (b) Regional sea-level rise;
- (c) Cryosphere in a changing climate;
- (d) Clouds and climate sensitivity;
- (e) Changes in water availability; and
- (f) Prediction and attribution of extreme events.

These research topics are seen by WCRP as scientific challenges of particularly high societal importance and as areas of research in which it is possible to expect significant progress within five to ten years. The Grand Challenges will also serve as unifying themes across the four WCRP core projects and the various working groups. The Association noted that WCRP and its constituencies are in the process of developing implementation plans for the Grand Challenges and emphasized that progress in the research on provision of skilful regional future climate information and climate extremes would be of high importance for the Region.

4.5.3 The Association noted with appreciation that WCRP led the development of the Research, Modelling, and Prediction Annex to the GFCS Implementation Plan, which was endorsed by the first session of Intergovernmental Board on Climate Services in July 2013. The Association noted that the Annex pays significant attention to the development of regional climate services. The research activities for GFCS aim at establishing partnerships to conduct effective research in areas of initial priority for GFCS and making the wealth of experimental climate information available to users. Also, they will create a scientific basis for account of climate information uncertainty in decision-making and will address a number of pressing science issues such as improved understanding of predictability and skill of prediction technologies.

4.5.4 The Association recognized significant progress on a number of research priorities pursued by WCRP, including, but not limited to, some issues of high importance for RA I. Major achievements have been made in advancing understanding of regional climate, especially through the successful implementation of the Coordinated Regional Downscaling Experiment (CORDEX) in many regions of the world. CORDEX-Africa, which has been the first focus for CORDEX since its establishment, featured prominently at the International Conference on Regional Climate – CORDEX 2013, jointly organized by the WCRP, the European Commission and IPCC in Brussels, Belgium, in November 2013. CORDEX-Africa is also an integral part of the Adaptation in Semi-Arid Regions (ASAR) project recently awarded by the Department for International Development (DFID) and International Development Research Center (IDRC) under the Collaborative Adaptation Research Initiative in Africa and Asia (CARIAS).

4.5.5 The WCRP/ACPC Africa Climate Conference (ACC2013) launched the Climate Research for sustainable Development (CR4D) Agenda: an international integrating mechanism of the Africa climate research community that will address the existing critical gaps in understanding of the Earth system (coupling its physical-, biosphere-, and socioeconomic domains), in the observations and monitoring capabilities, in the model performance, and in the current predictive capabilities. The first meeting of the Coordination Platform for Africa – the institutional framework to sustain and implement the CR4D – will be held in Marrakech, Morocco, 5–8 October 2014 under the auspices of WCRP, GFCS, ACPC, and WMO. The Association noted plans of WCRP CLIVAR and GEWEX projects to establish a WCRP CLIVAR/GEWEX Monsoons Panel with a working group on Africa Monsoon. This new initiative may benefit from the recent WCRP/GEWEX research activity on the West Africa Monsoon [<http://www.amma-international.org>] (AMMA). Another group of direct value to Africa is the WCRP Drought Information Group that aims to identify and leverage current drought research activities, especially under CLIVAR and GEWEX.

4.5.6 The Association took note with interest that the WCRP JSC at its 34th session (May 2013) endorsed the Earth System Grid Federation (ESGF) as a WCRP-recommended data and information access mechanism. Through ESGF, WCRP is enabling access to the climate model outputs and observational products for all scientists in the world, with data being available on the same grid, uniformly formatted and documented through the WCRP-led Observations for Model Intercomparison Projects (Obs4MIPs) initiative. The first WCRP initiatives that use this mechanism are the Coupled Model Intercomparison Project (CMIP), seasonal predictability experiments under the Climate system Historical Forecast Project (CHFP), and the Coordinated Regional Downscaling Experiment (CORDEX). The Association recommended to Members to study effective ways of accessing and evaluating the vast amount of research-based climate information that WCRP makes available through ESGF.

4.5.7 The Association also noted with appreciation a major contribution of WCRP and its affiliated scientists to the Fifth Assessment Report of IPCC, especially to the WG I Report "Climate

Change 2013: The Physical Science Basis”. The WCRP intercomparison experiment CMIP Phase 5 (CMIP5) provided an unprecedented dataset of model projections, which were widely used around the world to study climate variability and change and the impacts of climate change. The CMIP5 output constituted the basis for more than 350 scientific publications. The Association was pleased to learn that WCRP is now working on the design of CMIP6, which is expected to make climate predictions and projections even more robust and comprehensive.

4.5.8 The Association noted with appreciation the contribution of WCRP regional panels and grouping to establishing a scientific basis and motivation for development and maintenance of the regional observing systems, including ones spearheaded by GCOS and GOOS, such as PIRATA in the equatorial Atlantic, SAMOC with the SAMBA array in the South Atlantic, and the SOOS in the Southern Ocean. The WCRP CLIVAR Project is working together with GOOS on establishing the Indian Ocean Observing System and will contribute to the development of the major Second Indian Ocean Expedition under the auspices of the IOC of UNESCO. The two Regional Hydroclimate Projects (RHP) of the WCRP GEWEX Project in the RA I, namely the African Monsoon Multidisciplinary Analysis Project (AMMA) and the Hydrological cycle in the Mediterranean experiment (HyMeX), will also serve as the foundation for reinvigorating a number of regional research campaigns in the Region. Another RHP for the Lake Victoria basin (HYVIC) is in the making. The Association emphasized that effective collaboration of National Hydrometeorological Services and diverse research groups coordinated by WCRP would go a long way in the development of regional climate services.

4.5.9 The Association acknowledged with appreciation the WCRP commitment to capacity development in the domain of climate research and its support to Early Career Scientists (ECS), as well as students and scientists from developing countries. The Association also noted with appreciation the very successful 2014 WCRP Summer School on attribution and prediction of extreme events (July–August 2014, Trieste, Italy), in which six students from RA I participated. WCRP and ICTP are planning to hold another summer school in 2015 in Dakar, Senegal, hosted by the National Civil Aviation and Meteorological Agency (ANACIM). The focus of this summer school will be on the climate system prediction and the delivery of actionable regional climate information.

World Weather Research Programme (WWRP)

4.5.10 The Association recognized the contribution of THORPEX in Africa over its 10 years lifespan. It specifically noted the relevance of the scientific results obtained by the African Monsoon Multidisciplinary Analyses (AMMA) and the Year of Tropical Convection (YOTC), and the excellent progress made by the Working Groups on Global Interactive Forecast System-THORPEX interactive Grand Global Ensemble (GIFS-TIGGE), Data Assimilation and Observing Systems (DAOS) and Predictability and Dynamical Processes (PDP), and TIGGE-Limited Area Model (LAM). The Association further noted that THORPEX was concluded at the end of 2014 and requested the World Weather Research Programme (WWRP) to maintain and build on the research momentum achieved. The Association recorded its strong support for WWRP in the development and management of new projects, specifically the Sub-seasonal to Seasonal Prediction Research Project (S2S) jointly with the World Climate Research Programme (WCRP), the High Impact Weather Research Project (HIW), and the Polar Prediction Project (PPP), in close collaboration with WCRP. These projects will be beneficial to NHMs within the Region both in advancing the understanding of short-to-long term predictability and in innovating forecast products to support decision-making in key sectors (i.e. agriculture, health, food security, water, urban planning, water management).

4.5.11 The Association acknowledged the role of the WWRP in advancing societies' ability to cope with high-impact weather through research focusing on improving the accuracy, lead time and utilization of weather predictions. The Association supported the actions taken to strengthen WWRP cooperation with the WCRP, GAW and other WMO Programmes and initiatives such as the Severe Weather Forecast Demonstration Project (SWFDP) to ensure better integration of research and to optimize the operational benefits that can be derived from mature research results.

4.5.12 The Association noted with appreciation the availability of the forecast data from ten operational centres to the TIGGE archives hosted by the European Centre for Medium-Range Weather Forecasts (ECMWF), the National Centre for Atmospheric Research (NCAR) and China Meteorological Administration (CMA). The Association requested that special attention be given to RA I in order to disseminate these products for research and applied purposes.

4.5.13 The Association noted with appreciation that WWRP is placing special emphasis on advancing better predictions of high impact weather events on wider time ranges, from nowcasting to seasonal time scale, as the socioeconomic effects of these events remain of central importance to Members. Therefore, the Association suggested improving the interaction between Universities/Research Institutes and NMHSs in order to advance the understanding of the processes behind extreme events and to facilitate the development of new forecast tools and methods.

4.5.14 The Association requested WWRP to work closely with WCRP towards preparing scientific studies on the impact of intra-seasonal variability on high-impact weather events in Region I, providing useful research results for GFCS applications in key sectors (i.e., agriculture and food security, health, water, urban planning/management, energy).

4.5.15 The Association noted the outcomes of the sixteenth session of the Commission for Atmospheric Sciences (CAS) which was held in November 2013 in Antalya, Turkey, especially the session regarding the future scientific challenges (under agenda item 9) in developing high-impact weather research, water modelling, research and services for megacities, and new technologies.

4.5.16 The Association was pleased to note the success of the World Weather Open Science Conference (WWOSC) which was held from 16 to 21 August 2014 in Montreal, Canada. The overarching theme of WWOSC was the Seamless Prediction of the Earth System: from minutes to months. A strong focus was placed on applications in key sectors and on the active involvement of early career scientists, especially those from developing countries. The Association encouraged its Members to follow-up on the recommendation of WWOSC.

4.5.17 The Association noted that the total number of members in WWRP Working Groups and Expert Teams from RA I, including three THORPEX WGs, is 10 (and 27 from France and UK) out of 87. Egypt proposed to have more experts from RA I participating in WWRP. These working groups and expert teams cover a wide field of expertise relevant to assessing the status of weather modification techniques, enhancing systematically the scientific understanding and improving the predictive skill of weather phenomena, especially on high impact weather events, and establishing scientific procedures to evaluate forecasts, and ensure socioeconomic use.

4.5.18 The Association acknowledged the importance of the Forecast Demonstration Projects/ Research and Development Projects (FDPs/RDPs) in responding to regional needs. It noted the progress made with developing an extensive field programme for a Lake Victoria Research and Development Project (RDP) to better understand the dynamics of Lake Victoria thunderstorms and developing forecasting capabilities for the safety of people dependent on the lake for their livelihood.

4.5.19 The Association noted with appreciation the focus on Tropical Meteorology Research and encouraged RA I to identify and launch RDPs and FDPs related to tropical meteorology. It stressed the significance of these projects in light of the recent increase in the frequency or severity of extreme weather events indicating increasing threat to lives and property especially to developing countries. The Association encouraged Members to develop similar projects with a view to further improving operational weather and related environmental services and thereby meet the needs and requirements of tropical cyclone affected countries in Africa.

4.5.20 The Association noted with satisfaction that the Working Group on Tropical Meteorology Research (WGTMR) during the intersessional period had published technical books and scientific articles to improve our understanding of tropical cyclones and monsoons and also organized

training events on an almost yearly basis which especially benefited early career scientists from least developed and developing countries in the tropics, including those in RA I.

4.5.21 In view of the growing significance of the ensemble forecast in improving forecast performance, the Association fully supported the activities of the WWRP aimed at further enhancing forecaster understanding and use of these forecasts, such as the session on tropical cyclone ensemble forecast organized during the International Training Course on Tropical Cyclones held in Nanjing, China in December 2011. It therefore requested the WWRP to organize a similar training event in Africa.

4.5.22 The Association noted that the Joint Working Group on Forecast Verification Research (JWGFVR) has been active in previous years in training of forecasters and administrators in southern and eastern Africa on basic verification techniques. The Association acknowledge the role of the JWGFVR in order to take into account the needs of users so as to ensure the relevance of the practice of forecast verification in a vulnerable region such as Africa and to encourage the sharing of observational data for verification purposes.

4.5.23 The Association was pleased to note the success of the Workshop on Communicating Risk and Uncertainty organized by the WWRP Working Group on Societal and Economic Research Applications (WG SERA) held in Melbourne in July 2012. The workshop combined SERA member expertise with that of invited Australasian researchers and practitioners to update and report on current and cutting-edge research across two of the SERA research priorities: understanding and improving the use of weather information in decision-making; and understanding and improving the communication of weather forecast uncertainty. The workshop provided a forum for a research discussion concerning the effective communication of uncertainty and risk in weather and warning messages. Building on the success of this workshop for the Australasian region plan are to organize similar events in other regions.

4.5.24 The Association was informed that the WG SERA continuously provides guidance to assess user needs/requirements and to study/facilitate the use of new tools and information to evaluate benefits and performance in WWRP projects, FDPs and RDPs.

4.5.25 The Association noted with interest that the working group is currently developing a SERA RDP: Understanding the societal and economic dimensions of weather-related warning systems. This involves the development of a research and application framework (essentially sets of hypotheses and evaluation methods/designs) with the identification of projects/case studies. Relevant aspects will be abstracted and/or extended from the cases through add-on or complementary studies as resources permit. The projects include new long-term WWRP endeavours such as the three THORPEX legacy projects (S2S, PPP, and HIWeather) as well as activities outside of CAS, for example the JCOMM/CHy Coastal Inundation Forecast Demonstration Project (CIFDP) which plans to develop case studies in the South and East African coasts.

Global Atmosphere Watch Programme (GAW)

4.5.26 The Association noted that priorities of GAW development were provided by the sixteenth session of the Commission for Atmospheric Sciences (CAS-16). These are high-impact weather research, modelling and prediction of the water cycle, Integrated Global Greenhouse Gas Information System (IGIS), aerosol research, research and services for large urban complexes, and evolving technologies. The Association agreed that CAS priorities were relevant to the Region and called upon Members to take the necessary steps to address the above priorities.

4.5.27 The Association agreed that observations constitute the basis for the delivery of GAW products and services relevant to Members. The Association expressed a need for more regionally focused products and services that addressed sand and dust storms, regional sources and sinks of greenhouse gases and regional air quality. The Association recognized that useful regional services are provided by the Northern Africa-Middle East-Europe (NA-ME-E) Regional Centre of WMO Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

(<http://sds-was.aemet.es/>) operated by Spain and encouraged the Members to use those services more actively. The Association recognized that regional observations provide support to the Global Framework for Climate Services (GFCS), the WMO Integrated Global Observing System (WIGOS), the Global Climate Observing System (GCOS) and many other initiatives.

4.5.28 The Association recognized that the current observation network for atmospheric composition in Africa is inadequate for atmospheric composition monitoring and to support standard meteorological practices such as weather forecasting, severe weather warning systems. The Association appreciated the efforts by Algeria, Cabo Verde, France, Kenya, South Africa, and Spain on running comprehensive atmospheric composition observations at the GAW Global stations. The Association recognized that the observation station density should also be substantially increased in the Region to enable more accurate monitoring of pollution sources (both natural and anthropogenic). Egypt supports the Global Atmosphere Watch (GAW) Programme by establishing new stations to measure air pollution and by making the data available.

4.5.29 The Association appreciated the efforts of the Kenya Meteorological Department (KMD) to ensure an uninterrupted operational power line to the GAW Global station Mt. Kenya, which resulted in the resumption of the observations. The Association appreciated the support of MétéoSwiss in the extension of the observational programme at Mt. Kenya to include aerosol measurements in the framework of the CATCOS project and for the support to the ozone sounding programme in Nairobi (weekly ozonesondes). The Association acknowledged the efforts of France on the establishment of the new observatory at La Reunion.

4.5.30 The Association expressed its satisfaction with the long-term collaboration established between European and African institutes to sustainably operate atmospheric composition observations. Initiated, set up and still supported by LSCE (Laboratoire des Sciences du Climat et de l'Environnement) in France, the Lamto station in Côte d'Ivoire is run by the Université Félix Houphouët-Boigny in Abidjan and delivers an important contribution to the GAW Programme. The Association appreciated the support of the Max Planck Institute for Biogeochemistry in Germany for installation and operations of the Gobabeb climate monitoring station in Namibia. The Association was further pleased with the establishment of the partnership between the Rwandan Ministry of Education and the Massachusetts Institute of Technology, USA in setting up the Rwanda Climate Observatory. The Association was pleased with the three measurement campaigns since 2010 in South Africa in collaboration with the Finnish Meteorological Institute.

4.5.31 The Association was pleased that Izaña GAW Station run by Spain was nominated as a WMO-CIMO Testbed for Aerosols and Water Vapour Remote Sensing Instruments by CIMO in July 2014.

4.5.32 The Association emphasized that collaboration within the Region is essential for the observations sustainability. In this respect the Association highlighted the importance of twinning between GAW Global stations Izaña (Spain) and Tamanrasset (Algeria). It further acknowledged the support of the International Cooperation Agency for the Development of Spain that allowed installation of five instruments in Algeria, Egypt, Morocco and Tunisia. The Association recognized that there is a large potential for knowledge transfer from African universities to NMHSs and encouraging Members to establish collaboration with universities in the Region.

4.5.33 The Association further noted the importance of greenhouse gas (GHG) observations in support of independent emission inventories, verification, and analysis of the regional greenhouse gas fluxes. The Association expressed concerns about the inadequacy of the greenhouse gas observational network in Africa. The Association noted that current collaboration on GHG observations between African countries and NOAA includes only flask sampling in Algeria, Crozet Island (France), Namibia and South Africa. The Association expressed concern that logistical issues often prevented proper operation of this network and caused large gaps in the data. The Association requested Members to undertake the necessary steps to ensure the unbroken operation of GHG sampling and transportation of the air samples to the analytical laboratory. The Association stressed that the establishment of IGI3S would require more GHG observational stations in the Region. Egypt supported the call made by the Association to increase the network

for monitoring greenhouse gases in Africa in order to better quantify the actual role played by these gases in climate change in the continent. The Egyptian Meteorological Authority stated that it contributes to GAW with data on greenhouse gas (CO₂) measured at five stations in Egypt.

4.5.34 The Association noted that atmospheric aerosols are very important for climate and health. The Association recognized that the current in-situ aerosol observational network over continental Africa consists of only two stations; Kenya (Mt. Kenya) and South Africa (Cape Point). Aerosol optical depth (AOD) observations are performed at several stations as a part of the Aerosol Robotic Network (AERONET). Taking into consideration that the Region is highly susceptible to the impact of aerosols coming from sand storms and related to biomass burning, the Association recognized that the extension of the aerosol network is very important for the Region. It further recalled the WMO SDS-WAS (www.wmo.int/sdswas) requires near real-time observations of sand and dust aerosols to improve forecasts of sand and dust storms needed to reduce risk to aviation, human health and agriculture. The Association recommended that similar services are established for biomass burning.

4.5.35 The Association noted the impact that biomass burning in the Region has on air quality and was pleased to note that WMO, together with IGAC and the Integrated Land Ecosystems Atmosphere Process Study (iLEAPS), have initiated the Interdisciplinary Biomass Burning Initiative (IBBI) to address this topic <http://www.mpic.de/projects/ibbi.html>.

4.5.36 The Association recognized the importance of ozone and UV data that are used in the WMO/United Nations Environment Programme (UNEP) Scientific Assessment of Ozone Depletion and for satellite validation. It expressed concerns with the contribution of the Region in the UNEP/ WMO 9th Ozone Research Manager Meeting (9ORM) in May 2014. Only a few countries from the Region submitted reports to the 9ORM. Reports on ozone monitoring came from Algeria, Egypt, Kenya and South Africa, whilst Burkina Faso, Comoros, Gambia, Madagascar, and Togo reported only on the phasing out and control of Ozone Depleting Substances (ODS) through their ozone offices. The Association further noted with concern that initiatives to relocate good spare instruments from developed countries to sparsely covered African areas with suitable sites, remain without real momentum.

4.5.37 The Association noted that a global precipitation assessment has been finalized and published (<http://www.sciencedirect.com/science/journal/13522310/93/supp/C>). The Association acknowledged the contribution of the African Members of the International Global Atmosphere Chemistry Project (IGAC) Deposition of Biogeochemically Important Trace Species (DEBITS) network to this assessment. The Association recognized that after the publication of the Precipitation Assessment the observations of precipitation chemistry should be continued.

4.5.38 The Association stressed that Members should utilize existing collaborations such as with Copernicus Monitoring Atmospheric Composition and Climate (MACC-II) in Europe and similar initiatives in other Regions, in order to address urban and non-urban data and forecasting services (e.g., chemical weather forecasting, or forest fires forecast and impact). Near real-time (NRT) is essential to enable such services. In this respect the Association welcomed the efforts of Cabo Verde and South Africa on NRT provision of data from Cape Point and the Cabo Verde Atmospheric Observatory for model validation in the MACC-II project (<http://gmes-atmosphere.eu/d/services/gac/nrt/>).

4.5.39 The Association noted that the GAW Station Information System (GAWSIS) <http://gaw.empa.ch/gawsis/>, provides up-to-date information on GAW networks and urged the Members that operate regional, global or contributing GAW stations to make sure that their information is updated regularly. Taking note of the decline in data submission of several GAW parameters, the Association reminded Members that the latest data is needed in order for GAW to deliver required services and up-to-date information and urged Members to submit GAW observational data to the respective data centres as agreed, normally within one year after the measurement.

4.5.40 The Association emphasized the importance of quality assurance and control (QA/QC) in GAW and requested Members to implement the WMO Quality Management Framework (*Guide to the Implementation of a Quality Management System for National Meteorological and Hydrological Services*, WMO-No. 1100) for atmospheric composition measurements. The Association appreciated the contribution of Spain to the GAW quality assurance system through hosting the Regional Brewer Calibration Centre for Europe (RBCC-E). The Association welcomed the organization of Brewer intercomparisons in 2011 and 2013, which included participants from Algeria and Morocco. The Association further appreciated the South African Weather Service Irene technical centre hosting the WMO Regional Dobson Calibration Centre for RA I, which plans for the next Dobson intercomparison to be held during the period September/October 2015.

4.5.41 As regards GAW products, the Association noted the importance of the WMO Greenhouse Gas Bulletin, an authoritative WMO publication on the state of the key greenhouse gases in the atmosphere and the WMO Aerosol Bulletin with valuable contributions from Members, and urged for these to be supported.

4.5.42 The Association noted the need for capacity development in the Region. It further acknowledged the usefulness of the GAW Training and Education Centre (GAWTEC, www.gawtec.de) in Germany, SDS and Brewer training courses as well as co-sponsored summer schools and other training events. Capacity development activities toward the sustainability of the African operations were in particular accomplished through participation of fourteen operators from GAW stations in Africa in GAWTEC training sessions between 2010 and 2013. The Association encouraged Members to take advantage of such training events. The Association recommended that existing WMO Regional Training Centres be extended in scope to include atmospheric composition observations.

4.5.43 The Association noted other initiatives taking place in Africa which can contribute to capacity development. The African Union Commission had developed several higher education programmes to foster continental academic integration and to promote African development. The European Commission funded under its Framework Programme 7 the PAERIP (Promoting African European Research Infrastructure Partnerships) initiative. The Association recognized that these initiatives can help in capacity development in environmental sciences and urged the Members to take part in these activities.

4.5.44 The Association was pleased to note that GAW celebrated its 25th anniversary in conjunction with the 13th Quadrennial ICACGP Symposium and 13th IGAC Conference in Natal, Brazil, from 22 to 26 September 2014.

WCRP, WWRP and GAW Joint Research Initiatives

Sixteenth session of the Commission for Atmospheric Sciences (CAS-16)

4.5.45 The Association noted that the sixteenth session of the Commission for Atmospheric Sciences (CAS-16) was held from 20 to 26 November 2013 in Antalya, Turkey. The Technical Conference “Responding to the Environmental Stressors of the 21st Century” (Antalya, 18–19 November 2013) preceded the session. CAS-16 reviewed progress in the World Weather Research Programme (WWRP), including the successful conclusion of The Observing system Research and Predictability EXperiment (THORPEX), the development of the Global Atmosphere Watch (GAW) Programme, including GAW Urban Research Meteorology and Environment project (GURME), considered WMO priorities, especially regarding activities in the Global Framework for Climate Services (GFCS), WMO Integrated Global Observing System (WIGOS) and WMO Information System (WIS), identified, with the assistance of Members, emerging research priorities, and provided holistic guidance to the future activities of WWRP, including the smooth post-THORPEX transition at the end of 2014.

Working Group on Numerical Experimentation (WGNE)

4.5.46 The Association acknowledged the outcomes of the 29th session of the Working Group on Numerical Experimentation (WGNE) held in Melbourne, Australia, 10–14 March 2014. WGNE

has the responsibility of fostering the development of atmospheric circulation models for use in weather, climate, water and environmental prediction on all time and spatial scales and identifying and resolving shortcomings. The session addressed important topics such as the Sub-seasonal to Seasonal Prediction Project, studies of surface drag in numerical weather prediction and climate models, and the linkages between weather/climate models and aerosols. The session report is available at http://www.wmo.int/pages/about/sec/rescrosscut/resdept_wgne.html/.

4.5.47 The Association noted with appreciation the outcome of the 4th WGNE Workshop on Systematic Errors in Weather and Climate models held at the UK MetOffice, Exeter, 15–19 April 2013, which aimed at understanding the nature and causes of systematic errors in weather and climate prediction using diagnostic techniques, observations, process models and simplified experiments. The workshop recommended a more seamless approach to model evaluation through close collaboration between the World Climate Research Programme (WCRP) and WWRP, encouraged a wider range of diagnostic techniques supported by dedicated model and observational data sets in common formats, called for appropriate observations in polar and tropical regions and surface fluxes over the ocean and suggested the development of research efforts linking dynamical and physical processes in models. More information is available at <http://www.metoffice.gov.uk/conference/wgne2013/>.

4.5.48 The Association noted that the WCRP/WWRP Madden-Julian Oscillation (MJO) Task Force will now report directly to WGNE because it is widely recognized that improved understanding and prediction of MJO and related tropical intraseasonal variability (ISV) is crucial for both the climate and weather communities, especially in Africa. This Task Force is expected to make a major contribution to the Sub-seasonal to Seasonal (S2S) Prediction Project and will now be organized around four subprojects: (a) process-oriented diagnostics and metrics for MJO simulations; (b) boreal summer monsoon ISV monitoring and forecast metrics; (c) simplified MJO metrics and Coupled Model Intercomparison Project phase 5 analysis; and (d) vertical structure and diabatic processes of MJO. The Association recommended a specific effort to analyse the impact of MJO into the African Intra-seasonal Variability.

4.5.49 The Association noted that active interaction between the meteorological, environmental and climate communities is required to ensure the development of new generation coupled chemistry – meteorology models and their applications for numerical weather prediction, atmospheric pollution and climate studies. The International Conference on Coupled Chemistry – Meteorology Modelling, will be held in Geneva from 9–11 February 2015. Active participation of WGNE in these activities is acknowledged and further encouraged by the Association.

4.5.50 The Association further encouraged the emerging cooperation between WGNE and GAW, including a focus on aerosols and GURME. The Association stressed that new types of services making best use of science and technology will be needed to assist cities in facing hazards such as storm surge, flooding, heat waves, and air pollution episodes. These new services include observational systems focused on the urban environment; high resolution coupled environmental prediction models that include realistic city-specific processes, boundary conditions and fluxes of energy and physical properties, as well as technical skill and institutional capacity to make best use of the latest available technologies. As air quality and urbanization emerge as important regional issues the Association recommended appropriate workshop and training activities for Africa.

4.5.51 The Association noted that the concept paper for the above new urban cross-cutting activity, Integrated Urban Weather, Environment and Climate Service has been developed (http://www.wmo.int/pages/publications/bulletin_en/Bulletin631-2014_TowardsIntegratedUrbanWeather_en.html/).

Sub-seasonal to Seasonal Prediction Project (S2S)

4.5.52 The Association noted the establishment of the S2S Steering Group and supported the development of the five sub-projects (for extreme weather, monsoons, MJO, Africa, and verification), as Africa is strongly influenced by MJO, monsoon and extreme weather events. The

Association also noted the relevance of S2S to biomass burning forecasting. The Association appreciated the establishment in November 2013 of the International Coordination Office hosted by the Korean Meteorological Administration at the National Institute of Meteorological Research in Jeju, Republic of Korea. To achieve the goals of these sub-projects, the Steering Group advocates for the establishment of an extensive database of sub-seasonal (up to 60 days) forecasts and reforecasts, from multiple data providers, including South African Weather Service.

4.5.53 To ensure that the S2S project has adequate resources for implementation of its planned activities, the Association encouraged Members to contribute to its trust fund.

Polar Prediction Project (PPP)

4.5.54 The Association noted the activities of the newly established 10-year Polar Prediction Project (PPP), especially the finalization of the Implementation Plan and the progress on planning for the Year of Polar Prediction under the leadership of the PPP Steering Group and in close collaboration with the WCRP Polar Climate Predictability Initiative. The aim of the PPP is to promote cooperative international research enabling the development of improved weather and environmental prediction services for the Polar Regions, on time scales from hours to seasons. PPP represents a fundamental component of the emerging WMO Global Integrated Polar Prediction System. The Association noted the strong interest by South Africa in research and operational impacts of PPP.

Sand and Dust Storm Warning Advisory and Assessment System (SDS-WAS)

4.5.55 The Association expressed its satisfaction with joint WWRP/GAW activities within the SDS-WAS that have led to better understanding of the atmospheric dust processes, sand and dust impacts on climate and the environment, and the provision of observation data and multi-model forecast products. Three SDS-WAS nodes (for Asia, for Northern Africa, Middle East and Europe and for Pan America) have been established that provide efficient regional cooperation and exchange of products through regional web portals. The Association acknowledged the work done for the establishment of the web portal for Northern Africa, Middle East and Europe (<http://sds-was.aemet.es>) and encouraged Members to participate in the Northern African SDS-WAS node and in its implementation for Africa.

4.5.56 The Association was pleased to note the effort of the Regional Centre to coordinate with partners and NMHSs in the Region different actions aimed to strengthen the capacity of countries to use the observational and forecast products distributed in the framework of the WMO SDS-WAS. Training courses and technical seminars held in Spain (4 events), Turkey (3) and Oman have been attended by African meteorologists, in most cases financed by the organizations hosting the events. Moreover, the Association noted the effort for the products verification by using direct-sun photometric measurements and satellite retrievals for Africa. Egypt informed the Association about the addition of a new photometric instrument in the city Al Farafira (desert location) which will contribute to the evaluation of SDS forecasts and that the data from this instrument was being made freely available.

4.5.57 The Association was pleased to note that through collaboration between CAS and the WMO Commission for Basic Systems (CBS), mandatory functions for Regional Specialized Meteorological Centre(s) with specialization in Atmospheric Sand and Dust Storms Forecasts (RSMC-ASDF) have been developed and approved by EC-65 and that the Barcelona Computing Centre was mandated to be the first RSMC-ASDF and officially opened in the year 2014. The Association recognized the importance of this centre and requested Members to actively use its operational sand and dust storm forecasting for Northern Africa: <http://sds-was.aemet.es/> and <http://dust.aemet.es/>.

4.5.58 The Association noted that EC-66 adopted a resolution “Sand and Dust Storm Warning Advisory and Assessment System” to establish the SDS-WAS Steering Committee and its trust fund to support global coordination of the regional SDS-WAS research activities.

Transition of research to operations

4.5.59 The Association noted that given the challenges in predicting rainfall in tropical regions and given the high demand for operational intra-seasonal forecasts, there is a need to integrate research related to SDS-WAS, forecast verification and subseasonal to seasonal prediction into operational applications such as SWFDP.

4.6 Capacity development in Regional Association I and least developed countries (agenda item 4.6)

WMO Capacity Development Strategy Implementation Plan 2012–2015

Capacity Development Strategy

4.6.1 The Association recalled the discussions in Cg-XVI on the need for a cohesive and coordinated approach to capacity development to maximize the outcome of capacity development activities. It further noted the importance of regional and subregional efforts to support the capacity development of NMHSs given the large number of existing and planned regional centres and the regional emphasis of development partners. In this regard, the Association welcomed the WMO Capacity Development Strategy (CDS) and the CDS Implementation Plan (CDSIP) that had been approved at EC-64 and EC-65 respectively, and acknowledged the key role that the Association would have to play in implementing the CDS.

4.6.2 While the Association noted the progress of capacity development activities in the Region, it also recognized the need to further strengthen and harmonize such activities to address existing gaps in human, institutional, infrastructural and procedural capacities for many RA I Members. To foster the capacity development in the Region, the Association encouraged its Members to implement the CDS, as stipulated in [Resolution 12 \(RA I-16\)](#). In order to utilize limited resources effectively and efficiently the Association urged its Members to consider the strategic approaches to capacity development corresponding to the six Strategic Objectives of the CDS.

4.6.3 The Association was informed of the ongoing efforts of the EC Working Group on Capacity Development (EC-WG/CD) which led to the approval by EC-64 and EC-65 of the Capacity Development Strategy (CDS) the CDS Implementation Plan (CDSIP) respectively for 2012–2015. The Association noted the creation of EC-WG/CD Task Teams on the Country Profile Database and on the Categorization of NMHSs by level of service provision. At this point, the Association thanked representatives and experts from the Congo (Brazzaville), the Gambia, Guinea (Conakry), South Africa, United Republic of Tanzania and other Members of the Region for their participation in the working group and related programmes and encouraged them to continue providing a Region's perspective to the working group, especially as it considers further implementation priorities for 2016–2019.

4.6.4 The Association requested the Secretary-General to further enhance the capacity development in the Region taking into account the needs reflected in the RA I survey on institutional arrangements for NMHSs and identification of future priorities and as expressed by some of the NMHSs during the RA I-16 session.

4.6.5 The Association also agreed to reinforce the work of the Management Group in coordinating and harmonizing capacity development activities in line with the CDS and adopted [Resolution 12 \(RA I-16\) – Implementation of the WMO Strategy for Capacity Development in Regional Association I \(Africa\)](#).

4.6.6 The Association reviewed two tools being developed as part of the CDS: the on-line Country Profile Data Base; and the on-line Guide for the Role and Operations of Meteorological Services. Following a demonstration of these tools, the Association discussed how the tools can be used to build the NMHSs in RA I and offered suggestions and expressed their support for the deployment of these tools in 2014.

4.6.7 The Association encouraged its Members to support the Country Profile Data Base (CPDB) by updating their information during the roll-out of the CPDB initial operating capability and by maintaining the information contained in a database thereafter.

Special Focus on LDCs and SIDS

4.6.8 The Association recalled the discussions in Cg-XVI on the importance of the WMO Programme for the Least Developed Countries (LDCs) and the high priority to be continually attached to it. It welcomed Congress' decision to continue and enhance the WMO Programme for the LDCs to address the obstacles and constraints limiting NMHSs in LDCs and Small Island Developing States (SIDS) to provide relevant weather, water and climate information and services and to strengthen their capabilities to meet the demands and requirements of the priority areas for action as defined in the Istanbul Programme of Action (IPoA) for the LDCs for the decade 2011–2020. In this connection, the Association encouraged the Secretariat to ensure that all WMO's scientific and technical programmes continue to give higher and visible priority to LDCs and SIDS in their assistance and capacity-development activities.

4.6.9 The Association encouraged its Members to participate actively in, and to contribute to the maximum extent possible, to the funding of the WMO Programme for the LDCs, including through the WMO trust funds for NMHSs of LDCs and SIDS.

4.6.10 The Association noted that there are capacity-building needs relevant to Africa included in the WMO Strategy and the Integrated African Strategy on Meteorology (Weather and Climate Services), that should also be considered in the implementation of the Capacity Development Strategy.

Education and Training Programme – Regional Aspects

4.6.11 The Association acknowledged the importance of education and training for all Members in RA I, and the limited capabilities of many RA I Members to address their national needs. The Association recalled the discussions in the Regional Conference preceding this session that indicated the currently unmet demand for education and training in the Region and provided some indication of the increasing demand over the next six years in terms of numbers and increased scope.

4.6.12 The Association noted that there were few institutions currently offering graduate level forecasting courses in the Region and none currently offering some or all of these courses online to reduce the time and expense associated with personnel being absent from their service. The large distances, relatively small staff numbers and cost of travel make the utilization of distance learning very important for Africa to ensure that these NMHSs are able to access education and training opportunities in the coming years. The Association acknowledged that Internet bandwidth and access was still a problem for Members but recalled that a few of the Regional Training Centres (Kenya, Niger, South Africa and the Virtual Laboratory Centre of Excellence in Morocco), with the assistance of EUMETSAT and the WMO Secretariat, had successfully provided at least three extended online training courses in the last two years for RA I Members. Egypt advised the session that the RTC in Cairo was in the process of signing an MoU that would see it being able to provide distance learning courses in the near future. The Association was also informed that the COMET program in the United States of America was aware of this lack of distance learning opportunities and was examining options for how it could assist Members in this regard. The session also noted promising reports on increasing Internet access, such as "Lions go digital," from the McKinsey Global Institute (http://www.mckinsey.com/insights/high_tech_telecoms_internet/lions_go_digital_the_internets_transformative_potential_in_africa).

4.6.13 The Association recalled that European universities have portability of subjects and courses with the Erasmus Mundus Programme (http://eacea.ec.europa.eu/erasmus_mundus/), which has improved the quality of higher education through mobility and academic cooperation. The Association noted that implementation of a similar programme in RA I could allow universities with meteorology, hydrology or climate courses to better coordinate courses and resources on a

regional or subregional basis but further study and consideration would be required before the association would be in a position to support such a proposal. The Association also noted that such an initiative could increase opportunities for mobility and accessibility of students to colleges and universities within RA I and lower the cost of education and training, while maintaining the quality of education.

Role of education and training in assisting the regional association meet its goals

4.6.14 The Association acknowledged the key role education and training would have to play in meeting the goals outlined in its 2011 to 2014 Operating Plan and those proposed for the 2015 to 2018 intersessional period. The Association thus requested its president and the RA I Management Group to put in place actions to help identify any education and training gaps that could impact upon successfully achieving the goals and expected results of those plans. This gap analysis should be seen as part of the risk management actions taken by the Management Group and be based around the Members' needs in the high priority areas vis-à-vis Members' and Regional Training Centres' existing education and training capabilities. The Association recommended that the Management Group make any necessary adjustments to the operational plan if the gap analysis revealed deficiencies in meeting the training needs of the Region. In particular, noting the recent 1 December 2013 deadline for meeting the requirements for competencies and upcoming 1 December 2016 deadline for qualifications for aeronautical meteorological personnel laid down in the WMO Technical Regulations, the Association recommended that the determination of the regional needs and ability to address the aeronautical issue should be accorded high priority. Egypt advised the session that it had provided a number of courses to RA I Members on the subject of aeronautical meteorology to assist them to meet the deadlines. The session also noted that it would be important to address issues such as communication of climate products to end users when assessing the training gaps.

4.6.15 The Association recommended that the Management Group nominate one of its members to be the focal point for the ongoing assessment of the regional education and training needs against the operational plans and the ability of the regional training institutes to deliver that training. The Association recalled that the WMO Executive Council Panel of Experts on Education and Training had two RA I experts and that these Panel members could act as an interface between the Panel and the Management Group's ETR focal point to ensure smooth coordination and communication between the Panel and the Region.

4.6.16 The Association recalled the discussions in the Regional Conference regarding a new initiative known as the WMO Global Campus designed to increase cooperation, collaboration and communication between Regional Training Centres and other institutes. The Association noted that one of the main goals of the initiative is to put in place mechanisms and processes that will allow these institutes to increase their capabilities to better meet the education and training requirements of WMO Members. The Association noted that the proposal was consistent with WMO's approach of Members mutually assisting each other and it built on lessons learnt from activities such as the African Satellite Meteorology initiative (ASMET) and the WMO Virtual Laboratory for Satellite Meteorology. The Association encouraged all of its Regional Training Centres and other institutions such as WIS Centres and Regional Climate Centres with training obligations to work with the WMO Education and Training Office to ensure that RA I members would benefit from this initiative during its feasibility study period and beyond, if the feasibility study was approved during Congress in 2015 and the whole concept approved in 2019.

Fellowships

4.6.17 The Association noted that over the intersessional period 80 fellows from 36 of its Members had been supported by the WMO Fellowship Programme. The fellowship durations ranged from four months to five years with 35 of them undertaking four month secondments to the Africa Desk at the National Centre for Environmental Prediction (NCEP) in the United States of America (USA) through the US Voluntary Contribution Programme. The United States of America encouraged Members to continue recommending staff for this training opportunity and invited them

to utilise http://www.cpc.ncep.noaa.gov/products/african_desk/cpc_intl/menus/intro.shtml to make their applications. Sixteen of the 80 fellows undertook their training within the Region.

4.6.18 The Association noted that WMO has considerably increased its outreach to more partners for support to WMO fellowship activities in general, and hence increase in opportunities available to Members in the Region. The Association also noted the importance of the group training on “Instrument maintenance and Calibration” which commenced in 2013 and gratefully acknowledged the funding support from the Government of Norway that had allowed this training to occur. The Association encouraged its Management Group and the Secretary-General to explore ways of identifying further funds to conduct similar group training in the high priority areas of the Organization.

4.6.19 The Association thanked Algeria, Egypt, Kenya, Morocco, Nigeria, South Africa and Members from outside of the Region, particularly China, Finland, France, Norway, the United States of America and the United Kingdom of Great Britain and Northern Ireland, for the support they provided to the WMO Fellowship Programme. The Association strongly encouraged all its Members to support this important programme through cost-sharing to maximize the number of Members who could benefit. The Association noted with thanks the support from Members such as Egypt who waived tuition fees and arranged for low-cost housing options either through hostel accommodation or with local hotels to find safe, secure full board options. The Association also encouraged Members who did not have national training institutes and were not able to fully fund staff development to consider cost sharing options with WMO for on-the-job training opportunities for their staff in more developed services in the Region.

4.6.20 The Association noted with concern that some Members had not been able to employ WMO Fellows who had successfully completed their courses upon return to their home country. Whilst recognizing the many reasons that could lead to the fellows not being employed, the Association recalled the large demand upon the programme and thus encouraged its Members to make every effort to ensure that fellows for whom they had requested support found employment in the NMHSs or related institutes upon their return home in order to transfer skills and knowledge.

Regional Training Centres

4.6.21 The Association recalled that in previous sessions it had requested the Executive Council to recognize eight Members and twelve institutions as WMO Regional Training Centres (RTCs) to address the education and training needs of RA I Members and, where possible, assist in addressing the needs of WMO Members outside the Region (see [Annex II to the present report](#)).

4.6.22 The Association noted with some concern that the report provided to the EC Panel of Experts on Education and Training on activities in each of the RTCs indicated a relatively low use of some RA I Regional Training Centres by Association Members (see [Annex III to the present report](#)). The Association was particularly concerned that no reports had been received from the RTC in Angola or the Federal University of Technology, Akure (FUTA) in Nigeria. The Association requested the Permanent Representatives of Angola, Kenya and Nigeria to work with the RTCs to urgently address this situation. The Association further noted that under the revised EC Criteria for the recognition and reconfirmation of RTCs approved at EC-66, all future sessions of the Association would be required to make recommendations to EC on whether to continue each of the centres as RTCs. Given reports such as those provided to the EC Panel of Experts on Education and Training, the Association noted that it would be difficult for the next session to recommend reconfirmation of the RTC in Angola, the RTC component at the University of Nairobi or the FUTA component of the RTC in Nigeria unless significant improvements and resumption of reporting occurred in the next four years.

4.6.23 Recalling the imminent deadline of 1 December 2016 for Aeronautical Meteorological Forecasters (AMF) to meet the WMO qualification requirements, the Association noted that a number of its RTCs had provided Class II training courses for the NMHS personnel in the Region. The Association requested the Permanent Representatives of Algeria, Angola, Egypt, Kenya, Madagascar, Niger, Nigeria and South Africa to liaise with the RTCs hosted in their countries to

identify whether the RTCs would be able to provide RA I Members advice regarding whether they had listings of the successful graduates of their previous Class II courses and whether the content and level of the Class II courses met the BIP-M requirements at that time. The session recalled that RA III had recently taken similar steps and suggested that such action, provided the evidence was available, would assist a number of its Members in meeting the qualification requirements.

4.6.24 The United States of America advised the session of support from the US Federal Aviation Administration for a project known as “Safe Skies over Africa”. Under this project COMET had adopted a number of its aviation modules to include African case studies and support aeronautical meteorological training in Africa. The Association noted that COMET hosted 45 modules in French ([see Annex IV to the present report](#)) on the [MetEd website](#)) across a wide range of subjects of interest to RA I Members.

Training activities

4.6.25 The Association noted with pleasure the variety of training activities that had been provided to Members by WMO and Members from RA I and other Regions during the intersessional period. Distance learning activities ranged from regular online weather briefings such as Regional Focus Group weather discussions and other online offerings from the WMO Virtual Laboratory groups in South Africa, Kenya, and Morocco, to blended DL and classroom courses offered by Kenya and Niger, to the fully online hydrology courses offered by the RTC in Kenya, as well as a well-attended Online Seminar for Trainers led by WMO ETR. The Association recognized the contributions of workshops and training opportunities from Members outside the Region such as China, Finland, France, Israel, Japan, Kenya, Spain, Switzerland, the United Kingdom of Great Britain and Northern Ireland and the USA. The Association noted with pleasure that 133 requests to attend either online (85 participants) or face-to-face (48 participants) training events in countries such as China, France, Israel, Hong Kong, China and Turkey were able to be met in 2012–2014 by WMO through a variety of funding sources. The Association thanked France for its plan to host a 2-week training course on climate data management and climate services in Toulouse in March 2015. The Association noted that for the first time it will be conducted in French and will welcome 18 trainees mainly from French-speaking African NMSs. The Association noted the successful use of the online learning and encouraged its Regional Training Centres to provide even more opportunities in the next intersessional period. The Association recognized that the ETR office was unable to meet many of the financial requests due to the limited available funds and encouraged its Members to look for alternative funding to allow staff to undertake these important continuous professional development opportunities. The Association recognized the request from WMO ETR that each Member prioritize requests for financial assistance based on areas of greatest need to ensure that limited funds can support the entire Region’s needs.

4.6.26 On behalf of the Association Dr Bah thanked all Members hosting RTCs in RA I and the WMO Secretariat for the support that they provided to the Association by making their training facilities and support available to RA I Members.

Capacity-building

4.6.27 The Association noted with appreciation that a forecaster’s handbook, through a collaborative effort between researchers from Europe, US, Africa and forecasters from NHMSs in West Africa and ACMAD, is being finalized in the framework of the African Multidisciplinary Monsoon Analyses (AMMA). The English version will be published during 2015 and support is being sought to publish the French version.

4.6.28 The Association was informed that ASECNA has developed a users manual for the interpretation of the images and products from meteorological satellites in French. This Manual was presented at the 11th EUMETSAT User Forum in Johannesburg in September 2014. The paper received a positive welcome from the participants. The Forum recommended that EUMETSAT translate this book into English and publish it on the WMO and EUMETSAT websites.

Resource Mobilization

Resource Mobilization, Development Cooperation and Partnerships; including infrastructure and Operational Facilities Development

4.6.29 The Association welcomed the establishment of the Project Coordination Unit (PCU) within the Office for Resource Mobilization to enhance delivery of multi-disciplinary projects and donor reporting. The Association also welcomed the change of name to Office for Resource Mobilization and Development Partnership (RMDP) to better reflect the focus of the Office. The Association appreciated that the Office focuses on resource mobilization and also strengthening development partnerships with key organizations, including the Multilateral Development Banks such as the World Bank (WB), the Asian Development Bank and the African Development Bank, the European Commission, Regional Economic Communities, UN system partners and bilateral development agencies, among others. The Association also welcomed the support provided to the PCU through secondment from the UK and from Germany, Norway and Finland through the JPO programme. Annual voluntary contributions received by WMO are now approaching more than 40% of the total annual budget. (Cg-XVI (Resolution 37) authorizes the Executive Council, during the 16th financial period, to incur expenditure from the budget funded from Voluntary Contributions estimated at CHF 175 M, made up of CHF 142 M requested by WMO Budget Office and the WMO Technical Programmes for activities (Project Compendium 2012–2015) and an anticipated CHF 33 M for joint cooperation programmes (such as JCOMM, GCOS, WCRP) (the target amount requested by programmes was revised down CHF 120 M by EC-65: Resolution 19 (EC-65)).

4.6.30 The Association also welcomed the successful relationships being established for major hydromet development projects in the Region between WMO, Development Agencies and national Aid Agencies amounting to USD 45–50 million in financial terms (see [Annex V to the present report](#)).

4.6.31 In particular the Association noted the direct extrabudgetary financing through WMO of the following strategic initiatives:

- (a) Financing the AMCOMET Secretariat and AMCOMET processes since its inception;
- (b) Financing for the GFCS Secretariat;
- (c) Severe Weather Forecast Demonstration Project in East and Southern Africa;
- (d) Flash Flood Guidance System in Southern Africa;
- (e) Public Weather Service and Meteorological Services for Agriculture in West and North Africa (METAGRI and METAGRI OPS projects have reached more than 12,000 farmers in 17 Western Africa countries);
- (f) Joint WMO/WHO Climate & Health Office in the GFCS Secretariat;
- (g) West Africa (WA DARE) and Indian Ocean (INDARE) Climate Data Rescue Programmes;
- (h) Fellowship Fund;
- (i) US NWS Africa Desk;
- (j) GFCS Flagship “*Climate Services Adaptation Programme in Africa*” under implementation in Malawi and the United Republic of Tanzania.

4.6.32 The Association was advised that major ongoing strategic partnerships include, among others (the below list is non-exhaustive):

- (a) **African Union Commission** related to the establishment of the African Ministerial Conference on Meteorology (AMCOMET) and the related Integrated African Strategy on Meteorology (Weather and Climate Services);
- (b) **European Commission** and **ACP Secretariat** for potential opportunities through the European Development Fund (EDF-11) for a Pan African Programme for the implementation of the GFCS in African, Caribbean and Pacific countries. Another major area of engagement with the European Union in the near future is the Horizon 2020 programme;
- (c) **Norway through the Ministry of Foreign Affairs** who is the largest financial supporter of GFCS and active advocate of WMO and the GFCS;
- (d) **Government of Canada** is also a major supporter of the GFCS with 2 major projects with one to rehabilitate the hydromet services of Haiti, and another to develop Climate Services in developing countries in the Region;
- (e) **Swiss Agency for Cooperation and Development (SDC)** for the implementation of the “Water Security in the Middle East: Strategic Management of Hydrometeorological and Meteorological Data and Information Product Generation”, as a contribution to the Blue Peace Initiative in Middle Eastern countries (e.g. Jordan, Lebanon) and League of Arab States Region;
- (f) **Government of Japan** with respect to the Integrated African Strategy on Meteorology (Weather and Climate Services) within the framework of the Fifth Tokyo International Conference on African Development (TICAD V). WMO is also closely working with the Japan International Cooperation Agency (JICA) on mutual complementarity and synergetic cooperation between JICA, JMA and WMO for the development of bilateral projects and WMO activities in the Asia-Pacific, Africa and Caribbean regions;
- (g) **China** through the Ministry of Commerce and China Meteorological Administration (CMA) for the development of the Africa-China Meteorological Development Cooperation Programme in 10 target African countries, among others;
- (h) **European Organization for the Exploitation of Meteorological Satellites (EUMETSAT)** which implements projects in Africa, in particular the Monitoring of Environment and Security in Africa (MESA) project as well as GFCS implementation in general;
- (i) **World Bank** to develop synergies and coordination for the implementation of projects and programmes, in particular through the Global Facility for Disaster Reduction and Recovery (GFDRR), the Pilot Programme for Climate Resilience (PPCR) and more recently the Sahel Disaster Resilience Project being developed;
- (j) **African Development Bank (AfDB)** to cooperate on African hydrometeorological initiatives, in particular the African Ministerial Conference on Meteorology (AMCOMET) and the related Integrated African Strategy on Meteorology (Weather and Climate Services); the Climate for Development in Africa initiative (ClimDev-Africa) and more recently the Maritime Communications for Safety on Lake Victoria Project which is under consideration;
- (k) **United Nations System Organizations**, including UNDP, UNISDR, UNOPS, WHO, WFP, FAO, IFAD, among others, cooperate with WMO on a number of projects related to hydrometeorological and climate services.

4.6.33 Countries in the Region also benefited through the WMO Voluntary Cooperation Programme (WMO-VCP) during the period 2011–2014. In total, 27 requests for support were

received and of these more than 80% have been supported to date (see [Annex VI to the present report](#)).

4.6.34 The Association welcomed also the information that significant bi-lateral support is being provided to Hydromet Services development as evidenced by the reports of the Informal Planning Meeting (IPM) on the VCP. The Association encouraged its Members to continue to contribute to and participate more actively in the Programme to address the requirements of NMHSs in the Region (see [Annex VII to the present report](#) and <http://www.wmo.int/pages/prog/dra/vcp/InformalPlanningMeeting2014.php>).

4.6.35 The Association expressed its appreciation to WMO Members, particularly Australia, Canada, China, Finland, France, Germany, Greece, Ireland, Japan, New Zealand, Norway, Republic of Korea, Spain, Switzerland, UK, and USA for the financial and in-kind support that they have provided to WMO Members through the VCP Trust Fund and Coordinated Processes. Total global VCP Contributions have remained steady over the intersessional period at approximately USD 27 to 29 M per as illustrated in the table in the [Annex VIII to the present report](#) and the annual IPM reports (see <http://www.wmo.int/pages/prog/dra/vcp/InformalPlanningMeeting2014.php>).

4.6.36 The Association requested the Secretary-General to further enhance resource mobilization and capacity development in the Region taking into account the needs reflected in the recent regional survey and expressed by some of the NMHSs during the RA I session.

4.7 Partnership and cooperation in Regional Association I (agenda item 4.7)

4.7.1 The Association noted with satisfaction the strengthened cooperation activities between WMO and a significant number of regional and subregional economic and technical organizations in RA I for the development and implementation of programmes and projects related to meteorology and hydrology. These included the Economic Community of Western African States (ECOWAS), the Economic Community of Central African States (ECCAS/CEMAC), the East Africa Community (EAC), Southern African Development Community (SADC), the Permanent Inter-State Committee on Drought Control in the Sahel (CILSS), the African Development Bank, (ADB), the Niger Basin Authority (NBA), the Agency for Air Navigation Safety in Africa (ASECNA), Intergovernmental Authority on Development (IGAD), Common Market for Eastern and Southern Africa (COMESA), African Centre of Meteorological Applications for Development (ACMAD) and African Union (AU). The Association invited the WMO Secretariat to continue to collaborate with these intergovernmental bodies and also to encourage partnerships between NMHSs in RA I.

4.7.2 The Association noted that regional economic groups would continue to play significant and leading roles in socioeconomic development activities in the Region. In particular, it was noted that some development partners are opting to use the subregional economic groups to support development programmes in the Region. In this regard, the Association commended the Secretary-General for the efforts he had made to enhance collaboration with the subregional economic groups.

4.7.3 The Association noted that in October 2013 the African Climate Conference (ACC2013) was held in Arusha, United Republic of Tanzania. The conference adopted a Pan-African Climate Research for Development (CR4D) Agenda to advance implementation of the research component of the GFCS Implementation Plan. CR4D will focus on co-designed multidisciplinary climate research; improving observation systems and delivery; scientific and institutional capacity development; and mainstreaming climate services and user interface platform. A follow up CR4D Strategy Meeting was held 5–7 October 2014 in Marrakech, Morocco. The main recommendations from the meeting were the hosting of the CR4D Secretariat at the African Climate Policy Centre (ACPC) to facilitate the implementation of the activities of the CR4D Agenda. The meeting further recommended the joint oversight of the CR4D Agenda by the Clim-Dev Programme, WMO and the African Ministerial Conference on Meteorology (AMCOMET) and the launch of the CR4D Institutional Collaboration Platform during the Third Session of AMCOMET.

4.7.4 The Association took note of the report of the African Centre of Meteorological Applications for Development (ACMAD) Board of Governors which took place from 24 to 25 July 2014 in Niamey, Niger. The Association recognized that progress was made in the implementation of the ACMAD programme, particularly through support to countries, the provision of weather and climate information, the African Regional Climate Centre, the Enlarged Partnership projects, the Application Workshops, and capacity-building and cooperation.

4.7.5 The Association encouraged Members in the Region to fulfil their financial obligations and second experts to actively participate in the activities of ACMAD. Considering the role of ACMAD in the development of weather and climate services and the support it provides to NMHSs in the Region, the Association requested the Secretary-General to continue to strengthen WMO relationships with, and assistance to, ACMAD as appropriate.

4.7.6 The Association welcomed the WMO-EUMETSAT Joint Secretariat support to the ACP Task Team (AUC, ACP, RECS, RCCs, AMCOMET) on the Global Framework for Climate Services (GFCS), which seeks to mobilize funds for an intra-ACP project. The project would contribute to the implementation of the GFCS at the regional level in African, Caribbean and Pacific (ACP) regions within the framework of the European Development Fund-Intra-ACP cooperation. The Association further noted the Monitoring of Environment and Security in Africa (MESA), which is a technical assistance project for 48 ACP beneficiaries focused on leveraging the work of previous phases (Meteorological Transition Project in Africa MTAP/PUMA under the 8th EDF) and African Monitoring of the Environment for Sustainable Development (AMESD) under the 9th EDF).

4.7.7 The Association also noted the “Climate Services Adaptation Programme in Africa”, a multiagency 10 M USD initiative funded by the Government of Norway through the WMO to be implemented in Malawi and the United Republic of Tanzania to support the (GFCS) and the related activities in the Pan-African project also funded by the Government of Norway (10M USD), supporting extreme weather, early warning and agricultural meteorology services under development in many countries across the Region.

Information and Public Affairs

4.7.8 The Association recalled that the Sixteenth Congress by its Resolution 27 (Cg-XVI) on the WMO Information and Public Affairs Programme sought to advance “the aim of consolidating the WMO Web presence, including in social media, mobile telephone technology and other new media to reach out to people worldwide, in particular to youth, and paying special attention to the needs of developing countries”. Congress invited its Members to continue to contribute actively to this aim and more generally to regional cooperation on communications and public affairs.

4.7.9 The Association recognized that the WMO Secretariat is committed to making significant improvements to the WMO website over the coming year. As a first step the Communications and Public Affairs Office (CPA) has launched a new “youth corner” for the website. As the WMO website should represent and promote the entire WMO community, the Association stressed that it is important that as many Members as possible engage in strengthening WMO’s presence on the Internet.

4.7.10 The Association appreciated that, despite increasing competition for attention by the media, global press coverage of WMO activities and programmes continues to increase every year. WMO’s reports on the status of the global climate, the Greenhouse Gas Bulletin, the WMO/WHO Atlas of Health and Climate, the WMO/CRED Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes, and other regular and periodic publications play an important role in raising public awareness about the issues of “weather, climate and water”. These reports have increasingly strong regional components, and their regional public impact relies on the cooperation of the entire WMO community.

4.7.11 The Association noted that CPA works with Members and partners to promote WMO activities around the world, including conferences, workshops and launches of reports. Upcoming events in RA I include the Third Session of the African Ministerial Conference on Meteorology

(AMCOMET). The Association encouraged its Members to support outreach and communications for AMCOMET-3 and other relevant events in the Region.

4.7.12 The Association requested WMO-affiliated centres and facilities, such as WIS centres, African Center of Meteorological Applications for Development, the IGAD Climate Prediction and Applications Centre, and the Regional Climate Outlook Forums for the Greater Horn of Africa, Southern Africa, West Africa and Central Africa, to provide visible WMO identity on their websites.

4.7.13 The Association invited its Members to:

- (a) Link NMHSs' websites to the <http://www.wmo.int> Website;
- (b) Contribute to the "News from Members" section on the WMO website;
- (c) Designate and empower an IPA Focal Point;
- (d) Promote regional cooperation on information and public affairs.

5. EFFECTIVENESS AND EFFICIENCY IN REGIONAL ASSOCIATION I ACTIVITIES (agenda item 5)

5.1 WMO strategic planning – regional aspects (agenda item 5.1)

WMO Strategic Plan 2016–2019

5.1.1 The Association recalled that the Sixteenth World Meteorological Congress requested the regional associations (RAs) to:

- (a) Provide regional needs and priorities that should be taken into consideration in developing the WMO Strategic Plan 2016–2019; and
- (b) Coordinate, as necessary, national contributions to regional aspects of the Plan.

5.1.2 The Association noted with appreciation the active involvement of its Members and the president of the Association in the development of the WMO Strategic Plan 2016–2019 (SP) under the guidance of the Executive Council and its Working Group on Strategic and Operational Planning (WG/SOP), and with contributions from all regional associations and technical commissions (TCs).

5.1.3 The Association recalled that in December 2013 the Secretary-General communicated the draft Strategic Plan to all WMO Members for their input and indication on whether the capacity of NMHSs to provide services would be improved if the WMO followed the strategic directions proposed in the Plan, and if the Members would be able to use the Plan to inform the governments of the strategic directions and priorities of WMO.

5.1.4 The Association noted that the latest draft SP, finalized by the EC-WG/SOP as requested by the sixty-sixth session of the WMO Executive Council (EC-66), has the following seven priorities:

- (a) **High impact services for disaster risk reduction:** Improve the effectiveness of high quality impact-based forecasts and multi-hazard early warnings of high impact meteorological, hydrological and related environmental hazards, thereby contributing to international efforts on disaster risk reduction, resilience and prevention;
- (b) **WIGOS:** Complete the implementation of the WIGOS/WIS focusing on the implementation of all the interoperability building blocks of the framework and supporting their acceptance at regional and national levels;

- (c) **Aviation meteorological services:** Improve the ability of NMHSs to meet International Civil Aviation Organization (ICAO) requirements by: (a) accelerating the implementation of ICAO/WMO competency standards and Quality Management Systems (QMS); (b) addressing the emerging needs and challenges associated with the global air navigation plan; (c) strengthening cost recovery frameworks;
- (d) **Polar and high alpine regions:** Improve operational meteorological and hydrological monitoring and prediction services in polar and high alpine regions and beyond by: (a) operationalizing the Global Cryosphere Watch (GCW); (b) better understanding the implications of changes in these regions on the global weather and climate patterns; and (c) advancing the Polar Prediction under the Global Integrated Polar Prediction System (GIPPS);
- (e) **GFCS:** Implement climate services under the GFCS particularly for countries that lack them by: (a) establishment of regional climate centres; (b) identifying user requirements for climate products; (c) developing the Climate Services Information System (CSIS); and (d) advancing the Subseasonal to Seasonal (S2S) Prediction Project;
- (f) **Capacity Development:** Enhance the capacity of NMHSs to deliver on their mission by assisting with human resource development, technical and institutional capacities and improved infrastructure, particularly in developing, least developed and small island developing states; and
- (g) **WMO Governance:** Continue to conduct a strategic review of WMO structures, operating arrangements and budgeting practices focusing on the effectiveness of constituent body activities and the Secretariat arrangements.

5.1.5 The Association considered the priorities in the draft SP and agreed on the following priorities for the Region for the period 2016–2019 as recorded under item 5.2 below.

WMO Operating Plans 2016–2019

5.1.6 The Association recalled that the Sixteenth World Meteorological Congress requested the regional associations to prepare their operating plans to support the implementation of the WMO Strategic Plan. The Association further recalled the decision of EC at its sixty-first session (EC-LXI) that the Organization should have a single integrated Operating Plan that includes the activities of RAs and TCs and incorporates their own operating plans. The Association urged its president and Management Group to develop the Association's operating/action plan for 2016–2019 and to submit it as a contribution to the WMO Operating Plan (OP).

5.1.7 In order to ensure timely provision of the Association's contribution to WMO integrated strategic planning process in the future, the Association requested its president and Management Group to set a process and develop and submit such contributions, as required, in consultation with Members of the Association in the intersessional period.

Monitoring and Evaluation

5.1.8 The Association noted that the Secretariat continued to develop and implement the WMO Monitoring and Evaluation (M&E) System and that the Executive Council encouraged constituent bodies to make use of the M&E System and Guide prepared by the Secretariat and provide feedback for further improvement.

5.1.9 The Association also noted that under the guidance of the Executive Council its WG/SOP continued to further develop and improve the implementation of the M&E System. This particularly required better coordination with RAs to increase the level of Member's response to questionnaires. The Association noted with concern that only 42% of Members from the Region responded to the surveys on impacts of achieved results on Members conducted in October 2012 and November 2013. The Association noted the decision of EC requesting Members

to identify focal points to improve the levels of responses to surveys. It encouraged its Members to respond to M&E surveys to provide information that would assist in further development of their NMHSs.

5.2 Regional Association I strategic and operational planning (agenda item 5.2)

Strengthening good governance

5.2.1 The Association was briefed on the status of implementation of the RA I Strategic Plan (2012–2015) adopted by the fifteenth session of RA I (Marrakech 2010). Many activities had been implemented as reported in the various documents presented by the technical departments of WMO. The session noted that the Strategic Plan provided a useful roadmap in the further development of NMHSs in the Region.

5.2.2 The Association noted that the development of the RA I Strategic Plan (2012–2015) addressed the key priorities of the WMO Strategic Plan 2012–2015 which included: the Global Framework for Climate Services (GFCS); Capacity-building; WMO Integrated Observations and Information System (WIGOS/WIS) development; Disaster Risk Reduction; and Aviation Meteorology.

5.2.3 The Association observed that the elements of the current RA I Strategic Plan (2012–2015) was aligned with the African Ministers Conference on Meteorology (AMCOMET) Integrated Strategy on Meteorology (Climate and Weather Services). The Association further noted that the Integrated Strategy on Meteorology (Climate and Weather Services) is aligned with the WMO Strategic Plan for 2016–2019.

5.2.4 The Association emphasized the need to make regional priorities the centrepiece of the RA I Operational Plan. The Association decided on, but was not limited to, the following regional priorities:

- (a) Capacity Development
 - (i) Human Capital
 - Educational training, specifically for meteorologists with university degree (in aviation, agro-meteorology, hydrometeorology, biometeorology, dynamic / statistical forecasting, marine meteorology and oceanography)
 - Continuous Training to keep abreast and be actively involved with the evolving science, innovation and technology, including climate change and its associated impacts
 - Training on management and leadership of NMHSs (governance)
 - (ii) Infrastructure Development
 - Strengthen Observational Networks and Systems on land, water and air (WIGOS)
 - Strengthen Data Telecommunication Systems for Data Exchange (WIS)
 - Data processing, analysis and forecasting (nowcasting, short-, medium-, and long-range forecasting, including NWP)
 - Climate Database Management Systems (CDMS)
 - Service Dissemination Systems (RANET, SMS platform, etc.)
 - Data Rescue (DARE)
 - (iii) Institutional transformation
 - Transformation of NMHSs into autonomous entities, and facilitate and enhance cost recovery from aeronautical, marine and other services

- (b) Aeronautical Meteorological Services for Aviation
 - (i) Quality Management Systems (QMS) (Certification of NMHSs)
 - (ii) Competency Assessment
 - (iii) Cost Recovery
 - (iv) Open Skies Regionalization (elaboration of the issues and implications for NMHSs in the region)
- (c) Global Framework for Climate Services (GFCS)
 - (i) Development of National Frameworks of Climate Services (NFCS) / User Interface Platform (UIP)
 - (ii) Climate Services Information Systems (CSIS) for tailor made products and services (agriculture and food security, water resources, public health and disaster risk reduction, urban services and energy, among others)
 - (iii) Research and Development (R&D)
 - Application of knowledge to understand weather and climate systems
 - Downscaling products from national to community levels for informed decision-making (through statistical / numerical methodologies)
 - (iv) Archival of Digitized Data
- (d) Service Delivery
 - (i) Public Weather Service (radio, TV, RANET and other electronic media)
 - (ii) Roving Seminars
 - (iii) Public Awareness
 - (iv) Educational Outreach Programmes
 - (v) Providing early warning information for weather and climate related Disaster Risk Reduction (DRR) at the national level (tropical cyclones, storm surges, fire weather, floods and droughts)

5.2.5 The Association further noted that the Implementation and Resource Mobilization Plan of the Integrated African Strategy on Meteorology (Weather and Climate Services) is aligned with the RA I priorities identified for the period 2016–2019.

5.2.6 The Association requested the Secretary-General to support the preparation of RA I Operating Plan 2016–2019 that would take into account the priorities of the Organization and identified regional priorities, and be harmonized with the Implementation and Resource Mobilization Plan of the Integrated African Strategy on Meteorology (weather and climate services), that was developed by the African Ministerial Conference on Meteorology (AMCOMET).

5.3 Internal matters of the Association: efficiency of the operations of Regional Association I subsidiary bodies (agenda item 5.3)

5.3.1 In the context of the WMO Strategic Plan for 2012–2015, the Association noted the key priorities of WMO for 2012–2015: Global Framework for Climate Services (GFCS); Capacity Development; Service Delivery; WMO Integrated Global Observing System and WMO Information System (WIGOS/WIS); Disaster Risk Reduction; and Aviation Meteorology.

5.3.2 The Association noted further the recommendations that have been considered by the Executive Council regarding the review of the WMO constituent bodies, their strategic alignment

and their processes and practices for continuous improvement to better deliver the priorities of the Strategic Plan, and in particular that of Capacity Development. In this regard, it has been agreed that the identification of regional priorities and action lists by regional associations and their alignment with the technical commission activities was a crucial element in the integrated WMO strategic and operational planning and that these priorities should be one of the main driving forces of the activities of the technical commissions.

5.3.3 Several specific measures have been discussed by the EC regarding concrete changes to existing processes, such as: the development of simplified documentation for constituent body sessions to improve decision-making; further optimization of the schedule of the sessions of the constituent bodies; better involvement of the experts of the technical commissions in the subsidiary bodies of the regional associations and in conjoint projects and activities; reducing the intergovernmental part of constituent body sessions and redirecting the savings to increased technical activities, etc. Cg-XVI requested the EC to continue to work on, and implement as appropriate, continuous improvement of WMO processes and practices, and bring back to Cg-17 specific proposals, which may include changes to the General Regulations or the WMO Convention as necessary.

5.3.4 The Association was briefed on the follow up of Resolution 1 (EC-64), Review of the role and responsibilities of regional associations, by the EC-WG-SOP at its meeting in January 2013. The EC-WG-SOP reviewed proposals for better definition of the role and responsibilities of regional associations in the WMO integrated planning and implementation process. The Association noted the current provisions of the WMO Convention and the General Regulations, as well as further tasks and responsibilities assigned to regional associations by Congress and EC decisions, including responsibilities outlined in the WMO Technical Regulations. The Association further recommended the MG to review the ToRs of the working groups and to ensure they correspond to the RA I Operating Plan 2016–2019.

RA I Management Group

5.3.5 The Association noted the information provided by the president on the activities of the RA I subsidiary bodies during the intersessional period. While expressing its satisfaction with the activities performed by some of the working groups and rapporteurs it noted with concern that some had not been able to perform satisfactorily for various reasons. The session reiterated that the working groups and rapporteurs form the technical and scientific arm of the Association. The Association encouraged Members to provide necessary support to the designated members of working groups and other subsidiary bodies to allow them to conduct efficiently the planned activities.

5.3.6 The Association noted with appreciation the reports on the activities of the RA I Management Group (MG). The RA I MG provided guidance and advice to the president and vice-president in the implementation of WMO Programmes in the Region. In particular, the MG participated fully in the development of the RA I strategy in the implementation of WIGOS/WIS in Africa. The session expressed appreciation to the president, Dr Mamadou Lamine Bah, and the vice-president, Dr Amos Makarau, for their leadership. The session recommended the restructuring of the RA I Management Group to facilitate its functions.

5.3.7 The Association supported the need to align the working mechanism of the Association to the Strategic Thrusts and Expected Results of the WMO Strategic Plan as well as Expected Results of the RA I Strategic Plan. For that purpose, the Association decided to establish the following subsidiary bodies:

- (a) Management Group (MG);
- (b) Working Group on Observations, Telecommunication and Infrastructure;
- (c) Working Group on Climate Services and Applications;

- (d) Working Group on Hydrology and Water Resources;
- (e) Working Group on Improved Weather Forecasting, Natural Disaster Risk Reduction, Service Delivery and Communication;
- (f) Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery;
- (g) Tropical Cyclone Committee for the South-West Indian Ocean;
- (h) Task Team on Aeronautical Meteorology;
- (i) Task Team on WIGOS (created by Resolution 8 (RA I-16)).

5.3.8 With regard to the working mechanism of the Association, the following general principles were considered:

- (a) The work structure of the Association has been simplified and aligned with the new Expected Results of the WMO Strategic Plan for 2016–2019, to ensure a consistent approach in the implementation of the WMO Programmes;
- (b) The overall goal of the established work structure is the implementation of the regional aspects of the WMO Strategic Plan. Therefore, the resources should be used in accordance with the established key regional priorities and expected results;
- (c) The work programmes of the working groups consist of specific tasks designed to implement the regional aspects of the WMO Strategic Plan over the intersessional period. The working groups have the flexibility to propose to the MG the establishment of a manageable number of task teams to address specific tasks, as necessary, for the progress of the work programmes; and
- (d) Cross-cutting issues are addressed through coordination and collaboration between the working groups, each of them providing the necessary expertise. The MG facilitates the coordination process.

5.3.9 Considering the above general principles, the Association agreed on the subsidiary bodies listed below, for the next intersessional period (see [Annex IX to the present report](#)):

- (a) Management Group (MG)

Nine (9) Members with an option to invite the EC Members:

- (i) The president of RA I (Chairperson of MG);
- (ii) The vice-president;
- (iii) Regional Hydrological Advisor to the president of RA I (also chairperson of the Hydrology and Water Resource Working Group);
- (iv) Gender Coordinator (to consider the gender dimension of weather and climate services and ETR matters);
- (v) Chairpersons of WGs and TCC.

Financial Implication: Considering one meeting (of 3 days) per year in Geneva for 9 Members of the MG (3 plus 6 chairpersons) during the intersessional period (4 years).

Total expenditure = 4 meetings [9 Members (3 days of DSA + travel)].

It should be more cost-effective to have Working Group (WG) chairpersons as part of the Management Group (MG) with the possibility for the president to invite EC Members as appropriate.

Options for MG meetings can be realized with cost-savings if organized on the margins of the WMO EC session.

- (b) Working Group on Observations, Telecommunication and Infrastructure:
 - (i) Experts of Task Team on WIGOS (created by Resolution 8 (RA I-16));
 - (ii) Experts on WMO Information System (WIS), including the Chairperson of RA I WIS Implementation Team;
 - (iii) Two (2) Experts on Instruments and Methods of Observation (CIMO): one specializing in Conventional Observation Systems and the other in Remote Systems;
 - (iv) Experts on Regional Telecommunications; and
 - (v) Experts from RA I Dissemination Expert Group (RAIDEG) on satellite data.
- (c) Working Group on Climate Services and Applications:
 - (i) Expert on Climate and Data Management;
 - (ii) Expert on Climate Prediction from seasonal to decadal;
 - (iii) Expert on Agricultural Meteorology;
 - (iv) Expert on Climate Variability / Change, and Modelling; and
 - (v) Expert on Climate and Health.
- (d) Working Group on Improved Weather Forecasting, Natural Disaster Risk Reduction, Service Delivery and Communication:
 - (i) Expert on disaster prevention and mitigation;
 - (ii) Expert on marine meteorological and oceanographic services;
 - (iii) Expert on advancement, operation and application of numerical weather prediction (NWP), from nowcasting to medium range forecast; and
 - (iv) Expert on integrated service delivery, including public weather (media, social science, communication, etc.).
- (e) Working Group on Hydrology and Water Resources:
 - (i) Expert on hydrological prediction and forecasting;
 - (ii) Expert on integrated water resource management, development and service delivery;
 - (iii) Expert on hydrological monitoring and data management;
 - (iv) Expert on water and climate; and
 - (v) Expert on integrated high / low flow forecasting.

- (f) Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery
 - (i) Expert on marine meteorological services
 - (ii) Expert aeronautical meteorological services;
 - (iii) Expert on QMS including compliance to ICAO requirements and associated competences;
 - (iv) Expert on cost recovery from aviation and marine,
 - (v) Experts on human capital (capacity, development, retention, career path, etc ..) issues.
- (g) Tropical Cyclone Committee for the South-West Indian Ocean:

15 members of the Committee drawn from the Member countries most affected by the South-West Indian Ocean Tropical Cyclones.
- (h) Task Team on Aeronautical Meteorology.

Nominated by the president to have subregional representation

ToRs to be agreed by president in consultation with MG (list of TORs to be prepared by the MG at [Annex IX to the present report](#))

Considering two meetings of 3 days in the intersessional period of RA I sessions, the financial expenditure for the five (5) WGs assuming their meeting is in Geneva is as follows:

Financial Implications: Number of Members of the Working Groups (WGs):

- (a) WG on Observations, Telecommunication and Infrastructure (10);
- (b) WG on Climate Services and Applications (5);
- (c) WG on Improved Weather Forecasting, Natural Disaster Risk Reduction, Service Delivery and Communication (10);
- (d) WG on Hydrology and Water Resources (5);
- (e) Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery (10);
- (f) Tropical Cyclone Committee for the South-West Indian Ocean (15);
- (g) Task Team on Aeronautical Meteorology (5)

Total expenditure = 2 meetings [50 Members (3 days DSA + travel)].

Depending on availability of resources and needs, WG may meet more than 2 times during intersession period.

As resource is a constraint the association strongly encouraged to do as far as possible the work through remotely (internet, webex, skype, ...)

5.3.10 The Association agreed to established the RA I subsidiary bodies. In that connection, the Association adopted [Resolution 13 \(RA I-16\) – Management Group and subsidiary bodies of Regional Association I \(Africa\)](#).

Volunteerism in the work of Regional Association I (Africa)

5.3.11 The Association recalled that the Executive Council at its sixtieth session (June 2008) agreed in principle with the suggestions of the presidents of the Commission for Basic Systems (CBS) and the Commission for Hydrology (CHy) to award recognition to the experts who volunteered to devote their time to undertake the activities planned by technical commissions and regional associations. The Council also urged Permanent Representatives to facilitate the participation and voluntary contribution of experts, not only from the NMHSs but also from other institutions, to the activities of WMO.

5.3.12 In this context, the Association expressed its deep appreciation to the chairpersons and members of the working groups and rapporteurs, who had effectively collaborated in carrying out the activities of the Association during the intersessional period, by giving recognition to their valuable work for the regional association.

Representation of the Association in the Executive Council

5.3.13 The Association recalled that EC-LXII (Geneva, June 2010) considered the proposal submitted by the president of RA II to increase the number of EC seats from 37 to 38 to allow for an additional EC seat (from 6 to 7) for RA II, and Cg-XVI (2011) had acknowledged the proposals made by the presidents of Regional Associations II (Asia), IV (North America, Central America and the Caribbean), and V (South-West Pacific) to increase the number of the Executive Council seats to enable these Regions to obtain an extra seat with respect to the distribution of seats adopted by Resolution 44 (Cg-XVI) for consideration at Cg-17, in accordance with the procedures described in the WMO Convention.

5.3.14 The Association noted that at its sixty-fifth session, the Executive Council requested the Secretary-General to assist the presidents of regional associations in the preparation of submission of a proposal for the consideration of the EC Working Group on Strategic and Operating Planning (EC WG/SOP) by September 2013, and instructed the EC WG/SOP to prepare the proposal which includes the necessary changes to the WMO Convention and General Regulations if required, for consideration at EC-66.

5.3.15 The Association further noted that the January 2014 Meeting of the Presidents of Regional Associations (PRAs) came to a common understanding that an increase of 1 seat for RA II is an acceptable option, and that on the basis of this proposal, the third EC WG/SOP (Geneva, February 2014) considered the possibility of increasing seats in the Executive Council and made a proposal to EC-66 for consideration, including potential amendments to Article 13 of the WMO Convention and General Regulation 17 on the distribution of seats in the Executive Council.

5.3.16 The Association considered the issue regarding the representation of RA I in the Executive Council with respect to the distribution of seats adopted by Resolution 44 (Cg-XVI), and agreed to request Congress to consider an increase in the number of seats for RA I from 9 to 10 based on the number of Members.

6. GLOBAL FRAMEWORK FOR CLIMATE SERVICES (agenda item 6)

Outcomes of the Extraordinary Session of the World Meteorological Congress

6.1 The Global Framework for Climate Services (GFCS) was established to enable society to manage better the risks and opportunities arising from climate variability and change, especially for those who are most vulnerable to climate-related hazards. The Association recalled that effective climate services will facilitate climate-smart decisions that will reduce the impact of climate-related disasters, improve food security and health outcomes, and enhance water resource management, among other societal benefits. All countries will benefit, but in the initial stages priority shall go to building the capacity of developing countries vulnerable to the impacts of climate

variability and change. The GFCS aims to bridge the gap between those that need to know the climate and those that have such knowledge, thus empowering, in particular, the vulnerable.

6.2 The Association recalled that the GFCS identified four initial priority areas: agriculture and food security, water, health and disaster risk reduction. These priorities are major development drivers in Africa and highly sensitive to weather, climate, and water extreme events. To ensure that the entire value chain for the production and application of climate services is effectively addressed in support of effective decision-making in the four priority areas, the following components or pillars have to be implemented:

- (a) *The User Interface Platform* — to provide ways for climate services users and providers to interact to identify needs and capacities and improve the effectiveness of the Framework and its climate services;
- (b) *The Climate Services Information System* — to produce and distribute climate data, products and information according to the needs of users and to agreed standards;
- (c) *Observations and Monitoring* – to generate the necessary data for climate services according to agreed standards;
- (d) *Research, Modelling and Prediction* — to harness science capabilities and results and develop appropriate tools to meet the needs of climate services;
- (e) *Capacity Development* — to support the systematic development of the institutions, infrastructure and human resources needed for effective climate services.

6.3 The Association noted that the Extraordinary Session of the World Meteorological Congress was held in Geneva, Switzerland in October 2012. The key outcome of Extraordinary Congress was the adoption of three major resolutions pertaining to: (a) the Implementation Plan of the GFCS for the subsequent consideration by the Intergovernmental Board on Climate Services; (b) the establishment of the Intergovernmental Board on Climate Services as an additional body accountable to Congress under Article 8(h) of the Convention of the WMO; and (c) financing of the Intergovernmental Board on Climate Services, Secretariat and Implementation Plan of the GFCS.

6.4 The Association noted with appreciation that during the Second Session of the African Ministerial Conference on Meteorology (AMCOMET), which took place in Victoria Falls, Zimbabwe, 15–19 October 2012, the Integrated African Strategy on Meteorology (Weather and Climate Services) (IASM-WCS) presented that it had integrated the key elements and principles of the Global Framework for Climate Services (GFCS) in its development. The Association was further pleased to note that the said Strategy and the Addis Ababa Declaration, through the AMCOMET platform, serves as a key mechanism for the structured implementation of GFCS in Africa. The Association therefore urged WMO and relevant partners, to ensure strong linkages and harmonization of activities with the strategy on all weather- and climate-related activities.

6.5 The Association noted that a dialogue for Climate Services Users and Providers was organized prior to the Extraordinary Congress from 26 to 27 October 2012. During the dialogue a publication containing case studies on experiences around the world on the development and application of climate services in various socioeconomic sectors titled “Climate Exchange” was launched. The dialogue, besides allowing the exchange of experiences and good practices, provided participants with valuable information in preparation for the session of the Extraordinary Congress.

First session of the Intergovernmental Board on Climate Services (IBCS-1)

6.6 Association noted that the first session of the Intergovernmental Board on Climate Services (IBCS-1) was held in Geneva from 1 to 5 July 2013. As part of the session, a one-day workshop on “Operational Climate Services: a dialogue on practical action” was held on 1 July (see details at: <http://gfcs.wmo.int/content/operational-climate-services-dialogue-practical-action>).

The workshop demonstrated the value of an organized and coordinated system to maximize synergies in addressing the entire value chain for the production and application of climate services and provided examples of concrete activities from the global to the national levels.

6.7 The Association further noted that IBCS-1 took the following decisions (<https://docs.google.com/file/d/0BwdvoC9AeWjUdHdYVIRNVm1JSzg/edit?pli=1>):

- (a) Approved the Implementation Plan of the GFCS and a Compendium of initial GFCS projects for immediate implementation;
- (b) Agreed on the definition of processes and substructures supporting its advancement;
- (c) Established a stakeholder engagement mechanisms;
- (d) Elected Dr Anton Eliassen (Norway) as Chairperson, Dr Linda Makuleni (South Africa) and Dr Laxman Singh Rathore (India) as Co-Vice-Chairpersons. It also selected the Members forming the Management Committee of the Board, including Cameroon, Côte d'Ivoire, Egypt, Guinea-Bissau, South Africa and United Republic of Tanzania from the Region.

Second session of the Intergovernmental Board on Climate Services (IBCS-2)

6.8 The Second Session of the IBCS (IBCS-2) held from 10 to 14 November 2014 in Geneva took a number of important decisions to advance the implementation of the Global Framework on Climate Services (GFCS) as follows:

- (a) Elected the Dr Jens Sunde as Chairperson of IBCS and re-elected Dr Linda Makuleni and Dr Laxman Rathore as two Co-Vice-Chairpersons. It elected the Democratic Republic of the Congo (DRC), Senegal, Sudan, The Gambia and Tunisia to the Management Committee of the IBCS;
- (b) Agreed to have ordinary plenary meetings of the IBCS only once in the intersessional period prior to WMO Congress sessions and for the Management Committee to meet once a year to provide advice, oversight and management of implementation of the GFCS in the intersessional period;
- (c) Approved the revised terms of reference of the Partner Advisory Committee (PAC) of the IBCS, which specify functions, responsibilities, membership, mode of operation and financing of the PAC;
- (d) Agreed on the means through which GFCS partners and stakeholders with technical capability can play a role in the implementation of GFCS, specifically through participation in technical committees established for specific tasks as might be required, as per practice of WMO Technical Commissions;
- (e) Agreed on the interaction between the IBCS and the constituent bodies of WMO;
- (f) Approved revised terms of reference of the Management Committee, to strengthen the interface and linkages with the PAC;
- (g) Agreed that urban activities related to climate be included as a specific cross-cutting element within the priority areas of the GFCS;
- (h) Agreed on the further development of the Energy exemplar and on presenting a proposal to the Seventeenth World Meteorological Congress for consideration of Energy as an additional priority sector for GFCS;

- (i) Agreed on the creation of an ad-hoc Task Force or Working Group on Monitoring and Evaluation;
- (j) Agreed on the creation of an ad-hoc Task Force or Working Group to finalize the Operational and Resources Plan for the GFCS for 2015–2018;
- (k) Recognized the need for providing resources to support implementation of project and activities, the governance structure of the GFCS and the GFCS Office;
- (l) Requested the IBCS Management Committee to incorporate gender-related recommendations into the GFCS.

Progress on Implementation of the GFCS

6.9 The Association was pleased to note the efforts of the WMO Secretary-General to mobilize support from partner agencies for the GFCS. In this regard, Memoranda of Understanding were signed with the International Federation of the Red Cross and Red Crescent Societies (IFRC), the International Union for the Conservation of Nature (IUCN), the International Commission on Irrigation and Drainage (ICID), the United Nations Economic Commission for Africa (UNECA) and the United Nations Institute for Training and Research (UNITAR). The Association also noted efforts to strengthen synergies with the European Commission, the Green Climate Fund, the United Nations Development Programme (UNDP) and the World Bank to ensure that their initiatives and investments take into account the priorities under the GFCS.

6.10 The Association noted that a number of countries are conducting their national consultations intended to identify gaps and needs and to establish the internal coordination mechanisms needed to ensure that the entire value chain for the production and application of climate services in the country is effectively addressed (see <http://gfcs.wmo.int/events>). These consultations allow the identification of key gaps in the various components of the GFCS to support the development and application of climate services. They also facilitate the identification of critical elements that are supporting the development of guidelines for the establishment of frameworks for climate services at national level. Specifically, starting in 2012, GFCS facilitated national consultations in Burkina Faso, Chad, Mali, Niger and Senegal as a starting point for GFCS pilot activities in these countries. Action plans to address the gaps, needs and priorities identified by these consultations were developed for Burkina Faso and Niger, with an additional one for Mali in the process of being finalized. To ensure synergies, the World Bank has been engaged in the development of the actions plans with a view to inform its investments in these countries. Similarly, WMO has been interacting with the UNDP to ensure that its investments plans and future activities in support of the NMHSs are informed by gaps and needs identified through GFCS and WMO initiatives. WMO has also been discussing with the UN Framework Convention on Climate Change (UNFCCC) to consider the integration of these Action Plans into National Adaptation Plans (NAPs) that are currently being developed by several countries in the Region.

6.11 The Association was also pleased to note that South Africa had conducted its national consultation in August 2013 and that as a result the country had developed a road map for the implementation of the GFCS, including the required coordination mechanism and implementation plan which is being finalized.

6.12 The Association further noted that the United Republic of Tanzania and Malawi had conducted their national consultation in May and June 2014 and had established the national institutional mechanisms to oversee implementation at national level as part of the “Climate Services Adaptation Programme in Africa” a partnership aimed at co-designing and co-producing climate services involving WMO and partner agencies. This first multi-agency initiative implemented under the GFCS with funding from Norway (10 million USD) was launched in October 2013. The programme will build capacities of producers and users to develop and apply information and knowledge to support decision-making in food security and nutrition, health and disaster risk reduction with Malawi and the United Republic of Tanzania as the two focus countries. The project is hinged on multi-agency collaboration involving the following agencies:

- (a) CGIAR Research Program on Climate Change, Agriculture and Food Security (CCAFS);
- (b) Centre for International Climate and Environmental Research – Norway;
- (c) Chr. Michelsen Institute – Norway;
- (d) International Federation of Red Cross and Red Crescent Societies (IFRC) including Norwegian Red Cross and Red Cross/Red Crescent Climate Centre;
- (e) World Food Programme;
- (f) World Health Organization;
- (g) World Meteorological Organization.

6.13 The Association welcomed the national consultations conducted by some of its Members and the resulting coordination mechanisms being established to support effective development and application of climate services, and encouraged its Members to initiate frameworks for climate services at national level to identify gaps, prioritize needs for climate services and initiate activities at national level to fill the identified gaps, contribute to the identification and documentation of existing climate services delivery, identification of partnerships with all potential stakeholders, identification of funding mechanisms and the sharing of experiences in implementation of the GFCS. In addition, the Association urged its Members to strengthen the structures that support the pillars of the GFCS. Furthermore the Association appreciated the contributions made by South Africa and Members from other regions to the GFCS Trust Fund and urged its Members to make contributions to the GFCS Trust Fund and to second their experts to the GFCS Office to enable it to fully discharge its functions.

6.14 The Association also noted that building from the Climate Services Adaptation Programme in Africa a joint programmatic approach is being pursued with FAO for the Sahel. A comprehensive programme to implement the GFCS in the Sahel with the involvement of other UN and international agencies with regional and national components is being implemented with the support of the Norwegian Refugee Council (NRC). On 3 August 2014, using the Norwegian Capacity Facility (NORCAP), a GFCS Regional Coordinator for the Sahel was deployed in the FAO Regional Office in Dakar. The main task of the Coordinator is to ensure direct support to Burkina Faso, Chad, Mali, Niger and Senegal and provide system-wide (national authorities, UN system and other actors) coordination support for mainstreaming the use of climate services in the priority sectors at regional and national levels.

6.15 The Association noted with appreciation the pilot project financed under the Climate Change Agriculture and Food Security (CCAFS) programme in Senegal aimed at providing climate services to farmers being implemented by the Met Service since 2012. The project includes training activities of producers and intermediary organizations, dissemination of information through community radios and SMS, and evaluation of the contribution of climate information to food security. The association was informed that given the success of the project it will be rolled out to other regions in 2015.

6.16 The Association was informed that a pilot project on national climate outlook forum was started in Mozambique in March 2014. The pilot project started with a meeting in Maputo that provided an opportunity to identify specific user needs that could benefit from the use of climate services through a participatory process. It also agreed on user interface mechanisms to strengthen the interaction of the NMHS and users to ensure feedback and improvement of service provision.

6.17 The Association noted that the Egyptian Meteorological Authority hosted the 4th Regional Forum on Seasonal Forecasts in North Africa “PRESANORD-04” under the theme “Seasonal Forecasts: Climate Services and Risk Management on Agriculture, Water, Tourism and

Health” as part of implementation of the Global Framework for Climate Services under the auspices of the WMO and the African Centre of Meteorological Application and Development (ACMAD) and with the cooperation of North African countries. In addition, a workshop was organized with Plan Blue entitled Climate Risk Management in the Mediterranean Region with a view to contribute to Capacity-building and Planning for Managing Risks related to Climate Change and Variability. A website was created by the Egyptian Meteorological Authority devoted to research with a view to make available seasonal forecast for all the sectors that benefit from forecasts, particularly seasonal forecasts.

6.18 The Association noted the organization of an International Workshop on the Recovery and Digitization of Climate Heritage in the Indian Ocean Rim Countries and Islands, involving some of its Members in Maputo, Mozambique in April 2014. The workshop developed an implementation plan for an Indian Ocean Data Rescue initiative that will accelerate identification of data that need to be rescued and digitized, including historical records that are not held in the participating countries.

6.19 The Association noted efforts to advance implementation of the research component of the GFCS with the development of the Climate Research for Development Agenda for Africa (CR4D) following the Africa Climate Conference 2013, held in Arusha, in October 2013. Furthermore, the meeting was informed that a coordination platform meeting to advance implementation of CR4D was held in Marrakesh, Morocco from 5 to 8 October 2014 back-to-back with the 4th Conference on Climate Change and Adaptation in Africa (CCDA).

6.20 The Association noted with appreciation the establishment of a joint WMO/WHO climate and health Project Office under the GFCS Office to support implementation of the health priority area. The Association also appreciated the secondment of an expert by the Global Water Partnership to the Climate and Water Department of WMO to support the water priority area, particularly the programmes on flood and drought management. Furthermore, the Association was pleased to note that WFP is in the process of recruiting an expert to be deployed in the GFCS Office to support the agriculture and food security priority area.

6.21 The Association reiterated that effective implementation of the GFCS will depend on the clear identification of roles and contributions of the various stakeholders for realizing the results envisaged for the 2-, 6-, and 10 years’ time frames identified in the Implementation Plan of the GFCS. In this regard the Association appreciated the efforts being undertaken to enable the activities contained in the implementation plan to occur. Specifically, the Association appreciated current efforts in organizing a meeting to develop a matrix where the specific contributions of the various actors, including WMO constituent bodies, partner agencies and key stakeholders will be depicted.

6.22 The Association noted that the Task Team on WMO Policy for International Exchange of Climate Data and Products to support the implementation of the GFCS established by EC-64 had developed a draft resolution on WMO policy for International Exchange of Climate Data and Products to support implementation of the GFCS that was considered by EC-66, prior to submission to Cg-17. The resolution reiterates and complements Resolution 40 (Cg-XII) – WMO policy and Practice for the Exchange of Meteorological and Related Data and Products including Guidelines on the Relationships in Commercial Meteorological Activities and Resolution 25 (Cg-XIII) – Exchange of Hydrological Data and Products.

6.23 The Association noted that the Secretary-General had requested Members and Partners to report to the GFCS Office projects and activities they are implementing that contribute to the implementation of the GFCS. The reported projects and activities must comply to a criteria that was updated by the first meeting of the Management Committee of the Intergovernmental Board on Climate Services that was held in Geneva on 15 and 17 June 2014. The Association urged its Members to report as the information that will be compiled would allow an appreciation of the activities under the pillars and priority areas that are being currently implemented so as to maximize efficiencies in the implementation of the GFCS.

6.24 The Association noted that the third session of the Intergovernmental Board on Climate Services will take place in 2018 and encouraged Members to include users of climate services and partners in their delegations to ensure that the IBCS is true to the principles of user-driven climate services and interdisciplinarity.

7. EMERGING ISSUES AND SPECIFIC CHALLENGES (agenda item 7)

7.1 The African Ministerial Conference on Meteorology (agenda item 7.1)

AMCOMET Progress

7.1.1 The Association noted the status of AMCOMET, in particular, on the outcomes of the Second Session of AMCOMET, which was jointly organized by WMO, the African Union Commission (AUC) and hosted by Government of Zimbabwe in Victoria Falls, from 15 to 19 October 2012.

7.1.2 Key outcomes and decisions included the following:

- (a) Approval of the Integrated African Strategy on Meteorology (Weather and Climate Services);
- (b) Establishment of a Task Force to develop the Implementation and Resource Mobilization Plan for the Integrated African Strategy on Meteorology (Weather and Climate Services);
- (c) Establishment of a Task Force to review the Constitution and Rules of Procedures of AMCOMET;
- (d) Establishment of a Joint Task Force to investigate the feasibility of developing an African Regional Space Programme, ensuring close coordination with relevant African Union Commission Departments and stakeholders;
- (e) Taking the necessary steps to establish a Regional Climate Centre (RCC) for Central Africa in collaboration with WMO and partners; and
- (f) Taking the necessary steps to ensure that African National Meteorological and Hydrological Services (NMHSs) meet the International Civil Aviation Organization (ICAO) requirements regarding Quality Management System (QMS).

7.1.3 AMCOMET established Task Forces, and in collaboration with WMO and the African Union Commission, had accomplished the following during the intersessional period:

- (a) Developed the Implementation and Resource Mobilization Plan of the Integrated African Strategy on Meteorology (Weather and Climate Services);
- (b) Carried out a study on the establishment of the Regional Climate Centre (RCC) for Central Africa. The report has been validated through the AUC process, involving the Regional Economic Communities (RECs) and the National Meteorological and Hydrological Services (NMHSs) in Central Africa. The policy organs in Central Africa are reviewing the report for approval;
- (c) Completed the review of the AMCOMET Constitution and Rules of Procedure by the WMO Legal Counsel (LC);
- (d) Worked with the AUC, through the Human Resources and Science and Technology (HRST) Department, on the development of the African Regional Space Policy and Strategy;

- (e) Organized the Second Task Force and Bureau Meeting of AMCOMET in Harare, Zimbabwe from 26 to 30 May 2014, where documents by the Task Forces Implementation and Resource Mobilization Plan, RCC for Central Africa, Constitution and Rules of Procedure and the African Regional Space Policy and Strategy were endorsed by the Bureau of AMCOMET.

7.1.4 The Association was further informed that AMCOMET had been developing partnerships and enhancing the visibility of NMHSs through participation in relevant activities in the Region.

7.1.5 The Association agreed on the need for a strong resource mobilization and funding strategy mechanism for AMCOMET. The Association supported the proposal that AMCOMET Member States proactively engage with development partners, as indicated in the resource mobilization plan, to attract support for the implementation of the Integrated African Strategy on Meteorology (Weather and Climate Services).

7.1.6 The Association also acknowledged that the Bureau of AMCOMET encouraged African Member States to indicate willingness and commitment to contribute to the sustainability of the AMCOMET process, its Secretariat and its operations.

7.1.7 The Association noted the need to promote AMCOMET beyond the weather and climate community and to highlight the value additions in the services provided by the NMHSs to communities. In this regard, the Association noted and supported a media campaign, which started in October 2013, especially during the events and conferences in which AMCOMET participated. This campaign has provided visibility of AMCOMET and its mission to various African news outlets, decision-makers and potential partners. Social media tools have also been developed to communicate, not just AMCOMET activities in a broader scale, but also activities of the various NMHSs, RCCs, RECs and partners. An improved website (www.wmo.int/amcomet) is now operational, along with quarterly newsletters, a Facebook page including a Twitter account (#AMCOMET). In this regard, the Association expressed its appreciation to the WMO Secretary-General for the continued support to AMCOMET activities including the hosting of and support to the AMCOMET Secretariat.

7.1.8 The Association recognized and appreciated the contribution of the African Union Commission (AUC) in supporting the AMCOMET process in particular through provision of policy guidelines in engaging African Ministers and Heads of State and Government on issues of Meteorology (Weather and Climate Services). The Association noted that through partnership between WMO and AUC, AMCOMET could access support from development partners, in particular those allied to AUC. The Association urged the WMO Secretary-General to maintain and strengthen the partnership with AUC especially in the development of meteorology (Weather and Climate Services) and its applications in Africa. The Association further encouraged the AUC to continue and enhance its support to AMCOMET activities.

7.1.9 The Association expressed deep appreciation to the partners who had generously supported the implementation of the AMCOMET process and activities including the support to the AMCOMET Secretariat. In particular, the Association was grateful to WMO, Norway, Finland and the Republic of Zimbabwe for their significant support to the AMCOMET process.

7.1.10 The Association noted that AMCOMET needed support in order to sustain its programmes and operations. The Association further noted that efforts are ongoing to explore avenues to ensure the sustainability of the AMCOMET Secretariat. The Association requested the WMO Secretary-General to continue supporting the AMCOMET Secretariat's operations and programmes until such time as AMCOMET establishes an independent Secretariat.

Strengthening links between WMO Regional Association I (Africa) and AMCOMET

7.1.11 Acknowledging that AMCOMET is a high-level mechanism for the development of meteorology and its applications in Africa which thus serves as a platform for streamlining projects

and initiatives to promote and enhance the provision and access of weather and climate services, the Association noted that it is critical to strengthen the linkages between WMO RA I with the Integrated African Strategy on Meteorology (Weather and Climate Services) of AMCOMET, as well as with its complementary Implementation and Resource Mobilization Plan.

7.1.12 The Association recognized that strong linkages would strengthen support of national governments and development partners of NMHSs and RCCs, in particular through the various projects and activities being planned and implemented at the regional and national levels. This will further allow streamlining the message of Africa delivering as one on all matters related to weather and climate services, which will be greatly beneficial in mobilizing the necessary resources, both partnerships and financial support, to help achieve sustainable development in Africa.

7.1.13 The Association therefore called for the alignment of the WMO RA I Strategic Plan and the AMCOMET Integrated African Strategy on Meteorology (Weather and Climate Services); the inclusion of WMO RA I in the Plan and key initiatives on GFCS, WIGOS/WIS, HYCOS, Service delivery strategy, Disaster Risk Reduction, and Capacity Development.

7.2 Results of the Regional Association I survey (agenda item 7.2)

7.2.1 The Association noted with appreciation the outcomes of the sixteenth session of Regional Conference on Challenges and Opportunities for Africa (RECO-16) held in Praia, Cabo Verde from 1 to 2 February 2015, with a focus on identifying challenges and future priorities in the Region during the next intersessional period to support the discussion during RA I-16 for the contribution to the WMO SOP 2016–2019.

7.2.2 The Association further noted the RA I survey on institutional arrangements, challenges and priorities conducted in December 2014–January 2015 whose aim was to identify challenges and future priorities in the Region. The Association reviewed the survey report which included the analyses of the responses from 36 Members on: institutional arrangements; management and organization; operations and services; challenges and priorities; and expected outcomes from the sixteenth session of RA I. The Association commended the Task Team on RA I Strategic and Operating Planning (TT-SOP) and the Secretariat for their efforts.

7.2.3 The Association recognized that the challenges and priorities for the NMHSs in RA I identified by the regional survey and further discussed by the RECO-6 highlighted the key elements to support further discussion and prioritization. The challenges in the Region identified by the Survey and RECO-16 include:

- (a) Limited number of appropriately qualified personnel;
- (b) Insufficient budgetary allocations to NMHSs;
- (c) Need to improve services to users;
- (d) Inadequate institutional arrangements;
- (e) Limited political support for NMHSs;
- (f) Need to strengthen management and leadership skills for heads of NMHSs;
- (g) Inadequacy of QMS implementation;
- (h) Inadequacy of telecommunication facilities and capacity;
- (i) Need for national data exchange policies;
- (j) Inadequate management and leadership skills;
- (k) Inadequacy of NWP modelling and research capacity;

- (l) Gaps in the observing networks; and
- (m) Need to improve early warning services for DRR.

and the priorities include:

- (a) Issues related to capacity development including education and training needs, budget and staffing resources deficiencies, insufficient qualified personnel especially in modelling capacity;
- (b) Enhancement of hydrometeorological services, in particular public weather services, disaster risk reduction and early warning system, aviation, hydrology and related services including medium- and long-range forecasts, and demonstration of social and economic benefits;
- (c) Strengthening of climate services including improvement of existing climate services and implementation of the GFCS at regional and national levels;
- (d) Improvement of Quality Management System (QMS) such as consolidation and development of observer and forecaster capacity in support of QMS implementation;
- (e) Implementation of WIGOS and WIS focusing on concrete and urgent needs related to the maintenance and improvement of the observing systems and the quality of observations; and
- (f) Enhanced cooperation and partnership for improving outreach to the community, encouraging engagement with local government, raising the effectiveness and efficiency of the regional activities, building a common position on issues like data policy, commercialization and public/private sector relationships.

7.2.4 The Association recognized that RECO-16 also provided an opportunity to identify specific challenges in the regional cooperation mechanisms. Issues, concerns and respective proposals for actions at regional level included:

- (a) The need for WMO to provide better guidance on institutional and regulatory issues related to the weather, climate and hydrological services and data policy;
- (b) The need for guidance on the changing modalities of service provision, including multinational service provision and related issues of the funding mechanism of the underpinning infrastructure;
- (c) Improvement of cooperation mechanisms including joint funding of infrastructure, research and services including participation in RA I working group meetings;
- (d) The need for raising the profile of NMHSs and improving the relationship with their supervising bodies, in particular enhanced advocacy through WMO for the role of the services provided by NMHSs and their contribution to sustainable development;
- (e) Urge the WMO Secretariat to provide further guidance on GFCS implementation requirements and clear showcases on the benefits of GFCS to Members;
- (f) Urge the WMO Secretariat to provide further guidance on WIGOS/WIS implementation requirements and clear showcases on the benefits of WIGOS to Members;
- (g) The need to organize regional training events for the senior managers of NMHSs on policy and implementation aspects of the WMO high priority areas.

7.2.5 While the analysis is based on the 36 Members that responded, Members are being urged to submit their information online and the analysis will be revised later in the year. The

session thanked all Members that responded and urged those that have not done so to submit their information as soon as possible by 28 February 2015 to allow for updating of the results.

7.2.6 The Association recognized that the financial and staffing constraints were one of the main challenges that limit the ability of many Members to participate in regional activities and working bodies, and Members look to support from other Members in the form of joint/twinning projects, capacity-building, technical support on QMS and infrastructure support, and to the WMO Secretariat for coordination support for participation in regional events, strategic planning and sharing information on regional activities.

7.2.7 The Association further recognized the need for the preparation of a strategic operating plan, taking into account the challenges and priorities derived from the survey, that would guide the work of RA I for the next four years, including a clear articulation of a number of high priority work areas for strengthening of regional cooperation and for input from the AMCOMET process.

7.2.8 The Association extended its appreciation the chairperson of the RA I Task Team on Strategic and Operating Planning (TT-SOP) for the Survey analysis and report, and all who have contributed to the outcomes of the RECO-16 including facilitators, rapporteurs, speakers, and drafting committee members.

7.3 Gender mainstreaming (agenda item 7.3)

7.3.1 The Association welcomed the outcomes of the Conference on the Gender Dimensions of Weather and Climate Services (Geneva, 5–7 November 2014). It further noted with appreciation the Conference Statement and the range of identified issues and proposed actions formulated by the Conference. The Association expressed its appreciation to the Secretary-General for excellent organization of this Conference, to South Africa, the United Republic of Tanzania and other sponsors and partners of the Conference, as well as to Members' valuable contributions including financial support to participants. The Association noted that the Seventeenth World Meteorological Congress will discuss actions towards the gender-sensitive weather and climate services, as part of the implementation of the WMO Policy on Gender Mainstreaming, and requested its Management Group to incorporate decisions of the Congress in the work of the Association, as appropriate.

7.3.2 The Association further recalled the Resolution 22 (XIV-RA I) – Participation of women in the work of the Association. Noting the progress in the implementation of this Resolution, the Association urged increased participation and involvement of women in the work of the Association. It strongly encouraged Members to continue to promote and facilitate equal opportunities for women in meteorology, including training, employment, careers and participation in the activities of the Association and WMO technical commissions. The Association noted with appreciation the efforts of the Secretary-General to increase training opportunities for women, and encouraged Members to nominate women, as well as men, for fellowships and other WMO training events.

7.3.3 The Association designated Ms Aida Diongue Niang (Senegal) the RA I Gender Coordinator. It further decided to designate the focal points for gender issues from each subregion and invited Members to consult and designate these focal points. The Gender Coordinator was requested to work with subregional, as well as national focal points, to promote and facilitate implementation of WMO Policy on Gender Mainstreaming in the Region. The Coordinator was further requested to review the terms of reference for the RA I gender focal point as given in Annex III of the XIV-RA I report and propose terms of reference for the RA I Gender Coordinator, as appropriate, for consideration by the RA I Management Group, which was authorized to amend the terms of reference as necessary.

7.3.4 The Association encouraged Members to nominate national focal points on gender and to participate in the WMO surveys on gender mainstreaming.

8. WMO OFFICES FOR AFRICA AND LEAST DEVELOPED COUNTRIES INCLUDING WMO OFFICES IN THE REGION (agenda item 8)

8.1 The Association reviewed the WMO Offices for Africa and LDCs including the WMO Office for North, Central and West Africa (NCWA) and the WMO Office for Eastern and Southern Africa (ESA) since its fifteenth session. It recognized that the WMO Offices for Africa and LDCs, including the WMO Office for North, Central and West Africa and the WMO Office for Eastern and Southern Africa require strengthening their functions as an integral part of the WMO Secretariat.

8.2 The Association was pleased to note the appropriate and effective assistance provided by the Offices to the president, vice-president and subsidiary bodies of the Association in discharging their responsibilities. It expressed its appreciation to the Secretary-General and the staff of the Offices for their continued and enhanced support to the activities of the Association during the intersessional period.

8.3 The Association noted with appreciation that the Regional Office and WMO Offices in RA I continue to develop and maintain close liaison with several organizations in the development and implementation of meteorology programmes and projects in the respective subregions. These organizations include the Economic Community of West African States (ECOWAS), the Permanent Inter-State Committee on Drought Control in the Sahel (CILSS), the African Development Bank (AfDB), Economic and Monetary Community of Central Africa (CEMAC), Niger Basin Authority (NBA), Agency for Air Navigation Safety in Africa (ASECNA), African Centre of Meteorological Applications for Development (ACMAD), Southern African Development Community (SADC), Intergovernmental Authority on Development (IGAD), East Africa Community (EAC), Common Market for Eastern and Southern Africa (COMESA), African Union COMMISSION (AUC), and New Partnership for African Development (NEPAD). The Offices further maintained close cooperation with partners outside the Region such as EUMETSAT and other external partners for the implementation of programmes for development of NMHSs in Africa. In this regard the Association requested the Secretary-General to continue maintaining close liaison and cooperation with these organizations and institutions for the benefit of the NMHSs in the Region in the development and implementation of meteorology programmes and projects in the respective subregions.

8.4 The Association was pleased to note the increasing role of the Regional Office as a focal point and an information centre for regional activities, and in assisting Members to develop their NMHSs and implement WMO Programmes and other activities that had a regional focus. It recognized the efforts of the Regional Office in assisting the Members to address the high-priority needs in the areas of science and technology, capacity development, climate adaptation, water resources management, WIS/WIGOS and disaster risk reduction as well as other environmental issues that had been identified by Members.

8.5 The Association was pleased to note the efforts by the WMO Offices in the Region in resource mobilization through development of project proposals and using project funds to increase the staff capacity in the Offices. The increased capacity has helped in covering the activities in the Region. In order to assist the WMO Offices in the Region and efforts to address the growing needs of Members in the Region, the Association requested the Secretary-General to maintain his support to the Regional Office and Offices in Abuja and Nairobi and invited Members of the Association to consider national secondments and other forms of support.

8.6 The Association expressed its satisfaction at the commendable efforts of the WMO Offices in the Region in maintaining close contact with Members through visits; in supporting regional events, and in developing and implementing technical cooperation projects in order to ensure the enhanced Members' capabilities in providing weather, climate and water services at national and regional levels. The Association encouraged the staff of the Offices to continue to further strengthen contact with Members and facilitate the implementation of regional activities.

8.7 The Association noted with satisfaction the efforts of the Secretary-General in working with the African Union (AU). In particular, the Association expressed its satisfaction to WMO for the successful organization in collaboration with African Union Commission (AUC) of the Second

Conference of Ministers Responsible for Meteorology in Africa in Victoria Falls, Zimbabwe, from 15 to 19 October 2012. The Association requested the Secretary-General to give high priority to the implementation of the outcomes of the Conference. The Association further noted the work and completion of the Integrated African Strategy on Meteorology (Climate and Water) Services and its implementation plan. The Association requested the Secretary-General to maintain his support for the implementation of the Integrated African Strategy on Meteorology through resource mobilization.

8.8 The Association recognized that Members continued to benefit from development cooperation activities carried out within the framework of various funding sources. The Association further recognized the important role of the Regional Office and WMO Offices in the Region in support of projects implementation and technical assistance offered to Members.

8.9 The Association highlighted the key results obtained in the development of the RA I Strategic Plan for the Enhancement of the NMHSs in Region I (Africa) and commended the Regional Office and the WMO Offices in the Region for being instrumental in achieving the substantial results. The Association emphasized the important role the Offices will play in the coordination of the implementation of the RA I Strategic Plan, and requested the Regional Office and the WMO Offices in the Region to work closely with the Management Group on the further development of the RA I Operational Plan for 2016–2019 with concrete tasks and timelines for achieving the planned deliverables and outcomes in accordance with the established regional priorities and expected results.

8.10 The Association was pleased to note that, at the request of Cg-XVI, the Secretariat initiated a comprehensive review of the resources and location of the Regional Office for Africa and the WMO Offices in the Region, taking into account its previous location. It noted with appreciation that, through the Secretariat's consultations with Members in RAI some Members (Egypt, Ethiopia, Kenya, Nigeria and Tunisia) indicated their Government's interest in hosting the Regional Office. The Association recognized the advantages of the location of the Office being in the Region in particular in terms of cost-effectiveness, while also recognizing the associated risks. On the other hand, it noted potential difficulties in day-to-day coordination with the WMO Secretariat and Programmes when the Office is located in the Region.

8.11 In order to reinforce the WMO Regional Office and the WMO Offices in the region, to increase their efficiency and effectiveness in enhancing the visibility of NMHSs and adequately address the expectations and priorities of the region, the Association requested the Secretary General to:

- (a) To consider the changing role of regional and subregional offices with a view to adapting the activities of these offices to the broader scientific context and the expanding needs of NMHS in the region;
- (b) Increase efforts in resource mobilisation to raise extra-budgetary resources to support activities in the region, to include, but not limited to the development of regional projects in support of the operational plan and its implementation and the key priority areas;
- (c) Expedite the implementation of the relocation of the Africa Regional Office as discussed during the RA I-XV session in Marrakech, Morocco, while taking into account the previous host arrangements.

In light of the limited resources and the need to improve efficiency, the Association emphasized the need to link any further changes in the structure of the regional office to the priority functions of the offices in the field. In this regard, the Association identified the following key priorities and responsibilities for these offices:

- (i) Assist in the processes of strengthening the NMHSs;
- (ii) Effective support to the implementation of WMO Programmes in the region;

- (iii) Enhance WMO and NMHSs visibility in the region;
- (iv) Maintain liaison with regional Economic Groupings and relevant International Organizations.

The Association requested the Secretary-General to support these strategic offices of the region to fulfil their mandates within available resources.

8.12 The Association noted with appreciation that, in the process of adjustment in the Development and Regional Activities (DRA) Department, the Secretary-General assigned the function of regional coordination to a dedicated officer within the DRA Department to maintain close coordination with the Regional Offices located in the Region within the criterion of linkage with WMO Programmes and technical and administration departments/offices as well as for collaboration and coordination between the WMO Regions. The Association also appreciated the recently implemented improvements in video-conferencing and remote access to WMO's financial and administrative management system which further contributed to enhanced management and mobility.

8.13 The Association further noted the recommendations of WMO Cg-XV to form a network of advisers on International Advisers (INTADs) and the potential role which these INTADs could play in promoting greater efficiency of Member States and teamwork with the WMO regional and field offices. The Association also noted with concern the limited progress made by the INTADs to promote international cooperation and communication. In this regard, the Association, taking note of the benefits being accrued by those NMHSs with INTADS in operation, recommended:

- (a) The designation of INTADs in those NMHSs in the Region which are yet to do so;
- (b) The provision of advice and guidance to the INTAD activities by the WMO External Relations Office;
- (c) WMO to support and organize training sessions for INTADs within available resources;
- (d) The "on-line" sharing of knowledge and best practices amongst INTADs.

8.14 The Association agreed with the process for review of candidates for hosting the Regional Office leading to a recommendation to the Secretary-General on the appropriate location of the Office before Cg-17 (May 2015).

9. SCIENTIFIC LECTURES AND DISCUSSION (agenda item 9)

9.1 The following scientific lectures were presented during the session:

- (a) "Climate Research, Modelling and Prediction for Sustainable Development in the Greater Horn of Africa" by Professor Johnston Muthama, University of Nairobi, Department of Meteorology;
- (b) "Role of ACMAD on climate services for sustainable management of resources: A contribution for post-2015 sustainable development agenda" by Mr André Kamga Foamouhoue, Chief, Climate and Environment Department, African Centre for Meteorological Applications for Development (ACMAD).

9.2 The lectures were followed by fruitful discussions. The Association expressed its appreciation to the lecturers for their interesting and informative presentations. It requested the Secretary-General, in consultation with the president of RA I, to make the necessary arrangements for scientific lectures during the next session of the Association.

10. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE ASSOCIATION AND OF RELEVANT EXECUTIVE COUNCIL RESOLUTIONS
(agenda item 10)

10.1 The Association examined those of its resolutions which were still in force at the time of the sixteenth session.

10.2 The Association noted that most of its past resolutions had been replaced by new resolutions adopted during the session.

10.3 The Association accordingly adopted [Resolution 14 \(RA I-16\) – Review of previous resolutions and recommendations of the Association](#).

11. ELECTION OF OFFICERS (agenda item 11)

The Association unanimously elected Dr Amos Makarau (Zimbabwe) as president and Mr Daouda Konate (Côte d'Ivoire) as vice-president of WMO Regional Association I (Africa).

12. DATE AND PLACE OF THE SEVENTEENTH SESSION (agenda item 12)

12.1 In accordance with Regulation 171 of the WMO General Regulations, the president of the Association should determine the date and place of the seventeenth session, respecting the schedule of WMO constituent body sessions adopted by Cg-17, in agreement with the President of the World Meteorological Organization and after consultation with the Secretary-General, during the intersessional period.

12.2 The Association noted with appreciation the kind offers extended by Egypt, Ethiopia, Uganda, and the United Republic of Tanzania to host the seventeenth session, subject to further confirmation.

12.3 The seventeenth session would be held in the last quarter of 2018 or first quarter of 2019, taking into account the decisions of Congress and consultations with the host country.

13. CLOSURE OF THE SESSION (agenda item 13)

The sixteenth session of Regional Association I (Africa) closed at 16.55 on 9 February 2015.

RESOLUTIONS ADOPTED BY THE SESSION

Resolution 1 (RA I-16)

IMPLEMENTATION OF THE WMO STRATEGY FOR SERVICE DELIVERY IN REGIONAL ASSOCIATION I (AFRICA)

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) That the Sixteenth World Meteorological Congress (Geneva, May/June 2011) approved the WMO Strategy for Service Delivery,
- (2) That the Executive Council at its sixty-fifth session (Geneva, May 2013) endorsed the Implementation Plan for the Strategy,
- (3) That the Strategy and its Implementation Plan were cross-cutting and could be applied in the development of weather and warning services, and climate and hydrological services,
- (4) That *The WMO Strategy for Service Delivery and its Implementation Plan* (WMO-No. 1129) was published in March 2014,

Noting further:

- (1) That Sixteenth Congress requested regional associations to make full use of the Strategy in developing specific plans appropriate to their own Regions, and in engaging in regional partnerships,
- (2) That Sixteenth Congress also requested regional associations to seek every opportunity to transfer knowledge through advanced capacity-building approaches presented in the Strategy,

Having considered:

- (1) That regional associations, including Regional Association I, had expressed the desire for ownership of the Implementation Plan and for taking responsibility to implement it in their respective Regions,
- (2) That service-delivery-related priorities of the Association were fully catered for in the Strategy and its Implementation Plan,

Decides to assign to the Management Group the work of ensuring a harmonized and synchronized implementation of the Strategy by Members, as agreed in Resolution 13 (RA I-16) – Management Group and subsidiary bodies of Regional Association I (Africa);

Requests the Secretary-General to provide support to the Association in the implementation of this decision;

Requests the WMO Programmes to support the implementation of the Strategy in the Region by providing expertise and other forms of assistance, as may be requested.

Resolution 2 (RA I-16)**FUTURE DEVELOPMENT OF METEOROLOGICAL SERVICE PROVISION TO
CIVIL AVIATION IN REGION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting

- (1) The outcomes of the Conjoint ICAO/WMO Meteorology Divisional Meeting and the fifteenth session of the Commission for Aeronautical Meteorology (Montreal, Canada, 7–18 July 2014) and the related challenges and opportunities for the Members as outlined by the WMO Technical Conference “Aviation Meteorology – Building Blocks for the Future” (Montreal, Canada, 7–8 July 2014),
- (2) The plans of the International Civil Aviation Organization (ICAO) for significant changes in the global Air Traffic Management, as stipulated in the “One Sky” concept, the Global Air Navigation Plan and the Aviation System Block Upgrade methodology, that will have an impact on the meteorological service for international air navigation,

Noting further

- (1) The potentially serious legal and safety consequences of non-compliance with essential ICAO Standards and Recommended Practices and WMO Technical Regulations,
- (2) The concerns regarding the need for guidance material for governance aspects of the evolving business model for aeronautical service provision, including regionalization of cost recovery models as well as governance of data policy in view of the development of the ICAO System Wide Information Management concept and of the implementation of the Aviation System Block Upgrade,

Considering:

- (1) The importance of aviation as an enabler of socioeconomic development,
- (2) The needs of the aviation industry for timely and accurate meteorological information and services contributing to safety, efficiency and regularity of air transport,
- (3) The specific challenges facing the Members of the Association in ensuring continuous service at the required quality level, which may need innovative national and regional solutions,

Considering further the urgency of raising awareness of the coming changes in the global and regional Air Traffic Management and the related changes in meteorological service provision,

Requests the Secretary-General, in close cooperation with ICAO, Members, relevant regional partners and other international organizations concerned with the enhancement of aviation safety, efficiency and regularity, to organize a regional conference on the future of meteorological service provision to civil aviation in order to explore coordinated regional approaches in Region I in response to the evolving Air Traffic Management system and information-centric requirements, based on the outcomes of the Conjoint ICAO/WMO Meteorology Divisional Meeting;

Requests the president of the Commission for Aeronautical Meteorology, supported by the Secretariat and in close cooperation with ICAO, to expedite the development of guidance material on those aspects of the Global Air Navigation Plan and Aviation System Block Upgrade that would have a high impact on the service delivery models of Members, the envisaged regionalization of

some services, as well as the integration of the meteorological information into the ICAO System Wide Information Management and related data policies;

Urges Members to participate actively in the conference and provide support for its organization, as appropriate.

Resolution 3 (RA I-16)

TROPICAL CYCLONE OPERATIONAL PLAN FOR THE SOUTH-WEST INDIAN OCEAN

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) A series of resolutions adopted by the General Assembly of the United Nations calling for international cooperation and action by WMO on the mitigation of the harmful effects of storms,
- (2) Resolution 13 (RA I-16) – Management Group and subsidiary bodies of Regional Association I (Africa), under **Decides** 2 (e) and 4,

Considering:

- (1) The need to enhance cooperative efforts by countries within the tropical cyclone prone south-eastern part of the Region to effectively carry out their roles in coordinated arrangements for preparing and issuing meteorological forecasts and warnings of all tropical cyclones affecting the area,
- (2) That, to achieve this aim, it is essential to have an agreed tropical cyclone operational plan for the South-West Indian Ocean describing the coordinated arrangements and defining the observing, forecasting and warning responsibilities of all cooperating countries,

Decides to adopt the *Tropical Cyclone Operational Plan for the South-West Indian Ocean* (WMO/TD-No. 577, Report No. TCP-12) issued in the Tropical Cyclone Programme report series;

Authorizes the president of the Association to approve, on behalf of the Association, amendments to this Tropical Cyclone Operational Plan, as recommended by the Regional Association I Tropical Cyclone Committee for the South-West Indian Ocean;

Requests the Secretary-General to inform all Members concerned of any amendments to and updating of the Operational Plan.

Note: This resolution replaces Resolution 1 (XV-RA I), which is no longer in force.

Resolution 4 (RA I-16)**TECHNICAL PLAN OF THE REGIONAL ASSOCIATION I TROPICAL CYCLONE
COMMITTEE FOR THE SOUTH-WEST INDIAN OCEAN**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) A series of resolutions adopted by the General Assembly of the United Nations calling for international cooperation and action by WMO on the mitigation of the harmful effects of storms,
- (2) Resolution 13 (RA I-16) – Management Group and subsidiary bodies of Regional Association I (Africa), under **Decides** 2 (e) and 4,

Considering:

- (1) The need for the Members affected by tropical cyclones to join together to develop a regional programme of action to reduce the loss of human lives and damage caused by tropical cyclones and associated phenomena,
- (2) The need to establish a regional plan and an implementation programme,

Decides to make amendments to the Technical Plan of the Regional Association I Tropical Cyclone Committee for the South-West Indian Ocean as recommended by the RA I Tropical Cyclone Committee;

Authorizes the president of the Association to approve, on behalf of the Association, amendments to the Technical Plan, as recommended by the RA I Tropical Cyclone Committee for the South-West Indian Ocean;

Requests the Secretary-General:

- (1) To notify all Members concerned of any amendments to the Technical Plan adopted by the Association;
- (2) To assist Members concerned in the implementation of the Technical Plan.

Note: This resolution replaces Resolution 2 (XV-RA I), which is no longer in force.

Resolution 5 (RA I-16)**IMPLEMENTATION OF DISASTER RISK REDUCTION ACTIVITIES IN
REGIONAL ASSOCIATION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) The decisions of the Intergovernmental Board on Climate Services at its first and second sessions (*Abridged Final Report with Resolutions of the First Session of the*

Intergovernmental Board on Climate Services (WMO-No. 1124) and *Abridged Final Report with Resolutions of the Second Session of the Intergovernmental Board on Climate Services* (WMO-No. 1149), respectively),

- (2) The *WMO Strategic Plan 2012–2015* (WMO-No. 1069),
- (3) The *Abridged Final Report with Resolutions of the Sixteenth World Meteorological Congress* (WMO-No. 1077),
- (4) The decisions of the Executive Council at its sixty-sixth session (*Abridged Final Report with Resolutions of the Sixty-sixth Session of the Executive Council* (WMO-No. 1136),

Noting further:

- (1) The adoption of the Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters,
- (2) Decision 2/CP.19 – Warsaw international mechanism for loss and damage associated with climate change impacts, adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change at its nineteenth session held in Warsaw, from 11 to 23 November 2013,

Considering:

- (1) Disaster risk reduction (DRR) as one of the five priority areas for consideration under the voluntary resources of WMO and among the initial four high-priority areas of the Global Framework for Climate Services,
- (2) The importance of a user-driven approach to development and delivery of weather, hydrological and climate services to support policy development, risk analysis, multi-hazard early warning systems, sectoral risk management, and disaster risk financing and insurance,
- (3) The ongoing activities and opportunities for further collaboration with experts in the following DRR areas:
 - (a) Hazard and risk analysis,
 - (b) Multi-hazard early warning systems,
 - (c) Disaster risk financing and insurance,
- (4) The establishment of the Commission for Basic Systems Task Team on the Provision of Operational Meteorological Assistance to Humanitarian Agencies, in coordination with the Commission for Climatology and the Commission for Hydrology, with focus on development of requirements of the humanitarian community for meteorological and hydrological products and services for mitigating the impacts of meteorological-related hazards,
- (5) The outcomes of the first coordinated Capacity Assessment of National Meteorological and Hydrological Services in Support of Disaster Risk Reduction in 2006 and plans to conduct a second national and regional survey to assess capacities of these Services to support disaster risk reduction,
- (6) Regional consultations for the post-2015 framework for disaster risk reduction coordinated by the United Nations Office for Disaster Risk Reduction (UNISDR),
- (7) The Third United Nations World Conference on Disaster Risk Reduction, to be held in Sendai, Japan, from 14 to 18 March 2015, which would review and adopt the post-2015 framework for disaster risk reduction, including its two Preparatory Committee Meetings held in Geneva on 14–15 July and 17–18 November 2014,

Considering further:

- (1) The expressed need of Members for guidelines, standards and training modules for development and delivery of weather, climate and hydrological services to support DRR decision-making, in alignment with principles of quality management systems,
- (2) The experiences of Regional Association I in addressing natural hazards,
- (3) The opportunities for coordination of the Association's strategy and implementation plan with the regional DRR strategies through active engagement of the Association at the regional and subregional DRR platforms and events,
- (4) That the Region offered some good practices in disaster risk management for a regionally coordinated meteorological network and was developing similar regionally coordinated institutional capacities for climate services,
- (5) That a number of National Meteorological and Hydrological Services in the Region demonstrated good practices for provision of such services to the user community, and could thus support the development of DRR guidelines and training materials,

Requests the Secretary-General:

- (1) To provide further regular updates on progress with the implementation of WMO DRR activities to the 'Management Group, relevant subsidiary bodies and Members of the Association;
- (2) To provide assistance with resource mobilization for projects in support of disaster risk reduction and climate adaptation capacity development with a holistic user-driven approach to decisionmaking, which would link to the implementation of the Global Framework for Climate Services;
- (3) To assist the president of the Association, its Management Group and relevant subsidiary bodies, in coordination with the UNISDR Regional Office for Africa, to contribute to the shaping of the post-2015 framework for disaster risk reduction;

Requests the president of the Association and its Management Group:

- (1) To document the initiatives of the Region for implementation of the Global Framework for Climate Services related to DRR activities and to formulate corresponding recommendations to WMO constituent bodies based on the development of climate services for disaster risk reduction as input to the implementation of this Framework;
- (2) To actively participate in preparations for the post-2015 framework for disaster risk reduction to ensure that the needs for strengthening of national and regional capacities for development and provision of weather, climate and hydrological services are considered as an integral part of DRR strategies and development plans at the national and regional levels;
- (3) To address DRR-related matters, as appropriate, in respective areas of expertise of the subsidiary bodies of the Association;

Urges Members:

- (1) To support the implementation of the WMO DRR activities in the context of regional/national capacity development and contributions and by documentation of their respective good practices;
 - (2) To participate in the Third United Nations World Conference on Disaster Risk Reduction;
 - (3) To participate actively in a second WMO Survey to assess national and regional capacities of National Meteorological and Hydrological Services to support disaster risk reduction.
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Resolution 6 (RA I-16)**LAUNCHING THE ANNUAL STATEMENT ON THE STATUS OF
THE CLIMATE IN THE AFRICAN REGION**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) That the successful provision of the WMO annual statement on the status of the global climate since 1993 resulted in high scientific and communication impacts at a global scale,
- (2) The growing need of the scientific community, decision-makers and the public to have access to regional and national climate assessment on a regular basis,

Appreciating:

- (1) The collaborative spirit within the Region, as demonstrated during the work on the first statement on the status of climate in Africa in 2013 (*The Climate in Africa: 2013* (WMO-No. 1147)) as a demonstration project,
- (2) The valuable contribution of the Members of the Region to the WMO annual statement on the status of the global climate, as well as to *The Global Climate 2001–2010 – A Decade of Climate Extremes* (WMO-No. 1103),

Considering:

- (1) The implementation of the Global Framework for Climate Services, particularly with respect to two of its pillars: Observations and Monitoring, and Climate Services Information System,
- (2) The need for an enhanced collaboration mechanism to provide timely and high-quality climate monitoring information, focusing on regional temperature trends and weather and climate extreme events and their impacts, to be taken into account by policymakers and decisionmakers,

Decides to start issuing an annual Statement on the Status of the Climate in Africa starting from the year 2015;

Invites:

- (1) Members to collaborate enthusiastically on this important project;
 - (2) The Secretary-General, in coordination with the president of the Association and the African Centre of Meteorological Applications for Development, to establish an ad hoc expert mechanism involving the experts and climate institutions of the Region, with additional supporting expertise from other Regions if necessary, to define and launch the first edition of the Statement in English and French, and where resources are available, to include Portuguese and Arabic, and to assist in mobilizing resources for the project;
 - (3) The Secretary-General to bring this resolution to the attention of Members.
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Resolution 7 (RA I-16)**IMPLEMENTATION OF REGIONAL CLIMATE CENTRES AND NETWORKS IN REGION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) The *Abridged Final Report with Resolutions of the Sixteenth World Meteorological Congress* (WMO-No. 1077),
- (2) The *Abridged Final Report with Resolutions and Recommendations of the Sixteenth Session of the Commission for Climatology* (WMO-No. 1137),
- (3) The *Abridged Final Report with Resolutions and Recommendations of the Extraordinary Session (2014) of the Commission for Basic Systems* (WMO-No. 1140), Recommendation 2 (CBS-Ext.(2014) – Amendments to the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), Annex 3,
- (4) The 2010 edition of the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), updated in 2012,

Recognizing:

- (1) The criteria for formal WMO designation of Regional Climate Centres (RCCs) and RCC Networks in the WMO Technical Regulations as part of the *Manual on the Global Data-processing and Forecasting System* (WMO No. 485), Volume I – Global Aspects,
- (2) The role of RCCs in the implementation of the Global Framework for Climate Services,

Decides:

- (1) That RCC implementation in Region I will comprise RCC Africa hosted by the African Centre of Meteorological Applications for Development, RCC Intergovernmental Authority on Development (IGAD) hosted by the IGAD Climate Predication and Applications Centre, RCC Southern African Development Community (SADC) hosted by the SADC Climate Services Centre, RCC-Network-Northern Africa, RCC-Network Economic Community of West African States and RCC Economic Community of the Central African States;
- (2) That the operation of RCCs and RCC Networks in Region I, including demonstration phases and designation processes where required, be guided by an appropriate subsidiary body of RA I with oversight by the president of the Association in close consultation with the Commission for Climatology, the Commission for Basic Systems and the Secretariat;
- (3) To promote two-way communication between the RCCs/RCC Networks and the National Meteorological and Hydrological Services in the Region, to ensure effective uptake of RCC products and enhanced national inputs and user feedback;

Urges:

- (1) The RA I RCCs and RCC Networks to actively support the development and sustainable operation of Regional Climate Outlook Forums in the Region;
- (2) The RCCs and RCC Networks in the Region, including those in the demonstration phase, to submit activity reports on an annual basis to the concerned subsidiary body and to undertake recommended actions to ensure fulfilment of WMO designation criteria;

- (3) All Global Producing Centres for Long-range Forecasts and other centres in the Region routinely producing global climate information to support the efforts of and collaborate with the RA I RCCs and RCC Networks;
- (4) All Members of the Association to support the activities of the RCCs in the Region, use the products and provide feedback to RCCs and Global Producing Centres for Long-range Forecasts on their effectiveness for further improvement and tailoring to user needs;
- (5) All those concerned with the implementation of RA I RCCs and RCC Networks to keep themselves apprised of the implementation of the Global Framework for Climate Services, and to align their activities on an ongoing basis to support implementation of the Framework, particularly at the regional and national levels;

Invites the presidents of the Commission for Climatology and the Commission for Basic Systems and the Secretary-General to facilitate the necessary technical guidance for the development and operation of the RA I RCCs and RCC Networks.

Resolution 8 (RA I-16)

WMO INTEGRATED GLOBAL OBSERVING SYSTEM IMPLEMENTATION PLAN FOR REGIONAL ASSOCIATION I (AFRICA)

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) Resolution 50 (Cg-XVI) – Implementation of the WMO Integrated Global Observing System,
- (2) Resolution 10 (EC-64) – WMO Integrated Global Observing System Framework Implementation Plan,
- (3) Resolution 11 (RA I-16) –WMO Information System Implementation Plan for Regional Association I (Africa),
- (4) The final reports from the five subregional RA I workshops on the implementation of the WMO Integrated Global Observing System (WIGOS) and the WMO Information System (WIS),
- (5) That the expertise and knowledge acquired by the RA I Task Team on WIGOS will be vital for the success of the implementation of WIGOS in Region I,
- (6) The extensive capacity development represented by the implementation of WIGOS at the subregional and national levels and the need to establish an appropriate supporting structure in RA I,

Noting further the final reports of the first, second and third sessions of the Inter-Commission Coordination Group on the WMO Integrated Global Observing System and the recommendations on WIGOS implementation, including the development of Regional WIGOS Implementation Plans,

Decides:

- (1) To adopt the WIGOS Implementation Plan for Regional Association I (Africa) as presented in the annex to the present resolution;
- (2) That WIGOS will remain a high priority for the Association during the next intersessional period;

Requests the Management Group:

- (1) To regularly review and update the Implementation Plan; to guide, prioritize elements of, oversee and monitor the progress in the implementation of the Plan; and to submit amendments/updates to the Plan to the president of the Association for approval;
- (2) To provide oversight on the implementation of the WIGOS Regional Plan and the WIS Regional Plan to ensure the efficient and effective exchange of observations and related products, and to consult with the appropriate technical commissions on technical aspects of the implementation;
- (3) To reconstitute the Regional Association I Task Team on the WMO Integrated Global Observing System for the next intersessional period,

Requests Members:

- (1) To develop their national WIGOS implementation plans;
- (2) To nominate and provide adequate support to WIGOS National Focal Points who will be responsible for coordinating inter-agency collaboration and the development of national partnerships in the implementation of WIGOS within the country;
- (3) To organize their activities so as to realize WIGOS goals and associated outcomes as described in the RA I WIGOS Implementation Plan;
- (4) To communicate and promote the concept and benefits of WIGOS in the Region and nationally;
- (5) To continue providing resources, including through the WIGOS Trust Fund and/or seconded experts, and in-kind contributions, to support the implementation of WIGOS in the Region;

Requests:

- (1) Those Members hosting Regional Instrument Centres and Regional Radiation Centres to reaffirm their willingness to make these facilities available to other Members in the Region, and their compliance with the relevant terms of reference of these centres, at the latest by May 2015;
- (2) Those Members that have established calibration instrument facilities and are willing to avail them for use by other Members express interest to do so;

Requests the Executive Council to consider reconstituting the Inter-Commission Group on the WMO Integrated Global Observing System for the WMO financial period 2016–2019, and to further strengthen the representation of the Regions in this Group;

Requests the Secretary-General:

- (1) To explore the possibilities for establishing a permanent WIGOS support structure in Region I, which will be responsible for providing ongoing coordination and support for WIGOS development and implementation efforts at the regional, subregional and national levels;
- (2) To provide the necessary technical support and assistance for the implementation of WIGOS in Region I;

Invites partners to participate in relevant implementation activities as specified in the RA I WIGOS Implementation Plan.

Annex to Resolution 8 (RA I-16)

**WMO INTEGRATED GLOBAL OBSERVING SYSTEM IMPLEMENTATION PLAN FOR
REGIONAL ASSOCIATION I (AFRICA)**

WORLD METEOROLOGICAL ORGANIZATION

**WMO INTEGRATED GLOBAL OBSERVING SYSTEM
(WIGOS)**

**REGIONAL WIGOS IMPLEMENTATION PLAN
FOR
REGIONAL ASSOCIATION I (AFRICA)**

(R-WIP-I)

Version 1.0

(XX/02/2015)



DOCUMENT VERSION CONTROL

Version	Author(s)	Date	Description
0.1	WIGOS-PO	Sept 2012	TT-WIGOS-1, Nairobi, Kenya, 17–21 September 2012 Editorial
0.2	WIGOS-PO	Oct 2012	Feedback from TT-WIGOS Members Editorial
0.3	WIGOS-PO	Jan 2013	Editorial (consistency with the other R-WIP)
0.4	WIGOS PM	Jan 2015	TT-WIGOS-2, Harare, Zimbabwe, 25–27 November 2014
1.0	RA-I-16	Feb 2016	Adopted by RA-I-16, Cabo Verde, 3–9 February 2015

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 2. KEY ACTIVITY AREAS FOR REGIONAL WIGOS IMPLEMENTATION
 - 2.1 Management of WIGOS Implementation in RA I
 - 2.2 Collaboration with WMO and co-sponsored observing systems
 - 2.3 Design, planning and optimized evolution of WIGOS component observing systems
 - 2.4 Integrated Observing System Operation and Maintenance
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 - 2.6 Standardization, System Interoperability and Data Compatibility
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WIGOS FRAMEWORK REGIONAL IMPLEMENTATION PLAN

1. INTRODUCTION AND BACKGROUND

1.1 Purpose of WIGOS and Scope of the Regional WIGOS Implementation Plan for RA I (R-WIP-I)

The WMO Integrated Global Observing System (WIGOS) provides a new framework for WMO observing systems and the contributions of WMO to co-sponsored observing systems. It is important to recognize that WIGOS is not replacing the existing observing systems, but is rather an over-arching framework for the evolution of these systems which will continue to be owned and operated by a diverse array of organizations and programmes. WIGOS will focus on the integration of governance and management functions, mechanisms and activities to be accomplished by contributing observing systems, according to the resources allocated on a global, regional and national level.

The WIGOS Framework Implementation Plan (WIP) addresses the necessary activities to establish an operational WIGOS by the end of the period 2012–2015, as per the direction of WMO Congress. Yet WIGOS will continue to evolve and improve beyond 2015 through the governance and management mechanisms established by the execution of this plan.

The WIP also addresses a number of additional activities that would substantially improve the operational capabilities of WIGOS beyond the 2012–2015 implementation; however these activities are dependent on resources in addition to the regular budget. If these activities are not completed, WIGOS can still be considered operational. The resulting system will, however, be less effective in achieving its goals and benefits to Members will be reduced or delayed.

The WIP provides a basis for the development of the Regional WIGOS Implementation Plans (R-WIP). The Members of a Region will adhere to the global WIP and to their regional framework (R-WIP) in the design, operation, maintenance and evolution of their national observing systems.

This plan is laid out in several chapters that identify and describe the various activity areas to be addressed within this Region. Specific regional/national activities for each area are included in Table 2 (see Section 4), which identifies deliverables, timelines, responsibilities, costs and risks, and whether the activity requires regional and/or national implementation. Similar activities are grouped under the title corresponding to the respective sub-section of Section 2.

1.2 WIGOS Vision and Congress Guidance for WIGOS Implementation

The Sixteenth World Meteorological Congress decided that enhanced integration of the WMO observing systems should be pursued as a strategic objective of WMO and identified this as a major expected result of the WMO Strategic Plan¹.

The WIGOS vision calls for an integrated, coordinated and comprehensive observing system to satisfy, in a cost-effective and sustained manner, the evolving observing requirements of Members in delivering their weather, climate, water and related environmental services. WIGOS will enhance the coordination of WMO observing systems with those of partner organizations for the benefit of society. Furthermore, WIGOS will provide a framework for enabling the integration and optimized evolution of WMO observing systems, and of WMO's contribution to co-sponsored systems. Together with the WMO Information System (WIS), this will allow continuous and reliable access to an expanded set of environmental data and products, and associated metadata, resulting in increased knowledge and enhanced services across all WMO Programmes.

¹ see http://www.wmo.int/pages/about/documents/1069_en.pdf

The implementation of WIGOS should build upon and add value to the existing WMO observing systems with emphasis on integration of surface- and space-based observations in an evolutionary process to satisfy requirements of WMO and WMO co-sponsored Programmes.

In implementing WIGOS, it is imperative that the current management, governance and support activities be reviewed and aligned with WMO priorities. This alignment will promote cooperation and coordination at the technical, operational and administrative levels.

The integrated satellite systems are a unique source of observational data for monitoring of weather, climate and the environment. It is important to further advance instrument intercalibration, data exchange, data management standardization, and user information and training, in order to take full advantage of space-based capabilities in the context of WIGOS.

WIGOS will be essential for the Global Framework for Climate Services (GFCS), aviation meteorological services, disaster risk reduction, and capacity development, each of which is a WMO priority. It will also ensure a coordinated WMO contribution to the co-sponsored GCOS, GOOS, GTOS, and to the Global Earth Observation System of Systems (GEOSS).

2. KEY ACTIVITY AREAS FOR REGIONAL WIGOS IMPLEMENTATION

To migrate the existing global observing systems (the Global Observing System (GOS), the Global Atmosphere Watch (GAW), the World Hydrological Cycle Observing System (WHYCOS) and the Global Cryosphere Watch (GCW), including surface-based and space-based components and all WMO contributions to GFCS, GCOS, GOOS, GTOS and GEOSS), particularly their regional components, into a more integrated single system that is WIGOS, focused effort is required at the regional level in the following key areas, detailed in the sub-chapters to follow:

- (a) Management of WIGOS implementation;
- (b) Collaboration with WMO and co-sponsored observing systems;
- (c) Design, planning and optimized evolution;
- (d) Integrated Observing System operation and maintenance;
- (e) Integrated Quality Management;
- (f) Standardization, system interoperability and data compatibility;
- (g) The WIGOS Operational Information Resource;
- (h) Data and metadata management, delivery and archival;
- (i) Capacity development;
- (j) Communication and outreach.

2.1 Management of WIGOS implementation in RA I

WIGOS implementation is an integrating activity for all regional components of the WMO and co-sponsored observing systems: it supports all WMO Programmes and activities.

Executive Council

The WMO Executive Council will continue to monitor, guide, evaluate and support the overall implementation of WIGOS. Following the guidance by Cg-XVI, EC-LXIII established the Inter-Commission Coordination Group on WIGOS (ICG-WIGOS) with a view to providing technical guidance and assistance for the planning, implementation and further development of the WIGOS

components. Progress on implementation of WIGOS will be reported to subsequent sessions of EC. The Council designated the president of CBS as chairperson of ICG-WIGOS.

Regional Association

The regional association will play the key role in WIGOS implementation in the Region. The regional association, through its Task Team on WIGOS (TT-WIGOS)², will coordinate planning and implementation of WIGOS on the regional level taking into account all WMO future priorities, such as GFCS and DRR. The Task Team on WIGOS, under guidance from ICG-WIGOS, and with the support, where required, of the WIGOS Project Office in the WMO Secretariat, will be responsible for:

- (a) The development of the Regional WIGOS Implementation Plan (R-WIP);
- (b) The integration of WIGOS regional network components; and
- (c) The evolution of their regional networks according to the implementation plan for the evolution of global observing systems (EGOS-IP)³.

R-WIP will also address regional aspects of requirements, standardization, observing system interoperability, data compatibility, data management, Quality Management System (QMS) procedures including performance monitoring and data quality monitoring, and proposed improvements in observing networks/systems. An important role of the regional association will be to assess and continuously monitor regional requirements, identify regional gaps and identify capacity development projects within the Region to address those gaps.

The Members of the Region

Members will plan, implement, operate and maintain national networks and observing programmes based on the standards and best practices stated in the WMO Technical Regulations, the WIGOS Manual and the respective Manuals of the WIGOS component observing systems (e.g., GOS, GAW, WHYCOS and GCW). They will be encouraged to adopt a composite network approach to their networks and to include the acquisition, and onward transmission, of data from external sources, including NMHSs and other government agencies, the commercial sector and members of the public. A particular area of focus for Members of the Region under WIGOS will be increased attention to site protection and radio frequency spectrum protection.

Plans should also be developed to strengthen cooperation through partnership with different owners overseeing the WIGOS observing components within their countries. Specifically, these activities aim to enhance cooperation amongst meteorological, hydrological, marine/oceanographic and academic/research institutions/services where they are separated at the national level.

2.2 Collaboration with WMO and co-sponsored observing systems

WIGOS will be an integrated, comprehensive, and coordinated system primarily comprising the surface-based and space-based observing components of the GOS, GAW, GCW, and WHYCOS, plus all WMO contributions to GCOS, GOOS and GTOS. It should be noted that in contrast to the primarily NMHS-owned observing systems upon which the WWW was built, the proposed WIGOS component observing systems are owned and operated by a diverse array of organizations, both research and operational. Therefore, the interaction between these various communities at the regional and national levels is important for the implementation of WIGOS within the Region. In particular, strengthening the interaction between research and operational observing communities is important for sustaining and evolving observing systems and practices, in line with new science and technology outcomes.

² It is expected that mandate of TT-WIGOS will be extended by RA-I MG in October 2012 until the end of 2015.

³ <http://www.wmo.int/pages/prog/www/OSY/gos-vision.html#egos-ip>.

Partner Organizations

At the regional level, coordination and cooperation will be supported by a mechanism to be defined by the regional association and the respective regional bodies, such as ASECNA, ACMAD, AGRHYMET, CICOS, SADC-CSC, ICPAC, PANGEA⁴, in order to resolve possible problems in data policy, product delivery and other governance issues. This interagency and inter-observing system coordination mechanism will need to be complemented and supported through similar cooperation and coordination arrangements among NMHSs and through national implementation mechanisms for GFCS, GCOS, GOOS, GTOS, and GEOSS.

The Architecture for Climate Monitoring from Space has been defined as an end-to-end system, involving the different stakeholders including operational satellite operators and R&D space agencies, the Coordination Group for Meteorological Satellites (CGMS), the Committee on Earth Observation Satellites (CEOS), the Global Climate Observing System (GCOS), the World Climate Research Programme (WCRP) and the Group on Earth Observations (GEO). Within the regional context, the Architecture shall be part of the space-based component of WIGOS. Therefore, particular emphasis will be placed on their coordinated contribution to WIGOS within the Region, building on existing coordination mechanisms stated above.

2.3 Design, Planning and Optimized Evolution of WIGOS component observing systems

WMO has agreed on the Vision for the Global Observing Systems in 2025⁵ which provides high-level goals to guide the evolution of the global observing systems during the coming decades. To complement and respond to this Vision, an Implementation Plan for the Evolution of Global Observing Systems (EGOS-IP) has been considered by CBS-15. This EGOS-IP focuses on the long-term evolution of WIGOS observing systems components, while the WIP focuses on the integration of these observing system components. Beyond 2015 these plans will provide Members of the Region with clear and focused guidelines, specifying actions that stimulate the cost-effective evolution of the observing systems to address in an integrated way the requirements of all WMO Programmes and relevant parts of co-sponsored programmes.

Concerning the surface-based sub-system of WIGOS, the current composition of mainly separate networks of observing stations comprises numerous different types of sites. With the implementation of WIGOS, these separate networks will continue to evolve but will also be given a more prominent collective identity as the WIGOS surface-based sub-system and for some purposes may be considered as a single composite system of observing (fixed or mobile) sites/platforms. The regional association will adopt a broader role in coordinating the implementation of relevant elements of the WIGOS surface-based sub-system, evolving from the previous concepts of mainly the regional synoptic and climatological networks into an integrated concept of a WIGOS Regional Network.

Similarly, the space-based sub-system of WIGOS is composed of many different platforms and types of satellites. There is already partial integration due to the existence of a globally coordinated plan, which is maintained by WMO and CGMS, and which takes into account the needs of a number of application areas. However, it should be further developed and expanded to better support certain application areas that, at present, are not benefiting from the full potential of space-based observations, for example, other components of GAW and WHYCOS and new initiatives like GFCS and GCW. In addition, further integration shall be pursued in terms of inter-calibration, data and product harmonization, and composite product delivery. The regional association will adopt an active role in compiling the views of Members and maintaining documented requirements and priorities for data and products to be available for the Region from the WIGOS space-based sub-system.

⁴ Another key Partners and stakeholders can be considered

⁵ Available from the WMO Website at: <http://www.wmo.int/pages/prog/www/OSY/gos-vision.html>

Rolling Review of Requirements (RRR)⁶

Coordinated strategic planning at all levels will be based on the RRR process, and will be supported by the WIGOS regulatory material. This activity will be carried out primarily at the **global level** under the guidance of the ICG-WIGOS.

The RRR process involves regularly reviewing the observational data requirements⁷ for each of the defined WMO Application Areas and all required variables (see Table 1). The RRR process also involves reviewing the capabilities of WMO observing systems and co-sponsored systems, and the details of the networks/platforms in existence⁸, for both space-based and surface-based systems, in delivering data on different variables. The comprehensive information collected for the globe on both requirements and capabilities is quantitatively recorded in a database accessible through the Observing Systems Capability Analysis and Review tool (OSCAR⁹) of the WIGOS Operational Information Resource (WIR, see section 2.7 below). The information on surface-based networks and instrumentation details is currently recorded in the WMO Publication No. 9, Volume A, but will ultimately be available, with additional metadata through OSCAR. Space-based capabilities are also recorded and made available through OSCAR. OSCAR allows to perform gap analyses to identify weaknesses in existing observing programmes.

The above steps represent the analysis phase of the RRR, which is as objective as possible. Next is the prioritization and planning phase of the RRR in which experts from the various application areas interpret the gaps identified, draw conclusions, identify key issues and priorities for action. This input is composed as Statements of Guidance (SoG) from each application area. The technical commissions respond to the SoG by formulating new global observing system requirements and the regulatory and guidance publications to assist Members in addressing the new requirements. Additionally, CBS and other technical commissions draw on the SoGs to develop a Vision and an Implementation Plan for further developments of WIGOS.

Table 1: The 12 recognized WMO Application Areas

No.	Application Area	No.	Application Area
1	Global NWP	7	Ocean Applications
2	High Resolution NWP	8	Agricultural Meteorology
3	Nowcasting & Very Short-range Forecasting	9	Hydrology ¹⁰
4	Seasonal to Inter-annual Forecasts	10	Climate Monitoring
5	Aeronautical Meteorology	11	Climate Applications
6	Atmospheric Chemistry	12	Space Weather

⁶ Currently specified in the *Manual on the Global Observing System* (WMO-No. 544), elaborated in the *Guide to the Global Observing System* (WMO-No. 488), and described further on the WMO Website at <http://www.wmo.int/pages/prog/www/OSY/GOS-RRR.html>

⁷ The RRR describes data requirements, which are expressed in terms of space/time resolution, uncertainty, timeliness, etc., for each of the required observed variables, and are measures independent of observing technology.

⁸ Capabilities are derived from the individual platforms characteristics submitted by Members to WMO e.g. through WMO-No. 9, Volume A, or its evolution

⁹ The following components are currently available via the WMO website: User Requirements: <http://www.wmo.int/pages/prog/www/OSY/RRR-DB.html>; and Space-based capabilities: http://www.wmo.int/pages/prog/sat/gos-dossier_en.php. The surface-based capabilities part is currently under development

¹⁰ Hydrological information only; water quality monitoring and information is currently excluded.

At the Regional Level

Although the primary coordination of the RRR will lie with CBS for overall WIGOS planning, the regional association, through the TT-WIGOS, will follow the technical guidance of the technical commissions as represented in the EGOS-IP and other observation system implementation plans in order to evolve and implement observing systems in the Region.

The regional association will examine, and report back to CBS, its requirements for data, and any issues it identifies with the global WIGOS design, taking into account the particular requirements of the Region and international river basin authorities. This process will involve, in essence: (1) the use of the global data to prepare regional data requirements; (2) use of this for detailed planning of observing system components at the regional scale; and then (3) encouragement of Members of the Region to implement these components, subject to further review at the national or subregional level, where appropriate.

At the National or Subregional Level

The Members of the Region will contribute to the collective regional effort to: (1) assess the regional data requirements and plan the regional observing system components; and (2) implement and evolve observing systems following this plan, the EGOS-IP and other observation system implementation plans.

The Members of the Region will also have available the global and regional data requirements information available to use as guidance for the preparation of national requirements information which can then be used to assist with the detailed planning for evolution of national observing components of WIGOS.

In some cases, where countries are small and geographically close or already have established multilateral working relationships, there may be more merit in taking a subregional, as opposed to national, approach to WIGOS observing infrastructure planning. In this case, it will be necessary for the Members concerned to work in close cooperation to prepare subregional reviews of requirements to be used as a basis for detailed planning at that scale.

2.4 Integrated Observing System Operation and Maintenance

Observing system owners or custodians are responsible for operating and maintaining their systems and for complying with the regulations of the WMO and co-sponsored observing systems to which they contribute. System owners are generally NMHSs or other organizations within WMO Member countries but are sometimes other entities.

WIGOS on the regional level involves a process for sharing of operational experiences, practices and ideas, for sharing of expertise and for pooling resources for joint activities. The benefit is to realize synergies and greater efficiencies. These interactions may be between different teams within a single organization (such as an NMHS) or between regional organizations. These may benefit from technical guidance from relevant technical commissions and, while occurring primarily at a national level, there is a regional role to be played. Within Regional Association I, the following regional activities will be important, among others:

- CLIMDEV-AFRICA¹¹
- WHYCOS PROJECTS
- AMESD AND MESA
- AFRICAN AMDAR

¹¹ See Annex 2 (List of Acronyms)

2.5 Integrated Quality Management

The Region recognizes that meeting the quality requirements and expectations of users will be critical to the success of WIGOS. This will require an in-depth examination of current practices used by WMO observing programmes, specific mission-related requirements that are already in place, and available technological opportunities.

The WIGOS Quality Management approach is to apply the WMO QMF to the WIGOS observing components (see WMO *Technical Regulations*, WMO-No. 49, Vol. IV). WIGOS quality management at the regional level will strive for compliance of all components of WIGOS with international standards, such as ISO 9001/9004 and the ISO 17025 standard where appropriate (i.e. with respect to instrument calibration and traceability of data). Compliance with international standards should be pursued in all quality assurance (QA) procedures applied by Members of the Region to all their national WIGOS observing components. In addition to the WMO QMF document, further guidance to Members will be provided by WMO via the standards and best practices described in the Regulatory Materials, such as the WIGOS Manual and Guide. Such guidance, for both mandatory and desirable practices, can be referred to for the application and implementation of quality management in national observing systems. In this context, the Region will give attention to:

- (a) The examination of current quality management practices being used in the Region;
- (b) The documentation of the quality of observations from the WIGOS regional networks at all stages of data processing; and
- (c) Ensuring, where possible, traceability of observations to the International System of Units (SI).

CGMS, in coordination and collaboration with WMO, supports the development of quality assurance standards and formats for satellite observations, multi-satellite and multi-sensor algorithms for estimating retrieved data and products, and advanced atmospheric sounding derivation packages for use by WMO Members. To assist this effort, the Region will ensure that surface-based sites that are needed for calibration/validation of satellite data are specified.

A key aspect of regional quality management that requires particular attention under WIGOS is the systematic and rigorous performance monitoring and evaluation (PM&E) of WIGOS capabilities, in terms of both: (a) the flow of observational data/products to models; and (b) provision of products/information for decision-support tools and services in accordance with requirements specified by end-users. Effective PM&E can improve the overall performance of WIGOS and its ability to effectively interact with its user community and to meet community needs and requirements.

Members of the Region will be responsible for ensuring compliance with the WIGOS quality management principles (such as ISO 9001, 9004, 17025).

2.6 Standardization, System Interoperability¹² and Data Compatibility

The WIS has an important role in regional WIGOS implementation, in relation to data exchange and discovery, and the provision of effective standards and practices for data management. The Region will therefore coordinate WIGOS and WIS implementation activities.

Taking into account the ongoing rapid progress in technology that will continue to provide a basis for further improvements in the capability, reliability, quality and cost-effectiveness of observations, the Members of the Region will ensure that WIGOS utilizes international standards and best practices set by WMO and partner organizations and described in the WMO Regulatory Materials in the following areas:

¹² Interoperability is a property referring to the ability of diverse systems to work together (inter-operate)

- (a) Instruments and methods of observation across all components including surface-based and space-based elements (observations and their metadata);
- (b) WIS information exchange, as well as discovery, access and retrieval (DAR) services; and
- (c) Data Management (Data Processing, Quality Control, Monitoring and Archival).

The Region will support all activities leading to the interoperability (including data compatibility) of WIGOS observing components through utilization and application of the same, internationally accepted standards and best practices (that is, standardization). Data compatibility will also be supported through the use of standardized data representation and formats.

Any regional deviations from the standard practices (documented in the WMO Technical Regulations through the WIGOS Manual and other relevant Manuals) will be reported to the WIGOS Project Office.

2.7 The WIGOS Operational Information Resource

The WIGOS Operational Information Resource (WIR), accessible via a centralized point (web portal), will provide seamless access to all WIGOS-related operational information, including observational user requirements, a description of the contributing observing networks (instrument/site/platform metadata), and their capabilities, list of standards used in the WIGOS framework, data policies applicable, and information on how to access data. It will also provide general information on WIGOS benefits, and impacts to Members. It will be a tool for conducting critical reviews as part of the Rolling Review of Requirements, and can assist Members and the regional association in conducting observing network design studies as appropriate. It will provide guidance on how to develop capacities in developing countries according to WIGOS requirements, and will provide Members of the Region with a toolbox to be used nationally if and when required. The information collected is intended in particular to identify the gaps in the observational networks, identify areas where existing observing systems could be used, or where their scope could be expanded at limited cost to address the requirements of more application areas. The information provided on standards will support the production of more homogeneous datasets and make the observations traceable and of known quality.

The key support tools of WIGOS are: (a) a central web portal (WIGOS Portal); (b) the WIGOS “Standardization of Observations” Reference Tool (SORT); and (c) the Observing System Capabilities Analysis and Review tool (OSCAR) which includes information on observational user requirements and observing systems capabilities, and allow to perform the critical review by comparing the two.

Understanding that sources of the individual components of the WIGOS Operational Information Resource rely on the inputs from its Members, the Region is committed to provide regular inputs to keep the information resource up-to-date.

2.8 Data Discovery, Delivery and Archival

Within the WIGOS framework, the WMO Information System (WIS¹³) provides exchange of data and interpretation metadata¹⁴, and management of related discovery metadata¹⁵. These discovery metadata play an important role in the discovery, access and retrieval of WIGOS observations and products by the entire WMO community.

Submission, management and archival of the data themselves is generally the responsibility of observing system owners/data custodians. However, several World Data Centres and a number of regional or specialized data centres exist that collect, manage and archive basic observational

¹³ <http://www.wmo.int/wis>

¹⁴ Interpretation metadata is the information required to interpret the data

¹⁵ Discovery metadata is the information describing the data-sets, generally using ISO-19115 standard, and WMO core profile in case of WIS

data that are relevant to WMO Applications. Members of the Region are responsible for submitting their data to these regional or specialized data centres. The regional association will encourage its Members to abide by this commitment.

Members of the Region will adopt WIGOS and WIS standards and make their data and metadata available through WIS for delivery or for discovery, access and retrieval services. In this regard, promotion and implementation of DCPCs (Data Collection and Production Centres) as well as National Centres will be supported and encouraged by the regional association. Guidance will be developed and provided through the appropriate WIGOS regulatory and technical documents.

2.9 Capacity Development

A coordinated capacity development effort at global, regional and national levels is of paramount importance to the developing countries in the implementation of WIGOS. This is especially the case for NMHSs of Least Developed Countries (LDCs) and Small Island Developing States (SIDSs), to enable them to develop, improve and sustain national WIGOS observing components. This needs to be complemented by capacity development efforts outside of WIGOS but in closely related areas to improve access to and effective utilization of observations, data and products, and related technologies. The WIGOS capacity development activities at the Regional level are focused on:

- (a) Providing assistance to Members of the Region to introduce or improve institutional mandates and policies that enable effective implementation, operation and management of observing systems;
- (a) Filling the existing gaps in the design, operation and maintenance of WIGOS observing systems, including both the infrastructure and human capacities development;
- (a) Technological innovation, technology transfer, technical assistance and decision-support tools.

Capacity development in satellite applications for developing countries, LDCs and SIDSs are also addressed in the Implementation Plan for the Evolution of the GOS (see WMO/TD-No. 1267). The virtual lab (VL) will continue to grow and help all WMO Members realize the benefits of satellite data.

2.10 Communication and Outreach

The Region will establish its communication and outreach strategy through the efforts of WMO Members, Programmes, Regional Associations (RAs) and Technical Commissions (TCs), and co-sponsors. The strategy will provide details on WIGOS benefits, increased effectiveness, and efficiency, and impact on the activities of the Members of the Region, as well as on the socioeconomic benefits of WIGOS data. It will take advantage of outreach programmes developed and effectively deployed so far by WMO and its partner organizations within the Region.

The WIGOS Portal will provide convenient access to relevant information on the regional communication, outreach and capacity development, aimed at complementing, not duplicating, others' efforts. A variety of outreach materials will be developed to educate the Members, funding agencies, policy-makers and the general public, on the importance of WIGOS to society. Materials will include posters and other educational material for elementary and high school classes, a WIGOS brochure, a semi-annual or annual newsletter, an online photo and video library, and information on the current state of the observing systems.

3. REGIONAL PROJECT MANAGEMENT

The regional association will be responsible for the Project through the TT-WIGOS with the support from the Regional Office for Africa and its Subregional Offices.

3.1 Monitoring, review and reporting mechanism

- (a) The regional association, through its Management Group, will monitor, review, guide and support the overall implementation of WIGOS in the Region, and update the Implementation Plan if and when necessary;
- (b) The regional association, through the chairperson of the TT-WIGOS, will report to the ICG-WIGOS and the WIGOS Project Office on the progress in implementation of WIGOS in the Region;
- (c) The president will report at the RA's sessions on WIGOS implementation.

3.2 Evaluation

The evaluation methodology will be designed against WIGOS implementation activity tables, i.e. with respect to the activities, deliverables, timeline, responsibility and budget allocations. This will include a schedule of monitoring and evaluation activities and related responsibilities. Mid-term evaluation, interim progress reports and post-implementation reviews are planned as a means of providing early feedback on progress towards success, and as a means of meeting accountability and transparency requirements for the whole implementation phase. RAs and NMHSs will provide progress reports at the request of the WIGOS Project Office.

4. IMPLEMENTATION

4.1 Activities, Deliverables, Milestones, Costs and Risks

Table 2 presents the key implementation activities that are required for the regional WIGOS implementation within the timeframe 2012–2015. The table is arranged to correspond to the activity areas presented in Section 2. In the table each implementation activity is presented along with its associated deliverables, timelines, responsibilities, costs and associated risk.

For each activity in Table 2, a detailed activity plan will be developed by the responsible entity or entities, with support of the TT-WIGOS. The TT-WIGOS has responsibility for tracking execution of these activities and this plan itself.

Table 2 WIGOS Implementation Activities

Depending on the implementation scale, planned activities are specified as follows:

R = Regional activity; SR = Subregional activity and N = National activity.

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
1. Management of WIGOS Implementation in RA I								
1.1 R SR N	Establish the Regional WIGOS Governance structure, including subregional responsible economic bodies (SADC, IGAD, ECOWAS, CEMAC/ECCAS, UMA etc.), and technical groups (ACMAD, ASECNA, ICPAC, AGRHYMET, etc.) for each subregion	RA I WIGOS Governance structure, incl. WGs established with TOR (see ANNEX 1, Figure 1)	2012	RA I MG, Subregional WIGOS Working Body; Governance				Low

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
1.2 R SR N	Provide an effective RA I focal points at regional, subregional and national levels, to liaise with CBS, CIMO and other relevant TCs, WIGOS-PO on the implementation of WIGOS and EGOS-IP in the Region	National and subregional focal points at all levels are identified with special interest for CBS, CIMO	2012	PRs				Low
1.3 R SR	Develop and update the Regional WIGOS Implementation Plan for Region I (R-WIP-I), reflecting subregional priorities	1) Up-to-date RA-WIP-I, including: (a) actions sheets from all subregions, (b) actions specified at WIP for regional level, (c) actions specified at EGOS-IP relevant to RA I	2012–2013	RA I TT on WIGOS (TT-WIGOS); RA I MG; Subregional representatives in TT-WIGOS	RB from relevant departments			Low
1.4 R N	Mobilize needed resources for supporting the WIGOS implementation in the Region and all subregions	Appropriate resources are identified and available from Secretariat, subregions, partners, stakeholders and Members for supporting actions	2012–2015	RA I MG; PRs				High
1.5 R SR N	Monitor and evaluate (M&E) WIGOS implementation activities	Annual M&E reports; Problems are identified and sorted out timely	2012–2015	RA I WIGOS Governance body defined at 1.1 with the support of WMO Secretariat				Low
2. Collaboration with WMO and co-sponsored observing systems								
2.1 R SR N	Identify and engage key partner organizations (water, marine, agriculture, environment and research institutes, private sector, etc.) in implementation of WIGOS at regional, subregional and national levels	MoUs and Agreements signed with regional, subregional and national partner organizations	2012–2015	RA I President with the support of RA I MG responsible for the MoU/Agreements at the regional and subregional levels; PRs responsible for the MoU/Agreements with National Partners, with the support and guidance of RA I MG				High

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
2.2 R SR N	Establish working mechanisms with clear targets (such as data policies, MoUs, agreements) for collaboration in WIGOS implementation in the Region	Established collaboration mechanisms; Increased number and amount of exchanged observations, with the partners at regional, subregional and national levels, based on MoUs and agreements	2012–15	RA I President with the support of RA I MG responsible for the MoU/Agreements at the regional and subregional levels; PRs responsible for the MoU/Agreements with National Partners, with the support and guidance of RA I MG				High
3. Design, planning and optimized evolution of WIGOS and its regional, subregional and national observing components								
3.1 R	Design and plan observing systems in the Region taking into account: (a) The technical guidance as represented in the EGOS-IP and other relevant observing systems IP (b) Recommendations by XV-RA I session (2010) (c) Observational Requirements expressed in GFCS-IP (d) Up-to-date users requirements for data, including international river basin authorities	Optimized regional integrated observing system design plan taking into account partners requirements	2012–2015	TT-WIGOS				High
3.2 R	Develop a design of new RBN, in close collaboration with CBS	Design of a new RBN	2012–2015	TT-WIGOS				High
3.3 SR	Based on the design of a new RBN, design and plan observing systems in the subregions taking into account their priorities and requirements	Optimized subregional observing systems design plans	2013–2015	Subregional representatives in TT-WIGOS				Medium
3.4	Design and establish a Radar network for North Africa	A trans-national radar data display sharing platform operational in North Africa	2013–2015	PRs of North Africa				
3.5	Establish//Rehabilitate Automatic Weather Stations (AWSs), especially in data sparse regions, especially in the Indian Ocean, Central Africa and inland lakes	An enhanced meteorological observing network integrated into the GTS	2014–2016	PRs, GCOS,				

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
3.6	Establish new/revive silent stations providing rainfall and climate observations at national level							
3.7	Expand surface observation network (Synoptic stations) including those over the Indian Ocean and inland lakes							
3.8	Increase the number of the AMDAR aircraft reports, including humidity observations							
3.9	New/revive instruments/equipment for marine meteorological and oceanographic observations	A catalogue of recommended marine and oceanographic instruments available A guide on specifications marine instruments and how to make observations developed and operational						
3.10	Develop specifications for Automatic Weather Stations (AWSs) to conform with WMO standards	Reference guides on installation and operations of AWSs in all WMO languages available	2014–2015	WMO, WIGOS Project Office				
3.11	Establish lightning detection networks for early warning of severe weather events	National and/ or subregional networks and associated infrastructure in place Lightning detection systems in place nationally and at subregional levels	2015					
4. Integrated Observing System Operation and Maintenance								
4.1 R	Collect and compile examples of best practices and technical documentation	Availability of technical documents and best practices	2012–2013	TT-WIGOS; WMO Secretariat				Low
4.2 R SR	Establish a regional/subregional repository of guidance and technical documentation	Repository available to Members	2012–2015	TT-WIGOS; WMO Secretariat				Medium
4.3	Revive silent and upgrade outdated upper-air stations at various locations							

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
5. Integrated Quality Management								
5.1 R	Examine current quality management practices being used in the Region, including calibration of instruments for surface-based observations	Availability of status report on the current quality of management practices	2012–2013	TT-WIGOS; WMO Secretariat				Low
5.2 R	Establish mechanisms and systems to improve, monitor and document the quality of observations from the WIGOS Regional observing components at all stages of data processing	Established mechanisms for improved quality of observations at all levels	2012–2015	TT-WIGOS; Members; WMO Secretariat				High
5.3 R	Ensure, where possible, traceability of observations to the international standards (such as International System of Units (SI)), focusing initially on surface pressure, temperature, precipitation and humidity	Traceable observations	2012–2015	Members; RICs; WMO Secretariat				High
5.4 R	Progressively achieve compliance of all RICs with international standards	Compliance of RICs	2012–2015	Respective Members (RICs)				High
5.5 R	Achieve the functionality of RICs and RRCs in the subregions and in particular the full functionality of the RIC in Botswana through collaborative effort of Members	RICs and RRCs fulfil their mandates	2012–2015	Respective Members				High
5.6 R	Enhance support by RICs to Members and encourage Members to work with RICs and RRCs	Established mechanisms for collaboration between RICs, RRCs and Members	2012–2015	RICs; Members				Medium
5.7 R	Achieve, through collaborative effort of Kenya, Morocco and South Africa full functionality of the RMIC	Operational RMIC	2012–2015	South Africa, Kenya and Morocco				Medium
5.8 SR	Achieve compliance of the RRC in Dem. Rep. of the Congo with WMO agreed specifications defined in the CIMO Guide, Annex 7C	Compliance of RRC achieved	2013–2016	Dem. Rep. of the Congo; With support from Members				
5.9	Identify the needs for new Regional Centres of Excellence (RICs, RRCs, RMICs, RTCs, Subregional WIGOS Centres)	At least one centre of each type in each sub region approved by RA I		Members with the support of WMO and in collaboration with ASECNA (RICs)				
5.10 R	Ensure that surface-based sites that are needed for calibration/validation of satellite data are specified	List of surface-based sites for calibration/validation of satellite data	2012–2015	TT-WIGOS				Medium

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
6. Standardization, System Interoperability and Data Compatibility								
6.1 R	Implement the siting classification throughout the Region	Siting classification implemented	2012–2015	Members				High
6.2 R SR	Establish mechanisms for monitoring of compliance with WMO standards at regional and subregional level	Operational mechanisms for monitoring of compliance with WMO standard; More WMO standards are implemented at the national level	2012–2015	TT-WIGOS; WMO Secretariat; Members				High
6.3 R SR	Encourage Members to generate and provide metadata (to WIR-OSCAR)	Metadata generated	2012–2015	Members; TT-WIGOS; WMO Secretariat				High
6.4 N	Achieve migration to TDCF in the Region	Migration completed	2012–2014	Members				High
7. The WIGOS Operational Information Resource								
7.1 R	Develop and maintain a regional metadata database and a web portal to contribute to the WIR-OSCAR	Operational regional/sub regional WIR	2012–2015	TT-WIGOS; WMO Secretariat				High
7.2 R	Encourage Members to provide and share up-to-date communication and outreach information through the WIR	Up-to-date information available	2012–2015	Members; WMO Secretariat				Medium
8. Data discovery, delivery and archival								
8.1 R N	Encourage Members to be designated as WIS DCPCs or GISCs; Ensure Members to establish WIS NCs	Members designated as DCPCs/ GISCs; NCs established	2012–2015	Members; WMO Secretariat				High
8.2 N	Encourage Members to share data and metadata via WIS, including from institutions other than NHMSs	Enhanced availability of data and products	2012–2015	Members; WMO Secretariat				High
8.3 SR N	Data transmission to be modernized using new telecommunication systems (Internet) and mobile phone telephony, if available							
8.4 R	Enable the operational functioning of the GISCs (Casablanca, Pretoria)							
9. Capacity development								
9.1 R SR	Define TORs of these Centres for strengthening the regional capacity on WIGOS	Operational RICs	2012–2015	TT-WIGOS; PRs with support of WMO Secretariat				Mod

No.	Activity	Deliverables	Timeline	Responsibility	Estimated Costs (2012–2015) K CHF			Potential Risks
					Total	ARB	Shortfall	
9.2 R N	Provide assistance to Members to establish/enhance institutional mandates and policies that enable effective implementation, operation and management of observing systems by Members	Established/enhanced institutional mandates and policies for effective implementation, operation and management of observing systems by Members	2012–15	WMO Secretariat; RA I MG; PRs				Mod
9.3 R N	Provide assistance to Members to fill the existing gaps in the design, operation and maintenance of WIGOS observing systems, including both the infrastructure and human capacities development	Gaps in the WIGOS observing systems of Member countries are identified and filled	2012–15	RA I MG; TT-WIGOS; RA I WGs; WMO Secretariat Members, in collaboration with regional partners and TCs				Mod
9.4	Data rescue – Continue the identification of data records and their digitization and storage in electronic archive	A digital archive of historical observation records as a part of the GFCS	2014 onwards	Members – PR and WIGOS FP				
9.5	Training in Automatic weather Stations calibration and maintenance							
10. Communication and outreach								
10.1 R SR N	Utilize communication strategies developed by ICG-WIGOS and material provided by WIGOS-PO to raise awareness and commitment to WIGOS in the Region	Effective communication and outreach for WIGOS across the Region by presentations and side events at regional high level events	2012–15	RA I vice-president; RA I MG; WMO Secretariat				Low
10.2 R SR N	Develop communication and outreach material of RA I with a special focus on policymakers	Communication and outreach material of RA I is available through appropriate means (WIR, RANET, forums, etc.)	2013	WMO Secretariat; Regional Offices; Members				Low
10.3 R SR N	Communicate WIGOS benefits using all possibilities, such as COFs, AMCOMET	Workshops & side events at regional, subregional and national levels for promoting WIGOS	2012–15	RA I MG; Members with support of WMO Secretariat				Low
10.4 R SR N	Convene WIGOS implementation awareness meetings for PRs at subregional level	PRs have clear understanding of WIGOS and are aware of their roles in implementation of WIGOS	2013	RA I MG; WMO Secretariat				Low

5. RESOURCES

RA I has to have a resource mobilization strategy that includes implementation of WIGOS. The resources that are needed are financial as well as human, particularly identifying relevant and requisite skills. RA I will work closely with the WMO Secretariat in soliciting for support, including in-kind contributions. However, because WIGOS will ultimately be implemented at the national level, RA I should emphasize to the Members that they should use their own resources as much as possible.

6. RISK ASSESSMENT/ MANAGEMENT

The Risk Management Plan (RMP) will be developed for each implementation activity/projects, including risk mitigation. The following risk areas have been identified:

- (a) Limited resources, both financial and human;
- (b) Little awareness by the NMHSs in RA I Member countries of the importance and relevance of WIGOS and the benefits to be accrued by implementing WIGOS. As of now, WIGOS may not be among the highest priorities of NMHSs;
- (c) Lack of understanding of benefits that WIGOS can bring to the Region, Subregions and the Members;
- (d) Lack of cooperation and collaboration with key partners and stakeholders, particularly at the national level due to different priorities, mandates and expected outcomes.

7. OUTLOOK

This document has described the key activities for the period 2012 to 2015. As determined by Cg-XVI, the goal is to have WIGOS operational by 2016. This is a challenging task. The experience gained during the WIGOS test of the concept phase clearly shows that it will be impossible to complete integration of all observing systems on global, regional and national levels in only four years. While WIGOS operations should start in 2016, there will still be a strong need to continue a significant number of implementation activities.

ANNEX 1

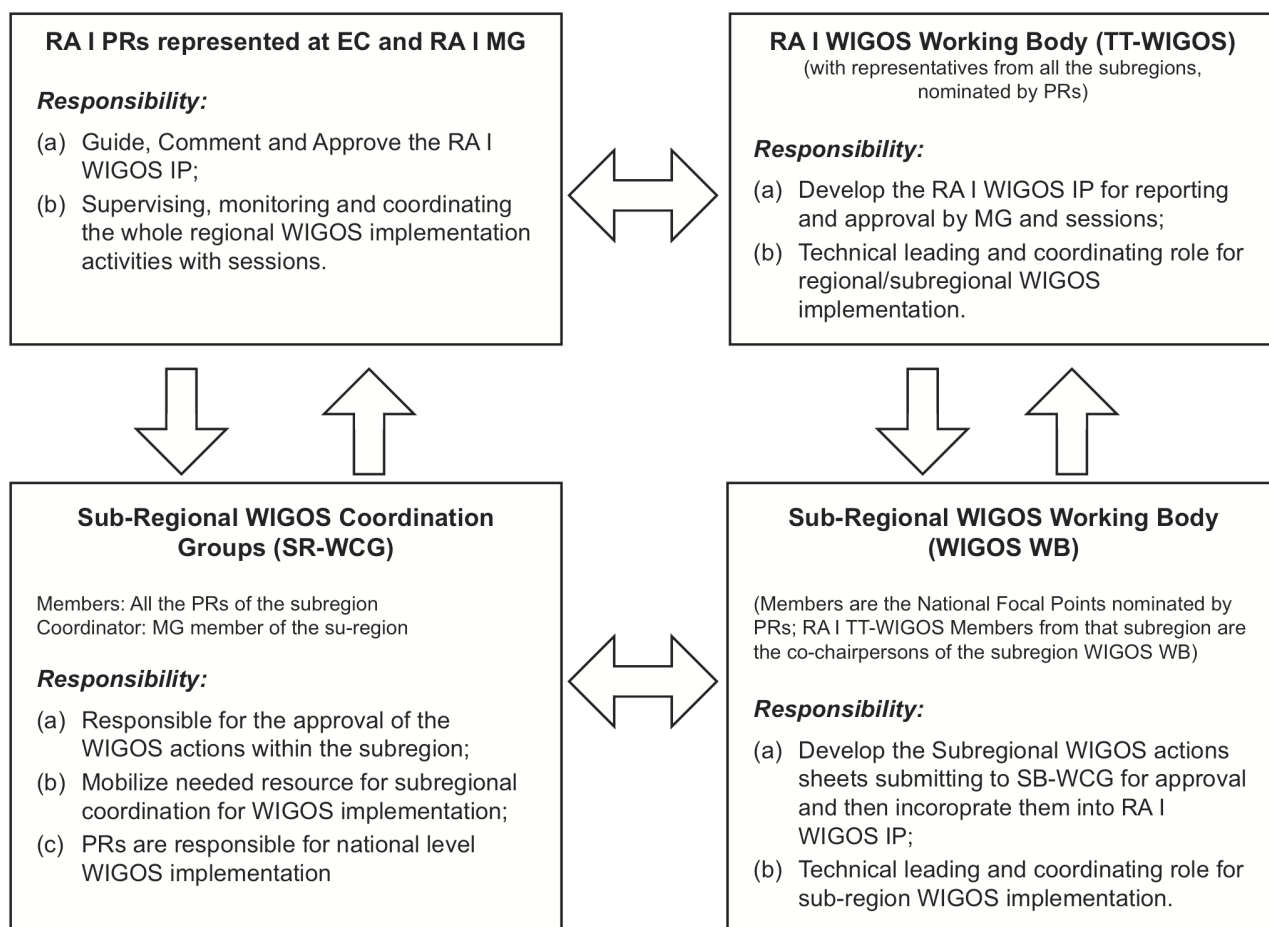


Figure 1: WIGOS Governance and Working Structure

Enablers and suggested Governance and working structure

1. A letter from the president of RA I to all the PRs of the Region: (a) to request them to establish the governance structure on WIGOS implementation within the Region. The structure should lead to the establishment of subregional coordination group headed, preferably by a MG member from that subregion, in alignment with existing subregional coordination mechanism if available; (b) to nominate a National WIGOS Focal Point working at the subregional WIGOS TT; and (c) to agree the current RA I WIGOS TT be kept in force until the next RA I session as the RA I WIGOS technical leading body.
2. The president of RA I write to the MG to request five subregional coordinators on WIGOS Implementation and coordination.

ANNEX 2**LIST OF ACRONYMS**

ASECNA	Agency for Aerial Navigation Safety in Africa and Madagascar
ACMAD	African Centre of Meteorological Applications for Development
AGRHYMET	Regional Training Centre for Agrometeorology and Operational Hydrology and their Applications
CEOS	Committee on Earth Observation Satellites
AMDAR	Aircraft Meteorological Data Relay
AMESD	The African Monitoring of Environment for Sustainable Development
CGMS	Coordination Group for Meteorological Satellites
CICOS	International Commission of the Congo-Ubangi-Sangha basin
CLIMDEV-AFRICA	Climate for Development in Africa
CONOPS	Concept of Operations
DAR	Discovery, Access and Retrieval
DB	Database
DCPC	Data Collection or Production Centre (of WIS)
DRR	Disaster Risk Reduction
ET	Expert Team (of WMO Technical Commission)
FAO	Food and Agriculture Organization of United Nations
GAW	Global Atmosphere Watch
GCOS	Global Climate Observing System
GCW	Global Cryosphere Watch
GEO	Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GISC	Global Information System Centre of WIS
GFCS	Global Framework for Climate Services
GOOS	Global Ocean Observing System
GTOS	Global Terrestrial Observing System
ICG-WIGOS	Inter-Commission Coordination Group on WIGOS
ICPC	Interagency Coordination and Planning Committee for Earth Observations
ICSU	International Council for Science
IOC	Intergovernmental Oceanographic Commission
ICPAC	IGAD Climate Prediction and Applications Centre
ISO	International Organization of Standardization
ITU	International Telecommunication Union

LDCs	Least Developed Countries
MoU	Memorandum of Understanding
MESA	Monitoring of Environment and Security in Africa
NMHS	National Meteorological and Hydrological Service
NOS	National Observing System
OSEs	Observing Systems Experiments
OSCAR	WIGOS Observing Systems Capabilities Analysis and Review tool
OSSEs	Observing System Simulation Experiments
QA	Quality Assurance
QC	Quality Control
QMF	Quality Management Framework
QMS	Quality Management System
PANGEA	Partnership for new GEOSS Application
RA	Regional Association
RCC	Regional Climate Centre
RIC	Regional Instrument Centre
RMIC	Regional Marine Instrument Centre
RRR	Rolling Review of Requirements
SADC-CSC	Southern African Development Community – Climate Services Centre
SIDS	Small Island Developing States
SoG	Statement of Guidance
SORT	“Standardization of Observations” Reference Tool (of WIGOS)
SLA	Service Level Agreement
TC	Technical Commission
TOR	Terms of Reference
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
WCRP	World Climate Research Programme
WIGOS	WMO Integrated Global Observing System
WIP	WIGOS framework Implementation Plan
WIR	WIGOS Operational Information Resource
WIS	WMO Information System
WHYCOS	World Hydrological Cycle Observation System
WWW	World Weather Watch

Resolution 9 (RA I-16)**REGIONAL BASIC SYNOPTIC NETWORK AND REGIONAL BASIC CLIMATOLOGICAL NETWORK IN REGION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) Resolution 5 (XV-RA I) – Regional Basic Synoptic Network and Regional Basic Climatological Network in Region I,
- (2) The *Manual on the Global Observing System* (WMO-No. 544), Volume I, Part III, Regulations 2.1.3.1–2.1.3.5, and the definition of the Regional Basic Synoptic and Climatological Networks,
- (3) The *Manual on Codes* (WMO-No. 306),
- (4) The *Manual on the Global Telecommunication System* (WMO-No. 386),

Considering:

- (1) That the establishment and maintenance of a Regional Basic Synoptic Network (RBSN) of surface and upper-air synoptic stations, adequate to meet the requirements of Members and of the World Weather Watch, constitute one of the most important obligations of Members under Article 2 of the WMO Convention,
- (2) That the Fourteenth World Meteorological Congress welcomed the establishment of Regional Basic Climatological Networks (RBCNs) in all WMO Regions and urged Members to ensure that their operational observing stations compile and transmit the CLIMAT messages according to existing regulations,

Decides:

- (1) That the stations and the observational programmes listed in Annex 1 to the present resolution constitute the update of the RBSN in Region I;
- (2) That the stations listed in Annex 2 to the present resolution constitute the update of the RBCN in Region I;

Urges Members:

- (1) To secure, at the earliest date possible, full implementation of the network of RBSN and RBCN stations and observational programmes set forth in Annexes 1 and 2 to the present resolution;
- (2) To comply fully with the standard times of observation, the global and regional coding procedures and data-collection standards as laid down in the *Technical Regulations* (WMO-No. 49), the *Manual on the Global Observing System* (WMO-No. 544), the *Manual on Codes* (WMO-No. 306) and the *Manual on the Global Telecommunication System* (WMO-No. 386);

Authorizes the president of the Association to approve, at the request of the Members concerned and in consultation with the Secretary-General, amendments to the list of RBSN and RBCN stations in accordance with the procedures laid down in the *Manual on the Global Observing System* (WMO-No. 544), Volume II – Regional Aspects, Region I (Africa), and to monitor the implementation by Members and to address non-compliance in consultation with the Member concerned and the Secretary General.

Annex 1 to Resolution 9 (RA I-16)**UPDATE OF THE REGIONAL BASIC SYNOPTIC NETWORK IN REGION I (AFRICA)***

INDEX	STATION NAME	OBSERVATIONS
<i>(ADDITIONS TO THE RBSN)</i>		
SOUTH SUDAN		
62871	RAGA	S
TUNISIA		
60767	GABES MATMATA	S
<i>(DELETIONS TO THE RBSN)</i>		
ASCENSION ISLAND		
61902	WIDE AWAKE FIELD (ASCENSION IS.)	R W
KENYA		
63619	MOYALE	S
63624	MANDERA	S
63641	MARSABIT	S
63740	JOMO KENYATTA INTERNATIONAL AIRPORT	S
63741	DAGORETTI CORNER	S
63741	DAGORETTI CORNER	R W
63799	MALINDI	S
OCEAN ISLANDS (FRENCH) BETWEEN 0° AND 30°S		
61970	ILE JUAN DE NOVA	S
TUNISIA		
60765	GABES	S
ZIMBABWE		
67964	BULAWAYO (GOETZ OBSY.)	R W

LEGEND: S = Surface; R= Radiosonde; W= Radiowind

* Update to [Resolution 5 \(XV-RA I\) – Regional Basic Synoptic Network and Regional Basic Climatological Network in Region I](#)

Annex 2 to Resolution 9 (RA I-16)**UPDATE OF THE REGIONAL BASIC CLIMATOLOGICAL NETWORK IN REGION I (AFRICA)***

INDEX	SUB INDEX	STATION NAME	CLIMAT	GSN	GUAN
<i>(ADDITIONS TO THE RBCN)</i>					
SOUTH SUDAN					
62871	0		X		
TUNISIA					
60767	0		X	X	
<i>(DELETIONS FROM THE RBCN)</i>					
KENYA					
63641	0	MARSABIT	X		
63671	0	WAJIR	X		
63695	0	MERU	X		
63708	0	KISUMU	X		
63714	0	NAKURU	X		
63766	0	MAKINDU	X		
63772	0	LAMU	X		
63793	0	VOI	X		
63799	0	MALINDI	X		
TUNISIA					
60765	0	GABES	X	X	
ZIMBABWE					
67779	0	MOUNT DARWIN	X		
67869	0	KADOMA	X		
67969	0	WEST NICHOLSON	X		
67971	0	ZVISHAVANE	X		

* Update to [Resolution 5 \(XV-RA I\) – Regional Basic Synoptic Network and Regional Basic Climatological Network in Region I](#)

Resolution 10 (RA I-16)**WMO/AMCOMET REGIONAL SPACE PROGRAMME FOR AFRICA**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) The critical importance of satellite observations to support weather, climate, marine and environmental services for disaster risk reduction, protection of life and property, and sustainable socioeconomic development of Africa,
- (2) The benefits demonstrated by existing satellite-related activities in the Region, including the Meteosat and Metop programmes and the PUMA, AMESD and MESA projects of the European Organization for the Exploitation of Meteorological Satellites, and through training and capacity-building at the VLab Centres of Excellence,

- (3) That in spite of rapid developments in the last two decades, an efficient and full exploitation of satellite observation data and products in the Region remains limited by access to data and information, capacity in regionally-tailored product development and in satellite utilization, as shown by WMO regional surveys,
- (4) The work initiated by the African Union (AU), in collaboration with the African Ministerial Conference on Science and Technology (AMCOST) and the African Ministerial Conference on Meteorology (AMCOMET) on an African Regional Space Programme, which addresses five thematic areas: Earth Observation; Navigation and Positioning; Satellite Communication; Space Physics; and Astronomy,
- (5) That the role of AMCOMET in the African Regional Space Programme, through the AMCOMET Task Force on the Regional Space Programme, is to provide input relevant to operational meteorology and linked to the thematic areas,
- (6) That meteorological space programmes generally consist of a ground segment, an application segment and a space segment,
- (7) The experience gained by several African nations, such as Algeria, Kenya, Nigeria and South Africa, in their development of national space programmes, as well as the experience of emerging countries such as China and India in developing space programmes, which all started by developing and strengthening national ground and application segments,

Recommendations:

- (1) That the WMO/AMCOMET Regional Space Programme for Africa build to full extent on, and strengthen, existing satellite-related programmes and activities in the Region, and focus on key gaps identified by Members;
- (2) That the prospective WMO/AMCOMET Regional Space Programme for Africa place emphasis on the further development of regionally tailored applications of space-based observations to weather prediction, climate monitoring and disaster risk reduction;
- (3) That considerations for the prospective development of a space segment be based on a thorough gap analysis using:
 - (a) The WMO Rolling Review of Requirements process;
 - (b) The experience gained in applications of existing satellite systems;
 - (c) The identification of precise needs and of gaps in current and planned satellite systems;
- (4) That the development of the WMO/AMCOMET Regional Space Programme for Africa be closely connected with the AU African Space Policy and African Space Strategy developed at the request of AMCOST, in collaboration with AMCOMET and the African Union Commission;
- (5) That the concept and elements of a WMO/AMCOMET Regional Space Programme for Africa be further developed in 2015;

Invites Members of RA I to provide support to the AMCOMET Task Force on the African Regional Space Programme to further refine the concept of the WMO/AMCOMET Regional Space Programme for Africa, and to develop a programme proposal;

Requests the Secretary-General, through the WMO Regional Programme and the WMO Space Programme, to provide the necessary support in facilitating the development and implementation of the WMO/AMCOMET Regional Space Programme for Africa.

Resolution 11 (RA I-16)**WMO INFORMATION SYSTEM IMPLEMENTATION PLAN FOR
REGIONAL ASSOCIATION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) Resolution 4 (Cg-XVI) – Report of the extraordinary session (2010) of the Commission for Basic Systems relevant to Technical Regulations concerning the Global Telecommunication System, data management and the WMO Information System,
- (2) The *Manual on the WMO Information System* (WMO-No. 1060),

Noting further:

- (1) The importance of implementing the WMO Information System (WIS) to support WMO priority activities, including the WMO Integrated Global Information System (WIGOS) and the Global Framework for Climate Services,
- (2) That the new functionality of WIS became operational in January 2012 and that Global Information System Centres Pretoria and Casablanca, along with those of Exeter and Toulouse, are providing operational support and capacity-building for the Region,

Decides to endorse the WMO Information System Implementation Plan 2014–2016 for Regional Association I (Africa), as given in the annex to the present resolution;

Requests the Management Group of Regional Association I to monitor WIS implementation within the Region, noting the desire of the Association that all of its Members be able to use WIS by the end of 2015;

Requests:

- (1) All Members that have yet to do so, to confirm their Principal GISC and National WIS Focal Point as soon as possible in writing to the Secretary-General and to report on the progress of WIS implementation to the RA I Management Group;
- (2) All Members to make the implementation of WIS a priority in their National Centres and Data Collection or Production Centres to ensure that staff supporting WIS components are appropriately trained in WIS support activities, in particular the creation and management of discovery metadata;

Requests all GISCs supporting RA I to work with Members to ensure that associated centres are compliant with the relevant standards laid out in the *Manual on the WMO Information System* (WMO-No. 1060) and to confirm compliance in writing to the Secretary-General;

Requests the Secretary-General to monitor WIS implementation and ensure liaison between Members, the Association and the technical commissions concerned.

Annex to Resolution 11 (RA I-16)**WMO INFORMATION SYSTEM IMPLEMENTATION PLAN 2014–2016 FOR
REGIONAL ASSOCIATION I (AFRICA)**

WORLD METEOROLOGICAL ORGANIZATION
REGIONAL ASSOCIATION I (Africa)

RA I
WIS IMPLEMENTATION PLAN
2014–2016



SEPTEMBER 2014

VERSION CONTROL

<i>Version</i>	<i>By</i>	<i>Date</i>	<i>Changes</i>
0.1	WMO Secretariat	31/07/2014	Initial draft based on RA III WIS Implementation Plan v0.3.
0.2	Ad hoc RA I WIS task team	26/09/2014	Final RA I ad hoc WIS team draft
1.0	RA I-16	5/02/2015	[Approved RA I-16]

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 - 4.4 WIS data networks
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Appendices:

- Appendix I: Action Plan for implementing a NC in RA-I under WIS
- Appendix II: Action Plan for implementing a DCPC in RA-I under WIS
- Appendix III: Sample letters
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1. EXECUTIVE SUMMARY

Benefits for the Member countries of WMO Regional Association I (Africa) arising from the full implementation of WIS (the WMO Information system) will include:

- Continued and enhanced operation of the GTS (WMO's Global Telecommunication System) providing a reliable and timely collection and dissemination service for time-critical and operation-critical data and products;
- The GTS will continue to make better use of public communications such as the Internet where appropriate and supported by advanced satellite distribution systems;
- The GTS data management framework will continue to pursue fast and efficient coding practices and data representations;
- A new system of catalogues available through a Global Information System Centre (GISC) portal, enabling online search, discovery and access of available data and products. This facilitates access to a much greater range of current and archived data and products;
- Easy access to GTS data and products published in the past 24 hours using browsers and other standard applications;
- Simplified processes for Member countries to update GTS routing and to provide information about available data and products.

The WIS Implementation Plan (WIS-IP) is aimed at guiding RA I Members to implement WIS functionality in their identified centres and to become effective WIS users in a timely and harmonized manner. Therefore, it concentrates on enablement of new WIS functionality by NMHSs as National Centres (NC), i.e. it focuses on helping the members of RA I to set up WIS functionality in their National Centres (NC) connected to their principal GISC in the Region. Although the establishment of Data Collection or Production Centres (DCPC) has been mentioned briefly, the implementation detail is not covered by this document, because implementation procedures for DCPCs are documented in the Manual on WIS¹ and WIS Demonstration Process "Procedures and Guidelines"².

The WIS-IP outlines: the features of WIS; the benefits for Members to be connected to WIS; the current status of WIS in RA I; the telecommunication network used for meteorological data and products; then goes on to describe steps for implementation in RA I. The list of countries in RA I together with their proposed principal GISC provides an overview of the structure of WIS after its regional implementation. The steps an NMHS has to take to function as a WIS NC are described in detail. The initial steps to establish a DCPC are also mentioned. Sample step-by-step implementation approach for these two cases is provided in the Appendices.

The goal is for most of the RA I Members to be WIS enabled by the end of 2015. Challenges associated with the WIS implementation in RA I are identified, together with possible remedies. The plan recommends that RA I forms a Task Team on WIS Implementation (TT-WIS) that includes representatives of the GISCs and subregions. Each Permanent Representative in RA I has to nominate a national WIS Focal Point and an alternate who have the responsibility for coordinating the actions needed to deliver the WIS in their own country. Permanent Representatives must also confirm the GISC they wish to use as their Principal GISC. The responsibilities of the TT-WIS in the WIS implementation monitoring are described with their importance for the successful implementation of the plan. The participation and cooperation of the national WIS Focal Points is stressed. The future activities to implement the plan are also listed.

¹ *Manual on the WMO Information System* (WMO No 1060) – <http://wis.wmo.int/wis-manual>

² WIS Demonstration Process Guidelines – <http://www-db.wmo.int/WIS/centres/guidance.doc>

Member countries and specifically their national WIS Focal Points are urged to maintain active collaboration with their principal GISC. For most RA I countries the principal GISC is either GISC Casablanca or GISC Pretoria for which the contact details are provided in Appendix VI.

2. INTRODUCTION

In 2003, the World Meteorological Congress (Cg-XIV) stated that an overarching approach for solving the data management problems for all WMO and related international programmes, a single coordinated global infrastructure was required. This solution was named the WMO Information System (WIS) with the following features:

- WIS would be used for the collection and sharing of information for all WMO and related international programmes;
- WIS would provide a flexible and extensible structure allowing the participating centres to enhance their capabilities as their national and international responsibilities grow;
- Implementation of WIS should build upon the most successful components of existing WMO information systems in an evolutionary process;
- WIS development should pay special attention to a smooth and coordinated transition;
- The basis for the core communication network should be the communication links used within the World Weather Watch (WWW) for the high priority real-time data;
- WIS should utilize international industry standards for protocols, hardware and software.

Between Cg-XIV (2003) and Cg-XV (2007), good progress was made in demonstrating the technological solutions for WIS through pilots and prototypes projects.

Cg-XV agreed that the WMO Information System should provide three fundamental types of services to meet the different requirements, as follows:

- a. Routine collection and dissemination service for time-critical and operation-critical data and products;
- b. Data discovery, access and retrieval service;
- c. Timely delivery service for data and products.

Cg-XV also emphasized that the WIS implementation should build upon existing WMO information systems in a smooth and evolutionary process. It agreed that the WIS implementation plan should have two parts that would be developed in parallel:

- **Part A:** the continued consolidation and further improvements of the GTS for time-critical and operation-critical data, including its extension to meet operational requirements of WMO Programmes in addition to the World Weather Watch (including improved management of services);
- **Part B:** an extension of the information services through flexible data discovery, access and retrieval services to authorized users, as well as flexible timely delivery services.

Cg-XV further emphasized that the support and involvement of all NMHSs, including regional associations and technical commissions in the WIS development was a crucial factor for ensuring a successful implementation and a shared ownership of the system.

During the period 2007–2011, between Cg-XV and Cg-XVI, under the leadership of the CBS, the development of WIS progressed both in terms of technological solutions and preparation of regulatory and guidance material for its implementation. Thus, Cg-XVI (2011) noted the significant

progress achieved by Members in implementing WIS with 18 Members/organizations that have entered into the first round of the demonstration process for a total of 13 GISCs and 56 DCPCs (some of these centres had been in pre-operational mode since May 2010). Congress accepted the recommendation by CBS on the designation of the initial set of WIS centres. Congress requested that after the initial designation of WIS centres, further designations will be performed by EC in accordance with the Manual on WIS.

Cg-XVI stated that WIS had moved from a development stage into an operational stage and advised Members and relevant international organizations that WIS activities in 2012–2015 should focus on:

- a. Complete WIS implementation across all WMO Centres;
- b. Capacity-building to ensure support of all WMO Members;
- c. Leveraging WIS advantages for all WMO Programmes; and
- d. Taking advantage of WIS in all WMO Data Management.

Cg-XVI became a turning point for intensive global, regional and national planning for the implementation of WIS and emphasized that although the implementation of the new functionality of WIS had been advanced in a few core centres, many Members were yet to begin their implementation. Cg-XVI expected that the full implementation of WIS by all Members will take at least the whole of the 2012–2015 financial period.

Congress set-up the following major activities and implementation target dates, urging all Members and the Secretary-General to identify the necessary resources for reaching the objectives:

- a. Improving the knowledge and capabilities of Members to benefit from WIS functionality, in particular least developed countries, developing countries and small island states through regional workshops and information sessions: 2012–2013;
- b. Implementation of WIS at all NMHS national centres (NCs): 2012–2015;
- c. Implementation of remaining candidate GISCs: 2012–2013;
- d. Implementation of more DCPCs, i.e. WIS interfaces at WMO Programmes' centres: 2012–2015;
- e. Amendments to the Manual on WIS for enhanced operational arrangements of WIS centres, especially GISCs: 2014.

The introduction on WIS presented above shows that the implementation of WIS in the WMO community opens the new chapter for the global data exchange. The benefits for the Member countries of WMO Regional Association I (Africa) arising from the full implementation of WIS will include:

- * Continued and enhanced operation of the GTS (WMO's Global Telecommunication System) providing a reliable and timely collection and dissemination service for time-critical and operation-critical data and products;
- * The GTS will make better use of public communications including the Internet where appropriate, and supported by advanced satellite distribution systems;
- * The GTS data management framework will continue to pursue fast and efficient coding practices and data representations;

- * A new system of catalogues available through a GISC portal, enabling online search, discovery and access of available data and products. This facilitates access to a much greater range of current and archived data and products;
- * Download or re-runs of GTS data and products published in the past 24 hours;
- * Simplified processes for Member countries to update GTS routing and provide information about available data and products.

The fifteenth session of World Meteorological Organization (WMO) Regional Association I (RA I), Marrakech (November 2010) established the RA I Management Group and the following subsidiary bodies:

- Working Group on Observations and Infrastructure (WG-OI)
- Working Group on Climate Matters and Applications
- Working Group on Improved Weather Forecasting and Natural Disaster Mitigation
- Working Group on Hydrology
- Working Group on Education and Training

The structure of WG-OI included Ms Lukiya Tazalika (Uganda) as chairperson supported by the following experts:

- Two experts each on WIGOS and on WIS:
Ms Mariane Diop Kane (Senegal)
Hanan Magzob Mohamed Rabah (Sudan)
Rabia Merrouchi (Morocco)
Henry Karanja (Kenya)
- Two regional experts on instruments and methods of observation (CIMO) (one specializing in conventional observation systems, and the other in remote sensing):
Ms Gasewasepe K. Nthobastsang (Botswana)
Ms Lukiya Tazalika (Uganda)
- Two telecommunications experts:
Francis Mosethlo (South Africa)
Walid Mohammed Abd El-Hamied (Egypt)

WG-OI established a WIGOS Task Team (TT-WIGOS) consisting of:

Francis Mosetlho / Nish Devanunthan	(South Africa)
Henry Karanja	(Kenya)
Rabia Merouchi	(Morocco)
Aida Diongue Niang	(Senegal)
Athanase Yambele	(Central African Republic)
Alphonse Kanga	(Congo)
Hanan Magzob Rabah	(Sudan)
Ogunyemi O.A	(Nigeria)
Islam Maher Amin	(Egypt)

The TT-WIGOS held five sub regional workshops across RA I (Central, North, West, East and South) and recognized the dependence of WIGOS on the establishment of the WMO Information System (WIS). It recommended that each Member should designate a National WIS Focal Point

and alternate (TOR provided at http://www.wmo.int/pages/prog/www/CBS/Lists_WorkGroups/CBS/cross-cutting/fp%20wis/tors), from which RA I Management Group, in consultation with PRs will identify Subregional focal points who, along with a representative from the GISCs would form a WIS Task Team. An interim TT-WIS developed this RA I WIS Implementation plan. The interim TT-WIS that met in Pretoria on 22–26 September 2014 included the following experts:

- Vice-president RA I: Amos Makarau (Zimbabwe)
- Central Africa: Donatien Kamunga (Democratic Republic of Congo)
- Eastern Africa: Peter Mutai (Kenya)
- Northern Africa: Hassan Haddouch (Morocco)
- Southern Africa: Dennis Kapaso (Zimbabwe)
- Western Africa and ASECNA: Saidou Dieme (Senegal)
- GISC Pretoria: Bubele Vakalisa (South Africa)
- GISC Casablanca: Hassan Haddouch (Morocco)
- GISC Toulouse: Remy Giraud (France)
- GISC Offenbach: Bernd Richter (Germany, by teleconference)
- Alternate for Zimbabwe: Freedom Mukanga (Zimbabwe)
- Alternate for South Africa: Christa Ferreria (South Africa)
- WMO Secretariat: Elijah Mukhala (WMO)
- WMO Secretariat: Steve Foreman (WMO)

A new structure will be submitted to RA I-16 to better address WIS and WIGOS implementation in RA I.

In conclusion, the RA I WIS Implementation Plan is an all-inclusive guiding document for RA I Members to follow in building an effective and efficient WIS infrastructure, in line with the guidance given by Cg-XVI for a fast transition from development to implementation phase of the WIS.

3. SCOPE AND PURPOSE OF RA I WIS IMPLEMENTATION PLAN

The RA I WIS Implementation Plan is aimed at guiding RA I Members to implement WIS functionality in their identified centres and to become effective WIS users in a timely and harmonized manner. Therefore, it concentrates on enablement of new WIS functionality by NMHSs as National Centres (NC). Included in the scope of this plan is assisting Members to understand the benefits of WIS and convey these benefits to stakeholders.

In order to facilitate the implementation process, RA I GISCs should establish close contacts with the NCs in their areas of responsibility. They are GISC Casablanca and GISC Pretoria supported by GISCs Exeter, Toulouse and Offenbach. In particular, GISCs should act as “help desks” and provide assistance to build the capacity of the NCs to handle the required discovery metadata. Also, the plan states the standards for WIS compliance of NCs for the guidance of Members and their principal GISCs.

The regional dimension of the implementation process is addressed in this WIS-IP. This dimension is important because it facilitates a synchronized and coordinated implementation by all Members and partner organizations of the Region. The existing capacity gaps, both technical and human resource related, could be addressed through the cooperation and assistance mechanisms of the Regional Association, which would accelerate the implementation and bring the expected benefits to all Members.

The Plan also provides practical guidance and a step-by-step approach towards the WIS implementation by Members in their National Centres. A primary task for the NMHSs is ensuring compliance with the WIS requirements established by the WMO regulatory material WMO *Technical Regulations*, Volume I (WMO-No. 49) and its Annex VII, *Manual on the WMO Information System* (WMO-No. 1060).

4. DESCRIPTION OF WIS

WIS is the global infrastructure for managing and making available weather, water and climate information. WIS meets the requirements for routine collection and automated dissemination of observed data and products, as well as data discovery, access and retrieval services for all weather, climate, water and related data and products provided by centres and Member countries in the framework of all WMO Programmes.

4.1 WIS Services

While WIS builds on and extends the GTS, it is also a new approach to data discovery and data provision in the meteorological community. WIS goes far beyond providing telecommunication services, and offers new and modern data management services to its users. These are essentially the possibility to discover all data and products of the wider WMO community, as well as the means and information on how to obtain the data. For this purpose, all information within WIS is described by discovery metadata in accordance to the WMO Metadata Core Profile. It is assumed that WIS by including the GTS and the Internet will have sufficient bandwidth/link capacity available to fulfill future user needs. To this end, WIS provides three types of services:

- a. **Routine collection and dissemination service for time-critical and operation-critical data and products:** This service is an extension of the current GTS. It is based on subscription to real-time “push and forward” distribution systems, including multicast and broadcast, and implemented mostly through dedicated telecommunication means providing a guaranteed quality of service. An important component of this service will be the “all hazards warning network” facilitating warnings to be distributed from one point in WIS to all other points within 2 minutes.
- b. **Service for the timely delivery of non time-critical, operationally critical or voluminous data and products:** This is a new service which allows users to subscribe to data that would not otherwise have been available through the GTS because it is too voluminous or because the delivery is not so critically time- or operationally- dependent. Thus, the delivery method for these data does not need to use the capacity of the GTS. It is also suitable for those users not connected to the GTS. The service is focused on a “push” mechanism and implemented mostly via public data-communication networks, such as the Internet. As with the time and operationally critical service (1), users may use the discovery service (3) to search for the information they would like to access or subscribe to.
- c. **Data Discovery, Access and Retrieval (DAR) service:** This is a new service where the user can use a variety of discovery services to search for data, products or other information registered within the WIS. Depending on the access policy for the data, the user may also access and download the data. The service is based on a request/reply “pull” mechanism and is to be implemented mainly through the Internet, but the user may also subscribe to receive data or products via the GTS or any other delivery mechanism available between the information provider and the user (for example via e-mail, SMS, facsimile, courier or postal services). In this way, WIS users can potentially discover and access all WMO data and products without having an extensive knowledge of the information practices and procedures of the WMO Programme responsible for the data or product. Note that if a user has an account at a GISC, then, depending on the data policy, it may be able to access information directly from the GISC, all of which hold information that is available for global exchange for at least 24 hours.

4.2 The structure of WIS

The WIS services described above are realized by WMO Members and associated centres through three types of WIS centres as well as the WIS data communication network. WIS centres need to be endorsed by WMO in accordance with the regulations described in the *WMO Technical Regulations* (WMO-No. 49) and the *Manual on WIS* (WMO-No. 1060).

The concept of interoperability guarantees that the overall functionality of WIS is realized by each WIS centre through implementing the specifications required for this type of centre. The four core components are:

- Global Information System Centres (GISC);
- Data Collection or Production Centres (DCPC);
- National Centres (NC);
- Data networks.

4.3 WIS Centres

GISCs collect and distribute information for routine global dissemination, such as GTS data. They serve as collection and distribution centres in their areas of responsibility and they provide access points for any request for data held within the WIS. A WIS user accessing the web portal of any GISC will be able to browse any data catalogue of information available in WIS.

DCPCs are connected to the GISCs and are responsible for the collection or generation of specialized sets of data, forecast products, processed or value-added information beyond the scope of NCs, and/or for providing archiving services.

NCs collect, produce and distribute data and products on a national basis and coordinate or authorize the use of the WIS by national users, normally under a policy established by the respective Permanent Representative with WMO.

The terms NC, DCPC and GISC are used for describing the necessary functions, not actual organizational entities. There may be organizations, such as NMHSs, which combine all three functions within their structure. There may be several GISCs in a Regional Association (RA). NCs and DCPCs can be associated with several GISCs but have to choose one of the GISCs as their principal GISC for the purposes of uploading and managing discovery metadata. The following diagram provides an overview of the various components:

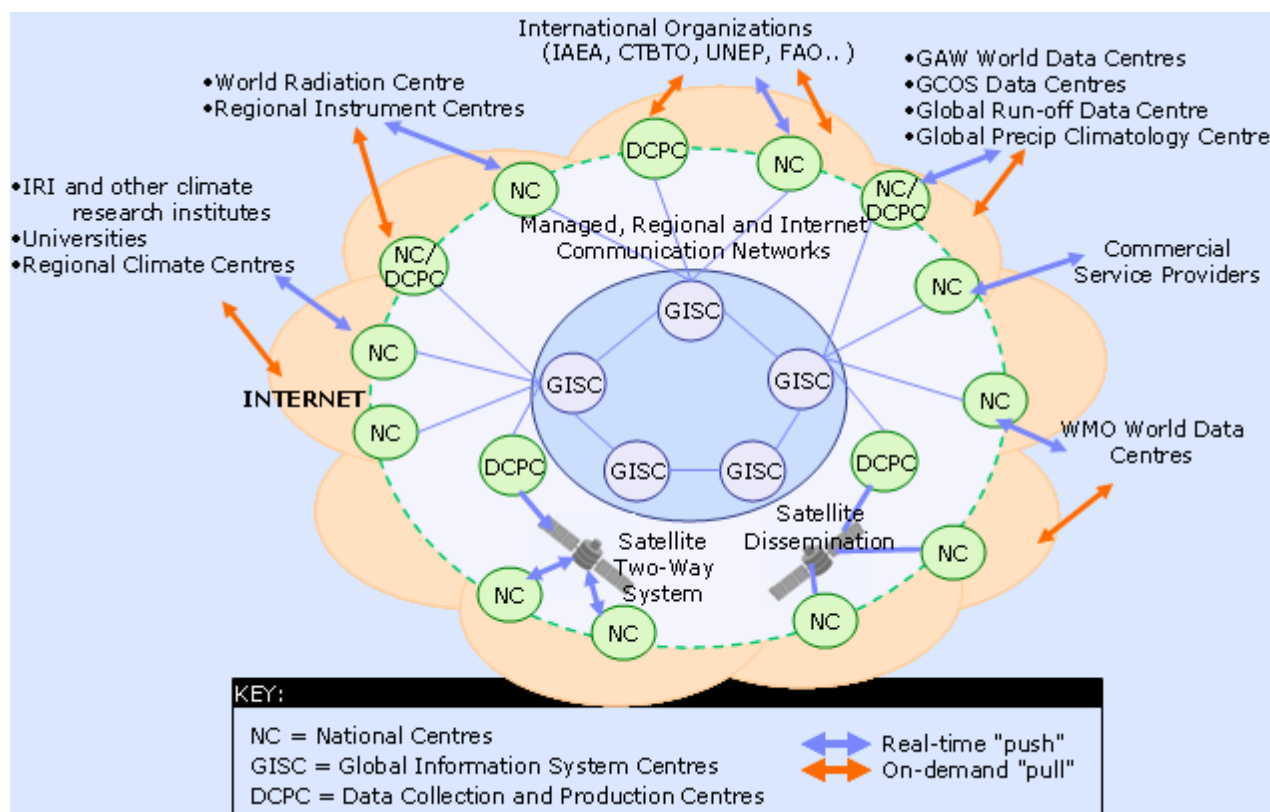


Figure 1: WIS core components and Information Exchange

4.4 WIS data networks

The WIS network structure consists of a WIS Core Network connecting all GISCs to each other. Each GISC has an Area Meteorological Data Communication Networks (AMDCN) connecting them to NCs and DCPCs in their area of responsibility. This is illustrated in Figure 2. An NC or DCPC may be in multiple AMDCNs. The AMDCNs incorporate GTS infrastructure and may involve single, partial or multiple regional meteorological telecommunication networks.

The data communication networks that can be used in WIS include:

- The Main Telecommunication Network (MTN) of the GTS³ forms the WIS Core Network;
- GISCs are also connected by the Internet, which presently is being used for discovery metadata synchronization;
- The GTS (MTN and RMTN) provides the dedicated network component of the AMDCNs, especially for meeting real-time exchange requirements and the all hazards network. Note that the GTS includes extensive use of Internet through Virtual Private Networks (VPN) in many areas where no alternatives exist;
- Satellite distribution systems such as those described by the Integrated Global Data Dissemination Service (IGDDS) form an essential part of the GTS and therefore the WIS, especially for the support of remote areas where terrestrial communication systems do not effectively meet the need. This includes data collection systems for remote platforms as well as for distribution of data and products related to the WMO Space Programme;
- Terrestrial links or managed data network services;
- The Internet, either open or utilizing VPN, which will be used in the AMDCNs to increase bandwidth capacity to many centres as well as providing connectivity for non-GTS centres and for individual users accessing WIS.

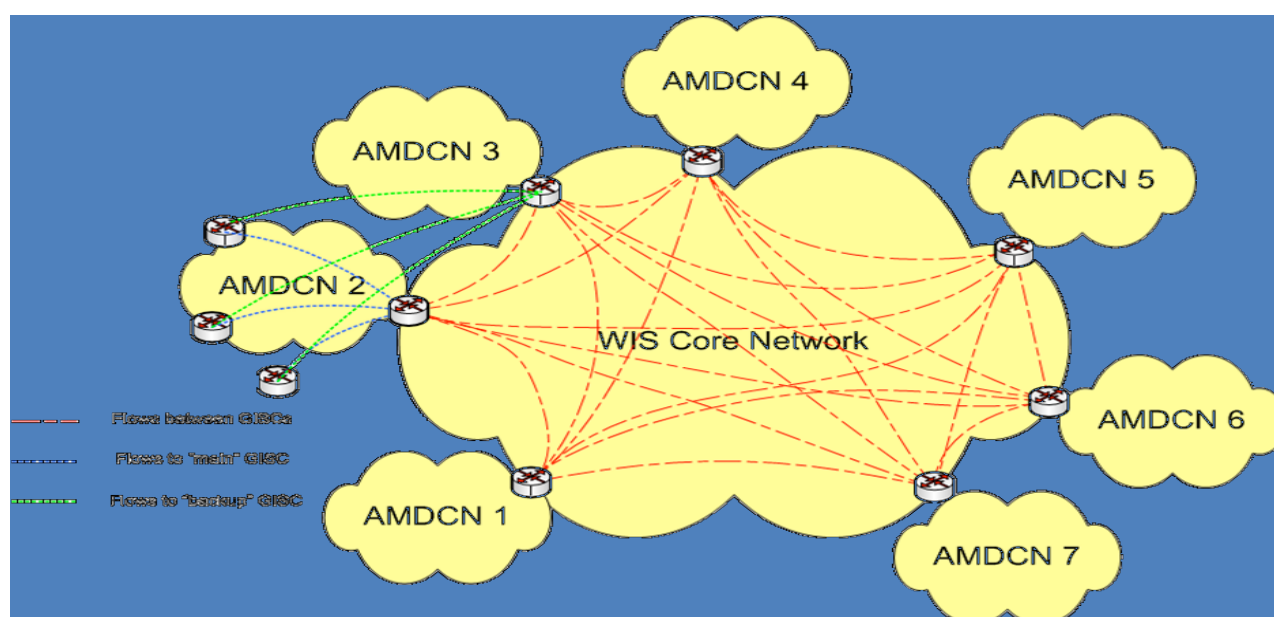


Figure 2: WIS network topology

³ A full description of the existing GTS structure and networks can be found in the *Manual on the GTS* (WMO-No. 386). <http://wis.wmo.int/gts-manual>

4.5 Benefits of WIS

As an integrated part of WIS from the World Weather Watch Programme (WWW), the aim of the GTS is to ensure delivery of time-critical and operation-critical data, products and services for all WMO Programmes, including warnings to and from NMHSs. GTS realizes this through the "Routine collection and dissemination service for time-critical and operation-critical data and products", mentioned above.

The GTS will continue to develop and incorporate new technology, linking all WMO Members with a dedicated, secure network. This network will continue to be supported by advanced satellite distribution systems. In addition, the GTS will also be able to supplement the private networks and make better use of public communications such as the Internet, where appropriate.

The GTS data management framework will include the development of data representations, including fast and efficient coding practices that allow increasingly voluminous data streams to reach countries with less advanced or low capacity communication systems. New functionality of WIS for GTS users will include:

- Online discovery of which data and products are available on the GTS by interactively accessing a GISC portal;
- Download or re-runs of GTS data and products published during the past 24 hours. This is of interest for users that have missed data because of a failure of IT systems, equipment or networks;
- Updating of GTS routing based on online subscription services rather than service messages requesting the GTS Point of Contacts to change the routing. An NMHS may configure its own routing information. Thus, a centre needs only deal with its associated GISC for changing subscription and publishing schedules;
- Configure upload of data to the GTS. Rather than requesting the GTS Point of Contact and WMO to change information about the data that is uploaded to the GTS, the NMHS may do the configuration;
- Ensure that the ownership and availability of the data provided is advertised by using the DAR metadata.

Existing centres within WMO Member States that comply with the required WIS functions and technical specifications will be designated as one of the three types of WIS centre. While Members can choose to apply for a type of centre matching their level of responsibilities and commitment, the expected mapping of WWW centres into WIS centres remains to be:

WWW Centre	WIS Centre
NMC	NC
RSMC	DCPC
WMC	DCPC and/or GISC
RTH	DCPC
RTH on MTN	DCPC and/or GISC
Others	NC and/or DCPC

4.6 WMO information sources and regulations on WIS

Information on all aspects of WIS is available on the WMO website at: <http://www.wmo.int/wis>.

The implementation of the WIS is coordinated through a Global Project and Implementation Plan available at: <http://www.wmo.int/pages/prog/www/WIS/documents/WIS-ProjectPlan-v1-2-1.doc>.

The technical regulations related to WIS are published in the WMO *Technical Regulations* (WMO-No. 49), Volume 1, General Meteorological Standards and Recommended Practices, Part I, Section 3, and in Annex VII, *Manual on the WMO Information System* (WMO-No. 1060). Practical guidance on the implementation of the technical regulations is provided in the *Guide to the WMO Information System* (WMO-No. 1061).

5. WIS IN REGION I (AFRICA)

5.1 Current status of RA I telecommunication

The current GTS in RA I is a hierarchical structure with eight Regional Telecommunications Hubs (RTH); Algiers, Brazzaville, Cairo, Dakar, Lusaka, Nairobi, Niamey and Pretoria where Algiers, Cairo, Dakar and Nairobi are on the MTN. All Members are connected to at least one RTH. The data is sent from RTH to RTH and then from the RTHs to the other nodes connected to it. The current communication links between the centres are given in Fig. 3a below. Note that this diagram does not reflect the connections to the WIS Core network in RA I that have been established at GISCs Casablanca and Pretoria which means they are also on the MTN.

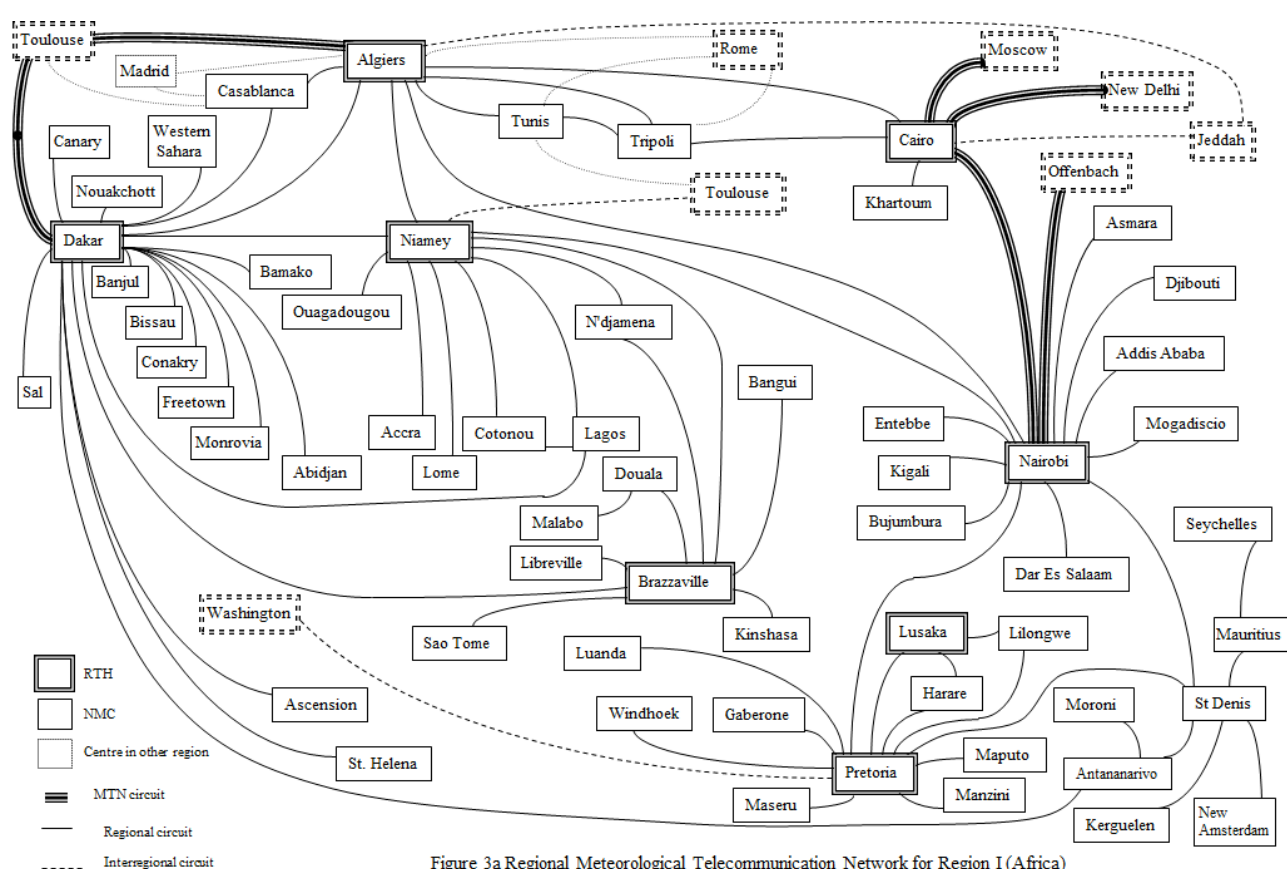


Figure 3a Regional Meteorological Telecommunication Network for Region I (Africa)

Figure 3a: Communication RMTN in RA I

Main Telecommunication Network

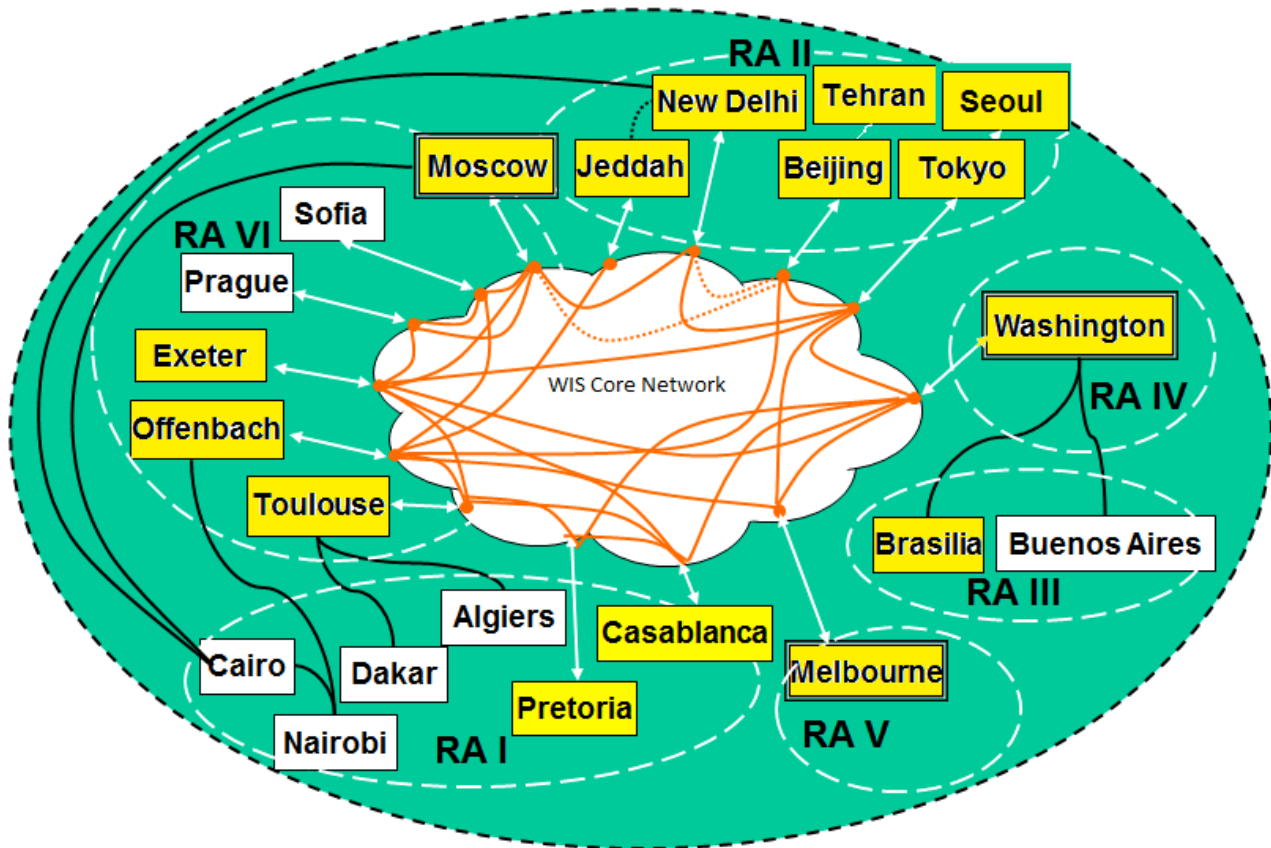


Figure 3b Connectivity Diagram WIS Core Network to RA I and MTN extensions

Figure 3b shows the WIS core network connecting all GISCs. In addition each GISC will establish communication links with each centre in its area of responsibility. These will vary with each GISC but will include being able to send data via the WIS Core Network to GISCs that are directly connected to RA I RTHs on the MTN as well as via the Internet.

Table 1 shows GTS access speeds for Members' centres. WIS links are still to be added as a part of the WIS implementation plan process. GISCs will provide the primary gateway from RA I to the WIS Core Network.

Table 1. Network connection and bandwidth for RA I centres

RA I National Centres WIS and GTS links					
Country	Centre location	Link bandwidth Kb/s	Link Type & Protocol	RTH	GISC
Algeria	Algiers	64		Toulouse	Casablanca
Algeria	Algiers	0,05		Rome	Casablanca
Angola	Luanda		NI	Pretoria	Pretoria
Benin	Cotonou	1,2	IP	Niamey	Casablanca
Botswana	Gaborone	64	IP	Pretoria	Pretoria
Burkina Faso	Ouagadougou	19,2	IP	Niamey	Casablanca
Burundi	Bujumbura		NI	Nairobi	Casablanca
Cabo Verde	Sal	0,05	IP	Dakar	Casablanca
Cameroon	Douala	1,2	IP	Brazzaville	Casablanca
Central African Republic	Bangui	1,2	IP	Brazzaville	Casablanca
Chad	N'Djaména	1,2	IP	Niamey	Casablanca
Chad	N'Djaména	19,2	IP	Brazzaville	Casablanca
Comoros	Moroni	9,6	IP	St Denis	Casablanca
Congo	Brazzaville	19,2	IP	Dakar	Casablanca
Congo	Brazzaville	19,2	IP	Niamey	Casablanca
Cote d'Ivoire	Abidjan	19,2	IP	Dakar	Casablanca
Democratic Republic of the Congo	Kinshasa	0,05	AFTN	Brazzaville	Casablanca
Djibouti	Djibouti		NI	Nairobi	Casablanca
Egypt	Cairo	9,6		Moscow	Casablanca
Egypt	Cairo	4,8	IP	Algiers	Casablanca
Equatorial Guinea	Malabo	0,05	AFTN	Brazzaville	Casablanca
Eritrea	Asmara		NI	Nairobi	Casablanca
Ethiopia	Addis Ababa	4,8	IP	Nairobi	Casablanca
France	Kerguelen	2,4	IP	St Denis	Toulouse
France	La Réunion	Internet	EMAIL	Pretoria	Toulouse
France	La Réunion	64	IP	Nairobi	Toulouse
Gabon	Libreville	1,2	IP	Brazzaville	Casablanca
Gambia	Banjul	0,075	IP	Dakar	Casablanca
Ghana	Accra	1,2	IP	Niamey	Casablanca
Guinea	Conakry	9,6	IP	Dakar	Casablanca
Guinea-Bissau	Bissau		NI	Dakar	Casablanca
Kenya	Nairobi	64		Toulouse	Offenbach
Kenya	Nairobi	64		Offenbach	Offenbach
Kenya	Nairobi	64	IP	Algiers	Offenbach
Kenya	Nairobi	9,6	IP	Niamey	Offenbach
Kenya	Nairobi	9,6	IP	Cairo	Offenbach
Lesotho	Maseru	64	IP	Pretoria	Pretoria

RA I National Centres WIS and GTS links					
Country	Centre location	Link bandwidth Kb/s	Link Type & Protocol	RTH	GISC
Liberia	Monrovia		NI	Dakar	Casablanca
Libya	Tripoli	0,05		Rome	Casablanca
Libya	Tripoli	1,2	IP	Tunis	Casablanca
Libya	Tripoli	0,075	IP	Cairo	Casablanca
Libya	Tripoli		NI	Algiers	Casablanca
Madagascar	Antananarivo	VSAT	IP	Washington	Casablanca
Madagascar	Antananarivo	19,2	IP	Dakar	Casablanca
Madagascar	Antananarivo	9,6	IP	St Denis	Casablanca
Malawi	Lilongwe	0,075	IP	Pretoria	Pretoria
Malawi	Lilongwe		NI	Lusaka	Pretoria
Mali	Bamako	19,2	IP	Dakar	Casablanca
Mauritania	Nouakchott	19,2	IP	Dakar	Casablanca
Mauritius	Port Louis	9,6	IP	St Denis	Casablanca
Morocco	Casablanca	128		Toulouse	Casablanca
Morocco	Casablanca	0,05	IP	Dakar	Casablanca
Morocco	Casablanca	0,05	IP	Algiers	Casablanca
Mozambique	Maputo	64	IP	Pretoria	Pretoria
Mozambique	Maputo	9,6	IP	St Denis	Pretoria
Namibia	Windhoek	64	IP	Pretoria	Pretoria
Niger	Niamey	19,2	IP	Dakar	Casablanca
Nigeria	Lagos	0,05	IP	Niamey	Casablanca
Nigeria	Lagos	0,05	IP	Cotonou	Casablanca
Nigeria	Lagos		NI	Dakar	Casablanca
Portugal	Madeira	64	IP	Toulouse	Toulouse
Rwanda	Kigali		NI	Nairobi	Casablanca
Sao Tome and Principe	São Tomé		NI	Brazzaville	Casablanca
Senegal	Dakar	9,6		Toulouse	Casablanca
Seychelles	Victoria	19,2	IP	St Denis	Casablanca
Seychelles	Victoria		NI	Port Louis, Mauritius	Casablanca
Sierra Leone	Freetown		NI	Dakar	Casablanca
Somalia	Mogadishu		NI	Nairobi	Casablanca
South Africa	Pretoria	64	IP	Washington	Pretoria
South Africa	Pretoria	128	IP	Nairobi	Pretoria
South Africa	Pretoria	Internet	IP	Lusaka	Pretoria
South Sudan					
Spain	Santa Cruz de Tenerife, Canary Islands	0,05	IP	Dakar	Toulouse
Sudan	Khartoum	DCP	DCP	Cairo	Pretoria

RA I National Centres WIS and GTS links					
Country	Centre location	Link bandwidth Kb/s	Link Type & Protocol	RTH	GISC
Swaziland	Manzini	64	IP	Pretoria	Pretoria
Togo	Lomé	1,2	IP	Niamey	Casablanca
Tunisia	Tunis	64		Toulouse	Casablanca
Tunisia	Tunis	0,05		Rome	Casablanca
Tunisia	Tunis	2,4	IP	Algiers	Casablanca
Uganda	Entebbe	33,6	IP	Nairobi	Casablanca
United Kingdom of Great Britain and Northern Ireland	Georgetown, Ascension Island	256k ADSL	IP	Exeter	Exeter
United Kingdom of Great Britain and Northern Ireland	Jamestown	256k ADSL	IP	Exeter	Exeter
United Republic of Tanzania	Dar es Salaam	33,6	IP	Nairobi	Exeter
Zambia	Lusaka	Internet	IP	Pretoria	Pretoria
Zambia	Lusaka	Internet	IP	Exeter	Pretoria
Zimbabwe	Harare	64	IP	Pretoria	Pretoria
Zimbabwe	Harare	Internet	NI	Lusaka	Pretoria

The architecture of RA I GTS was developed to take into account improved and cost effective secure connectivity. It has proven to be very effective and robust. TT-WIS plans to undertake a review of the architecture with an aim to modernising the components and further enhance the performance and capacity of the network.

5.2 Status of WIS Centres in Region I (Africa)

The procedures for the designation of the three types of WIS centres are provided in the Manual on WIS (WMO-No. 1060), Part II. After successful completion of the designation procedure, the centre is included in Appendix B to the Manual, Approved WMO Information System Centres.

Note: Information on the current status of the designation of centres by Members is available on: http://www.wmo.int/pages/prog/www/WIS/centres/index_en.php.

a. GISCs used by centres in RA I

GISCs Casablanca and Pretoria are the only GISCs located within Region I and are the principal GISCs for most centres in the Region. GISCs Exeter, Offenbach and Toulouse are also associated with many centres in RA I, including acting as the principal GISC for some centres. GISCs Pretoria and Casablanca plan to be operational in 2015, the other GISCs are already operational and able to provide WIS services.

b. DCPCs in RA I

Table 2 below provides information on the DCPCs in RA-I with their planned functions and designation status (as of July 2014). For DCPCs to complete their registration in the Manual on the WIS, it is necessary for them to work with their GISC and the CBS Task Team on Centre Audits and Certification in order to demonstrate their compliance with the WIS Manual as described in the Manual on WIS and in the Demonstration Guidelines.

Table 2. DCPCs in RA I

Member/ Org	Centre type	Function	Principal GISC	Const. Body	Endorsement CBS	Congress/EC
ACMAD	DCPC	RCC	Casablanca	CCI	Not submitted to TT-CAC	
Algeria	DCPC	RTH / RSMC- Geographical	Casablanca	CBS	Not submitted to TT-CAC	
Egypt	DCPC	RTH	Casablanca	CBS	Not submitted to TT-CAC	
Egypt	DCPC	RTC	Casablanca	EC-Pan-ET	Not submitted to TT-CAC	
Egypt	DCPC	RSMC- Geographical	Casablanca	CBS	Not submitted to TT-CAC	
Egypt	DCPC	RRC	Casablanca	CBS	Not submitted to TT-CAC	
Egypt	DCPC	RIC	Casablanca	CIMO	Not submitted to TT-CAC	
Egypt	DCPC	Regional Ozone Centre	Casablanca	CAS	Not submitted to TT-CAC	
France	DCPC	RSMC-Activity-TC (La Reunion)	Casablanca	CBS	Approved by Cg/EC	2011-06-01
Kenya	DCPC	RTH	Offenbach	CBS	Not submitted to TT-CAC	
Kenya	DCPC	RSMC- Geographical	Offenbach	CBS	Not submitted to TT-CAC	
Kenya	DCPC	RIC	Offenbach	CIMO	Not submitted to TT-CAC	
Niger	DCPC	RTH	Casablanca	CBS	Not submitted to TT-CAC	
Niger	DCPC	AGRHYMET	Casablanca	CBS/CHy/ CAGM	Not submitted to TT-CAC	
Senegal	DCPC	RTH	Casablanca	CBS	Not submitted to TT-CAC	
Senegal	DCPC	RSMC- Geographical	Casablanca	CBS	Not submitted to TT-CAC	
Senegal	DCPC	Aviation Centre	Casablanca	CAeM	Not submitted to TT-CAC	
South Africa	DCPC	RTH	Pretoria	CBS	Endorsed by TT-CAC	2011-06-01

NCs in RA I

In accordance with the *Manual on WIS* (WMO-No. 1060), each WMO Member shall notify the WMO Secretariat of the name and location of its centre(s) that are to be designated as NC(s). It is therefore expected that each Member will have at least one NC in WIS.

In February 2012, WMO circulated a letter to all Members inquiring information from the Permanent Representatives regarding: (1) nomination of a principle GISC which will be associated with the WIS centre(s) of the Member; and (2) nomination of a focal point for WIS/GTS related matters).

Table 3 below presents the current status⁴ of the designation of NCs in RA-I with their Principal GISC and Focal Points.

⁴ The current status is based WMO [WIS Centres Database in August 2014](http://www.wmo.int/pages/prog/www/WIS/circular_letters_questionnaires.html). Focal Point is based responses to the letter of 10 February 2012 (http://www.wmo.int/pages/prog/www/WIS/circular_letters_questionnaires.html) requesting PRs to nominate WIS focal points and Principal GISCs.

Table 3. RA I NCs

Member/Org	Function	Principal GISC	PR letter	Focal Point (FP)	FP confirmed to WMO
Algeria	NMC	Casablanca			
Angola	NMC	Pretoria		TIMA, Lutumba	Yes
Benin	NMC	Casablanca		OYEDE, Modoukpe Ines	
Botswana	NMC	Pretoria			
Burkina Faso	NMC	Casablanca			
Burundi	NMC	Casablanca			
Cabo Verde	NMC	Casablanca			
Cameroon	NMC	Casablanca			
Central African Republic	NMC	Casablanca			
Chad	NMC	Casablanca			
Comoros	NMC	Casablanca			
Congo	NMC	Casablanca		MABIALA MBABIA DEMABOU, Gral Quiji	Yes
Côte d'Ivoire	NMC	Casablanca			
Democratic Republic of the Congo	NMC	Casablanca		DIEUDONNE, Balemale Magba	Yes
Djibouti	NMC	Casablanca			
Egypt	NMC	Casablanca		GOMAA, Walid	Yes
Equatorial Guinea	NMC	Casablanca			
Eritrea	NMC	Casablanca			
Ethiopia	NMC	Casablanca		BEYENE, Kinfe Hailemariam	Yes
France	WSO (Reunion)	Toulouse		SACLIER, Benjamin	Yes
France	WSO (Kerguelen Islands)	Toulouse			
Gabon	NMC	Casablanca		ALAIN, Ndzie Meviane	Yes
Gambia	NMC	Casablanca			
Ghana	NMC	Casablanca			
Guinea	NMC	Casablanca		LADDAH, Gberegbe	
Guinea-Bissau	NMC	Casablanca		MENDONCA, Feliciano	
Kenya	NMC	Offenbach		MUTAI, Peter. K.	Yes
Lesotho	NMC	Pretoria			
Liberia	NMC	Casablanca			
Libya	NMC	Casablanca			
Madagascar	NMC	Casablanca			
Malawi	NMC	Pretoria			
Mali	NMC	Casablanca		TEKETE, Aliou	Yes
Mauritania	NMC	Casablanca			

Member/Org	Function	Principal GISC	PR letter	Focal Point (FP)	FP confirmed to WMO
Mauritius	NMC	Casablanca		HATTEEA, Umayr	Yes
Morocco	NMC	Casablanca		HADDOUCH, Hassan	Yes
Mozambique	NMC	Pretoria		NHAMUCHO, Rute	Yes
Namibia	NMC	Pretoria			
Niger	NMC	Casablanca			
Nigeria	NMC	Casablanca			
Rwanda	NMC	Casablanca			
Sao Tome and Principe	NMC	Casablanca			
Senegal	NMC	Casablanca		DIEME, Saïdou	Yes
Seychelles	NMC	Casablanca			
Sierra Leone	NMC	Casablanca			
Somalia	NMC	Casablanca			
South Africa	NMC	Pretoria		DE WAAL, Karel	No
South Sudan	NMC	TBD		ASHIEK, Edward Andrew	Yes
Spain	NMC (Canary Islands)	Toulouse			
Sudan	NMC	Pretoria		ATIF, Elsir Mohammed Ali	Yes
Swaziland	NMC	Pretoria			
Togo	NMC	Casablanca			
Tunisia	NMC	Casablanca			
Uganda	NMC	Casablanca			
United Kingdom of Great Britain and Northern Ireland	WSO (St. Helena Island)	Exeter		LITTLE, Chris	No
United Kingdom of Great Britain and Northern Ireland	WSO (Ascension Island)	Exeter			
United Republic of Tanzania	NMC	Exeter		TUMAINI, Emanuel	Yes
Zambia	NMC	Pretoria			
Zimbabwe	NMC	Pretoria		KAPASO, Dennis MUKANGA, Freedom	

Note: In view of the important role the national WIS focal points plays in the coordination of the WIS implementation, the Members who have not yet responded to the WMO circular letter are strongly encouraged to do so as soon as possible. Members should also keep the WMO Secretariat informed of any changes of the status and operation of their centres and/or changes of their focal points information.

6. WIS PLANNING AND IMPLEMENTATION BY RA I MEMBERS

In planning the WIS implementation at national level, Members should strive to comply with the relevant WMO technical regulations, that include procedures, specifications and functional requirements, provided in the WMO *Technical Regulations* (WMO-No. 49), Volume I, Part 1, Section 3, and the *Manual on WIS* (WMO-No. 1060). The *Guide to WIS* (WMO-No. 1061) complements the technical regulations with additional description and explanation of the WIS, which would assist Members in their implementation actions.

6.1 Pre-requisites for participate WIS operation by an NMHS as NC

For a NMHS, there are several requirements to be met by a current GTS centre and thus become a compliant NC. They are mostly concerned with administrative issues and less with technical matters.

When a centre plans to use WIS, the PR of the country should nominate a “WIS Focal Point” and a “Principal GISC”.

a. WIS Focal point

The National WIS Focal⁵ point should be a member of staff who is familiar with the telecommunications and information provision in the country and other topics in the Terms of Reference for the WIS Focal Point (see Appendix VIII), and in particular the current GTS support. Within Region I it is considered good practice to nominate an alternate WIS Focal Point as well to help maintain organizational memory. The person will receive all WIS related information with regard to the country on one hand, but is expected on the other hand to inform WMO and its relevant bodies about any progress or problems encountered when using WIS. He/she will attend training courses organized by WMO or WIS centres and serve as the national distributor of WIS knowledge, in particular the concept of metadata. It is envisaged that the national WIS Focal point will provide the necessary monitoring information.

Since the structure of WIS assumes that an NC is connected to a GISC for its WIS functions and thus participates in the AMDCN organized by that GISC, it is necessary to set up the required administrative links with the GISC. In principle, an NC may belong to the users of any GISC, unless the network connectivity only allows one choice. In any case, an agreement should be reached between the NC and the GISC about their relationship, including identifying their “Principal GISC” for the purposes of managing discovery metadata, of which the WMO should be notified together with the nomination of the WIS Focal point (see Appendix III).

For users who want to access GISC system for services and request an account on the GISC system, the GISC is required to seek permission from the national WIS Focal Point of the country where the users are from.

b. Principal GISC

The principal GISC will ensure within its AMDCN that all connected centres will receive all the data meant for them, be it globally distributed, additional or addressed data. The principal GISC will also collect the data sent by NCs and distribute them in accordance with GTS/WIS regulations. It will maintain the global metadata catalogue and provide means for its AMDCN centres to create/update those parts of the discovery metadata catalogue describing their own data and products, possibly via Internet access.

The principal GISC is to be contacted first by any of its connected centres about any issue related to WIS. It will organize regular meetings with the WIS Focal Points of the centres belonging to its AMDCN and provide training material and courses as required. It will support the metadata

⁵ Terms of Reference for WIS Focal Points http://www.wmo.int/pages/prog/www/CBS/Lists_WorkGroups/CBS/cross-cutting/fp%20wis/tors

activities in its area of responsibility in a suitable manner and provide data for the regional WIS monitoring.

Member countries and specifically their national WIS Focal Points are urged to maintain active collaboration with their principal GISC. For many RA I countries the principal GISC is GISC Casablanca or GISC Pretoria for which the contact details are provided in Appendix VI.

Besides the principal, a back-up GISC is required for operational continuity in case the partial or total failure of the principal GISC. To guarantee at least the dissemination and collection of the globally distributed GTS data, the principal GISC need to consider a communication connection being established between NCs and the backup GISC, in collaboration with the NC and the backup GISC. Agreement needs to be reached on the network specific details, the conditions when it should be used and the actual services provided by it. The primary role of the backup GISC is to ensure data and products continue to be collected and distributed within RA I and shared with other Regions. Regular tests should be carried out to ensure the availability of the back-up when suddenly required. Details of further back-up arrangements to be provided still need further work by the relevant CBS WIS expert teams. The backup GISCs for Casablanca and GISC Pretoria will be formalized before these GISCs become operational, and the GISCs will inform NCs that have designated them as Principal GISC of the decision so that the NCs can make the appropriate arrangements with the backup GISCs.

Connectivity

RA I Members are connected to RTHs using a variety of methods. Members in the west of RA I who use ASECNA services mainly use IP over VSAT. In the north and east of RA I the connections mainly use the internet. In the south of RA I, fixed line, Internet and VSAT connections are used. Some centres are now able to connect to their RTH using MPLS networks.

National telecommunications networks are a challenge for many Members of RA I, with many not having access to digital telecommunications to transmit observations to national centres. In some cases, observations are made but are unable to be passed to the centres that need to use them.

c. Bandwidth

The GTS in RA I has been steadily improving and the migration to IP, including over satellite links, is effectively complete. Noting that bandwidth remains somewhat limited by the cost of satellite connectivity, VSAT links in RA I typically operate at relatively low speeds of 64–128kbps. These 2-way communications systems are supplemented by satellite broadcast and Internet access. Current access speeds are recorded in Table 1 maintained by the Working Group on Observations and Infrastructure.

d. Discovery Metadata

Whereas the GTS data is defined by its header which is recorded in the relevant volumes, held by WMO, the data in WIS is described by a discovery metadata record in accordance to the WMO Metadata Core Profile and is stored in a metadata catalogue for each GISC and shared amongst all GISCs at regular intervals. It is the responsibility of the data owner to generate the corresponding discovery metadata record and to maintain it. However, in order to facilitate the initial deployment of WIS, Météo-France generated metadata records for all data currently exchanged via the GTS. In the longer term though, these initial records have to be taken over by the relevant data owners and updated if required. In addition, if any new data is being considered for exchange, a corresponding discovery metadata record has to be generated and sent to the principal GISC in advance of the data.

Each NC, therefore, requires personnel with metadata knowledge and responsibility. To train the staff of NCs in discovery metadata handling, their principal GISC will offer regular training courses

in addition to WMO sponsored training events like the WMO WIS Centre Jump-Start Offer⁶. Each NC should make sure that staff are knowledgeable about the WMO Metadata Core Profile and are able to update its metadata records.

e. Access to metadata editor

The editor for metadata records consists of a software tool which can be used locally by an NC or remotely at a GISC which makes this service available to NCs. New or modified records have to be made available to the principal GISC for feeding them into the WIS.

f. Demonstration of WIS Compliance

A National Centre will need to demonstrate its compliance with WIS standards as laid out in the Manual on WIS. This is achieved by the centre working with the principal GISC to successfully complete the three test cases in Appendix IV and advising the WMO secretariat that the GISC has endorsed the centre as having demonstrated its compliance with relevant WIS standards.

6.1 Pre-requisites for participation of WIS operation by other centres

There may be other WIS centres besides the NC of an NMHS within a country. For example, the NMHS might also operate one or more DCPCs for specialized data or there may be multiple DCPCs run by different organizations like hydrology and oceanographic centres. It is also possible, with the permission of the PR, for a centre other than the NMHS to operate an NC.

a. DCPC

As stated earlier, a DCPC is the WIS categorization of a programme centre that provides programme-specific data, e.g. An RTH is a centre supporting the GTS, or a RSMC providing specialize products under the GDPFS. Therefore, it has to be sponsored by a WMO Programme. As for all WIS centres, it has to be associated with a principal GISC. In addition, special software to support the WIS functions of the centre has to be implemented, and have sufficient bandwidth to deliver its products to the users. Once this has been achieved, the relevant PR and centre director may submit a proposal to WMO for the DCPC to be accepted, nominating a staff member responsible and stating the commitment to operate the DCPC after its validation.

In accordance with the Manual on WIS, a number of certifications and tests by WMO and, in particular, the CBS expert team designated for this role, will subsequently be carried out. When all operational and administrative requirements have been met successfully, including the handling of metadata in accordance with WMO Metadata Core Profile, CBS will propose to the EC that the DCPC becomes part of WIS.

b. NC

Any NC additional to that of the NMHS will have to adhere to the same procedures as stated in 6.1. Its WIS centre Focal Point should work closely with the national WIS Focal point of the NMHS who will be the main WIS interface of the country.

7. CHALLENGES ASSOCIATED WITH WIS IMPLEMENTATION IN RA-I

7.1 General WIS acceptance

The benefits of WIS rely to a large extent on the global acceptance of WIS as the standard communication, discovery and access platform for WMO and associated institutions. Although WIS was declared operational in January 2012, many NMHS centres in RA I are still in the process of learning and understanding WIS. It is, therefore, necessary to raise the awareness of WIS in the region. GISCs should help centres to gain in-depth knowledge of how WIS works and what the

⁶ WIS Jump Start – <http://www.wmo.int/pages/prog/www/WIS/documents/JumpStartFlyer.doc>

benefits are. Other WMO initiatives such as WIGOS and GFCS are encouraged to use WIS as their information system, which will ensure the full benefits of WIS to all WMO Programmes and activities to be delivered.

Issues that have to be addressed include:

- Ensuring that senior decision-makers are aware of the benefits offered by WIS and that there are initial and ongoing tasks that their centres will need to undertake that that will require an appropriate level of resources to achieve;
- Technical staff understand what they are expected to deliver;
- Potential users are aware of the benefits that the WIS can offer them and how they can use WIS to deliver those benefits.

7.2 Lack of staff resources for operational WIS centre

Depending on the type of WIS centre being considered, there may be a concern of staff resources. For example, to operate a DCPC, staff are required, who understand the software/system such as DAR to support the metadata. For an NC, the competence requirements can usually be met by the available resources for the on-going GTS support with additional training in maintaining WIS discovery metadata. Generally, staff need to be trained to run WIS system and handle WIS related requests. CBS-Ext.(2014) has developed a set of WIS Competencies and an associated Training and Learning Guide for consideration of Congress. RA I Members are encouraged to use the Competencies proposed for the Manual on WIS in identifying their own NMHSs human resource needs.

A particular concern in RA I is the rate of staff turnover. Not only is there a need to bring the WIS competences of staff up to the required levels initially, it is essential that mechanisms are put in place to allow new staff to gain the competences and for organizations to retain a corporate memory of what has to be done to operate their WIS centre.

7.3 Discovery Metadata knowledge

Initially, there may be a lack of relevant metadata knowledge amongst the staff of the prospective WIS centre. It is therefore important to train staff on the WMO Metadata Core Profile and metadata in general. In addition, the WMO would try to arrange for training courses and support the attendance of relevant staff from developing countries. The necessary training material should be widely circulated. Furthermore, centres may take the WIS Jump-Start offered by the WMO secretariat or GISCs.

7.4 Adoption of new technologies at national level

In many countries, NMHSs are lagging behind technological advances, especially in the transmission of observations to the national centre and internationally. In addition, the human and financial implications of adopting and operating new technology (such as software and hardware) are prohibitive. This negatively affects the quality, timeliness of exchange and processing of information. WIS will only be able to deliver full benefits to countries if solutions to these national problems are found, implemented and maintained.

8. RA I WIS IMPLEMENTATION PLAN – EXECUTION AND TIMELINE

8.1 Approval

This Implementation Plan prepared by WG-IO/TT-WIS will be presented to RA I-16 for approval.

8.2 Regional coordination and monitoring

It is proposed that the RA I Management Group will nominate a Task Team on WIS Implementation (TT-WIS) to coordinate the implementation of WIS consisting of WIS experts and report to the RA I Management Group, chaired by a member of the RA I Management Group, and consisting of representatives of GISCs Casablanca and Pretoria and a WIS Focal Point from each of the RA I subregions. An important aspect of the regional approach is the monitoring of the implementation actions that would allow quick identification and response to the problems and deficiencies. Without monitoring, there is a high risk that the implementation of WIS in some parts of RA-I would be delayed. The monitoring procedures will be defined to include regular information flow between RA-I WIS Focal Points, and TT-WIS. GISCs and DCPCs will play an important role in the monitoring as described in 8.6 below.

8.3 National implementation plans

Members are expected to develop their national WIS Implementation Plans by May 2015. The national WIS Focal point should communicate the national plans to the RA I TT-WIS the target dates for the planned operation of WIS centres (NC, DCPC). The national plans should be coordinated with the principal GISCs and should be in agreement with the RA I WIS Implementation Timeline.

8.4 Capacity-building – training and support

Noting the WIS competencies identified by CBS and the need to enable WIS functionality by all Members by the end of 2015, an essential activity in RA I is to provide “train the trainer” metadata management training as soon as possible. It is suggested that at least one expert be trained in each NMHS. Members are encouraged to utilize the WIS competencies and training guide in undertaking their capacity development and staffing.

Regional capacity development should utilize GISC Casablanca, GISC Pretoria and the skills of the RTCs for capacity-building through regional cooperation, including sharing of training resources to support the WIS Training and Learning Guide, and reusing those prepared outside RA I. This would benefit from WMO ETR coordination of the development of training materials.

8.5 Goals and timeline

The main goal of the WIS implementation in RA I is that the majority of RA I Members should be WIS users by December 2015, which means that most NMHSs are:

- (a) Certified as a NC or DCPC, according to the WMO WIS centre certification procedure outlined in the Manual on WIS. The principal GISC of those NMHSs shall help in this process by providing technical support and conducting test for all WIS related operations together with the NCs or DCPCs;
- (b) Able to participate in major WIS operations, i.e. a NC or DCPC should be able to obtain data and products from WIS system of its principal GISC, and to provide its own observation data and other products, along with the associated metadata, to its principal GISC.

The WIS implementation efforts so far and future timeline is as follows:

- (a) September 2014: RA I WG-OI/ad hoc TT-WIS workshop – set the direction for WIS implementation;
- (b) November 2014: Updated Regional WIS Implementation Plan available in English and French;

- (c) Mid-December 2014: RA I Management Group has reviewed Regional WIS Implementation Plan;
- (d) December 2014: National WIS Focal Points notified to WMO and national preference for Principal GISC notified to TT-WIS (Appendix III);
- (e) 14 February 2015: RA I-16 adopts Regional WIS Implementation Plan;
- (f) April 2015: Formal notification from PRs to WMO of their Principal GISC together with the agreement of that GISC;
- (g) Mid-2015: GISC Pretoria becomes operational and workshop introducing RA I Members to WIS and GISC Pretoria;
- (h) Mid-2015: GISC Casablanca becomes operational and WIS training workshop;
- (i) Mid-2015: subject to funding approval, conduct “train the trainer” metadata management workshop;
- (j) May 2015: National Focal Points inform TT-WIS of target operational dates for national WIS centres;
- (k) May 2015: Cg-17 informed about the RA I WIS Implementation Plan;
- (l) April–December 2015: Act on the National WIS Implementation plan by each Member, with the help and support from its Principal GISC, to archive the goal outline at the beginning of this paragraph.

8.6 Progress and Performance Monitoring

RA I TT-WIS in conjunction with GISC Casablanca, GISC Pretoria, DCPC/RTH Dakar and DCPC/RTH Nairobi will play an active role in monitoring the progress of the WIS implementation in the Region. A half-yearly report will be issued to the RA I Management Group including updates from the RA I online WIS Survey to report the overall progress of the implementation. The members of the TT-WIS should also report experience with metadata and problems encountered in the areas they are representing, as well as other implementation related issues, so that this information can be shared among the members through the half-yearly report.

Further improvement of the communications connectivity in RA I is an ongoing task, which is crucial for the success of WIS implementation in the Region. It is important to cooperate with Task Teams within WG-OI to work on this task.

APPENDIX I – NC ACTION PLAN

Implementing a NC in RA I under WIS

1. Make (national) decision to join WIS as a NC.
2. Identify the Principal GISC.
3. Nominate the WIS Focal Point for the NC. The person should preferably be a part of the NMHS knowledgeable on current GTS operation and the concept of WIS.
4. Review the status of the information technology and communication network, in particular the bandwidth to the current RTH and the bandwidth of the Internet connection.
5. Review the current GTS operation in terms of data exchange and ensure that the communication network is sufficient to send and receive data in a reliable and timely fashion under WIS. If this is not the case, the improvement of the communication network would be a priority. Solutions, such as increasing the bandwidth existing network or adopting additional communication means (e.g. satellite communication etc.) need to be implemented.
6. Communicate with the chosen Principal GISC for support in the process of NC certification. Test cases listed in Appendix IV need to be carried out in cooperation with the GISC and approved by GISC.
7. Set up a communication link to the principal GISC and create user accounts at the GISC for using the GISC systems.
8. Decide whether the metadata generation/update should be supported locally or remotely by the GISC. In view of this decision, set up the necessary software environment: either by installing the metadata editor on a local server or by setting-up a connection to the GISC to use the metadata editing facility on GISC system.
9. Inform WMO by letter from the PR on: (a) the decision to become an NC and the endorsement from the Principal GISC after the success in performing the test cases; (b) the choice of the principal GISC and the nomination of the WIS Focal point, if haven't done so yet.
10. Train a staff member and, if possible, a back-up in the WMO metadata Core Profile by sending them to training courses organized by WMO or the GISC. It is also possible to ask for on-site support/training through the WMO WIS Jumpstart Offer.
11. Take over responsibility for the metadata records describing the data submitted by the NMHS and modify/update them, if necessary.
12. Start using the WIS functionality for sending and receiving data with their associated metadata.
13. Join the user group of the GISC by attending meetings and other organized events.
14. Support the monitoring of the regional WIS operation by responding to queries and/or questionnaires from the Principal GISC, which collects information, including availability of service, network traffic status, errors and other comments etc.

APPENDIX II – DCPC ACTION PLAN

Implementing a DCPC in RA I under WIS

1. Make (national) decision to join WIS as a DCPC. Inform WMO, in particular CBS, by letter from the Director of the Organization about the wish to become a DCPC.
2. Identify the Principal GISC.
3. Nominate the WIS Centre Focal Point for the DCPC. The person should preferably be knowledgeable on the concept of WIS and, if applicable, knowledgeable on current GTS operations.
4. Review the status of the communication network, in particular the bandwidth to the current RTH and the bandwidth of the Internet connection.
5. Review the current data exchange, including if applicable the GTS operation, ensuring that the communication network is sufficient to send and receive data a reliable and timely fashion under WIS. If this is not the case, make sure that an upgrade of the communication network is planned and implemented prior to the operation as a DCPC.
6. Select and install system(s) that can provide required services by a DCPC, as described in the Manual on WIS, in particular the metadata management, which is new under WIS.
7. Communicate with the chosen Principal GISC for support in the process of DCPC certification. Contact CBS ET-WISC to organize demonstration of DCPC capability, in order to be endorsed by CBS and designated by the WMO Congress as a DCPC.
8. In accordance with the Manual on WIS and Guide to the WIS, collaborate with the relevant CBS ET's to pass all the necessary tests for a DCPC, which are outlined in the WIS Demonstration Process "Procedures and Guidelines" (<http://www-db.wmo.int/WIS/centres/guidance.doc>).
9. Once the tests have been passed successfully and the centre has been endorsed by WMO Congress / EC, set up operations as a DCPC.
10. Train a staff member and, if possible, a back-up in the WMO metadata Core Profile by sending them to training courses organized by WMO or the GISC. It is also possible to ask for on-site support/training through the WMO WIS Jumpstart Offer.
11. Join the user group of the GISC by attending meetings and other organized events.
12. Support the monitoring of the regional WIS operation by responding to queries and/or questionnaires from the Principal GISC, which collects information, including availability of service, network traffic status, errors and other comments etc.

APPENDIX III – SAMPLE LETTER BY PR OF COUNTRY TO WMO FOR ESTABLISHMENT OF NC, NOMINATION OF THE WIS FOCAL POINT AND THE PRINCIPAL GISC

To: the Secretary-General

WMO

Subject: Proposal for designation of WIS National Centre.

Dear Secretary-General,

In accordance with the *Manual on the WMO Information System* (WMO-No. 1060), paragraph 2.4.2, and as part of the national plan for the implementation of the WIS, I would like to request that the centre *[name, location]*, which is part of the *[name of the NMHS]*, be designated as a National Centre (NC) of the WMO Information System (WIS), in accordance with the established procedure. I would like to inform you that the principal Global Information System Centre (GISC) associated to NC *[name]* should be *[GISC name]*.

For coordination of WIS-related issues, I hereby nominate Mr/Ms *[name, position, e-mail address, phone]* as the national WIS Focal Point.

Please update the records accordingly.

I look forward to receiving your advice on the action taken on the above request.

Yours sincerely

Permanent Representative of *[WMO Member]*

APPENDIX IV – NC DEMONSTRATION TEST CASES

Test Case Name: NC Demonstration Test Case 1	
Uploading of Discovery Metadata for Data and Products into DAR catalogue	
Test Case ID	NC-TC1
Component	Metadata Management
Purpose of test	
<p>Validate the function of adding, updating and deleting metadata records from NC to the Principal GISC.</p> <p>All metadata records must be checked against the relevant schemas. (e.g. The record should be rejected if not fitting the schema)</p> <p>Note 1: The term “upload” refers to the movement of metadata records between the National Centre that provides the metadata and the WIS centre that manages the DAR catalogue hosted by the Principal GISC. It can actually be implemented as a “pull” initiated from the DAR catalogue site, or as a “push” initiated by the metadata provider.</p> <p>Note 2: this functionalities can be implemented as:</p> <ul style="list-style-type: none"> • A web interface allowing registered users to manage their metadata interactively • A machine-to-machine interface allowing automated batch processing of metadata. <p>All GISCs support both methods. The NC may choose one or both methods</p>	
Relevant technical specifications	
<ul style="list-style-type: none"> • Tech specs 1 (Uploading of metadata) • Tech specs 8 (DAR Catalogue Search and Retrieval) 	

Precondition			
<ol style="list-style-type: none"> 1. Network connection (dedicated and/or public connection) exists between the NC and GISC 2. GISC has a file upload facility for collecting metadata from other WIS centre(s) 3. GISC has a fully functional DAR catalogue 4. GISC has a registered user/process that is authorized to manage metadata of a given WIS centre 5. GISC has a web interface to the DAR catalogue that allow searches (see WIS-TC6¹) 			
Test Steps			
	Description	Expected Results	Actual Results
1	A user/process adds a valid metadata record to the DAR catalogue	The metadata record must be found when browsing/searching the DAR catalogue	
2	A user/process modifies a record from the DAR catalogue,	The modification should be immediately visible when browsing/searching the DAR catalogue	
3	A user/process deletes a record from the DAR catalogue,	The deleted record should not be found when browsing/searching the DAR catalogue	
...	A authorized user/process attempts to upload an invalid metadata record	The user/process must be notified of the fact that the metadata record is invalid. The addition/update operation is aborted. The DAR catalogue is unchanged.	
...	A authorized user/process attempts to upload a record with a unique identifier that is already in the DAR catalogue	<p>The DAR catalogue should not contain record with duplicate identifiers. Either:</p> <ol style="list-style-type: none"> 1. The new metadata record replaces the old metadata record. The old metadata record should not be present in the catalogue. The new metadata record must be found when browsing/searching the catalogue 	

¹ WIS Demonstration Process – <http://www-db.wmo.int/WIS/centres/guidance.doc>

		2. The user/process must be notified of the fact that the record is a duplicate. The addition/update operation is aborted. The DAR catalogue is unchanged. Note: it is essential to ensure an update is an edit and not an accidental duplication	
...	Access control No unauthorized addition 1	A non-authorized user/process should not be able to add a metadata record to the DAR catalogue	
...	Access control – No unauthorized addition 2	A user/process should not be able to add a metadata record to the DAR catalogue representing data from another WIS centre	
...	Access control No unauthorized modification 1	A non-authorized user/process should not be able to modify a metadata record from the DAR catalogue	
...	Access control No unauthorized modification 2	A user/process should not be able to modify a metadata record from the DAR catalogue that belongs to another WIS centre	
...	Access control No unauthorized deletion 1	A non-authorized user/process should not be able to delete a metadata record to the DAR catalogue	
...	Access control No unauthorized deletion 2	A user/process should not be able to delete a metadata record from the DAR catalogue that belongs to another WIS centre	
Centre	Organization	Country	
Test Date			

Test Case Name: NC Demonstration Test Case 2				
Uploading and downloading of data between WIS centres				
Test Case ID		NC-TC2		
Component				
Purpose of test				
Validate the upload and download of data and products and association with metadata				
Requirements Covered				
<ul style="list-style-type: none">Tech specs 2 (Uploading of data and products)Tech specs 10 (Downloading file via dedicated network)Tech specs 11 (Downloading file via non-dedicated network)Tech specs 12 (Downloading file via other methods)				
Precondition				
<ol style="list-style-type: none">Network connection (dedicated and/or public connection) between the NC and GISC (includes via RTH where relevant)Have file upload and download facilities (FTP, mail, HTTP, ...)Have data available for upload or downloadHave DAR facilities available at GISC.				
Test Steps				
	Description	Expected Results	Actual Results	
1	<ol style="list-style-type: none">upload a file which is associated with a metadata record in the DAR catalogue of the GISC to a GISC centreuse DAR facilities to search the metadata then retrieve the file	<ol style="list-style-type: none">The uploaded file has been delivered to the GISC and match with the corresponding metadataThe file can be downloaded		
Centre		Organization	Country	
Test Date				

Test Case Name: NC Demonstration Test Case 3	
Maintenance of users, roles, authorization and authentication	
Test Case ID	NC-TC3
Component	Management of users and access
Purpose of test	
Create and exercise a variety of user types.	
Note: A centre may utilize GISC user control interface	
Relevant Technical Specifications	
<ul style="list-style-type: none"> • Tech specs 4 (Maintenance of User Identification and Role Information) • Tech specs 6 (Authentication of a User) • Tech specs 7 (Authorization of a User Role) • Tech specs 13 (Maintenance of Dissemination Metadata) 	
Precondition	
<ol style="list-style-type: none"> 1. The Centre has authority to provide access to users (i.e. PR approval) 2. A process is in place between the NC and GISC for the Centre to authorize its users to use the GISC with appropriate access levels. 3. The user interface is via the internet (i.e. web page) 	

Test Steps			
	Description	Expected Results	Actual Results
1	Provide access for an external user to search metadata	Temporary user can search metadata, but not access data from the GIS or cache, or subscribe to data.	
	a) User goes to search web page b) User makes metadata search c) Tries to access data	a) User has access to search page b) User finds metadata c) User tries to access data and is referred to authorisation page at data source. Cannot access data without validating in an authorized user role	
2	Create accounts with access to WIS metadata and data for a WMO centre authorized user	Two users are created. One with access to metadata only, the other with the ability to access the Centre subscription service or ad hoc request from the cache	
	a) User goes to registered user web page b) User is required to login or create account c) User registers account and selects role of valid WMO member with authority to access WIS data (e.g. is from WMO NC) d) User enters login details e) User makes metadata search f) Tries to access WMO globally available data from the centre g) User tries to access additional data at centre that he is not authorized to access h) Tries to access data or product at another site	a) User has access to login page b) New user, so has to create an account c) User account is validated as a WMO NC member and account is created. The user receives a user login (e.g. code via e-mail or encrypted symbol) d) User is logged in. As user is validated as WMO NC member, he is allocated access to search and access to download data from cache and to subscription services e) User finds metadata f) User successfully accesses data from centre g) User receives advice that he is not authorized to access this data and referred to access page where he can request change in user role or re-login as another user h) User is referred to authorisation page at other site	

	i) User subscribes to data for future delivery from centre j) User returns on another session and reuses login to search or subscribe k) User edits subscription details l) User cancels a subscription m) User logs out or leaves centre's site and tries to return to a bookmarked page at a later date and access data	i) User receives scheduled data via agreed method at agreed time j) User maintains successful access with same access rights k) Users subscription details are updated and reflected in subsequent deliveries l) Users subscription details are updated and receives no further deliveries m) Attempting to use a bookmarked page from earlier session to access data, directs the user to the registered user login page.	
4	User checks status of account and subscriptions	User can view his account and subscription details, including historic and future transactions, and the status of current transactions	
...			
Centre		Organization	Country
Test Date			

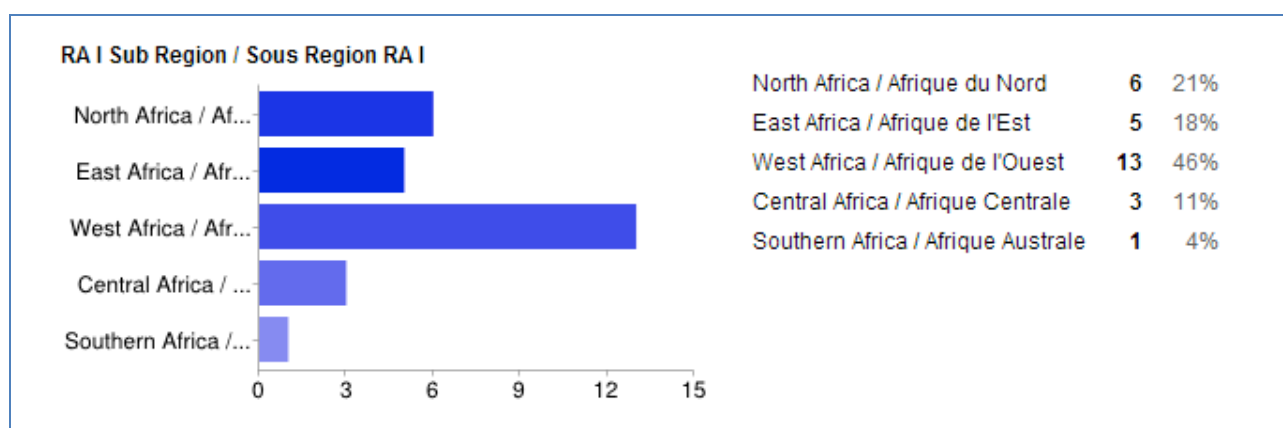
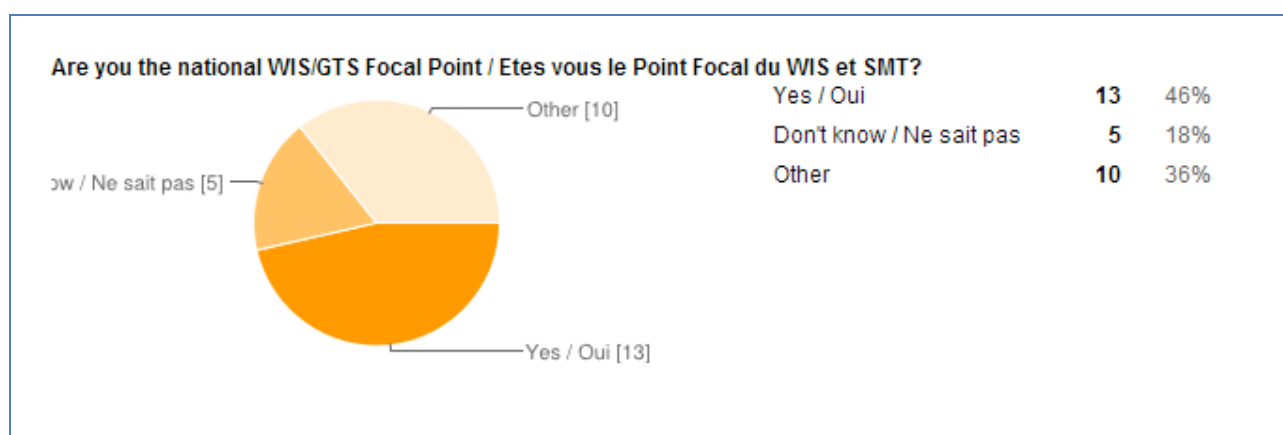
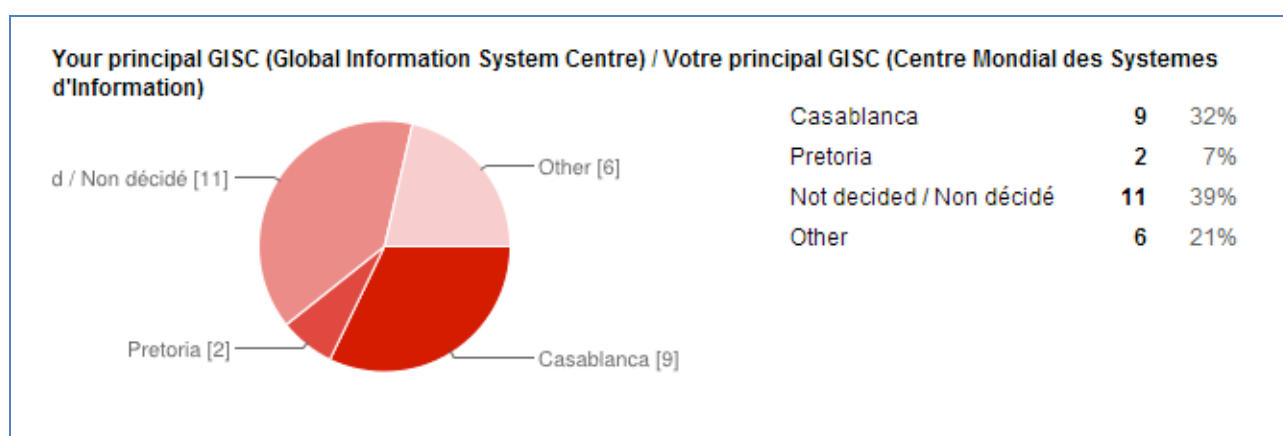
APPENDIX V – LIST OF ACRONYMS AND SELECTED DEFINITIONS

AMDCN	Area Meteorological Data Communication Network
Associated GISC	A GISC with which a WIS centre has a bilateral agreement for the purposes of uploading or downloading data. A centre can have multiple associated GISCs but shall identify a principal GISC for uploading and managing metadata.
CBS	Commission for Basic Systems
Cg	Congress
DAR	Data Access and Recovery
DCPC	Data Collection or Production Centre
ECMWF	European Centre for Medium-range Weather Forecasts
ET-WISC	CBS Expert Team on WIS Centres (responsible for GISC/DCPC demonstration process)
GFCS	Global Framework for Climate Services
GISC	Global Information System Centre
GTS	World Weather Watch Global Telecommunication System
IGDDS	Integrated Global Data Dissemination Service
IMTN	Improved Main Telecommunication Network
MPLS	Multi-protocol Label Switching
MTN	Main Telecommunication Network
NC	National Centre
NMHS	National Meteorological and Hydrological Service
PR	Permanent Representative
Principal GISC	The GISC that is used by a WIS centre for updating and managing the centre's WIS Discovery Metadata.
RA	Regional Association
RMDCN	Regional Meteorological Data Communication Network
RMTN	Regional Meteorological Telecommunications Network
RTH	Regional Telecommunication Hub
WG-OI	RA I Working Group on Observations and Infrastructure
TT-WIGOS	WG-OI Task Team on WIGOS
TT-WIS	WG-OI Task Team on WIS
VPN	Virtual Private Network
WIGOS	WMO Integrated Global Observing System
WIS	WMO Information System
WMO	World Meteorological Organization
WWW	World Weather Watch

APPENDIX VI – CONTACT POINTS FOR THIS PLAN

The following contact details are referred to within the text of the plan. These are recorded in this Appendix so that they can be updated without changing the text of the plan itself.

GISC Casablanca	
Main contact Mr Hassan HADDOUCH, Direction de la Météorologie Nationale, DMN/SMM B.P. 8106 en face de la prefecture Hay Hassani CASABLANCA Morocco Tel: +212 66 1 47 23 68 Fax: +212 5 22 91 3255 E-mail: haddouchh@yahoo.com	Operational issues Rabia Merrouchi Direction de la Météorologie Nationale, DMN/SMM B.P. 8106 en face de la prefecture Hay Hassani CASABLANCA Morocco Tel: +212 5 22 65 48 32 Fax: +212 5 22 91 3255 E-mail: gisc@marocmeteo.ma cc to: rabia.merrouchi@gmail.com
GISC Pretoria	
Main contact Mr Bubele VAKALISA, South African Weather Service Department of Environment Affairs Private Bag X097 PRETORIA 0001 South Africa Tel: +27 12 367 6118 Fax: +27 12 367 6418 E-mail: bubele.vakalisa@weathersa.co.za	Operational issues Ms Christa Ferreira South African Weather Service Department of Environment Affairs Private Bag X097 PRETORIA 0001 South Africa Tel: +27 12 367 6135 Fax: +27 12 367 6435 E-mail: gisc@weathersa.co.za cc to: christa.ferreira@weathersa.co.za

APPENDIX VII – WIS IMPLEMENTATION MONITORING (SURVEY RESULTS¹ MAY 2014)**Figure 4. RA I Subregion****Figure 5. WIS Focal Point****Figure 6. Principal GISC**

¹ See pdf of survey questions at: <http://wis.wmo.int/doc=3239>, and May 2014 results at: <http://wis.wmo.int/doc=3237>

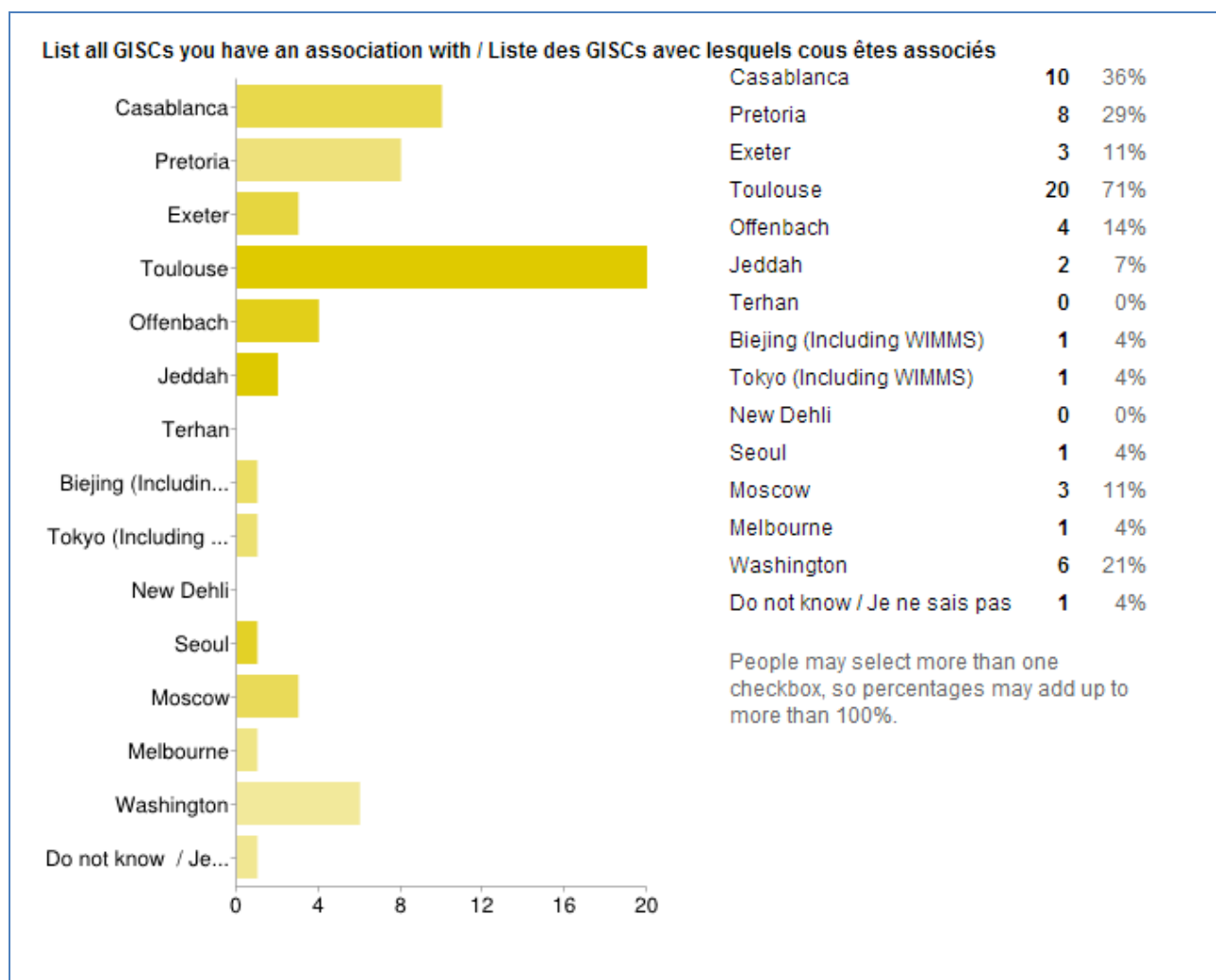


Figure 7. Associated GISCs

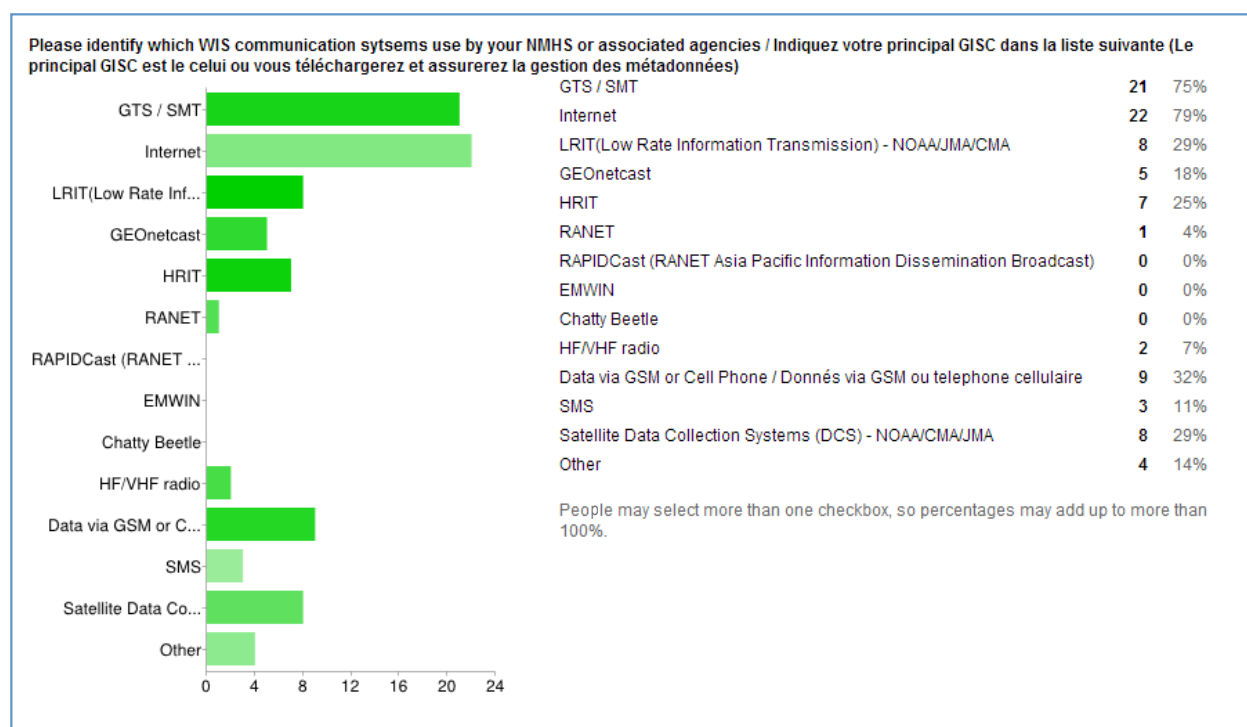


Figure 8. Communication technologies

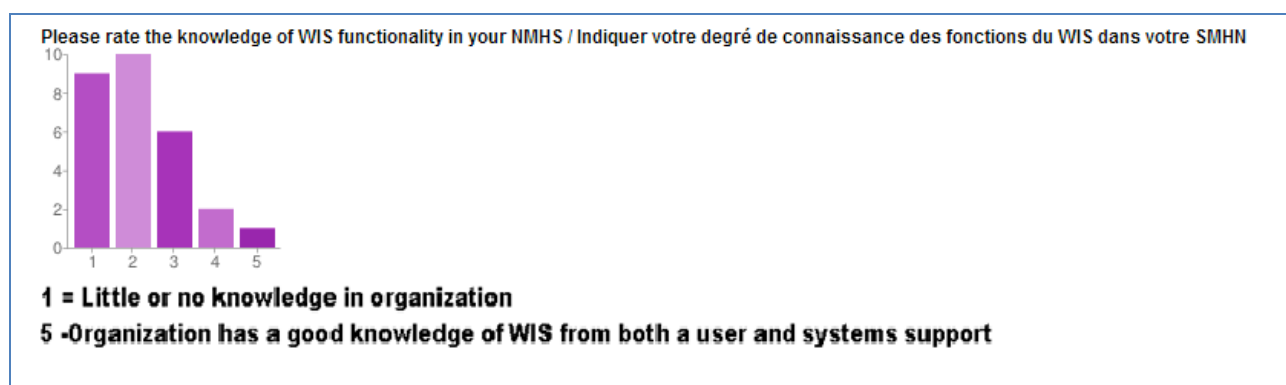


Figure 9. Level of organization knowledge of WIS

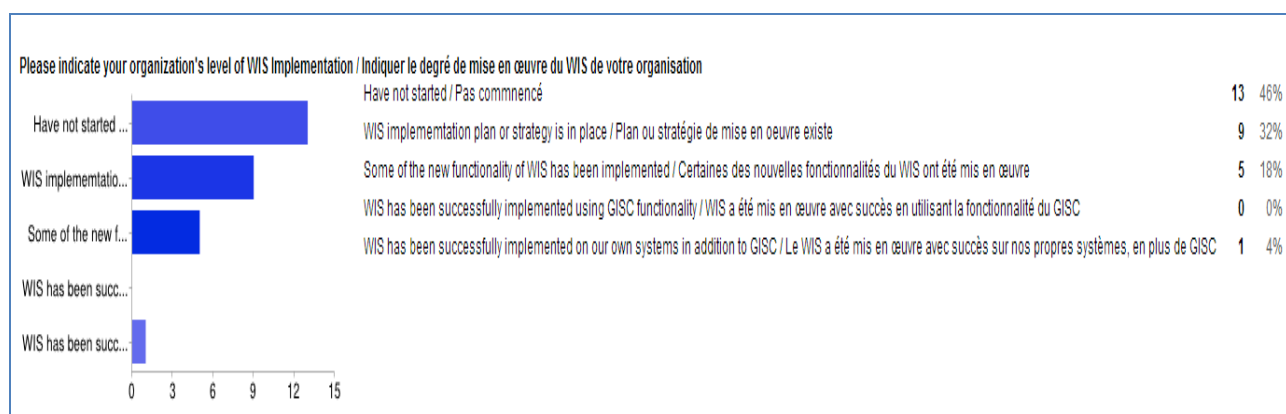


Figure 10. WIS implementation progress

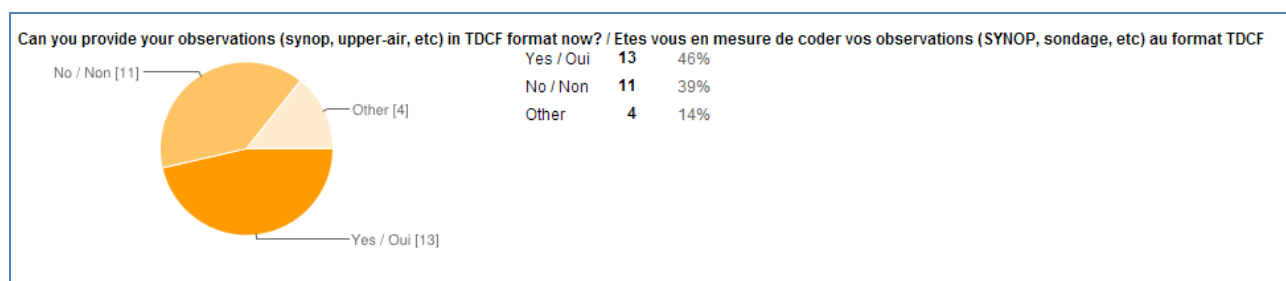


Figure 11. Progress in TDCF Migration

APPENDIX VIII – TERMS OF REFERENCE FOR FOCAL POINTS

National Focal Point for WIS

National Focal Points for WIS are nominated by the Permanent Representatives of Members of WMO. These Focal Points provide the operational channel of communication with the WMO Secretariat, and Centre and National Focal Points for WIS.

The responsibilities of the Focal Points are:

- (a) Act as a focal point on all WIS activities within the Member State or territory;
- (b) Monitor and report on the national status of WIS implementation;
- (c) Participate in regional or subregional WIS coordination and implementation activities;
- (d) Arrange for the authorization of national entities or people for access to WIS;
- (e) Ensure issues relating to WIS, including the GTS, and World Weather Watch monitoring are directed to the relevant person and followed-up on;
- (f) Monitor and participate in the overall maintenance of WIS including CBS expert teams addressing data management and data representation as well as network issues;
- (g) Oversee the creation and management of WIS Discovery Metadata for data and products from participation centres;
- (h) Assist centre focal points in matters relating to WIS, including compliance and functional issues;
- (i) Identify and follow-up on training and capacity development needs;
- (j) Represent the NMHS in WIS contributions and liaison with other initiatives such as WIGOS and GFCS.

Note: If Recommendation 15 (CBS Ext.(2014)) is endorsed by Congress or EC, the following additional tasks will be added:

- (k) *To receive notifications of amendments to the Manual on WIS (WMO-No. 1060), the Guide to WIS (WMO-No. 1061), the Manual on the GTS (WMO-No. 386) and associated Guides, and propagate the information within their state or territory;*
- (l) *To comment on amendments to the Manual on WIS (WMO-No. 1060), the Guide to WIS (WMO-No. 1061), the Manual on the GTS (WMO-No. 386) and associated Guides by the simple procedure, on behalf of the Permanent Representative;*
- (m) *To request amendments to the Manual on WIS (WMO-No. 1060), the Guide to WIS (WMO-No. 1061), the Manual on the GTS (WMO-No. 386) and associated Guides on behalf of the Permanent Representative.*

Centre Focal Point for WIS matters

Centre Focal Points for WIS matters are nominated by the centre or the Permanent Representative responsible for the centre. These Focal Points provide the operational channel of communication with the WMO Secretariat, and Centre and National WIS Focal Points.

The responsibilities of the Focal Points are:

- (a) Monitor and report on the status of WIS implementation within the centre;
- (b) Participate in national and international WIS coordination and implementation activities;
- (c) Arrange for the authorization of access to data, products and/or services available through the centre;
- (d) Ensure issues relating to WIS are directed to the relevant person and followed-up on;
- (e) Monitor and participate in the overall maintenance of WIS including contributions to CBS expert teams addressing data management and data representation as well as network issues;
- (f) Oversee the creation and management of WIS Discovery Metadata for data and products from the centre;
- (g) Assist staff and users of the centre in matters relating to WIS, including WIS Discovery Metadata, WIS applications, WIS networks and systems;
- (h) Identify and follow up on training and capacity development needs.

GTS Focal Point

GTS Focal Points are nominated by the Permanent Representatives of Member countries of WMO that are connected to the GTS. These Focal Points provide the operational channel of communication with the WMO Secretariat, RTH and GTS Focal Points.

The Terms of Reference of the Focal Points are:

- (a) Act as a focal point on all GTS matters within the centre and with its national users;
- (b) Manage authorization of reception or transmission of information using the GTS;
- (c) Manage subscriptions and access to GTS traffic;
- (d) Oversee the creation and management of GTS headers for data and products from the centre;
- (e) Ensure data and products published to the GTS from your centre have appropriate WIS discovery metadata already uploaded to the principal GISC;
- (f) Coordinate GTS traffic with the RTH(s) to which the centre is attached exchange of information through the GTS for national centres;
- (g) Arrange for exchange of information between the GTS and national users, including WIS centres;
- (h) Ensure issues relating to the GTS and World Weather Watch monitoring are directed to the relevant person and followed-up on;
- (i) Monitor, report on, and participate in the overall maintenance of the GTS including contributions to CBS expert teams addressing data management and data representation as well as network issues;
- (j) Assist staff and users of the centre in matters relating to GTS, including compliance and functional issues;
- (k) Identify and follow up on training and capacity development needs.

RTH Focal Point

Regional Telecommunications Hub Focal Points are nominated by the Permanent Representatives of Member countries of WMO that are responsible for a Regional Telecommunications Hub. These Focal Points provide the operational channel of communication with the WMO Secretariat, other RTHs and GTS centres.

The responsibilities of the Focal Points are:

- (a) Undertake the role of national GTS Focal Point;
- (b) Arrange for the attached GTS centres to initiate, modify and terminate data flows on the GTS, including negotiation of relevant GTS headers, provision of required notices and maintaining operational information held by WMO on the information within the area of responsibility of the RTH;
- (c) Monitor and report on the status of RTH operations;
- (d) Coordinate the flow of GTS traffic flowing through the RTH, including supporting GISC subscriptions;
- (e) Working with the WIS Centre Focal Points, to ensure that GTS traffic from the attached centres has appropriate WIS Discovery Metadata records.

**APPENDIX IX – CHECKLIST OF ICT RELATED ACTIONS THAT
MIGHT BE CONSIDERED IN NATIONAL PLANS TO IMPROVE
NATIONAL ABILITY TO EXCHANGE AND PROCESS INFORMATION**

Action No.	Action	Urgency
1	Creation of digital reports at manual station for transmission	
2	Automatic digital transmission of AWS information to national/sub-national collection point	
3	Telecommunications connection from observing site (or production office) to national/sub-national centre	
4	National/sub-national collection centre	
5*	National/sub-national data store	
6*	Display/production system (integration of information from multiple sources)	
7	Create reports in TDCF	
8	Transmit information to national users	
9	Transmit information to international users – management of data flow (including GTS)	
10	International telecommunications connections	
11	Reception of information from international centres (including GTS)	
12*	Data store for international information (ideally the same as the national/sub-national data store to allow seamless use of information)	
13*	Long-term storage and protection of information	
14	Creation and maintenance of WIS Discovery metadata records	
15	Delivery of non real-time national products through the WIS	
16	Implementation of centres other than the NMHS as WIS National Centres (or DCPCs)	
17	National Centre/DCPC compliance with WIS requirements	
18	Exploit GISC and other WIS facilities to provide more information to national users	
19	National training in WIS – users	
20	National training in WIS – operators of WIS infrastructure	

* Not a component of WIS, but a task that may need to be done to deliver the benefits of WIS/WIGOS nationally

Resolution 12 (RA I-16)**IMPLEMENTATION OF THE WMO STRATEGY FOR CAPACITY DEVELOPMENT IN
REGIONAL ASSOCIATION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) That the Executive Council at its sixty-fourth session (Geneva, June/July 2012) approved the Capacity Development Strategy that had been developed on the decision of the Sixteenth World Meteorological Congress (Geneva, May/June 2011),
- (2) That the Executive Council at its sixty-fifth session (Geneva, May 2013) commented on and adopted the draft Capacity Development Strategy Implementation Plan developed by the Executive Council Working Group on Capacity Development,

Noting further:

- (1) That the Executive Council at its sixty-fifth session urged regional associations to collaborate in and provide all possible support for the Capacity Development Strategy Implementation Plan,
- (2) That the Strategy as approved by the Executive Council at its sixty-fourth session has a special focus on least developed countries and small island developing States, and thus, regarding the geopolitical particularities of Region I, offers important support to its Members,

Decides to assign to the appropriate mechanism within the Association the work of ensuring a harmonized and synchronized implementation of the Strategy by Members;

Requests Members to coordinate within the Association and support the implementation of the Strategy, especially in Region I;

Requests the Secretary-General to provide support to the Association in the implementation of the decision;

Requests the WMO Programmes to support the implementation of the Strategy in Regional Association I by providing expertise and other forms of assistance, as may be requested.

Resolution 13 (RA I-16)**MANAGEMENT GROUP AND SUBSIDIARY BODIES OF
REGIONAL ASSOCIATION I (AFRICA)**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) The *Abridged Final Report with Resolutions of the Sixteenth World Meteorological Congress* (WMO-No. 1077),
- (2) The *Abridged Final Report with Resolutions of the Fifteenth Session of Regional Association I (Africa)* (WMO-No. 1068),

- (3) *The Abridged Final Report with Resolutions of the Sixty-sixth Session of the Executive Council* (WMO-No. 1136),
- (4) *The WMO Strategic Plan 2012–2015* (WMO-No. 1069),
- (5) The WMO Operating Plan 2012–2015 (October 2011 version),
- (6) The Strategic Plan for the Enhancement of National Meteorological and Hydrological Services in WMO Regional Association I (Africa) 2012–2015,

Considering the proposal made by the president of the Association,

Further noting:

- (1) The effective role played by the RA I Management Group during the intersessional period,
- (2) The growing need to plan and coordinate the activities of the Association in order to achieve the Expected Results and key outcomes of the WMO Strategic Plan and RA I Strategic Plan,
- (3) The need to establish an effective and efficient work structure of subsidiary bodies and to guide and coordinate their activities during the intersessional period,
- (4) The need to constantly keep abreast of the needs and issues of Members and communicate their requirements to the appropriate constituent bodies, technical commissions and the Secretariat,
- (5) That there is need for a mechanism to address cross-cutting issues not handled by other working groups or task teams, especially issues related to Expected Results 6 and 7 of the WMO Strategic Plan 2012–2015,

Recognizing:

- (1) That the Members agree on the importance of continuing the activities of the Management Group, as well as other working groups of the Association,
- (2) That there is a growing need for greater coordination of the activities of the Association,
- (3) That there is the need for an arrangement to discuss the matters of importance for the Association, including the activities of its working groups, their members and the rapporteurs, during the intersessional period,

Decides:

- (1) To restructure the Management Group of Regional Association I (Africa), to advise the president and to make recommendations on matters relevant to the Association, with the following membership and terms of reference:
 - (a) *Membership*
 - (i) RA I president;
 - (ii) RA I vice-president;
 - (iii) Chairpersons of Working Groups and the Tropical Cyclone Committee;
 - (iv) Hydrological Advisor to the president;
 - (v) Gender Coordinator;

- (vi) RA I Members of the Executive Council and other experts may be invited by the president, as appropriate;

(b) *Terms of reference*

- (i) To discuss matters related to the work of the Association, including emerging matters or matters requiring the adoption of actions that could not be postponed until the following regular session of the Association;
- (ii) To plan and coordinate the work of the Association and its subsidiary bodies;
- (iii) To ensure that priorities are addressed, and to advise on the appropriate arrangements to achieve results according to the Strategic Plan for the Enhancement of National Meteorological and Hydrological Services in WMO Regional Association I (Africa) 2012–2015 and the regional Operating Plan;
- (iv) To select the members of the working groups and appoint chairpersons of the working groups from nominations provided by Members of the Association;
- (v) To establish and review the structure and work of the subsidiary bodies of the Association, including the implementation of its recommendations, and to disband or reorganize the bodies as may be required;
- (vi) To collaborate with the WMO Secretariat in the mobilization of resources, and to advise on the way to align resources with regional priorities and the implementation of the Operating Plan;
- (vii) To coordinate and monitor the implementation of the Strategic Plan for the enhancement of the National Meteorological and Hydrological Services in Regional Association I (Africa), and to provide the contribution of Region I to the WMO Strategic Plan;
- (viii) To finalize the RA I Operating Plan for the remainder of the fifteenth financial period based on the discussions during the sixteenth session of the Association and taking into account input from the Members of the Association, and to develop a regional Operating Plan for the sixteenth financial period (2016–2019);
- (ix) To address other issues as they arise, including strengthening of strategic partnerships with regional organizations, development agencies and other stakeholders;

(2) To establish the following working groups:

(a) Working Group on Observations, Telecommunication and Infrastructure:

- (i) Experts on WMO Integrated Global Observing Systems, including the chairperson of the RA I WMO Information System Implementation Team;
- (ii) Experts on the WMO Information System;
- (iii) Two experts on Instruments and Methods of Observation, one specializing in conventional observation systems and the other in remote systems;
- (iv) Experts on regional telecommunications;
- (v) Experts from the RA I Dissemination Expert Group on satellite data;

(b) Working Group on Climate Services and Applications:

- (i) Expert on climate and data management;

- (ii) Expert on climate prediction from seasonal to decadal;
 - (iii) Expert on agricultural meteorology;
 - (iv) Expert on climate variability/change and modelling;
 - (v) Expert on climate and health;
- (c) Working Group on Improved Weather Forecasting, Natural Disaster Risk Reduction, Service Delivery and Communication:
 - (i) Expert on disaster prevention and mitigation;
 - (ii) Expert on marine meteorological and oceanographic services;
 - (iii) Expert on advancement, operation and application of numerical weather prediction, from nowcasting to medium-range forecast;
 - (iv) Expert on integrated service delivery, including Public Weather Services;
- (d) Working Group on Hydrology and Water Resources:
 - (i) Expert on hydrological prediction and forecasting;
 - (ii) Expert on integrated water resource management, development and service delivery;
 - (iii) Expert on hydrological monitoring and data management;
 - (iv) Expert on water and climate;
 - (v) Expert on integrated high/low flow forecasting;
- (e) Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery:
 - (i) Expert on aeronautical meteorological services;
 - (ii) Expert on marine meteorological services;
 - (iii) Expert on quality management systems including compliance with International Civil Aviation Organization requirements and associated competences;
 - (iv) Expert on cost recovery from aviation and marine;
 - (v) Experts on human capital (capacity, development, retention, career path, etc.) issues;
- (f) Tropical Cyclone Committee for the South-West Indian Ocean:
 - (i) 15 members of the Committee drawn from the Member countries most affected by the South-West Indian Ocean Tropical Cyclones;

(3) To establish the following Task Team:

Task Team on Aeronautical Meteorology;

- (4) To invite the president to act as chairperson of the Management Group; the Management Group may invite experts of RA I to participate in their meetings depending on the need for such expertise;
- (5) To invite the president and the Management Group to develop the terms of reference for the working groups and task team, taking into account the priority areas provided by the Association and in consultation with appropriate technical departments of WMO;

Requests the president to ensure that Members are adequately represented in the Management Group and working groups, and that the Management Group meet at least once a year, or whenever it is deemed necessary, preferably in conjunction with other events or meetings;

Requests the Management Group, with input from the RA I Permanent Representatives, to activate initial RA I subsidiary bodies not later than 31 March 2015;

Authorizes the president to adopt the necessary decisions on important matters on behalf of the Association, after consultation with the Management Group;

Further requests the president to report to the Association during the intersessional period, as necessary, and at its next regular meeting, on the activities of the Management Group and the relevant decisions made on behalf of the Association.

Resolution 14 (RA I-16)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE ASSOCIATION

REGIONAL ASSOCIATION I (AFRICA),

Noting the *Abridged Final Report with Resolutions of the Ninth Session of the Executive Committee* (WMO-No. 67), general summary, paragraph 3.7.1,

Considering:

- (1) That a number of the resolutions adopted before the sixteenth session have been revised and incorporated in the resolutions of the sixteenth session,
- (2) That some of the previous resolutions have been incorporated in appropriate WMO publications or have become obsolete,
- (3) That some of the previous resolutions are still to be implemented,

Decides:

- (1) To keep in force Resolutions 3 (XV-RA I), 4 (XV-RA I), 8 (XV-RA I), 5 (XIV-RA I), 22 (XIV-RA I), 11 (XIII-RA I), 12 (XIII-RA I), 13 (XIII-RA I), 15 (XI-RA I) and 20 (X-RA I);
- (2) To keep in force Resolution 5 (XV-R I) – Regional Basic Synoptic Network and Regional Basic Climatological Network in Region I, as updated through Resolution 9 (RA I-16);
- (3) Not to keep in force the other resolutions adopted before its sixteenth session;
- (4) To publish the text of the resolutions kept in force in the annex to the present resolution.

Note: This resolution replaces Resolution 9 (XV-RA I), which is no longer in force.

Annex to Resolution 14 (RA I-16)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE ASSOCIATION

Resolution 20 (X-RA I)

MARINE METEOROLOGICAL SERVICES IN REGION I

REGIONAL ASSOCIATION I (AFRICA),

NOTING:

- (1) Resolution 19 (IX-RA I) — Marine meteorological services in Region I,
- (2) Resolution 20 (IX-RA I) — Port meteorological services,
- (3) Second WMO Long-term Plan, Part II, Volume 4, Section 4.3 — Marine Meteorology and Associated Oceanographic Affairs Programme,
- (4) Resolution 14 (Cg-X) — Marine Meteorology and Associated Oceanographic Activities Programme for the period 1988–1991,
- (5) Resolution 11 (EC-XLI) — Development of a global operational ocean observing system,
- (6) Recommendation 6 (CMM-X) — The WMO VOS scheme,
- (7) Final report of the first session of the CMM Subgroup on Observations and Telecommunications (Geneva, February 1990), general summary, section 4,

CONSIDERING:

- (1) That, in addition to shipping and deep-sea fishing, marine activities such as coastal fisheries, offshore operations, coastal development works, harbour development, etc. call for increased marine meteorological support,
- (2) That NMSs should be in a position to provide the necessary marine meteorological services for the safety and economy of these activities,
- (3) That an adequate forecast service to coastal and offshore areas needs the backing of observational data from these areas and that, in addition, these data are essential in support of climate monitoring, research and prediction,
- (4) That the real-time collection of observational data from the sea areas surrounding the continent and islands of RA I is of fundamental importance to the provision of meteorological services for marine activities,
- (5) That the establishment or expansion of port meteorological services will be of particular importance in obtaining increased observations, especially from the ocean areas in the tropics and the southern oceans,

URGES MEMBERS:

- (1) To develop their national marine meteorological services to meet the growing demands for combined meteorological and related oceanographic information in support of marine activities on high seas, in coastal and offshore waters and in and near ports;

- (2) To make every effort to establish a network of stations in coastal areas for providing the necessary meteorological and related oceanographic observations for marine services and in support of climate and global change studies;
- (3) To take steps to improve communications links between their national centres (NMCs) and GTS centres in the countries operating INMARSAT Coastal Earth Stations (CES);
- (4) To take all possible steps to improve the operation of coastal radio stations (CRSs) responsible for collecting observational data and ensure that the CRSs are kept in force and operational at least until 1999;
- (5) To establish or strengthen port meteorological services in all major ports in their countries in support of ships operating in the Region and with a view to increased data collection from these ocean areas;
- (6) To cooperate fully with the two Regional Rapporteurs in the discharge of their tasks;

REQUESTS the Secretary-General:

- (1) To arrange for the two Rapporteurs to meet with a view to harmonizing their work programme within the Region;
 - (2) To assist countries in the setting up of marine meteorological and oceanographic observation networks and in providing appropriate information and assistance as required.
-

Resolution 15 (XI-RA I)

USE OF INMARSAT FOR THE COLLECTION OF SHIPS' METEOROLOGICAL AND OCEANOGRAPHIC REPORTS

REGIONAL ASSOCIATION I (AFRICA),

NOTING:

- (1) Resolution 19 (Cg-XI) — The collection and dissemination of marine meteorological and oceanographic information using INMARSAT,
- (2) Resolution 16 (V-RA I) — Collection, exchange and distribution of ships' weather reports,
- (3) The equipping of an increased number of ships participating in the WMO VOS scheme with Ship Earth Stations (SES) of INMARSAT, in particular with the INMARSAT-C facility,

CONSIDERING:

- (1) The need to increase the number of ships' meteorological and oceanographic reports from most of the sea areas of Region I,
- (2) The considerable improvements to be expected in the receipt of marine meteorological and oceanographic observations from ships at sea through the enhanced use of the INMARSAT system,
- (3) The cost savings which will accrue to those Members collecting such reports through INMARSAT by the increased use of the new INMARSAT-C facility for this purpose,

RECOGNIZING with appreciation that certain Members operating INMARSAT CESs have already arranged through their CES to accept ships' meteorological and oceanographic reports that are of general value to all Members of WMO,

BEING CONCERNED however, that problems continue to be related to the timely redistribution to the countries closest to their geographical origin of reports collection through INMARSAT,

URGES:

- (1) Members concerned to make every effort to ensure the timely global redistribution on the GTS of reports collected through INMARSAT to all Members and in particular to countries in the areas of the geographical origins of those reports;
- (2) All Members in the Region operating VOS equipped with INMARSAT-C to make every effort for ships to be supplied with new software package for the compilation and transmission of meteorological reports through INMARSAT-C, to ensure the maximum efficiency and cost-effectiveness of such an operation;
- (3) All Members which have designated coastal radio stations to continue their operation for the next five to ten years, or until INMARSAT becomes fully operational, so that ships not yet equipped with INMARSAT-C stations can continue to provide meteorological reports;

REQUESTS the Secretary-General to assist Members in the implementation of this resolution.

NOTE: This resolution replaces Resolution 16 (V-RA I), which is no longer in force.

Resolution 11 (XIII-RA I)

COORDINATED COMMON SYSTEM FOR THE DESIGNATION OF MARINE FORECAST AREAS IN METAREA II

REGIONAL ASSOCIATION I (AFRICA),

NOTING the report by France on Coordinated Common Systems for the Designation of Marine Forecast Areas for Metarea II and Metarea III (W),

CONSIDERING that the designation of common forecast areas in METAREA II will enhance the coordination of marine meteorological support to marine activities, particularly shipping, fisheries, marine pollution emergency response and maritime search and rescue operations, in Metarea II,

DECIDES to formally adopt the Coordinated Common System for the Designation of Marine Forecast Areas in Metarea II as given in the annex to this resolution;

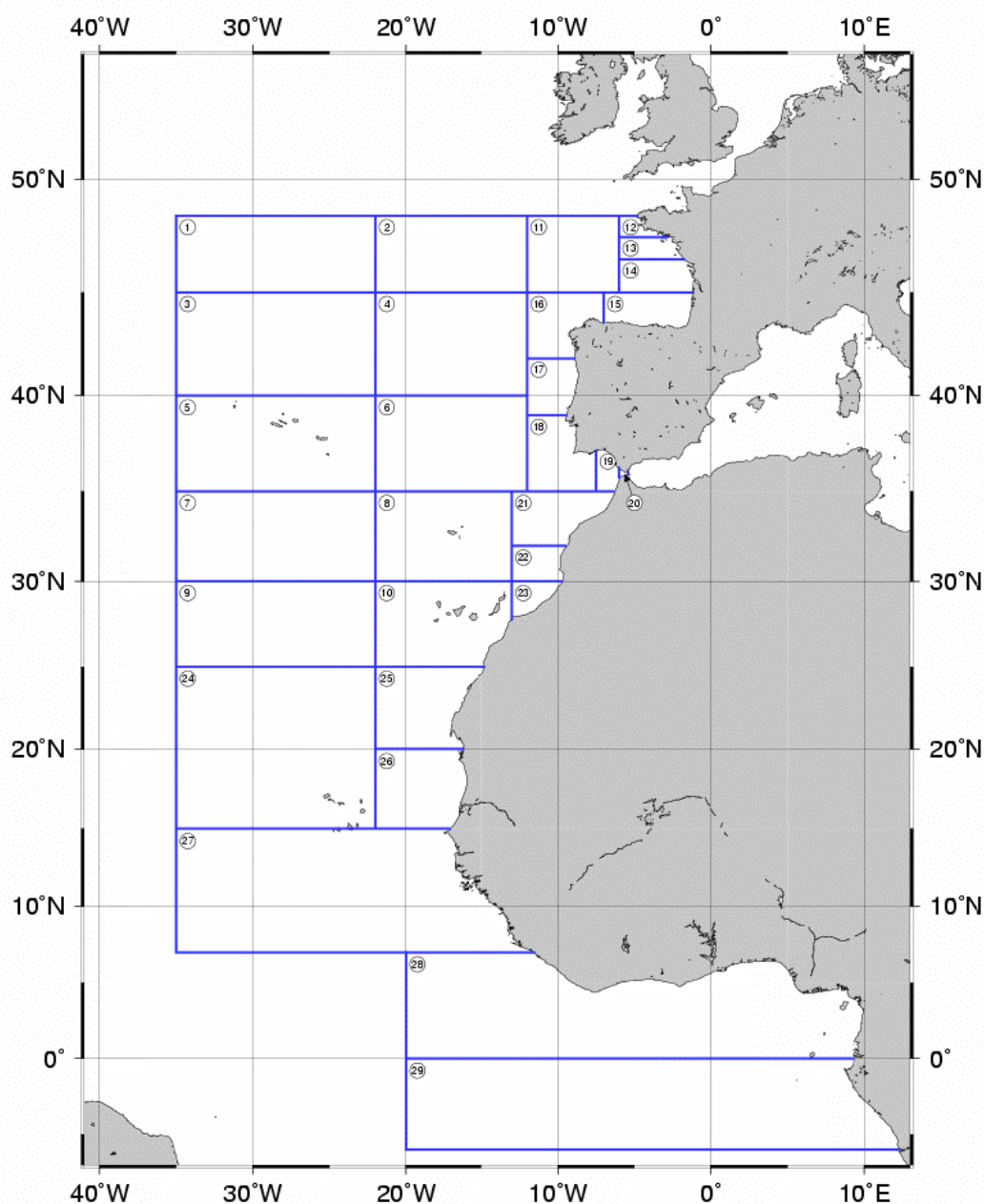
REQUESTS the Secretary-General of WMO to include the substance of the annex to this resolution in *Weather Reporting* (WMO-No. 9), Volume D and in the *Manual on Marine Meteorological Services* (WMO-No. 558).

Annex to Resolution 11 (XIII-RA I)

COORDINATED COMMON SYSTEM FOR THE DESIGNATION OF MARINE FORECAST AREAS IN METAREA II

Considering that the designation of common forecast areas in Metarea II will enhance the coordination of marine meteorological support to various marine activities Regional Association I has adopted the Coordinated Common System for the Designation of Marine Forecast Areas as described below. The basis for the uniform system is a two-level division of the forecast areas, main areas and sub-areas. Sub-areas within the main area are described, in general, according to the point of compass, e.g. eastern part, southern part, etc.

Common GMDSS subareas for METAREA II



Name list of METAREA II marine areas

- 1 – FARADAY : BETWEEN 45°N AND 48°27'N, BETWEEN 22°W AND 35°W
- 2 – ROMEO : between 45°N and 48°27'N, between 12°W and 22°W
- 3 – ALTAÏR : between 40°N and 45°N, between 22°W and 35°W
- 4 – CHARCOT : between 40°N and 45°N, between 12°W and 22°W
- 5 – ACORES : between 35°N and 40°N, between 22°W and 35°W
- 6 – JOSEPHINE : between 35°N and 40°N, between 12°W and 22°W
- 7 – IRVING : between 30°N and 35°N, between 22°W and 35°W
- 8 – MADEIRA : between 30°N and 35°N, between 13°W and 22°W
- 9 – METEOR : between 25°N and 30°N, between 22°W and 35°W
- 10 – CANARIAS : between 25°N and 35°N, between 13°W and 22°W
- 11 – PAZENN : BETWEEN 45°N AND 48°27'N, BETWEEN 6°W AND 12°W
- 12 – IROISE : between 47°30'N and 48°27'N, from the coast of France to 6°W
- 13 – YEU : between 46°30'N and 47°30'N, from the coast of France to 6°W
- 14 – ROCHEBONNE : between 45°N and 46°30'N, from the coast of France to 6°W
- 15 – CANTABRICO : from the coast of Spain to 45°N, from the coast to of France to 7°W
- 16 – FINISTERRE : between 41°50'N and 45°N, between 7°W and 12°W
- 17 – PORTO : BETWEEN 39°N AND 41°50'N, FROM THE COAST OF PORTUGAL TO 12°W
- 18 – S. VICENTE : between 35°N and 39°N, between 7°30'W to 12°W
- 19 – CADIZ : from 35°N to the coast of Spain, between 6°W and 7°30'W
- 20 – GIBRALTAR STRAIT / ESTRECHO : between line Gibraltar/Ceuta and 6°W, from the coast of Morocco to the coast of Spain
- 21 – CASABLANCA : BETWEEN 32°N AND 35°N, FROM THE COAST OF MOROCCO TO 13°W
- 22 – AGADIR : between 30°N and 32°N, from the coast of Morocco to 13°W
- 23 – TARFAYA : from the coast of Morocco to 30°N, from the coast of Morocco to 13°W
- 24 – CAPE VERDE : between 15°N and 25°N, between 22°W and 35°W
- 25 – CAP BLANC : between 20°N and 25°N, from the coast of Africa to 22°W
- 26 – CAP TIMIRIS : BETWEEN 15°N AND 20°N, FROM THE COAST OF AFRICA TO 22°W
- 27 – SIERRA LEONE : between 7°N and 15°N, from the coast of Africa to 35°W
- 28 – GULF OF GUINEA : between the equator and 7°N, from the coast of Africa to 20°W
- 29 – POINTE NOIRE : between 6°S and the equator, from the coast of Africa to 20°W

Resolution 12 (XIII-RA I)

**COORDINATED COMMON SYSTEM FOR THE DESIGNATION OF
MARINE FORECAST AREAS IN METAREA III(W)**

REGIONAL ASSOCIATION I (AFRICA),

NOTING the report by France on Coordinated Common Systems for the Designation of Marine Forecast Areas for Metarea II and Metarea III(W),

CONSIDERING that the designation of common forecast areas in Metarea III(W) will enhance the coordination of marine meteorological support to marine activities, particularly shipping, fisheries, marine pollution emergency response and maritime search and rescue operations, in Metarea III(W),

DECIDES to formally adopt the Coordinated Common System for the Designation of Marine Forecast Areas in Metarea III(W) as given in the annex to this resolution;

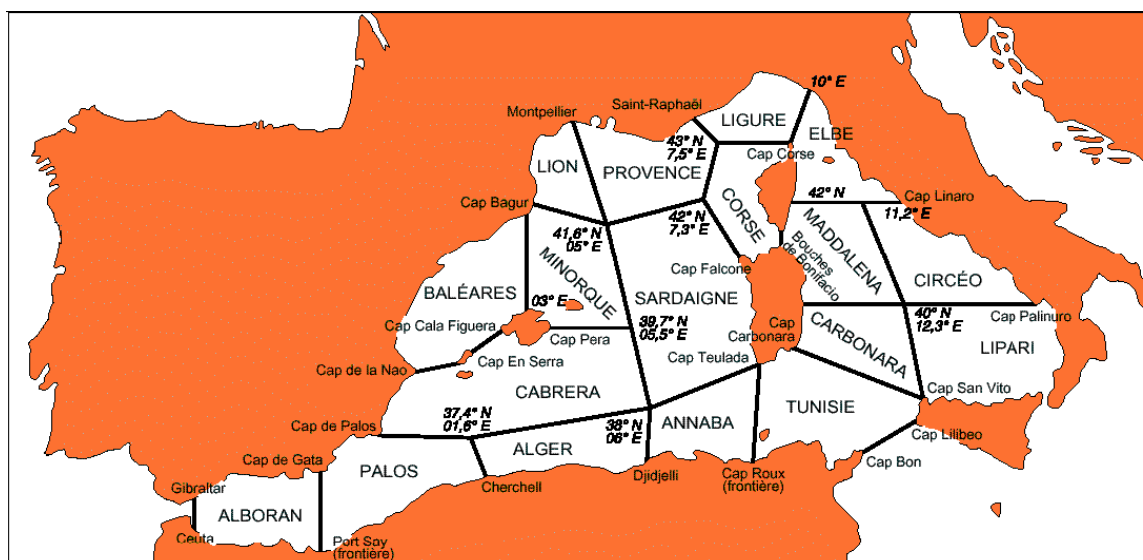
REQUESTS the Secretary-General of WMO to include the substance of the annex to this resolution in *Weather Reporting* (WMO-No. 9), Volume D and in the *Manual on Marine Meteorological Services* (WMO-No.558).

Annex to Resolution 12 (XIII-RA I)

COORDINATED COMMON SYSTEM FOR THE DESIGNATION OF MARINE FORECAST AREAS IN METAREA III(W)

Considering that the designation of common forecast areas in Metarea III(W) will enhance the coordination of marine meteorological support to various marine activities, Regional Association I has adopted the Coordinated Common System for the Designation of Marine Forecast Areas as described below. The basis for the uniform system is a two-level division of the forecast areas, main areas, sub-areas. Sub-areas within the main area are described, in general, according to the point of compass, e.g. eastern part, southern part, etc.

COORDINATED COMMON SYSTEM FOR THE DESIGNATION OF MARINE FORECAST AREAS IN METAREA III(W)



5. Characteristic points	6. Latitude in degrees/minutes	7. Longitude in degrees/minutes	8. Characteristic points	10. Latitude in degrees/minutes	11. Longitude in degrees/minutes
12. GIBRALTAR	13. 36°09'N	14. 005°21'W	15. 16. CAP TEULADA	17. 38°52'N	18. 008°38'E
19. CAP DE GATA	20. 36°44'N	21. 002°16'W	22. 23. CAP CARBONARA	24. 39°07'N	25. 009°33'E
26. CAP DE PALOS	27. 37°38'N	28. 000°40'W	29. 30. CAP FALCONE	31. 40°57'N	32. 008°12'E
33. CAP DE LA NAO	34. 38°44'N	35. 000°14'E	36. 37. CAP LINARO	38. 42°01'N	39. 011°52'E
40. CAP EN SERRA	41. 38°54'N	42. 001°36'E	43. 44. CAP PALIMURO	45. 40°02'N	46. 015°15'E
47. CAP GALA FIGUERA	48. 39°20'N	49. 003°10'E	50. 51. CAP SAN VITO	52. 38°12'N	53. 012°43'E
54. CAP PERA	55. 39°43'N	56. 003°28'E	57. 58. CAP LILIBEO	59. 37°48'N	60. 012°26'E
61. CAP BAGUR	62. 41°57'N	63. 003°12'E	64. 65. CAP BON	66. 37°01'N	67. 011°08'E
68. MONTPELLIER	69. 43°36'N	70. 003°53'E	71. 72. CAP ROUX	73. 36°57'N	74. 008°47'E
75. SAINT RAPHAEL	76. 43°26'N	77. 006°46'E	78. 79. JIJEL	80. 36°50'N	81. 005°43'E
82. CAP CORSE	83. 43°00'N	84. 009°21'E	85. 86. CHERCHEL	87. 36°36'N	88. 002°11'E
89. BOUCHES DE BONIFACIO	91. 41°23'N	92. 009°10'E	93. 94. PORT SAY	95. 35°04'N	96. 002°30'W
			97. 98. CEUTA	99. 35°53'N	100. 002°15'W

Resolution 13 (XIII-RA I)

SUPPORT FOR THE JOINT WMO/IOC TECHNICAL COMMISSION FOR OCEANOGRAPHY AND MARINE METEOROLOGY (JCOMM)

REGIONAL ASSOCIATION I (AFRICA),

NOTING:

- (1) Resolution 14 (Cg-XIII) – Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM),
- (2) IOC Assembly Resolution XX-12 – The Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM),
- (3) *Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology, First Session – Abridged Final Report with Resolutions and Recommendations* (WMO-No. 931),

CONSIDERING that oceanographic and marine meteorological observations not only make a significant contribution to operational meteorology and the provision of marine services, but also are essential to global climate studies generally,

RECOGNIZING:

- (1) That JCOMM is now the appropriate and sole WMO body for the international coordination and regulation of a global operational ocean observing, data management and services system,
- (2) That some Members of the Association are actively involved in the deployment and maintenance of a variety of ocean observation facilities, for both operational and research purposes,
- (3) That Members of the Association are also increasingly being required to provide coordinated meteorological and oceanographic services for a large variety of marine user groups,
- (4) That the Global Telecommunication System (GTS) will continue to be essential for the operational collection and exchange of many types of ocean data,

RECOGNIZING FURTHER that a substantial increase in the amount of ocean data available operationally is needed to satisfy the requirements of operational meteorology, oceanographic services and research and global climate studies for such data,

URGES Members:

- (1) To continue and, where possible, expand their existing operational ocean observing system facilities and activities, as contributions to the World Weather Watch (WWW), Global Climate Observing System (GCOS) and Global Ocean Observing System (GOOS) and with international coordination effected through JCOMM;
- (2) To participate actively in the planning and implementation of these systems and in the work of JCOMM;
- (3) To coordinate with appropriate national oceanographic agencies and institutions to ensure the long-term operational maintenance of oceanographic observing systems;
- (4) To coordinate with appropriate national oceanographic agencies and institutions in developing oceanographic data management capabilities and oceanographic services;

- (5) To enhance two-way ship-shore telecommunication arrangements for oceanographic data and products, in particular through the greater use of satellite-based telecommunications facilities such as the Inmarsat and Argos systems;

REQUESTS the Secretary-General to take any action considered necessary, and within the available budgetary resources, to assist Members to participate in the development and maintenance of JCOMM.

NOTE: This resolution replaces Resolution 10 (XII-RA I), which is no longer in force.

Resolution 5 (XIV-RA I)

RA I REGIONAL INSTRUMENT CENTRE WITH FULL CAPABILITIES AND FUNCTIONS

REGIONAL ASSOCIATION I,

Noting:

- (1) The benefit to Members and the experience gained from the establishment of Regional Instrument Centres,
- (2) Recommendation 14 (CIMO-IX) — Intercomparison of Instruments,
- (3) Recommendation 19 (CIMO-IX) — Establishment of Regional Instrument Centres,
- (4) Recommendation 11 (CIMO-XIV) — Regional Instrument Centres with Full Capabilities and Functions,

Considering:

- (1) The results of the evaluation of the RICs and the need for the sustainability of their services to Members,
- (2) The need for regular calibration and maintenance of meteorological and related environmental instruments to meet increasing needs for high quality meteorological and hydrological data,
- (3) The need for building the hierarchy of traceability of measurements to International System of Units (SI) standards,
- (4) The requirements of Members in the Region for standardization of meteorological and related environmental measurements,
- (5) The need for international instrument comparisons and evaluations in support of worldwide data compatibility and homogeneity,
- (6) The role RICs may play in the Global Earth Observing System of Systems, Natural Disaster Prevention and Mitigation, QMF and other WMO crosscutting programmes,
- (7) Limited resources of many Meteorological Services for employing experts with a scientific background or technical experience in the field of meteorological instruments and methods of observation,
- (8) The difficulties met by several Members when attempting to calibrate or compare their meteorological instruments against recognized standard instrument,

Designates the Calibration Laboratory of the Direction de la météorologie nationale of Morocco as Regional Instrument Centre of RA I with the following capabilities and corresponding functions:

Capabilities:

- (a) A RIC must have, or have access to, the necessary facilities and laboratory equipment to perform the functions necessary for the calibration of meteorological and related environmental instruments;
- (b) A RIC must maintain a set of meteorological standard instruments and establish traceability of its own measurement standards and measuring instruments to the SI;
- (c) A RIC must have qualified managerial and technical staff with necessary experience in fulfilling its functions;
- (d) A RIC must develop its individual technical procedures for calibration of meteorological and related environmental instruments using calibration equipment employed by the RIC;
- (e) A RIC must develop its individual quality assurance procedures;
- (f) A RIC must participate in, or organize, inter-laboratory comparisons of standard calibration instruments and methods;
- (g) A RIC must, as appropriate, utilize the resources and capabilities of the Region to the best interest of the Region;
- (h) A RIC must, as far as possible, apply international standards applicable for calibration laboratories, such as ISO 17025;
- (i) A recognized authority must assess a RIC, at least every five years, to verify its capabilities and performance;

Corresponding functions:

- (j) A RIC must assist Members of the Region in calibrating their national meteorological standards and related environmental monitoring instruments;
- (k) A RIC must participate in or organize, WMO and/or regional instrument intercomparisons, following relevant CIMO recommendations;
- (l) According to relevant recommendations on the WMO Quality Management Framework a RIC must contribute positively to Members regarding quality of measurements;
- (m) A RIC must advise Members on inquiries regarding instrument performance, maintenance and the availability of relevant guidance materials;
- (n) A RIC must actively participate in, or assist in the organization of regional workshops on meteorological and related environmental instruments;
- (o) A RIC must cooperate with other RICs in standardization of meteorological and related environmental measurements;
- (p) A RIC must regularly inform Members and report,¹ on an annual basis, to the president of the Regional Association and to the WMO Secretariat on services offered to Members and activities done.

¹ Web-based approach is recommended.

Resolution 22 (XIV-RA I)**PARTICIPATION OF WOMEN IN THE WORK OF THE ASSOCIATION**

REGIONAL ASSOCIATION I,

Noting:

- (1) The United Nations Conference on Women (Beijing 1995) and its recognition of the importance of women and their contribution to science,
- (2) The appeals made in Agenda 21: Programme for Action for Sustainable Development (Rio de Janeiro, June 1992), Chapter 24: Global action for women towards sustainable and equitable development,
- (3) The Report of the Second WMO Conference on Women in Meteorology and Hydrology, Geneva, March 2003,
- (4) Resolution 33 of the Fourteenth World Meteorological Congress (Cg-XIV), which calls for equal opportunities for the participation of women in meteorology and hydrology,

Considering:

- (1) The need for trained, qualified professionals regardless of gender, in the work of the Association,
- (2) The need to encourage national education programmes in science and technology that actively target girls and woman predisposing and training them to enter the fields of meteorology and related sciences,
- (3) The need to increase opportunities and inducements for the recruitment of women within NMHSs, and provide equal opportunities for career advancement to the highest levels,

Welcoming and supporting the active participation of women delegates in this Association,

Urges increased participation and involvement of women in the work of this Association;

Recommends that Members:

- (1) Continue to encourage, promote and facilitate equal opportunities for women in science and technology and request partners to encourage the training of women in meteorology and hydrology, in order to prepare them for careers in scientific professions such as meteorology and related sciences;
- (2) Facilitate the participation of women in the activities of the Association;
- (3) Provide active encouragement and support for equal opportunity for the participation of women in all fields of meteorology and related sciences at decision-making levels, particularly, in RA I and its working programmes;
- (4) Train all staff in gender issues in service delivery;
- (5) Introduce meteorology curriculum in primary and secondary school and encourage the girls to take sciences and in particular meteorology;
- (6) Take affirmative action in promotion and employment to correct the gender importance currently in favour of men, until such a time when gender equity is achieved in meteorology and hydrological services;

- (7) Encourage the promotion of science studies in schools, as a means of ensuring the participation of women and men on an equal basis in this field of work;

Further recommends that the Secretary-General establishes a Fellowship scheme dedicated for the training and capacity-building for women in meteorology, hydrology and related sciences;

Requests the president of the Association to report to the next session of the Association on progress made on the main aspects of the implementation of this resolution during the intersessional period;

Decides to appoint and support a gender focal point from among the Members with appropriate expertise, who will report to the president of the Association.

Resolution 3 (XV-RA I)

IMPLEMENTATION OF A CLIMATE WATCH SYSTEM

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) Resolution 12 (Cg-XV) – World Climate Data and Monitoring Program, of the Fifteenth World Meteorological Congress 2007, deciding on priorities for the World Climate Data and Monitoring Programme including, inter alia, the implementation of climate watches,
- (2) The conclusions of WMO workshops on climate monitoring including implementation of a climate watch system in Region III (Guayaquil, Ecuador, 8–11 December 2008) and Region II (Beijing, China, 10–13 November 2009),
- (3) The decision of the Executive Council at its sixty-second session urging Members to implement climate watches,

Considering:

- (1) The role of the National Meteorological and Hydrological Services in the provision of timely weather and climate advisories for warning against extreme weather and climate events,
- (2) The WMO and Commission for Climatology (CCI) efforts in promoting the provision of climate watches based on CCI guidelines and brochure as a mechanism to heighten awareness among the users of ongoing or foreseen climate anomalies and related extreme weather and climate events and their negative impacts,
- (3) The increasing demand from governments, semi-public and private agencies for climate advisories covering time ranges from a month to seasonal timescales that would allow for an improved time frame for preparation against extreme climate events,

Recognizing:

- (1) That extreme climate events may extend beyond the boundaries of a single nation and the need to coordinate the climate watch system activities among neighbouring countries,
- (2) That important progress has been achieved in the development of useful and timely climate monitoring and prediction products at national, regional and global scales,
- (3) The need for involving users in the definition of the content and thresholds which frames climate advisories depending on sectoral requirements and needs,

Decides to start the implementation of a climate watch system in Region I enabling National Meteorological and Hydrological Services in the Region to issue climate advisories at national level based on:

- (a) The general recommendations and guidelines provided by the relevant WMO technical documents, for example, guidelines on climate watches and the WMO brochure on climate watch systems) as well as other WMO publications to support design and implementation of climate watch system;
- (b) Global and regional infrastructure and mechanisms such as Regional Climate Outlook Forums for the generation of climate products;

Urges Members to strengthen their cooperation on the climate watch system and related topics, to ensure a harmonized climate watch system implementation, interoperable systems and timely exchange of related data and products;

Requests the Secretary-General to facilitate the implementation of a climate watch system in the Region.

Resolution 4 (XV-RA I)

ESTABLISHMENT OF REGIONAL CLIMATE CENTRES

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) The *Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026),
- (2) The *Abridged Final Report with Resolutions of the Fourteenth Session of the Commission for Basic Systems* (WMO-No. 1040),
- (3) The *Abridged Final Report with Resolutions of the Sixty-first Session of the Executive Council* (WMO-No. 1042),
- (4) The *Abridged Final Report with Resolutions of the Sixty-second Session of the Executive Council* (WMO-No. 1059),
- (5) The *Abridged Final Report with Resolutions and Recommendations of the Fifteenth Session of the Commission for Climatology* (WMO-No. 1054),

Recognizing:

- (1) The enhanced worldwide attention to climate change, the associated vulnerabilities in the Region and the need to support decision-making for adaptation to climate change and variability with more detailed regional climate information,
- (2) The endorsement by the WMO Executive Council at its sixty-first session in 2009 of the amendment to the *Manual on the Global Data-processing and Forecasting System* (WMO-No. 485), Volume 1 – Global Aspects, embedding the process for formal WMO designation of Regional Climate Centres (RCCs) and RCC Networks in WMO Technical Regulations,

Decides:

- (1) To keep under review the needs and gap analysis for the establishment of RCCs in Region I, through continued assessment of the requirements and capabilities of the Region vis-à-vis the mandatory and highly recommended RCC functions, and to mandate the Regional Association I Working Group on Climate Matters and Applications under the guidance of the president of the Association to coordinate this process;
- (2) To develop and implement RCCs in Region I, with the guidance and support provided from time to time by the presidents of Regional Association I, the Commission for Climatology (CCI) and the Commission for Basic Systems (CBS) and the Secretary-General;
- (3) To keep the RA I RCC operational activities flexible, allowing them to evolve based on Members' requirements and in compliance with WMO regulations;
- (4) To seek formal WMO designation of the RA I RCCs through the process described in the *Manual on the Global Data-processing and Forecasting System* and to mandate the president of the Association to initiate this process, after satisfactory evaluation of the fulfilment of the Members' requirements as well as capability to fulfil the mandatory functions and demonstration of this capability for at least two years to CCI and CBS;
- (5) To regularly review RA I Members' requirements for climate information, products and services, and to ensure a state-of-the-art service provision to Members to meet their priority needs;

Urges:

- (1) The Secretary-General to ensure that the Members are regularly updated on the latest designation criteria for the establishment and designation of WMO RCCs;
- (2) Regional Climate Centre candidates to undertake a self-appraisal prior to submitting their proposals in order to determine their capabilities to fulfil the requirements of RCC designation criteria by WMO, develop implementation plans and submit these to the concerned subsidiary body of the Association for their assessment and advice;
- (3) Regional Climate Centres to submit activity reports on an annual basis to the RA I Working Group on Climate Matters and Applications, and to undertake recommended remedial actions, to ensure fulfilment of WMO designation criteria;
- (4) Regional Climate Centres to actively support the further development and operation of Regional Climate Outlook Forums in the Region;
- (5) All Global Producing Centres of Long-range Forecasts (GPCs) to support the efforts of and collaborate with the RA I RCCs;
- (6) All RA I Members to support RA I RCC activities, use the products and provide feedback to RCCs and GPCs on their effectiveness for further improvement and tailoring to user needs;

Requests:

- (1) The presidents of CCI and CBS and the Secretary-General to provide the necessary support to ensure the success of RCC establishment in Region I, and effective collaboration with the RCCs in other Regions;
 - (2) The president of the Association to consult with CCI, CBS and the WMO Secretariat in the effective implementation of RCCs and in determining the eligibility of new RCC candidates.
-

Resolution 8 (XV-RA I)**STRATEGIC PLAN FOR THE ENHANCEMENT OF NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES IN REGIONAL ASSOCIATION I (AFRICA) 2012–2015**

REGIONAL ASSOCIATION I (AFRICA),

Noting:

- (1) *The Abridged Final Report with Resolutions of the Fourteenth Session of Regional Association I (Africa)* (WMO-No. 1022),
- (2) *The Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026), especially its discussion and Resolution 27 (Cg-XV) – WMO Strategic Plan, as well as Resolution 28 (Cg-XV) – Preparation of the WMO Strategic Plan for 2012–2015,

Recognizing:

- (1) That the WMO Strategic Plan provides a high-level statement of the future direction and priorities of WMO in terms of Top-level Objectives, Strategic Thrusts and Expected Results,
- (2) That the above framework provides useful guidance in establishing an overall Strategic Plan for the Region,

Considering the usefulness of a Regional Strategic Plan that encompasses the development and/or enhancement of all weather-, climate- and water-related services;

Agrees that the priorities of the Region be expressed in terms of Regional Expected Results associated with the WMO Expected Results, with each Regional Expected Result having identifiable deliverables;

Approves the Strategic Plan for the Enhancement of National Meteorological and Hydrological Services in WMO Regional Association I (Africa) 2012–2015, as given in the annex to the present resolution;

Authorizes its president to make the necessary adjustments to the RA I Strategic Plan in consultation with the RA I Management Group and working groups in light of the discussions of the Association at this session;

Urges Members to participate actively in the implementation of this RA I Strategic Plan, and take this Plan into account in developing and enhancing their national programmes in meteorology, hydrology and related disciplines to better respond to the demand for a widening range of services to meet the sustainable development goals of nations;

Urges Members to make every effort to galvanize services, both financial and institutional, at the national level to complement resource mobilization efforts of the Secretariat;

Requests the Secretary-General:

- (1) To seek partnerships with, and collaboration of, relevant institutions and programmes within the United Nations system, multilateral donors and international agencies, particularly in the provision of technical and financial support for the implementation of the RA I Strategic Plan;
- (2) To facilitate the preparation of the RA I Operating Plan that would be in line with the identified regional priorities and expected results;

- (3) To mobilize resources for technical cooperation activities in line with the RA I Strategic Plan and to assist Members to do the same;
- (4) To arrange for the publication of the RA I Strategic Plan and its dissemination to Members of the Association, the presidents of other regional associations and the presidents of technical commissions, and relevant regional and international organizations;
- (5) To report to Regional Association I at its sixteenth session on the progress made on the implementation of the RA I Strategic Plan;

Requests further the Secretary-General to take into account the experience gained concerning strategic planning at the regional level in the development of the succeeding WMO Strategic Plan and the associated planning process as well as in relation to the monitoring and evaluation of these plans.

Annex to Resolution 8 (XV-RA I)

STRATEGIC PLAN FOR THE ENHANCEMENT OF NATIONAL METEOROLOGICAL AND HYDROLOGICAL SERVICES IN REGIONAL ASSOCIATION I (AFRICA) 2012–2015

This document contains the core of the RA I Strategic Plan. It takes into account the framework of the WMO Strategic Plan (i.e., Expected Results grouped within five Strategic Thrusts under three Top-level Objectives). The regional consideration for each of the five WMO Strategic Thrusts is presented. Thereafter, under the relevant WMO Strategic Plan Expected Results, Regional Expected Results are identified and will serve as the common regional basis for action. Listed under each of the Regional Expected Results are the areas where deliverables are expected, through cooperation among Members, especially their NMHSs, for enhanced provision, access, operation or capability.

WMO REGIONAL ASSOCIATION I (AFRICA) STRATEGIC PLAN JANUARY 2010

Mission Statement for WMO Regional Association 1 (Africa)

To support NMHSs of the Region to make effective contribution to sustainable socio economic development through partnerships with relevant stakeholders and the provision of timely, reliable and relevant information on meteorological, hydrological and related natural occurrences.

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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
EC	Executive Council
ER	Expected Results
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
GTS	Global Telecommunications Systems
HYCOS	Hydrological Cycle Observing System
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
ISO	International Organization for Standardization
KOS	Key Outcomes
KPI	Key Performance Indicators
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

NWP	Numerical Weather Prediction
PR	Permanent Representative
PUMA	Meteorological Transition in Africa Project
RA I	Regional Association I (Africa)
RB	Regional Bodies
RBB	Results-based Budget
RBM	Results Based Management
RSBN	Regional Synoptic Basic Network
RTCS	Regional Training Centres
SADC-DMC	Southern African Development Community-Drought Monitoring Centre
SREC	Subregional Economic Communities
SWOT	Strengths, Weaknesses, Opportunities and Threats
ST	Strategic Thrust
TDCF	Table Driven Code Format
UMA	Union du Maghreb Arabe
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
UNCCD	United Nations Convention to Combat Desertification
WIS	WMO Information System
WMO	World Meteorological Organization

I. FOREWORD

The fourteenth Session of the WMO Regional Association I (Africa), held in Burkina Faso in February 2007, recalled that the fifty-eighth Session of the Executive Council (Geneva, June 2006) recognized the need for the Regional Associations to craft their Strategic Plans and, in so doing, ensure that they were aligned to that of WMO's long-term plan, particularly the Strategic Plan (2008–2011), and mindful that the Organization had adopted a Results-Based Management (RBM) system with its attendant Results-Based Budgeting mechanism. The six plans were to be amalgamated and a resultant WMO Operating Plan designed so that WMO would accommodate and respond to the dictates of the global society as well as attend to the needs of its internal environment (WMO Members). Accordingly, RA I (Africa) resolved to develop its Strategic Plan. This decision was later approved by the Fifteenth WMO Congress in Geneva in May 2007. This Plan, therefore, is a culmination of these developments.

This Strategic Plan is a planning process driven by the needs and priorities identified by RA I Members in 2007. Top of the agenda is the need for NMHSs to provide the scientific mandate that enable Africa to appropriately address the impacts of climate change. The Members unanimously acknowledged that weather and climate related natural disasters have become all too frequent, prolonged, more extreme in intensity and devastating. The following readily comes to mind:

- A see-saw of extreme weather episodes (floods and droughts)
- High incidents of lightning and strong winds
- Extent and severity of dust storms
- Increasing desertification and shifting of sand dunes
- Fluctuating onsets, cessation and duration of rainy seasons
- Fresh water scarcity.

In addition to the issue of climate change, the Region still has poor meteorological and hydrological infrastructure and its skilled manpower base is shrinking. At the same time, the continent has more than half of the countries categorized by the United Nations as Least Developing Countries (LDCs). It is my wish to witness most of these LDCs move out of this category with respect to the provision of weather, climate and hydrological products and services. This success will depend, to a large extent, on the commitment by all players, principally NMHSs themselves, RA I as a regional body with its attendant Regional institutions and WMO.

I hope all RA I Members, as they prepare, develop or update their national strategic plans, will find this to be useful reference guide. I also call on all Members to join hands with the aim of ensuring successful implementation of this Plan. I would like to use this opportunity to thank, on behalf of RA I, WMO Secretariat, in particular the Director of WMO Regional Office for Africa, Mr Alioune Ndiaye for the support and facilitation in the development of this Plan. I express my deep appreciation to my vice-president, Dr Amos Makarau, PR of Zimbabwe with WMO for the assiduous work he has done with the assistance of WMO staff, particularly Dr Yinka Adebayo, Mr Stephen Njoroge and Mr Ishiaku Muhammed in making sure that this plan was prepared.

I thank you.

Signed: The president of RA I

II. EXECUTIVE SUMMARY

The Regional Association I embarked on the development of a strategic plan for the region in response to the new dispensation in WMO to move from Long Term Planning approach to Results Based Management (RBM) approach. The Association recognizes that RBM is not only a worthwhile approach for delivering its activities, but it is also an excellent way for its Members to join hands, in order to bolster its impact. Through this approach, activities are clearly spelt out, linked with results, and these results are, in-turn monitored on a continuous basis, using clear indicators to identify whatever achievements are accomplished within a time scale. Given the link between strategic plan, available resources and evaluation, the RBM approach also gives room for transparency and accountability hence enabling stakeholders to identify with the use of their resources as they are able to see the outcome of their investments. In line with the traditional approach to the development of strategic plan, this current Plan has been developed along the lines enumerated below.

The situational analysis of the state of affairs in Africa is as presented. This involves an illumination of the strengths, weaknesses, opportunities and threats surrounding the conception and delivery of the plan within the milieu of Africa's existing natural, socioeconomic and political situations. It is recognized that whereas NMHSs in Africa have operated for decades, the strengths of the existing infrastructure and competencies are still largely unable to meet up to the existing and potential challenges as a result of the various weaknesses and threats such as low level of technological development, poor recognition by policy makers, inadequate telecommunication facilities, lack of adequate financial support, brain drain and negative effects of globalization. Despite all these situations, however, the stakeholders are aware of the strategic role that NMHSs have to play in the manifestation of the recurrent and future socioeconomic activities in their respective countries.

An indication is given of what RA I needs to do especially, taking account of the major stakeholders within and outside the Region. The key issue so be dealt with, by and large, revolve around the following building blocks:

- (a) Cooperation with national and international stakeholders to enable adequate delivery of weather, climate and water related information and services;
- (b) Two-pronged capacity-building for policy makers and also to enable development on human and institutional resources in NMHSs. The essential issues that should be taken into consideration within the framework of capacity-building revolve around the need for enhancement of capacity of relevant actors as and when appropriate;
- (c) Engagement of relevant stakeholders especially policymakers, in the development of the multifarious infrastructure that are necessary for achieving the goals set in the Plan;
- (d) The issues surrounding early warning, Climate Change and climate variability.

The Plan identifies the key partners that are directly or indirectly essential to the delivery of concrete activities. 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, Subregional Economic Communities, research, training and policy related institutions, Non-Governmental Organizations and United Nations agencies operating in the Region.

On programme delivery, the Expected Results have been downscaled from those given by WMO as the Organization-wide Expected Results. This approach was adapted in order to make sure that the Region does not operate at variance with the Organization's approved programme. Hence, a set of the Expected Results was developed for the African Region so that the related issues could be addressed in tandem with the programme and activities of WMO, albeit with specificities to Africa and its NMHSs. It is on the basis of the downscaled Expected Results for Africa that Key Outcomes (KOs) and commensurate Key Performance Indicators were developed. It is also noteworthy that the KOs were developed with a deliberate attempt at making sure that the desired activities and resources for actualizing them are within the control of the Management, especially NMHSs and partners operating in and outside the Region including at national and local levels.

Finally, an explanation is given about how the Plan will be implemented, taking into account the need to ensure appropriate monitoring and evaluation. Hence enumerated in the Plan are the key reference points against which the success or otherwise of the associated activities will be measured during the evaluation exercise.

III. INTRODUCTION

From the day-to-day weather that affects livelihoods and economic decisions, to the storms, floods and droughts that can determine the very survival of millions of people, weather, climate, water and related environmental issues impact people and the world's economy. Policymakers, professionals and the public alike use and benefit from environmental forecasts and assessments. Nevertheless, between 1980 and 2000, over 1.2 million people died and more than US\$ 900 billion were spent coping with weather, climate and hydrological phenomena (WMO). Much of the impact could have been avoided by proactive initiatives by governments and people. Loss of livelihood and financial costs are growing steadily as exposure to environmental hazards increases. At the same time, scientific and technological advances are providing tools and opportunities to enable more effective action. Realizing these opportunities requires vision, planning and strong organizational commitment. This Strategic Plan lays out the vision and roadmap whereby WMO RA I Members build upon their achievements and collectively identify their commitment to advance their efforts aimed at addressing the critical social and development needs of today and tomorrow.

Weather, climate and water information influences social and economic decisions every day, routinely contributing to efficient generation of electricity; safe transport in the air, on land and at sea; management of agricultural production and water resources; and development planning. In the extreme, weather-, climate- and water-related events dramatically affect lives and livelihoods, threaten food security, reduce the availability of uncontaminated fresh water, increase the spread of disease and undermine development. Growing urbanization and the expansion of communities into previously uninhabited areas, such as arid zones and flood plains, are compounding the threat by exposing populations to air- and waterborne diseases, heat stress, drought, air pollution, landslides, floods, storm surges, tsunamis and other environmental hazards. Furthermore, many disasters are rooted in poor development planning and methodologies, increasing vulnerability to extreme weather, climate and water conditions. Governments and people everywhere continue to need expert assistance to understand and assess the effects of day-to-day weather, climate and water conditions and the impacts of extreme events on their societies, and to exploit weather, climate and water information more effectively with a view to maximizing its benefits to society.

It is a recognized fact that Africa, because of widespread poverty and consequential limited adaptation and coping capabilities, is one of the most vulnerable regions of the world to the

projected impacts of climate change. It is also a known fact that most of Africa's disasters are meteorologically and hydrologically related. These disasters pose a serious threat to the continent's ability to attain the Millennium Development Goals and sustainable development. While it is projected that some parts of Africa, especially in the Sahel region, may experience an increase in rainfall, and others in southern Africa may experience a reduction over the next forty to fifty years, overall the African continent is likely to suffer 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.

As a preventative measure against the negative economic and livelihood impacts of climate change, Africa needs to intensify its agricultural diversification programme in a way that would ensure food self-sufficiency and sustainably contribute to food security in years of unprecedented climatic eventualities (AU). Climate monitoring and prediction play an important role in informing government policy decisions in this respect. However, Africa's efforts have to be linked to the global processes and be informed by them in a way that would further enhance the continent's capacity to observe climate systems and analyze and apply climate information to development.

The Environment Initiative of the New Partnership for Africa's Development (NEPAD) and its related Action Plan took cognisance of the economic importance of climate change and variability in its programme area on combating climate change in Africa. The African Union Commission wishes to see the outcome of the Addis Ababa meeting coordinated with the Action Plan of the NEPAD Environment Initiative for a harmonious implementation of climate change and variability as well as vulnerability reduction initiatives in the continent.

The vulnerability of communities throughout the world will be reduced by introducing authoritative, scientifically sound information into sustainable development policies and into the global partnership strategies for development, especially for least developed countries. In particular, WMO is committed to the implementation of the Hyogo Framework for Action 2005–2015: *Building the Resilience of Nations and Communities to Disasters*. The Framework for Action 2005–2015 shifts disaster risk management from post-emergency response and recovery to an approach that emphasizes prevention, preparedness and contingency planning. WMO activities will help through the provision of early warning systems, support to operational decision processes and the incorporation of hydro-meteorological risk assessment in disaster risk management and development planning. Monitoring, assessing and forecasting weather, air quality, climate, oceanic conditions, the global water cycle and hydro-meteorological hazards are important components of WMO's commitment to the international community's strategy to attain the United Nations Millennium Development Goals. WMO activities will help to achieve the following results:

- **Lessen** the impact of drought, desertification, extreme weather, water and climate events, and associated pests and diseases on agricultural production and activities essential to food security and industrial production, thereby contributing to the eradication of extreme poverty and hunger (Goal 1);
- **Mitigate** the impact of weather- and climate-sensitive epidemics, thereby helping to reduce child mortality (Goal 4), improve maternal health (Goal 5), and combat HIV/AIDS, malaria and other diseases (Goal 6);
- **Monitor** the environment to assess and reduce the impact of climate change and help countries, especially the developing and least developed, to adapt, thereby helping to ensure environmental sustainability (Goal 7);
- **Encourage** the participation of women in science, and recognize and support the special needs of rural women and of women involved in water management and disaster response, to apply weather, water and climate information effectively, thereby contributing to the promotion of gender equality and the empowerment of women (Goal 3).

IV. PURPOSE OF THE REGIONAL ASSOCIATION I (AFRICA)

To support the aims of WMO and the implementation of its global Programmes at the national, subregional and regional levels, the WMO has defined a framework of six Regional Associations of which Africa is Regional Association 1 (RA I Africa). There are 56 Member countries and territories. Thirty-four of these are categorized as Least Developed Countries (LDCs) which constitutes two-thirds of all LDCs in the world. This situation has further been complicated in numerous countries with a variety of natural hazards in the form of drought, desertification, floods, pests and Tropical Cyclones. The political disturbances and attendant civil strife in some of the countries further worsen the socioeconomic development and slow the fight against poverty. The resulting effect is the slow development of NMHSs (poor network of observing stations, small skilled human resource base and inadequate and obsolete infrastructure). This situation heightens the vulnerability of the Region to severe weather, climate and hydrological hazards.

RA I (Africa) is responsible for the coordination, development and promotion of meteorological, hydrological and related activities in Africa. These are agreed upon during the RA I Sessions held once every four years and approved by WMO Congress.

By assisting in the coordination of the use of meteorological and hydrological infrastructure and delivery of programmes within the Region, all Members are able to benefit from this regional approach such as telecommunication systems (GTS and WMO Information Systems), capacity-building and meteorological and hydrological data management, among others. Each Member decides how best to use its own capacities, and especially its NMHS to contribute to these regional outcomes. The activities within the Region include, among others, being responsible for official recording and collection of meteorological and climatological data, archiving and custodian of the national meteorological databank, maintenance and operation of the meteorological and hydrological infrastructure, and providing expertise on weather, climate, water and the related environment.

V. SITUATIONAL ANALYSIS AND CURRENT CHALLENGES

More than half of African countries are categorized as Least Developed Countries (LDCs) (see Annex 2). This situation has further been complicated in numerous countries with a variety of natural hazards in the form of drought, desertification, floods, pests and Tropical Cyclones. The political disturbances and attendant civil wars in many of the countries further worsen the socioeconomic development of some of these countries. The resulting effect is the slow development of NMHSs (poor network of observing stations, small skilled human resource base and inadequate and obsolete infrastructure). A combination of these situations heightens the vulnerability of the Region to severe weather, climate and hydrological hazards.

WMO has facilitated in RA I the establishment of Regional and Subregional Centres which include ACMAD, AGRHYMET, ASECNA, ICPAC and SADC- DMC. Apart from providing capacity-building, these centres have the sub regional mandate to address issue relating to climate change (CLIMDev), Satellite based monitoring systems (PUMA and AMESD). In addition, WMO, in collaboration with NMHSs, is spearheading the development and implementation of several hydrological projects in Africa (such as SADC-HYCOS, Niger-HYCOS, Volta-HYCOS etc.) and Integrated Flood Management Plans. RA I NMHSs also play active collaborative roles in River and Lake Basin Organizations in Africa (for example, Niger Basin, Nile Basin, Congo–Oubangui–Sangha Basin, Zambezi Basin, Lake Chad Basin, Lake Victoria, etc.).

WMO has, at the recommendation of the RA I designated several Regional Training Centres (RTCs) that are located in Egypt, Algeria, Nigeria, Kenya, Madagascar, Niger and Angola. The Region has also established cooperation with the subregional economic groupings such as CEMAC, UMA, ECOWAS, SADC, IGAD, COMESA and EAC in support of activities of the NMHSs in the Region. Under these economic groupings, meteorological associations are being formed in some. The objective is to harmonize the development of meteorology through regional approaches. This will minimize duplication of efforts and eliminate competition among the NMHS.

One of these is the Meteorological Association of Southern Africa (MASA) formed in 2007 by SADC member countries while the process to establish a similar association for the East African community is underway.

V-1 Strengths, Weaknesses, Opportunities and Threats (SWOT)

The Strengths, Weaknesses, Opportunities and Threats of the Region as identified during the 14th Session of RA I are presented as follows:

Strengths

- NMHSs are sole designated national authorities and chief advisers to governments on all matters relating to meteorology, climatology and water resources
- Availability of regional and Subregional Centres like ACMAD, AGRHYMET, IGAD and DMCs to enhance human capital and infrastructural development
- Meteorology and hydrology are central to the national security (food security, water resources, energy) of a country
- Meteorological and hydrological information are essential part of national Plan
- Existence of national meteorological and hydrological databanks
- Existence of Regional Synoptic Basic Network (RSBN)
- Real-time operational services
- Existence of infrastructure for sharing meteorological data
- Impact of meteorological data in aviation and marine services.

Weaknesses/Areas of improvement

- Incompatibility of technology between member countries
- Difficulties in keeping in pace with the rapid technological advances
- Difficulties in the maintenance and sustainability of basic systems
- Poor visibility of NMHSs at national level, leading to low funding from government and the development partners
- Lack of effective mechanisms for collaboration between public and private sectors and across scientific disciplines and technical domains
- Gaps between users and providers of meteorological and hydrological information (communication, understanding and dissemination)
- Poor telecommunication network
- Inadequate skilled human resources
- Lack of a defined framework for mainstreaming gender in meteorology
- Low recognition of socioeconomic value of NMHSs and their services
- Lack of legal frameworks for establishment of NMHSs in many Member countries
- Lack of adequate and appropriate climate information system/database on impact analysis.

Opportunities

- Growing awareness of the public and the decision makers of how everyday life and the sustainable development of society are affected by the weather, climate, water resources and the natural environment
- Growing demand for ever broader range of meteorological and hydrological services
- Existence of development partners and funding agencies as a potential source of resources for meteorological and hydrological development projects
- The possibility to use new and evolving technologies
- Diversifying in the potential areas like Marine meteorology, environmental protection among others
- Transformation of NMHSs into cost recovery and revenue generation agencies
- Climate change is now a high level political and developmental issue at national, regional and international levels that has the potential to increase the visibility of NMHSs
- Extreme weather events are becoming more frequent and severe and, therefore, increasing the need for meteorological and hydrological forecasts and applications
- Partnering with existing regional and subregional institutions

- Relevance of meteorological and hydrological information to disaster risk reduction
- Emergence/ existence of south–south cooperation and partnerships
- More involvement of NMHSs in regional and subregional water, climate and meteorological and hydrological programmes.

Threats

- Inadequate financial support from governments
- Emergence of alternative sources that issue climate and weather information
- Globalization of weather issues through international media and research institutions
- Brain drain and high staff turn-over
- HIV/AIDS and other health pandemics
- Political instability in some countries.

V-2 Internal analysis

This Section looks at emerging issues and specific challenges in the region as identified by RA I.

(i) Challenges facing RA I

- Increasing Natural Hazards in Regional Association I
- Technological gap between NMHSs of developed and developing countries (LDCs) of RA I
- Poor infrastructure and Manpower development
- Rapidly increasing societal demands for meteorological, hydrological and related data and information
- The need to be relevant in the political and socioeconomic development of the region (Millennium Development Goals, NEPAD, etc.)
- En-mass retirement of staff and slow replacement rate
- Complying with demands by ICAO to be ISO-certified with respect to services to aviation.

(ii) Causes of these challenges

- Effect of climate change.
- Inadequate allocation of Fund to NMHSs to undertake the continuous modernization resulting from the rapid advances in the science and technology.
- Inadequate critical mass of qualified Human Resource in NMHSs.
- Non-consideration of the perception of stakeholders as a way of scanning the environment in which WMO Member States as well as RA I operate.
- Poor visibility with governments and some inter-governmental bodies
- External forces (e.g., politics, economics, laws, society, technology).

(iii) Desired realizations

Once these challenges have been addressed it is anticipated that the following will be realized:

- Enhanced capacities of NMHSs to develop tailor made products to support the socioeconomic development of the region
- Enhanced Hydrological operations in water resource management and in particular in respect to inland lakes and underground water resources
- Strengthened regional institutions and Centres of Excellence such as the ACMAD, AGRHYMET, ICPAC, and SADC-DMC
- Improved delivery of accurate and reliable warnings of severe weather and climate extreme events
- Enhanced timely availability of forecasts, advisories and warnings to the governments, individuals and industries
- Enhanced resources mobilization to implement the Strategy
- Increased participation of NMHSs in Climate Change matters especially in the IPCC, UNFCCC, and UNCCD and other multilateral processes
- Increased support to WMO LDC Programme

- Active involvement and Participation in Regional projects in particular the planned ClimDev and AMESD projects amongst others
- Improved facilities and human resource capacity required for efficient gathering, exchange and processing of meteorological observations, data and products
- Enhanced skills in the management of NMHSs
- Codes of conduct are in place and practiced by all NMHSs.

V-3 External analysis

Since the priority sectors of Member States of Africa are agriculture, transport, communication, energy and water resources, meteorological services play an important role in integration and development of the afore-mentioned economic activities. The meteorological and climatological information are used in the monitoring of the pasture land and assessment of crop yields and similarly planning of agricultural work during the crop growing season. With regard to transport, meteorological information and atmospheric phenomena contribute to ensure the safety of air traffic and land and sea transport. Climatological studies are used for assessment and management of countries energy resources in term of public works the construction of roads and port installations requires in-depth analysis of meteorological data particularly those relating to rainfall, sunshine, wind and humidity, etc.

It should be noted that meteorological application have become increasingly important, in particular to combat the adverse effects of drought, desertification in Sahel and Southern Africa and natural disasters such as floods and tropical cyclones in eastern Africa. Furthermore, in the light of recent reports on global warming, far-reaching measures are being taken to improve the monitoring of meteorological and climatic parameters and the management of the global environment. In this regard, meteorological services help to draw up policies on environmental management at the national and regional level Member states of Africa. These included the contribution made by meteorological services during the preparatory activities for the United National Conference on Environment and Development. They also play an active role in proposing draft regulations for the environment and development. Meteorological Services of the member countries of Africa play important role in the economic and social development of respective countries. The various Economic groupings (ECOWAS, SADEC, IGADD, UMA, CEMAC) have integrated meteorological Services as an area of community action within the continent.

In order for RA I NMHSs to fulfil their mandates the stakeholders listed in Table 1, among others, have been identified as key partners at various levels.

Table 1: Major stakeholders and their linkages to RA I

Partnership and Co-operation

The table below shows traditional partners and stakeholders of the Association who contribute tremendously in many varying forms and degree to the achievements of the RA I and its Member countries through the WMO VCP program and other funding mechanisms. The list given below can never be complete or it is all inclusive due to the cross cutting nature of National Meteorological Service.

Stakeholders	Relationship and/or contribution to RA I
Continental level	
African Union (AU)	Political leadership and support by Heads of State for policy formulation
United Nations Economic Commission of Africa (ECA) Africa Development Bank (AfDB)	Mobilisation of resources from various donors for social and economic development. This will be more crucial in ClimDev Programme Development support
African Centre of Meteorological Applications for Development (ACMAD)	Capacity-building

Stakeholders	Relationship and/or contribution to RA I
Sub-continental level	
Subregional Economic Groupings (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 Organizations	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 and sub regional levels.
Regional Meteorological Development Institutions (ICPAC, AGRHYMET, SADC-Climate Services Centre, OSS.)	Capacity-building and regional products (forecasts, bulletins)
Meteorological and Hydrological Associations	Harmonization and coordination of meteorological activities in the regions
National level	
National Governments	Political and financial support, & 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.
Related Ministries and Agencies	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.
National Universities, Research Institutes and Technical Institutions	These are sources of skilled manpower. They also provide academic 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 variability through awareness programmes.
Private Sector	Partnership and product development
Global level	
WMO Secretariat	Overall guidance and support
United Nations Organizations	These are development partners at national, regional and international levels with specific mandates (social, environment, health, food security, disaster management, etc.).
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. They also provide upper air observations (AMDAR, airesps)
EUMETSAT, NOAA,	Provides satellite-based meteorological information to NMHSs (PUMA, AMESD).
Advanced Global Data Processing Centres (Météo-France, UKMet office, JMA, CMA, NWS, NCEP, etc.)	Global Numerical Weather Products, Trainings, Tools and Proceedings.
Development partners through VCP	Human and infrastructure capacity-building and development

Stakeholders	Relationship and/or contribution to RA I
Service providers from outside RA I	
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.
Media	Outreach
IOC	They provide observation at sea through their ships and buoys

Stakeholder involvement and participation in the activities of the Association is very critical to its success as this will foster equitable use of the already limited resources; avoid duplication of efforts; addressing regional and global posed by extreme weather events and climate in co-ordinated manner. Targeted user awareness workshops and meetings would be mutually beneficial in identifying the real needs and priority of users of meteorological information and data.

Positioning the Association in a manner that it becomes readily visible to decision-making and stakeholders was clearly demonstrated as a successful initiative in Kenya, Nairobi during the First Conference of Ministers Responsible for Meteorology in Africa.

V-4 Current challenges and emerging issues

(a) Current Challenges

- Increasing Natural Hazards in Regional Association I
- Technological gap between NMHSs of developed and developing countries (LDCs) of RA I
- Poor infrastructure
- The need to be relevant in the political and socioeconomic development of the region (Millennium Development Goals, NEPAD, etc.)
- Complying with demands by ICAO to be ISO-certified with respect to services to aviation
- Reduced financial support from government
- Health epidemics
- Sustained human resource development, due to, among others, brain drain, en-mass retirements, health epidemics
- Climate change adaptation and mitigation strategies
- Service delivery and dissemination to end users
- Food and water security
- Low levels of cooperation with the private sector
- Non-recognition of the social and economic benefits of NMHSs' services
- Attainment of Millennium Development Goals
- Collaboration between NMHSs, research and industrial community.

(b) Emerging Issues

- Climate Change
- Rapidly increasing societal demands for meteorological, hydrological and related data and information
- Emergence of alternative sources that issue climate and weather information
- Globalization of weather issues through international media and research institutions
- Global financial crisis
- Rapid changes in technology.

VI. WHAT RA I NEEDS TO DO

There is a continent-wide desire to ensure that the Regional Association positions itself with relevant stakeholders in Africa and takes the utmost advantage of the existing WMO infrastructure

in Member states and, particularly, those facilities that exist in National Meteorological and Hydrological Services, in support of socioeconomic development. Whereas there are a lot of pertinent issues to be addressed in realization of these monumental goals, it is however necessary to identify key building blocks for the attainment of adequate and measurable results through the actualization of a strategic plan. It is in this regard that this strategic plan is sustained upon the following:

- (a) Cooperation with national and international stakeholders to enable adequate delivery of weather, climate and water related information and services. There is the need for the Regional Association to sustain international cooperation and collaboration on critical issues that are essential to development of NMHSs. In this regard the Association is going to continue to ensure that the activities of WMO are downscaled as much as possible at the Regional level, taking into account the existing needs and challenges which the continent is facing. In this regard the association will ensure that in addition to the programmes and activities of WMO, the other complimentary and relevant activities of international organizations and agencies are taken advantage of within the continent. This therefore will be one of the major thrusts of the current strategic plan.
- (b) Two-pronged capacity-building for policy makers and also to enable development on human and institutional resources in NMHSs. The essential issues that should be taken into consideration within the framework of capacity-building revolve around the need for enhancement of capacity of relevant actors as and when appropriate. The Regional association is aware that more needs to be done in ensuring the awareness of the competencies of NMHSs in African countries. Furthermore education and training traditionally play a critical role in laying adequate foundation for socioeconomic development. In order to make sure that adequate services are delivered while at the same time there is effective and timely uptake of the output of the information from these services by policy makers, there should also be continuous awareness building and exchange of policy related information with relevant stakeholders. It is in this framework that the Regional Association will promote sustained capacity development efforts in the appropriate directions; namely at the level of policy makers, and human and institutional capacity-building.
- (c) The Regional Association further realizes that at the end of the day Africa can not exclude itself from the reality of ensuring that appropriate efforts are made at the level of promoting home-grown development of science and technology, with the aim of minimizing wholesale dependency on external support. Various stakeholders in Africa have over the years identified challenges that face sustained development of both indigenous and modern science and technology. The NMHSs are not excluded from the core of national development stakeholders that should take part in promotion of appropriate science and technology for the benefit of their services to the society. This is the reason the Association considers it timely to engage and sustain such engagement, of relevant stakeholders especially policymakers, industrial investors and academia, in the development of the multifarious infrastructure that are necessary for achieving these relevant goals.
- (d) The Association has a responsibility to play an important role in the crucial issue surrounding climate change and variability and efforts towards adaptation and mitigation.

VII. STRATEGIC CONSIDERATIONS

The following have been identified as the key Global Societal Needs on which the WMO Strategic Plan is based:

- Improved protection of life, and property (related to impacts of hazardous weather, climate, water and other environmental events and increased safety of land, sea and air circulation and transport)

- Poverty alleviation, sustained livelihoods and economic growth (in connection with the Millennium Development Goals) including improved health and social well-being of citizens (related to weather, climate, water and environmental events and influence)
- Sustainable use of natural resources and improved environmental quality.

To respond to the Global Societal Needs as relevant to the Region it is necessary to put an appropriate Strategic Plan in place. This RA I Strategic Plan is guided by the following:

- Continental Vision
- Mission, core purpose and values
- RA I major goals.

At the Fourteenth Session RA I agreed that, amongst others, more focus should be given to alleviating poverty in the Region, adapting to rapid changes in information technology, taking cognisance of increasing competitiveness among stakeholders in a growing market economy, and researching in order to address and accommodate various challenges.

VII-1 The Vision of RA I

The vision of RA I is To provide guidance to National Meteorological and Hydrological Services to enable them to produce and deliver timely, accurate and appropriate products and services to the users and thereby contribute to the socioeconomic development.

VII-2 Core purpose and values

Within the framework of the overall vision of the WMO, the Regional Association I will, based on this Strategic Plan, be involved in the following:

- *Facilitation* of regional cooperation and coordination in the establishment of networks of stations for the making of meteorological observations as well as hydrological and other geophysical observations related to meteorology, and to promote the establishment and maintenance of centres charged with the provision of meteorological and related services;
- *Promotion* of the establishment and maintenance of systems for the rapid exchange of meteorological and related information;
- *Promotion* of the standardization of meteorological and related observations and to ensure the uniform publication of observations and statistics;
- *Furthering* the application of meteorology to aviation, shipping, water problems, agriculture and other human activities;
- *Promotion* of activities in operational hydrology and to further close cooperation between Meteorological and Hydrological Services;
- *Encouraging* research and training in meteorology and, as appropriate, in related fields, and to assist in coordinating the international aspects of such research and training.

The **core purpose** of RA I is to assist NMHSs in the Region to help their stakeholders to make informed socioeconomic decisions through the provision of timely, reliable and relevant information on meteorological, hydrological and related natural occurrences.

The Region urges the following **values** to be adhered to by the NMHSs in their quest to increase their visibility, gain respect of their stakeholders and be relevant to the socioeconomic development of their countries:

- Professionalism
- Partnership
- Accountability

- Transparency
- Integrity
- Responsiveness.

VII-3 RA I major goals

To be more focused, RA I stressed the following goals / issues to be considered in the Plan:

- **Enhancing** the activities in the WWW Programme
(Improvement of GTS in RA I in order to improve exchange of information within RA I and between members, accompanying capacity enhancement in GTS, TC and NWP, data processing and data management and improvement and maintenance of observing networks –RSBN);
- **Strengthening** relationships with external stakeholders: the African Union and its subregional economic groupings, private sector and multilateral development partners
(To ensure NMHSs in the Region are fully engaged in continental GCOS initiatives such as AMESD and CLIMDEV-Africa);
- **Further capacitating** the Region's Hydrology and Water Resources Programme
(Collaboration between NMSs and NHSs in data exchange, flood forecasting and Warning and implementation of HYCOS projects with respect to inland lakes and underground water resources);
- **Facilitating** WMO World Climate Programme in the Region
(Active involvement of NMSs in regional Programmes and projects such CLIMDEV, AMESD and participation in climate change matters especially in the IPCC, UNFCCC and UNCCD among others);
- **Increasing involvement** of NMHSs in Disaster Risk Reduction
(Strengthening the activities of the RA I and NMHSs to work with partners in dealing with natural disasters and poverty);
- **Increase focus** on the applications and Services
(Strengthening of early warning systems such as those for Tropical Cyclones, drought and flood also promoting the establishment cost recovery and quality management framework)

VIII. THE WMO STRATEGIC THRUSTS

These are as follows:

- Improving service quality and service delivery
- Advancing scientific research and application as well as development and implementation of technology
- Strengthening capacity-building
- Building and enhancing partnerships and cooperation
- Strengthening good governance

IX. EXPECTED RESULTS, KEY OUTCOMES AND KEY PERFORMANCE INDICATORS FOR RA I (2012–2015)

Global Societal Need 1: Improved protection of life and property (related to impacts of hazardous weather, climate, water and other environmental events and increased safety of land, sea and air circulation and transport)

WMO Strategic Thrust (ST1) – Improving service quality and service delivery			
<i>WMO Expected Results (ER)</i>	<i>RA I Expected Results (ER)</i>	<i>RA I Key Outcomes (KO)</i>	<i>RA I Key Performance Indicators (KPI)</i>
1.0 Enhanced capabilities of Members to deliver and improve access to high quality weather, climate and water and related environmental predictions, information and services in response to users' needs and to enable their use in decision-making by all relevant societal sectors	1.1 Enhanced capabilities of NMHSs of Africa to access, produce, and deliver high quality weather, climate and water related products and services in response to users' needs and to enable their use in decision making by all relevant societal sectors	1.1.1 All NMHSs have migrated to Table Driven Code Format (TDCF) 1.1.2 Ensemble weather forecasts and products easily available from appropriate and designated Global Centres 1.1.3 RA I Regional Climate Centres established 1.1.4 No. of hydro-meteorological information users increased at national level	<ul style="list-style-type: none"> • 90% increase in the number of NMHSs in Africa implementing the TDCF • No. of NMHSs with adequate infrastructure to effectively access NWP products • No. of NMHSs verifying NWP Products • At least 50% of users have regular access to hydro-meteorological information
2.0 Enhanced capabilities of Members to reduce risks and potential impacts of hazards caused by weather, climate and water and related environmental elements	2.1 Enhanced capabilities and capacities with respect to disaster risk reduction and environmental management in Africa	2.1.1 Meteorological and hydrological early warning systems are in place in all RA I Member States 2.1.2 Agreements, where appropriate, between NMSs and related agencies on disaster risk reduction with respect to data and information exchange	<ul style="list-style-type: none"> • No. of NMHSs incorporated and having specific roles in national disaster risk reduction agencies • Number of working arrangements between NMSs and NHSs increased • No. of NMHSs with structures responsible for natural disaster prevention and early warning systems
3.0 Enhanced capabilities of NMHSs to produce better weather, climate, and water information, predictions and warnings to support in particular climate impact and adaptation strategies	3.1 Enhanced capabilities of NMHSs in Africa to provide better climate predictions and assessments for climate change mitigation and adaptation 3.2 Enhanced capabilities of NMHSs in Africa to provide better forecasts for meteorology and hydrology	3.1.1 Appropriate internet and other technology and communication facilities (websites, SMS, MMS) installed at all NMHSs 3.1.2 Future climate scenarios involving downscaling an statistical adaptation developed at national and regional levels 3.1.3 Climate change vulnerability assessments and impact studies for different sectors available at national and regional levels 3.2.1 Guides to meteorological and hydrological practices available in place	<ul style="list-style-type: none"> • No. of NMHSs with appropriate communication facilities • No. of NMHSs having climate scientists highly trained in climate change scenarios • No. of NMHSs having vulnerability assessments and impact studies • No of NMHSs with meteorological and hydrological guides • Number of experts trained on hydrological, climatological and meteorological practices
4.0 Enhanced capabilities of Members to access, develop, implement and use integrated and inter-operable Earth- and space-based systems for weather, climate and hydrological observations, based on World standards set by WMO, as well as related environmental observations	4.1 Enhanced environment and capabilities of NMHSs of Africa to access and apply earth and space based observing products for use by stakeholders	4.1.1 The requirements, in the form of a manual, for migration from GTS to WIS in place 4.1.2 Appropriate ICT facilities in place to support GTS and WIS installed at all NMHS	<ul style="list-style-type: none"> • Number of WIS workshops held • No of Manual on WIS prepared • Percentage of NMHSs implementing WIS

Global Societal Need 2: Poverty alleviation, sustained livelihoods and economic growth (in connection with the Millennium Development Goals) including improved health and social well-being of citizens (related to weather, climate, water and environmental events and influence)

WMO Strategic Thrust (ST2) – Advancing scientific research and application as well as development and implementation of technology (ST3) – Strengthening capacity-building			
<i>WMO Expected Results (ER)</i>	<i>RA I Expected Results (ER)</i>	<i>RA I Key Outcomes (KO)</i>	<i>RA I Key Performance Indicators (KPI)</i>
5.0 Enhanced capabilities of Members to contribute to and draw benefits from the global research capacity for weather, climate, water and environmental science and technology development	5.1 Enhanced capabilities and enabled environment for appropriate research institutions in Africa to contribute to and access global research products on weather, climate, water and environmental science and technology development	5.1.1 Five subregional and one regional data banks in standard format available for research and education in support of NMHSs upgraded 5.1.2 Internet facilities and websites to support local exchange of products to and from regional and global research centres installed at all NMHSs 5.1.3 Increase in the No of professionals trained in RA I centres of excellence such ACMAD, RTCs and universities taking to account gender consideration (at least 20%) 5.1.4 High performance computing – available for data processing, analysis and forecasting including data archiving 5.1.5 Improved Telecommunications systems for rapid data exchange and information dissemination	<ul style="list-style-type: none"> • Number of subregional data bases • Number of subregional data bases • Percentage increase in the number of graduates from RTCs and universities (target 5%) • Percentage increase in fellowships awarded by WMO to RA I of which at least 40% are women (target 15%) • Percentage improvement in skill in nowcasting (0–6 hours), short range (24h–3 days), medium range (up to 10 days) and long range (monthly to seasonal). • Feedback from users of meteorological information
6.0 Enhanced capabilities of NMHSs, in particular in developing and least developed countries, to fulfil their mandates	6.1 Enhanced capabilities of NMHSs of Africa, particularly those in LDCs and including those emerging from civil strife to fulfil their mandates	6.1.1 All NMHS in Africa upgraded to WMO and ICAO standards. 6.1.2 At least five NMHSs of RA I from the LDCs have adequate and qualified human resources by 2015 6.1.3 Increased visibility of NMHSs through support in advocacy and awareness of national authorities and other stakeholders	<ul style="list-style-type: none"> • Situational reports from NMSs in Least Developed Countries (LDC) • Number of LDCs with adequate and qualified human resources measured against the WMO reference databases • Number of trained personnel in each of the identified 5 NMSs • Number of NMHSs with enhanced national budget • Number of appropriate legislations put in place or augmented in support of the status • Number of countries with upgraded infrastructure • No of workshops held for high-level policy makers

Global Societal Need 3: Sustainable use of natural resources and improved environmental quality

WMO Strategic Thrust (ST4) – Building and enhancing partnerships and cooperation (ST5) – Strengthening good governance			
<i>WMO Expected Results</i>	<i>RA I Expected Results (ER)</i>	<i>RA I Key Outcomes (KO)</i>	<i>RA I Key Performance Indicators (KPI)</i>
7.0 New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of WMO within the UN System, relevant international conventions and national strategies	7.1 New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of RA I within the relevant international agreements and national strategies in Africa	7.1.1 Agreements between relevant actors to facilitate cross-boundary warning systems drafted and negotiated 7.1.2 Partnerships developed between NMHSs and their local communities with communities adopting strategies to cope with climate variability and climate change. 7.1.3 A framework for collaboration between RA I and other Regions established to enhance the development of NWP products 7.1.4 NMHSs actively participate in inter-governmental activities and those related to internationally agreed multilateral conventions such as IPCC, UNFCCC and UNCCD	<ul style="list-style-type: none"> • No of NMHSs with operational working arrangements finalized • Number of community stakeholder workshops and training seminars held. • Number of scientists exchanged • Number of joint workshops and projects • Number of NMHSs actively involved in national committees • No. of NMHSs attending internationally agreed multilateral conventions such as IPCC, UNFCCC and UNCCD
8.0 An effective and efficient Organization	8.1 An effective and efficient Governance system for running RA I	8.1.1 NMHSs transformed into agencies or implementing cost recovery increased 8.1.2 Results-based Management (RBM) and Results- based Budget (RBB) adopted by all NMHSs and RTCs in RA I 8.1.3 Codes of conduct/ ethics have been established by NMHSs and RTCs in the Region 8.1.4 Oversight mechanisms are in place at all RTCs and WMO subregional offices of the Region 8.1.5 Implementation of Strategic Plan by RA I management	<ul style="list-style-type: none"> • 50% of NMHSs by 2015 implementing cost recovery. • Incremental growth of NMHSs implementing RBM and RBB • Number of RA I Member States with Codes of conduct in place • Increase in number of RTCs and subregional offices that are compliant • No of plans executed from the RA I Implementation Plan • No of successes of compliance on governance as audited by the WMO Regional Director and president of RA I

X. RA I COOPERATION FRAMEWORK

Global Societal Need 1: Improved protection of life and property (related to impacts of hazardous weather, climate, water and other environmental events and increased safety of land, sea and air circulation and transport)

WMO Strategic Thrust (ST1) – Improving service quality and service delivery			
<i>RA I Key Outcomes (KO)</i>	<i>RA I Key Performance Indicators (KPI)</i>	<i>Responsible Actors</i>	<i>Resources</i>
<p>1.1.1 All NMHSs have migrated to Table Driven Code Format (TDCF)</p> <p>1.1.2 Ensemble weather forecasts and products easily available from appropriate and designated Global Centres</p> <p>1.1.3 RA I Regional Climate Centres established</p> <p>1.1.4 No. of hydro-meteorological information users increased at national level</p>	<ul style="list-style-type: none"> • 90% increase in the number of NMHSs in Africa implementing the TDCF • No. of NMHSs with adequate infrastructure to effectively access NWP products. • No. of NMHSs verifying NWP Products • At least 50% of users have regular access to hydro-meteorological information 	<p>WMO, NMHSs, ASECN</p> <p>WMO, NMHSs, ASECNA</p> <p>WMO, NMHSs</p> <p>WMO, NMHSs,</p>	<p>National budgets. Development Partners. WMO, ASECNA</p>
<p>2.1.1 Meteorological and hydrological early warning systems are in place in all RA I Member States</p> <p>2.1.2 Agreements, where appropriate, between NMSs and related agencies on disaster risk reduction with respect to data and information exchange.</p>	<ul style="list-style-type: none"> • No. of NMHSs incorporated and having specific roles in national disaster risk reduction agencies. • Number of working arrangements between NMSs and NHSs increased • No. of NMHSs with structures responsible for natural disaster prevention and early warning systems 	<p>NMHSs</p> <p>NMHSs, National and Regional Disaster Management Authorities</p>	<p>National, Regional resources and related Agencies</p>
<p>3.1.1 Appropriate internet and other technology and communication facilities (websites, SMS, MMS) installed at all NMHSs</p> <p>3.1.2 Future climate scenarios involving downscaling and statistical adaptation developed at national and regional levels</p> <p>3.1.3 Climate change vulnerability assessments and impact studies for different sectors available at national and regional levels</p> <p>3.2.1 Guides to meteorological and hydrological practices in place</p>	<ul style="list-style-type: none"> • No. of NMHSs with appropriate communication facilities • No. of NMHSs having climate scientists highly trained in climate change scenarios. • No. of NMHSs having vulnerability assessments and impact studies • No of NMHSs with meteorological and hydrological guides. • Number of experts trained on hydrological, climatological and meteorological practices 	<p>NMHSs, WMO, ASECNA, and National Telecommunication Operators.</p> <p>NMHSs, Regional and Sub regional Centres, Research Institutes, WMO, IPCC</p> <p>NMHSs, Regional and Sub regional Centres, Research Institutes, WMO, IPCC</p> <p>WMO, NMHSs and/or National Hydrological Services in some cases, Universities</p>	<p>National Budgets, ASECNA, WMO, Development Partners</p> <p>NMHSs, AfDB, GEF, Regional Economic Groupings, UN Agencies</p> <p>NMHSs, AfDB, GEF, Regional Economic Groupings, UN Agencies</p> <p>NMHSs/ National Hydrological Agencies, WMO</p> <p>National Budgets, WMO, Development partners</p>
<p>4.1.1 The requirements, in the form of a manual, for migration from GTS to WIS in place</p> <p>4.1.2 Appropriate ICT facilities in place to support GTS and WIS installed at all NMHS</p>	<ul style="list-style-type: none"> • Number of WIS workshops held • No of Manual on WIS prepared • Percentage of NMHSs implementing WIS 	<p>WMO, NMHSs and National Telecommunication Operators</p> <p>WMO, NMHSs and National Telecommunication Operators</p>	<p>NMHSs, WMO</p> <p>NMHSs, WMO</p>

Global Societal Need 2: Poverty alleviation, sustained livelihoods and economic growth (in connection with the Millennium Development Goals) including improved health and social well-being of citizens (related to weather, climate, water and environmental events and influence)

WMO Strategic Thrust (ST2) – Advancing scientific research and application as well as development and implementation of technology (ST3) – Strengthening capacity-building			
<i>RA I Key Outcomes (KO)</i>	<i>RA I Key Performance Indicators (KPI)</i>	<i>Responsible Actors</i>	<i>Resources</i>
5.1.1 Five subregional and one regional data banks in standard format available for research and education in support of NMHSs upgraded.	<ul style="list-style-type: none"> • Number of subregional data bases 	RTCs, NMHSs and WMO RTC, Universities,	NMHSs, WMO
5.1.2 Internet facilities and websites to support local exchange of products to and from regional and global research centres installed at all NMHSs	<ul style="list-style-type: none"> • Number of subregional data bases 	WMO, NMHSs	MHSs, WMO, Development partners
5.1.3 Increase in the No of professionals trained in RA I centres of excellence such RTCs and universities taking to account gender consideration (at least 20%)	<ul style="list-style-type: none"> • Percentage increase in the number of graduates from RTCs and universities (target 5%) • Percentage increase in fellowships awarded by WMO to RA I of which at least 40% are women (target 15%) 	WMO, Subregional Specialized Centres NMHSs and Users at National Level	NMHSs, WMO, Subregional Centres NMHSs, WMO
5.1.4 High performance computing – available for data processing, analysis and forecasting including data archiving	<ul style="list-style-type: none"> • Percentage improvement in skill in nowcasting (0–6 hours), short range (24h–3days), medium range (up to 10 days) and long range (monthly to seasonal). 	NMHSs, RTCs, Universities	NMHSs, WMO, Development Partners,
5.1.5 Improved Telecommunications system for rapid data exchange and information dissemination	<ul style="list-style-type: none"> • Feedback from users of meteorological information 	MHSs, WMO, Partners	NMHSs, WMO, Development Partners
6.1.1 All NMHS in Africa upgraded to WMO and ICAO standards.	<ul style="list-style-type: none"> • Situational reports from NMSs in Least Developed Countries (LDC) 	WMO, ICAO, ASECNA, NMHSs	NMHSs, WMO
6.1.2 At least five NMHSs of RA I from the LDCs have adequate and qualified human resources by 2015	<ul style="list-style-type: none"> • Number of LDCs with adequate and qualified human resources measured against the WMO reference databases 	WMO, NMHSs, Sub regional Offices.	NMHSs, WMO, Partners
6.1.3 Increased visibility of NMHSs through support in advocacy and awareness of national authorities and other stakeholders	<ul style="list-style-type: none"> • Number of trained personnel in each of the identified 5 NMSs • Number of NMHSs with enhanced national budget • Number of appropriate legislations put in place or augmented in support of the status • Number of countries with upgraded infrastructure • No of workshops held for high-level policy makers 	NMHSs, WMO NMHSs NMHS NMHSs, WMO NMHSs	NMHSs, WMO, Partners NMHSs NMHSs NMHSs, WMO, Partners NMHSs, WMO, Partners

Global Societal Need 3: Sustainable use of natural resources and improved environmental quality. Sustainable use of natural resources and improved environmental quality

WMO Strategic Thrust (ST4): Building and enhancing partnerships and cooperation; (ST5): Strengthening good governance			
<i>RA I Key Outcomes (KO)</i>	<i>RA I Key Performance Indicators (KPI)</i>	<i>Responsible Actors</i>	<i>Resources</i>
<p>7.1.1 Agreements between relevant actors to facilitate cross-boundary warning systems drafted and negotiated</p> <p>7.1.2 Partnerships developed between NMHSs and their local communities with communities adopting strategies to cope with climate variability and climate change.</p> <p>7.1.3 A framework for collaboration between RA I and other Regions established to enhance the development of NWP products</p> <p>7.1.4 NMHSs actively participate in inter-governmental activities and those related to internationally agreed multilateral conventions such as IPCC, UNFCCC and UNCCD;</p> <p>7.1.5 RA I Stakeholders Relations Management framework to identify and define the Associations' interaction with Key role players</p>	<ul style="list-style-type: none"> • No of NMHSs with operational working arrangements finalized • Number of community stakeholder workshops and training seminars held. • Number of scientists exchanged • Number of joint workshops and projects • Number of NMHSs actively involved in national committees • All NMHSs attending internationally agreed multilateral conventions such as IPCC, UNFCCC and UNCCD; • Approved RA I Stakeholder Relations Management framework 	<p>NMHSs,</p> <p>NMHSs and Sectors Concerned</p> <p>NMHSs, RTCs, WMO</p> <p>WMO, Advanced Data Processing Centres</p> <p>NMHSs, WMO,</p> <p>NMHSs</p>	<p>NMHSs, Regional Economic Groupings, WMO,</p> <p>National Governments</p> <p>WMO Regional Associations, Development partners</p> <p>NMHSs</p> <p>NMHS</p>
<p>8.1.1 NMHSs transformed into agencies or implementing cost recovery increased</p> <p>8.1.2 Results-based Management (RBM) and Results-based Budget (RBB) adopted by all NMHSs and RTCs in RA I</p>	<ul style="list-style-type: none"> • 50% of NMHSs by 2015 implementing cost recovery • Incremental growth of NMHSs implementing RBM and RBB 	<p>NMHSs</p> <p>WMO, NMHSs</p>	<p>National Govts, NMHSs, Development partners</p> <p>WMO, NMHSs</p>
<p>8.1.3 Codes of conduct/ ethics have been established by NMHSs and RTCs in the Region</p> <p>8.1.4 Oversight mechanisms are in place at all RTCs and WMO subregional offices of the Region</p> <p>8.1.5 Implementation of Strategic Plan by RA I management</p>	<ul style="list-style-type: none"> • Number of RA I Member States with Codes of conduct in place • Increase in number of RTCs and subregional offices that are compliant • No of plans executed from the RA I Implementation Plan • No of successes of compliance on governance as audited by the WMO Regional Director and president of RA I 	<p>WMO, RTCs</p> <p>WMO, president RA I</p> <p>WMO, NMHSs, RTC and Subregional Centres</p> <p>WMO, Regional Director, president of RA I</p>	<p>NMHSs, WMO</p> <p>WMO, RTCs, NMHSs</p> <p>WMO, RTCs, NMHSs</p> <p>WMO</p>

XI. MONITORING, EVALUATION AND REPORTING

The strategic plan outlines strategies, outcomes and performance indicators in all areas of WMO thrusts and RA I goals. It is an evolving document. While the vision, core values and goals remain almost intact, the plan for bringing such designs to life requires routine oversight and, in many cases, fine-tuning. By monitoring the progress at regular intervals, the plan is able to absorb the changing environment.

The monitoring, evaluation and reporting instruments and timetable in this strategic plan for RA I pivot around capacity enhancement, infrastructural development, user tailor-made product and service improvement and timely accessibility. Most important is the need to upgrade facilities and enhance capacities of National Meteorological and Hydrological Services in the Least Developed Countries. Most of the performance targets indicators relate to expected results for which NMHSs are primarily responsible. However, due to the fact that RA I does not have an operational budget specifically allocated to it, the majority of these targets are purposeful instead of being strictly controllable.

It must be emphasized that RA I outcomes should be owned by the NMHSs. Accordingly, the first line of accountability rests with the RA I Members themselves. This entails on- the- ground performance monitoring and evaluation, which should be done first at the NMHS level. RA I, through the Presidency, should be responsible for Region-wide indicators and will be conducting the monitoring through the subregional offices.

In order to ensure appropriate reporting and accountability, it is expected that the reporting process will be along the following lines:

- Annual reports by RA I NMHSs, RTCs and Regional Offices
- Reports by the RA I Advisory Working Group
- Reports by the president of RA I submitted to the Executive Council
- Progress reports of the Regions Working Groups and Rapporteurs appointed by at the Fourteenth Session of RA I (Annex 4)
- Reports by the president of RA I at the RA I Technical Conference on Management of National Meteorological Services
- A comprehensive and analytical results- based mid-term review of the Strategic Plan in 2009, focusing on assessment achievements, re-defining targets and re-tasking will be produced by the president of RA I.

Whilst the association will make the utmost possible effort to ensure that this strategic plan is adequately implemented to the satisfaction of all stakeholders it is however important to underscore the fact that all effort will have to be made to circumvent and take care of the following critical assumptions and risks:

- (i) Political disturbances in RA I countries (R)
- (ii) National resource allocations are sufficient (A)
- (iii) Political realignment with the development partners (R)
- (iv) HIV/ Aids and epidemics like malaria (R)
- (v) RA I Working groups and Rapporteurs will deliver (A)
- (vi) High staff turnover and en-mass retirement (R)
- (vii) Appropriate skilled human resource is available (A)
- (viii) Environment for recruitment of women is conducive (A).

In the course of the delivery of this Plan, the above will form essential reference points against which the success or otherwise of the associated activities will be measured during the evaluation exercise.

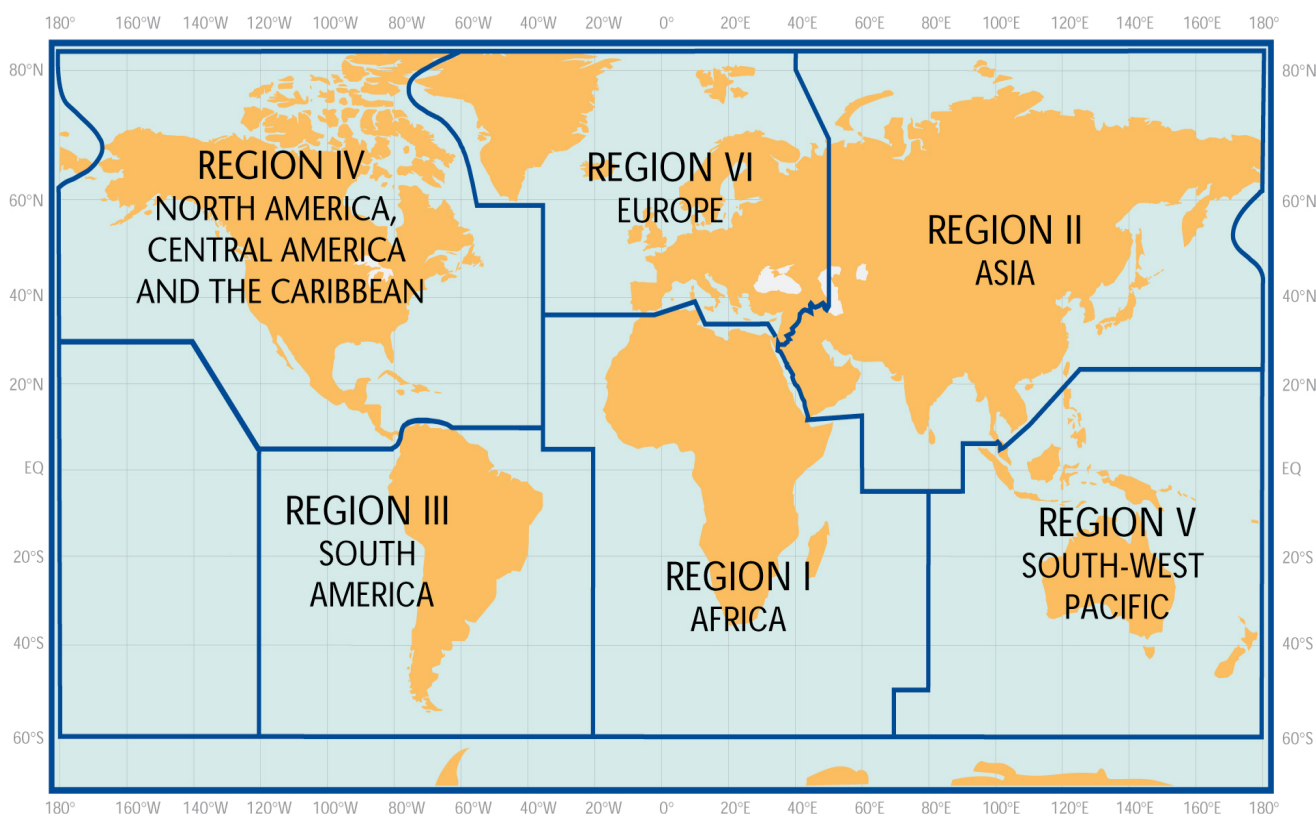
XII. CONCLUSION

It is a scientific fact and documented that Africa countries are most vulnerable to impacts of Climate Change. (IPCC 4th Assessment Report, 2007). There is, therefore, an urgent need for Africa to take appropriate mitigation and adaptation measures especially in the face of extreme climate related natural hazards. In addition Africa is, to a large extent, dependent on rain-fed agriculture and hydro-power energy generation. The frequent occurrence of droughts affects these sectors, which in turn impact considerably on the livelihoods of the African populations. Furthermore, the performance of economies in Africa are extremely weather sensitive. It is in this respect that the further development of National Meteorological and Hydrological services is an important contribution to the socioeconomic development in Africa. Successful implementation of this Strategic Plan will address these situations.

While weather, climate and water impact people locally, the Earth system is responsible for these phenomena on a regional and global scale. Thus, local forecasts and assessments depend on cooperation between neighbouring countries, within regions and throughout the entire global community to provide data and regional products. This dependence of countries on each other for weather, climate and water information is the principal reason for the existence of WMO and its Regional Associations, which provide the forum for the exchange of data, the transfer of technology and expertise and the sharing of knowledge. The RA I Strategic Plan underscores the urgent need for the upgrading of the basic infrastructures of meteorological and hydrological services in order to enhance the availability of observed data and thereby contribute to the production of timely and accurate forecasts. The Plan also recognizes the benefits of embracing new and emerging technologies in order to benefit fully from partnerships with more advanced institutions outside the region.

The Plan further recognizes the diverse development levels among the countries in Africa and in particular addresses the special needs of the Least Developed Countries. For effective implementation of the Strategic Plan, it is noted that the issues transcend scientific, political and institutional boundaries encompassing many opportunities and risks. The RA I Strategic Plan provides direction for the Association to achieve its objectives.

ANNEX 1. Map of WMO Regional Associations



Annex 2. An Example of How RA I Can Conduct Its Monitoring and Evaluation

RA I Strategic Plan 2012–2015

RA I / ER	Objective Variable Indicators	Baselines and Targets		Means of Verification	Assumptions and Risks
		Baseline	Targets		
1.1 Enhanced capabilities of NMHSs of Africa to access, produce, and deliver high quality weather, climate and water related products and services in response to users' needs and to enable their use in decision making by all relevant societal sectors	1.1.1 All NMHSs have migrated to Table Driven Code Format (TDCF) 1.1.2 Ensemble weather forecasts and products easily available from appropriate and designated Global Centres. 1.1.3 RA I Regional Climate Centres established 1.1.4 No. of hydro-meteorological information users increased at national level				Assumptions (1) National resource allocations are sufficient (2) RA I Working groups and Rapporteurs will deliver (3) Appropriate skilled human resource is available
2.1. Enhanced capabilities and capacities with respect to disaster risk reduction and environmental management in Africa	2.1.1 Meteorological and hydrological early warning systems are in place in all RA I Member States 2.1.2 Agreements, where appropriate, between NMSs and related agencies on disaster risk reduction with respect to data and information exchange				(4) Environment for recruitment of women is conducive Risks (1) Political disturbances in RA I countries
3.1 Enhanced capabilities of NMHSs in Africa to provide better climate predictions and assessments for climate change mitigation and adaptation 3.2 Enhanced capabilities of NMHSs in Africa to provide better forecasts for meteorology and hydrology	3.1.1 Appropriate internet and other technology and communication facilities (websites, SMS, MMS) installed at all NMHSs 3.1.2 Future climate scenarios involving downscaling an statistical adaptation developed at national and regional levels 3.1.3 Climate change vulnerability assessments and impact studies for different sectors available at national and regional levels 3.2.1 Guides to meteorological and hydrological practices available in place				(2) Political realignment with the development partners (3) HIV/ Aids and epidemics like malaria (4) High staff turnover and en-mass retirement

RA I ER	Objective Variable Indicators	Baselines and Targets		Means of Verification	Assumptions and Risks
		Baseline	Targets		
4.1 Enhanced environment and capabilities of NMHSs of Africa to access and apply earth and space based observing products for use by stakeholders	<p>4.1.1 The requirements, in the form of a manual, for migration from GTS to WIS in place</p> <p>4.1.2 Appropriate ICT facilities in place to support GTS and WIS installed at all NMHS</p>				
5.1 Enhanced capabilities and enabled environment for appropriate research institutions in Africa to contribute to and access global research products on weather, climate, water and environmental science and technology development	<p>5.1.1 Five subregional and one regional data banks in standard format available for research and education in support of NMHSs upgraded.</p> <p>5.1.2 Internet facilities and websites to support local exchange of products to and from regional and global research centres installed at all NMHSs</p> <p>5.1.3 Increase in the No of professionals trained in RA I centres of excellence such ACMAD, RTCs and universities taking to account gender consideration (at least 20%)</p> <p>5.1.4 Number of professionals trained in RA I centres of excellence such ACMAD, RTCs and universities</p> <p>5.1.5 High performance computing – available for data processing, analysis and forecasting including data archiving</p> <p>5.1.6 Improved Telecommunications systems for rapid data exchange and information dissemination</p>				
6.1 Enhanced capabilities of NMHSs of Africa, particularly those in LDCs, to fulfil their mandates	<p>6.1.1 All NMHS in Africa upgraded to WMO and ICAO standards.</p> <p>6.1.2 At least five NMHSs of RA I from the LDCs have adequate and qualified human resources by 2015</p> <p>6.1.3 Increased visibility of NMHSs through support in advocacy and awareness of national authorities and other stakeholders</p>				

<i>RA / ER</i>	<i>Objective Variable Indicators</i>	<i>Baselines and Targets</i>		<i>Means of Verification</i>	<i>Assumptions and Risks</i>
		<i>Baseline</i>	<i>Targets</i>		
7.1 New and strengthened partnerships and cooperation activities to improve NMHSs' performance in delivering services and to increase the value of the contributions of RA I within the relevant international agreements and national strategies in Africa	7.1.1 Agreements between relevant actors to facilitate cross-boundary warning systems drafted and negotiated 7.1.2 Partnerships developed between NMHSs and their local communities with communities adopting strategies to cope with climate variability and climate change 7.1.3 A framework for collaboration between RA I and other Regions established to enhance the development of NWP products 7.1.4 NMHSs actively participate in inter-governmental activities and those related to internationally agreed multilateral conventions such as IPCC, UNFCCC and UNCCD				
8.1 An effective and efficient Governance system for running RA I	8.1.1 NMHSs transformed into agencies or implementing cost recovery increased 8.1.2 Results-based Management (RBM) and Results-based Budget (RBB) adopted by all NMHSs and RTCs in RA I 8.1.3 Codes of conduct/ethics have been established by NMHSs and RTCs in the Region 8.1.4 Oversight mechanisms are in place at all RTCs and WMO subregional offices of the Region 8.1.5 Implementation of Strategic Plan by RA I management				

ANNEXES

ANNEX I

Annex to [paragraph 4.4.50](#) of the general summary

TERMS OF REFERENCE OF THE REGIONAL ASSOCIATION I DISSEMINATION EXPERT GROUP

Scope

The primary scope of the RA I Dissemination Expert Group (RAIDEG) is to identify and document the needs of the Region in the areas of satellite derived products and other meteorological/environmental data in order for Members to fulfil their national or international obligations in support of protection of environment, life and property and spur their socioeconomic development.

Main tasks

The Group shall:

- (a) Collect, review and maintain requirements for access to meteorological and environmental data and products by NMHSs and partner organizations in Africa;
- (b) Analyse the requirements for satellite-based products expressed by African NMHSs, Centres of Excellence, Training Institutes and other environmental monitoring organizations in Africa making use of EUMETCast or other data dissemination services; and
- (c) Make recommendations on the requirements for products, related training needs, and on the assignment of priorities, aiming at optimizing product dissemination through EUMETCast or other dissemination services.

Composition

The group includes:

- (a) Experts from NMHSs of the six RA I subregions;
- (b) Representatives of the VLab Centres of Excellence;
- (c) One representative of ACMAD;
- (d) Representatives of the EUMETSAT and WMO Secretariats.

Working Modalities

The Group works mainly by correspondence and with face-to-face meetings held annually with alternating venues, usually in conjunction with the EUMETSAT User Forum in Africa, or in Europe (at EUMETSAT, WMO headquarters). It is assisted by points of contact nominated in every NMHS.

The Group reports to the RA I Working Group on Observations and Infrastructure (subject to decision to be made under agenda item 5.3).

ANNEX II
Annex to [paragraph 4.6.21](#) of the general summary

REGIONAL TRAINING CENTRES

<i>Members</i>	<i>Institutions</i>
Algeria	Institut Hydrométéorologique de Formation et de Recherches (IHFR)
Angola	Instituto Nacional de Meteorologia e Geofísica (INAMET)
Egypt	Egyptian Meteorological Authority (EMA)
Kenya	University of Nairobi (UON) Institute for Meteorological Training and Research (IMTR)
Madagascar	École Supérieure Polytechnique à Antananarivo (ESPA) and École Nationale d'Enseignement de l'Aéronautique et de la Météorologie (ENEAM)
Niger	Centre Régional AGRHYMET (AGRHYMET) and École Africaine de la Météorologie et de l'Aviation Civile (EAMAC)
Nigeria	Federal University of Technology, Akure (FUTA) and Meteorological Research and Training Institute (MRTI)
South Africa	South African Weather Service (SAWS)

ANNEX III
Annex to [paragraph 4.6.22](#) of the general summary

REPORTS FROM REGIONAL TRAINING CENTRES ON ACTIVITIES SINCE 2010

2010 & 2011				2012 & 2013		
WMO Member	Local Participants	Foreign Participants	No. Courses*	Local Participants	Foreign Participants	No. Courses*
Region I						
Algeria	41	3	6	512	50	4
Angola	-	-	-	-	-	-
Egypt	404	90	41	402	83	14
Kenya	90	66	15	64	255	9
Madagascar	120	9	10	203	18	-
Niger	31	322	18	28	612	7
Nigeria	339	8	5	493	11	-
South Africa	**	**	**	692	213	8

Note: Extracted from the report of the 26th session of the EC Panel of Experts on Education and Training, Seoul, Republic of Korea, 24 to 28 March 2014)

* Number of courses includes both long-term, short-, and very short-term courses.

** Indicates that this RTC was not yet confirmed.

ANNEX IV**Annex to [paragraph 4.6.24](#) of the general summary****COMET TRAINING MODULES**

- ASMET 7: Détection de la turbulence en air clair: étude de cas de l'Afrique du Sud
 - ASMET 7: Orages et activités aéronautiques en Afrique de l'Ouest et du Centre
 - ASMET 7: Prévision du brouillard pour l'aviation: étude de cas du Kenya
 - Produits aéronautiques du modèle WRF-EMS
 - La prévision aéronautique immédiate en Afrique
 - Inférer trois dimensions à partir de l'imagerie de vapeur d'eau
 - Applications des données d'ensemble l'hiver
 - Identification des éléments satellites : Les ceintures de transport
 - L'écriture de TAF relative aux plafonds et à la visibilité, édition pour l'Afrique
 - Maîtrise d'un téphigramme
 - Les courants-jets
 - La poussière atmosphérique
 - Notions de base à propos des radars météorologiques
 - Utilisation intelligente de la PNT dans le processus de prévision : Introduction
 - Déterminer les résultats de prévision plausibles
 - Utilisation efficace des modèles à haute résolution
 - Préparation en vue de l'évaluation des modèles de PNT
 - Comment la PNT s'inscrit dans le processus de prévision
 - Fournir une valeur ajoutée aux guides de PNT
 - Les types de vagues et leurs caractéristiques
 - Outils d'analyse, de diagnostic et de prévision à court terme
 - Répercussions de la structure et de la dynamique du modèle – Version 2
 - Comment les modèles produisent des précipitations et des nuages – Version 2
 - Influence de la physique des modèles sur la prévision numérique du temps – Version 2
 - ASMET : La sécheresse en Afrique de l'Est en 2009
 - ASMET : Les Produits satellitaires de précipitation pour la gestion de l'hydrologie en Afrique Australe
 - ASMET: Inondations en Afrique de l'ouest
 - Notions de base en modélisation – Version 2
 - Utilisation intelligente des produits dérivés des modèles – Version 2
 - Identification des éléments satellitaires: L'arc de convection
 - Jason-2 – Utilisation de l'altimétrie satellitaire pour la surveillance des océans
 - Identification des caractéristiques satellitaires: Situations de blocage
 - Analyse d'une zone de déformation
 - Diagnostic d'une zone de déformation
 - L'élaboration de produits météorologique à partir de données satellitaires
 - La prévision d'ensemble expliquée
 - Dix idées fausses en PNÉT
 - Une Introduction au Système Polaire EUMETSAT (EPS)
 - Maximums de tourbillon et configurations en virgule
 - Minimums de tourbillon et configurations en virgule miroir
 - Détermination de caractéristiques dynamiques à l'aide de l'imagerie satellitaire
 - La prévision du type et de l'intensité de givrage en vol
 - De mm à cm... Étude des rapports neige/eau liquide au Québec
 - Les cartes de tourbillon potentiel équivalent du Centre météorologique canadien
-

ANNEX V**Annex to paragraph 4.6.30 of the general summary****MAJOR HYDROMET DEVELOPMENT PROJECTS IN REGION I (AFRICA)****WMO DIRECT FINANCING PROJECTS**

Activity/Project	Duration	Beneficiary Country/Region	Amount	Funding Agency	Thematic Areas
1) Global Framework for Climate Services (GFCS) – Adaptation and Disaster Risk Reduction in Africa	4 years (2011–2015)	Southern, East and West Africa	NOK 60,000,000 (approx USD 10m)	Norway MFA	Strategy Development – supporting the GFCS Secretariat and the African Ministerial Conference on Meteorology (AMCOMET); Technical Capacity and Service Delivery, Data Rescue, Fellowships, Severe Weather Forecast Demonstration Project, Public Weather Service and Meteorological Services for Agriculture
2) Global Framework for Climate Services (GFCS) – Adaptation Programme in Africa	3 years (2014–2016)	Malawi and United Republic of Tanzania	NOK 60,000,000 (approx USD 10m)	Norway	GFCS Adaptation Food Security Nutrition and Health
3) Implementing the Global Framework for Climate Services (GFCS) at regional and national Scales	4 years (2013–2017)	Arctic Region, South West Pacific and Caribbean and Indian Ocean Small Island States South Asia/3rd Pole (Himalaya and Tibetan Plateau)	CAD 6.138,000	Canada	GFCS Climate resilience Development of climate services
4) CATCOS – Climate Observations	3 years (2012–2015)	10 countries including Kenya in RA I	CHF 3,300,000	Swiss Development Cooperation	GFCS Climate Services
5) Improvement of Agrometeorological information for small-scale agricultural production	2 years (2013–2014)	Ethiopia	€ 400,000	Irish Aid (Ireland)	GFCS Climate services Food security Agriculture
6) Hydrometeorological Disaster Impact Mitigation Projects	5 years (2011–2016)	Various regions: S. Africa FFG-SWFDP Integration	USD 10,035,000	US Agency for International Development (USAID) – OFDA	Flooding Coastal inundation Drought Climate Applications
7) “Blue Peace – Water Security” in the Middle East: Strategic Management of Hydrological and Meteorological Data and Information Product Generation” project (Phase 2)	2 years (2014–2015)	Middle East Blue Nile Tigris	USD 900,000	Swiss Development Cooperation	Water resources management Hydro meteorological data sharing

Activity/Project	Duration	Beneficiary Country/Region	Amount	Funding Agency	Thematic Areas
8) East Africa IGAD HyCOS (Phase 2)	3 years (2013–2016)	Uganda, United Republic of Tanzania, Kenya, Rwanda, Burundi, Ethiopia, Eritrea	€ 6,600,000	EU ACP	Water resources management Development of hydrological systems
9) Afrimet: Conference of Directors of the West African National Meteorological and Hydrological Services	Since 2007	West Africa Marine Countries Emerging from Conflict and Natural Disasters Project (Guinea-Bissau, Liberia, Sierra Leone, Côte d’Ivoire and Togo) Management	€ 3,000,000	Spain (AEMET)	Capacity-building Weather and climate services
10) Climate Change Adaptation and Improved Climate Services in Sub-Saharan Africa – National Frameworks for Climate Services	2 years	East, Central and West Africa	€ 1,000,000	Greece	GFCS Climate Change Adaptation Climate Services
11) Mobile Weather Alert Project		Uganda / United Republic of Tanzania	USD 450,000	Norway	Agriculture
12) Regional Climate Framework in Eastern Africa to Support Adaptation to Climate Change (Phase 2)	1 year (2014)	East Africa (Rwanda)	USD 150,000	Republic of Korea (KOICA)	Capacity-building Weather and climate services
13) Regional Climate Framework in Eastern Africa to Support Adaptation to Climate Change (Phase 2)	1 year (2014)	East Africa (Burundi)	USD 150,000	Republic of Korea (KOICA)	Capacity-building Weather and climate services
14) AMCOMET Secretariat and processes	3 years	All African Countries	USD 500,000	Norway, Finland,	Capacity-building Weather and climate services
15) Regional Framework for Weather and Climate Services for food security, maritime transport safety contributing to disaster risk reduction In Lake Victoria region	2 years	Uganda, United Republic of Tanzania, Kenya	750,000 USD	World Bank (WB)	SWFDP & AgMet Services

PARTNERSHIP PROJECTS

Activity/Project	Duration	Beneficiary Country/Region	Amount	Funding Agency	Thematic Areas
1) UNDP 10 country-led projects that focus on strengthening climate information and early warning systems (CI/EWS)	4 years	Benin, Burkina Faso, Liberia, Sierra Leone, Sao Tome and Principe, Ethiopia, Uganda, United Republic of Tanzania, Malawi and Zambia	40 M USD	GEF	Strengthen the capacity of the NMHS for Climate EWS
2) Norwegian Refugee Council – NORCAP	ongoing	Sahel		NORAD	Expert Deployments
3) World Bank	ongoing	Sahel	TBD	WB	HydroMet Modernization
4) UK Met Office – DFID	5 years	Africa	50 M UKP		Design of Intervention Strategy for DFID Africa Programme for Climate Services
5) GFCS ACP Task Team	ongoing	ACP		EU EDF	Design Project for EU EDF 11

ANNEX VI**Annex to [paragraph 4.6.33](#) of the general summary****INFRASTRUCTURE AND OPERATIONAL FACILITIES DEVELOPMENT
(VOLUNTARY COOPERATION PROGRAMME)**

Year	Country	Project	Donor	Status
2011	Mauritius	Provision of 400 radiosondes for wind, temperature and humidity observations in the South West Indian Ocean	GCOS	Completed
2011	Comoros	Data Processing System	Not supported	Request
2011	Sudan	Radiosonde transmitters and balloons	Switzerland (GCOS)	Completed
2011	United Republic of Tanzania	Acquisition of sondes for observation of upper-air information of weather and climate at Dar-es-Salaam	GCOS	on-going
2011	Ethiopia	Upgrading and strengthening of the Public Weather Services presentation	VCP (F) and UK	on-going
2011	DRC	Rehabilitation of three meteorological stations	GCOS	
2011	Congo	Migration to BUFR Table Driven Code Forms	No	Request
2011	Mali	Strengthen the capacity of the DNM to ensure better presentation of weather forecasts on TV	VCP (F) and UK	on-going
2011	Cabo Verde	Data acquisition and transmission	Not confirmed	on-going
2012	Mauritania	Provision of a TV Weather Presentation System	VCP (F) and UK	Completed
2012	Uganda	Upgrade of the Upper-air station in Entebbe	Not supported	Request
2012	Zimbabwe	Replacement of Standard Instruments on 10 GSN stations	No	Request
2012	Sudan	Radiosonde transmitters and balloons	GCOS	on-going
2012	Ghana	Implementation of QMS based on ISO 9001:2008 Standards for the Ghana Met Agency	VCP (F)	on-going

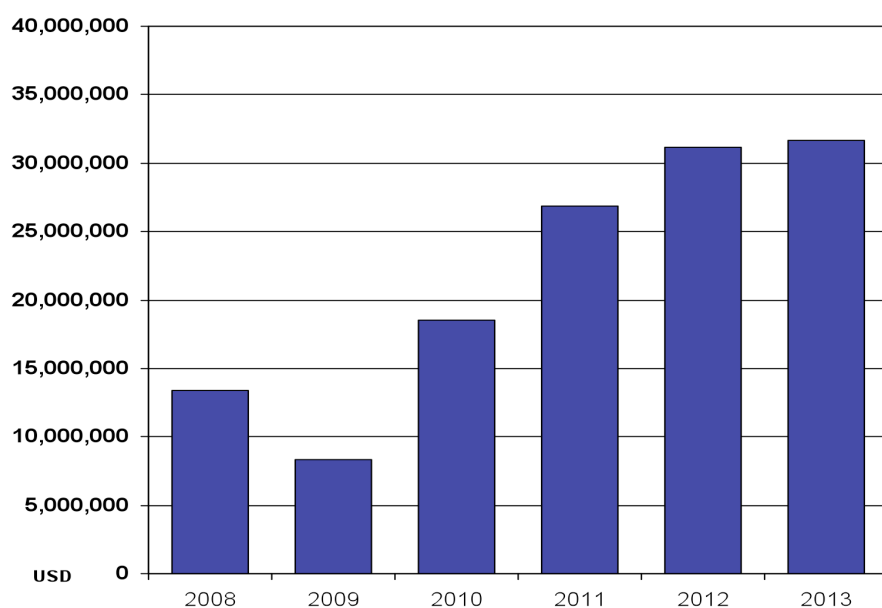
Year	Country	Project	Donor	Status
2013	Egypt	Assistance in reviewing EMA's national arrangements for aeronautical meteorological service delivery	VCP (F)	on-going
2013	Guinea	Provision of meteorological thermometers to the Republic of Guinea	VCP (F)	on-going
2013	Guinea-Bissau	Acquisition of multimedia studio for the presentation of weather forecasts for the general public	UKMO	on-going
2013	Sudan	Calibration Chambers	Not supported	Request
2013	Sudan	Hydrogen generator	Not supported	Request
2013	Mali	Development of a web site for Mali-Meteo	Discussion	Request
2013	Rwanda	Support Rwanda Meteorological Agency to establish the climate analysis and prediction system for capacity development of Republic of Rwanda	Republic of Korea	on-going
2013	Botswana	Consultancy on Cost Recovery	VCP (F)	on-going
2013	Djibouti	Development of Strategic Plan for NMS	VCP (F)	on-going
2013	South Sudan	Rehabilitation of the Juba Synoptic station and strengthening the weather forecast centre	US-NWS under consideration	Request
2014	Burundi	Training presentation skills for TV Presentation	VCP (F)	
2014	Guinea Bissau	Acquisition of MESSIR Multimedia System	Unfunded	Request

ANNEX VII

Annex to [paragraph 4.6.34](#) of the general summary

TOTAL INVESTMENT (VOLUNTARY COOPERATION PROGRAMME (FUND AND EQUIPMENT AND SERVICES)) AND BILATERAL 2008–2013

Amount listed includes contributions for Equipment & Services and Fellowships & Training and Development Projects



ANNEX VIII
Annex to paragraph 4.6.35 of the general summary

VOLUNTARY COOPERATION PROGRAMME INFORMAL PLANNING MEETING
PARTNER PROJECTS (BILATERAL MEMBER–NATIONAL
METEOROLOGICAL AND HYDROLOGICAL SERVICES)

Activity Name	World region/country	Priority area	Timeframe	Amount (currency)	Donor
Weather studio to Guinean Meteorological Department	Guinea	Cap Dev	1 year		China
Installation of MICAPS systems	Togo and Cote d'Ivoire	CSIS	1 year		China
Institutional capacity development in Khartoum and Juba, establishment of Juba meteorological office	Sudan	Cap Dev	Jul 2011–Dec 2013	500k€	Ministry for Foreign Affairs of Finland
Equipment upgrade at Madagascar	Madagascar	Cap Dev		45K€	Météo-France/ MFI/WMO
Equipment upgrade for the countries of the Indian Ocean Commission	Madagascar, Mauritius, Seychelles and Comoros			266 k€	French Ministry of Foreign Affairs
Support to the ACMAD Centre	Africa			180K€	French Ministry of Foreign Affairs
ViGIRisC project	Africa	DRR	1 year +	800k€	FFEM/ French Ministry of Foreign Affairs
Experts Service and Fellowships through bilateral cooperation and Highlights on a training course: "Climatology, a step towards climate services"		Satellite meteorology, climate services		465 k€	Météo-France/ WMO/French Embassies
Project SASSCAL (Southern African Science Service Centre for Climate Change and Adaptive Land Management)	Angola, Botswana, Namibia, South Africa, Zambia	Adaptation to climate change and sustainable land management	2012–2016	20 M€	DWD / BMBF
GIZ project Uganda		Adaptation to climate change and improvement of monitoring systems		129,000 \$	GIZ / BMZ
Zambia: Climate Monitoring and Early Warning System for Weather-related Disasters	Zambia	Water Resource Management	2013–2017		German Energy and Climate fund (BMU and BMZ).

Activity Name	World region/country	Priority area	Timeframe	Amount (currency)	Donor
AFRIMET	(cooperation programme with NW African NMHSs)	Capacity development in applied meteorology projects: MARINEMET Project – METAGRI Project, – HEALTHMET Project: Capacity development in management and other tasks	(2009 +)	4 M€	AEMET in cooperation with Norway and Greece
CATCOS (Capacity and Twinning of Climate Observing Systems)	Kenya, Indonesia, Viet Nam, Chile, Ecuador, Colombia, Kyrgyzstan	Supports the enhancement of greenhouse gases, aerosol and glacier measurements in 7 countries worldwide	Sep 2011–Dec 2013	CHF 2.3 M	Swiss Development and Cooperation Agency (SDC)
UK VCP has continued to assist with a GCOS funded project in Madagascar	Madagascar	Observations: 11 AWSs have now been installed across the country	2011–2014	300K USD	UK VCP
Continued support was provided to the WMO SWFDP	Southern Africa, Eastern Africa and Pacific projects	Forecasting and NWP: Continued delivery of Global Centre products	on-going	Expert Services	UK VCP
UK VCP is currently working on the provision of lake surface temperature measurements on Lake Victoria	Lake Victoria	Forecasting and NWP: To help improve the modelling in the Lake Victoria Region, which aims to assist regional forecasting activities in the East Africa Area	2011 +	100K €	UK VCP
Climate Data Management “localization” project	Zambia	Climate Services, IT and Communications: implemented using Climsoft on second-user PCs supplied by Computer Aid International	2011–2013	200K BP	Computer Aid International and UK VCP
Implementation of automatic communications of observational data and their transmission as TDCF onto the WIS, and also to enable automatic ingestion into the Climsoft Climate Data Management System	Rwanda	Climate Services, IT and Communications	2011–2013	Expert Services	UK VCP
Support has continued for TV weather presentation delivery by NMHSs	Hardware components were replaced at a number of sites including Guinea Conakry, Rwanda, Malawi, Democratic Republic of the Congo, Djibouti, Senegal, Maldives and Congo Brazzaville	Service Delivery	2012–2013	100,000 BP	UK VCP

Activity Name	World region/country	Priority area	Timeframe	Amount (currency)	Donor
NMHSs with digital hard drive recorders to improve the efficiency of the media studios	28 developing country NMHSs including Africa countries	Service Delivery	2012–2013	200K BP	FCO – UKMO
Upgrade of Media studio at the Ethiopia National Met Agency (NMA)	Ethiopia	Service Delivery – New studio equipment and software training, a digital recorder was provided which has saved a daily 200km round-trip to one of the TV stations	2013–2014	40,000 USD	WMO VCP – UK VCP
Installation of a new TV media studio WMO VCP	Comoros Island, Meteo Madagascar	Service Delivery	2014	30,000 USD	UK VCP, Kenya Met Department, WMO VCP
East Africa IGAD HyCOS	Uganda, United Republic of Tanzania, Kenya, Rwanda, Burundi, Ethiopia, Eritrea		2011–2015	5,000,000 Euro	EU ACP
Programme for Disaster Risk Reduction (Floods / Drought/SWFDP)	Various Regions RA I – Southern Africa	SWFDP – FFSS	2014–2016	11,000,000 USD	USAID-OFDA
Afrimet: Conference of Directors of the West African National Meteorological and Hydrological Services	West Africa Marine Countries Emerging from Conflict and Natural Disasters Project (Guinea-Bissau, Liberia, Sierra Leone, Côte d'Ivoire and Togo) Management	Marinemet Afrimet Regional Cooperation ACMAD	2009 +	4M €	Spain (AEMET)
Global Atmospheric Watch in the Magreb-Sahara Region	Magreb-Sahara Region	Sand and Dust Storms	2009–2013	340000	Spain (AECID)
Sand and dust Storm (SDS) Early Warning System in the Magreb Region	Magreb Region	Sand and Dust Storms	2009–2013	184,000	Spain (AECID)
Food Security project in Africa-Flood and Drought	Mali	Drought	2008–2010	300,000	Government of Italy
Understanding the Findings of the IPCC Fourth Assessment Report “Climate Change 2007” – Integrating Climate Change Adaptation and Mitigation in Development Planning	Africa	Climate Change	2009–2012	1,000,000	EU-COM DG Environment
Strengthening Observation Networks Africa	East Africa	Observations	2013 +	20,000,000 USD	China

ANNEX IX

Annex to [paragraph 5.3.9](#) of the general summary

MEMBERSHIP OF SUBSIDIARY BODIES OF REGIONAL ASSOCIATION I AND MAIN AREAS OF RESPONSIBILITY

Management Group (MG)

The Management Group will consist of the president of RA I (Chairperson), the vice-president of RA I, and the Hydrological Advisor to the president of RA I and the Gender Coordinator. The president may invite the EC members of RA I and expert(s) to Management Group meetings.

The Management Group will focus on Expected Results 6, 7 & 8. Particular emphasis should be given to the cross-cutting issues which include Capacity Development, Strategic Planning, Resource Mobilization, and Education and Training.

The Management Group will monitor the performance of the other subsidiary bodies of the Association. It will review and decide on proposals from the chairpersons of the working groups regarding work plans.

Working Group on Observations, Telecommunication and Infrastructure

The core will consist of Regional Experts, as nominated by the Permanent Representatives of RA I Members, who have demonstrated expertise in the specified sub-components of the Working Group.

The chairperson, as appointed by the president, in consultation with members of the Group, may propose to the RA I Management Group establishment of task teams to deal with specific issues or tasks related to sub-components.

The Expert from RA I Dissemination Expert Group (RAIDEG) provides regular report to the Working Group. The Group will focus on Expected Results 1, 2, 3, 4 & 6.

Working Group on Climate Services and Applications

The core will consist of regional experts as nominated by the Permanent Representatives of RA I, who have demonstrated expertise in the delivery of climate information and services as specified in the sub-components of the Working Group.

The chairperson, as appointed by the president, in consultation with members of the Group may propose to the RA I Management Group the establishment of task teams to deal with specific issues/tasks related to sub-components. This Group will maintain close consultation with the Management Group in order to ensure that the cross-cutting tasks are supported by the necessary fields of expertise and properly addressed.

The Group will focus on Expected Results 2, 3 & 6.

Working Group on Improved Weather Forecasting, Natural Disaster Risk Reduction, Service Delivery and Communication

The core of this Working Group will be regional experts as nominated by the Permanent Representatives of RA I corresponding to the subject fields as reflected in the title. The chairperson, as appointed by the president, in consultation with members of the Group may propose to the RA I Management Group establishment of task teams to deal with specific issues/tasks related to sub-components.

This Group will maintain close consultation with the Management Group in order to ensure that the cross-cutting tasks are supported by the necessary fields of expertise and properly addressed.

The Group will focus on Expected Result 5.

Working Group on Hydrology and Water Resources

The experts in this Working Group will be required to have knowledge in the application of hydrological information for the assessment of water availability or in real time monitoring of high/low flows to avoid or mitigate natural disasters.

The Group will focus on Expected Result 1,2 5, & 6.

Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery

The core of this Working Group will be regional experts as nominated by the Permanent Representatives of RA I with expertise on cost recovery from services to the aviation sector corresponding to the subject fields as reflected in the title. The chairperson, as appointed by the president in consultation with the Management Group, may propose to the RA I Management Group establishment of task teams to deal with specific issues/tasks related to sub-components. Experts on specific topics may be invited to participate to address specific concerns or decisions related to ICAO, AMCOMET and other authoritative bodies, as appropriate.

This Group will maintain close consultation with the Management Group in order to ensure that the cross-cutting tasks are supported by the necessary fields of expertise and properly addressed.

The Group will focus on Expected Result 2, 6 & 8.

Tropical Cyclone Committee for the South-West Indian Ocean

The core will consist of 15 experts nominated from 15 countries most affected by Tropical Cyclones of the South-West Indian Ocean.

The chairperson, as proposed by the Committee, with the approval of president, in consultation with the members of the Committee, may establish task teams to deal with specific issues/tasks.

The Group will focus on Expected Results 2, 3 & 6.

Task Team on Aeronautical Meteorology

The Team Leader will be selected by the president, in consultation with the MG. The Task Team will monitor all aviation related activity of RA I members in coordination with appropriate CAeM bodies, the Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery and will address specific issues/tasks to be assigned by the MG. Draft Terms of Reference for consideration by the MG are as follows:

1. Survey current business models (institutional arrangements) for the whole continent including cost-recovery;
2. Investigate the reasons for identified MET deficiencies in RA1 services in coordination with ICAO regional offices RA I (Dakar, Nairobi, Cairo);
3. Support the regional SIGMET tests and analysis of their findings;
4. Assist in the preparation of a regional aviation MET conference (as per Resolution 2 (RA I-16)); which will unpack a GANP, ASUB and one sky implementation plan for RA I;

5. Support the efforts for furthering the implementation of QMS, CA and qualification requirements including development of a mechanism to encourage bilateral agreement to assist twining;
6. Keep the region informed of compliance requirements and deadlines including the planned migration of digital OPMET data exchange, highlighting the impacts and risks associated with non-compliance;
7. Provide annual reports to the president of RAI.

Terms of reference to be agreed by the MG:

- (a) Management Group (MG), as approved by Resolution 13 (RA I-16);
 - (b) Working Group on Observations, Telecommunication and Infrastructure;
 - (c) Working Group on Climate Services and Applications;
 - (d) Working Group on Hydrology and Water Resources;
 - (e) Working Group on Improved Weather Forecasting, Natural Disaster Risk Reduction, Service Delivery and Communication;
 - (f) Working Group on Compliance Issues in Marine and Aeronautical Meteorological Services and Cost Recovery;
 - (g) Tropical Cyclone Committee for the South-West Indian Ocean;
 - (h) Task Team on Aeronautical Meteorology.
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APPENDIX

LIST OF PARTICIPANTS

1. Officers of the session

Mamadou Lamine BAH	President
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2. Representatives of WMO Members within Region I

Angola

Domingos José DO NASCIMENTO	Principal Delegate
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Burkina Faso

Dieudonné P. A. YAKA	Principal Delegate
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Cabo Verde

Ester ARAÚJO BRITO (MS)	Principal Delegate
Francisco DE VEIGA CORREIA	Delegate
Emanuel SANTOS SOARES	Delegate
Hercules VIEIRA	Delegate

Comoros

Abdourazakou AN-YNAYA BINTIE (MS)	Principal Delegate
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Congo

Camille LOUMOUAMOU	Principal Delegate
Alphonse KANGA	Alternate

Côte d'Ivoire

Daouda KONATE	Principal Delegate
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Djibouti

Said OSMAN SAAD SAID	Principal Delegate
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Egypt

Ahmed A. MOHAMED	Principal Delegate
Ashraf S. ZAKY	Alternate
Ahmed S. HAMED	Delegate
Nadia M. HASSAN (MS)	Delegate

Ethiopia

Fetene TESHOME	Principal Delegate
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France

Bernard STRAUSS	Principal Delegate
Quoc-Phi DUONG	Alternate

Gambia

Lamin M. TOURAY	Principal Delegate
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Ghana

Andrew NKANSAH	Delegate
Stephen QUAO NYARKOTEY	Delegate

Guinea

Mamadou Lamine BAH	Principal Delegate
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Guinea-Bissau

João L. TCHÉDNÁ	Delegate
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Kenya

James KONGOTI	Principal Delegate
Sospeter MUIRURI	Alternate
Peter S. MASIKA	Delegate

Madagascar

Samueline RAHARIVELOARIMIZA S. (MS)	Principal Delegate
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Mali

Mamadou Adama DIALLO	Principal Delegate
Aliou TEKETE	Alternate

Mauritania

Mohamed E. KHTOUR	Delegate
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Morocco

Abdalah MOKSSIT	Principal Delegate
Abdelaziz OULDBBA	Delegate

Mozambique

Atanásio J. MANHIQUE	Principal Delegate
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Namibia

Franz UIRAB	Principal Delegate
Simon André DIRKSE	Delegate

Niger

Moussa LABO	Principal Delegate
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Nigeria

Ernest A. AFIESIMAMA	Delegate
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Portugal

Pedro VITERBO	Delegate
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Sao Tome and Principe

Auselmo XAVIER FERNANDES	Principal Delegate
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Senegal

Aida DIONGUE NIANG (MS)	Principal Delegate
Ousmane NDIAYE	Delegate

Sierra Leone

Alpha BOCKARI	Principal Delegate
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South Africa

Linda MAKULENI (MS)	Principal Delegate
Mark MAJODINA	Alternate
Gaborekwe KHAMBULE (MS)	Delegate
Minikeli NDABAMBI	Delegate

South Sudan

Mojwok AYOKER	Principal Delegate
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Spain

Carmen RUS JIMENÉZ (MS)	Principal Delegate
Luis F. LOPEZ COTIN	Alternate
Antonio CONESA MARGELÍ	Delegate

Sudan

Sharafeldein H. IDRIS AHMED	Principal Delegate
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Uganda

Michael Zacheus NKALUBO SEVUME	Principal Delegate
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United Kingdom of Great Britain and Northern Ireland

Karen MCCOURT (MS)	Principal Delegate
Jane WARDLE (MS)	Alternate
Steve MANKTELOW	Advisor

United Republic of Tanzania

Agnes L. KIJAZI (MS)	Principal Delegate
Faustine TILYA (MS)	Alternate

Zambia

Jacob NKOMOKI	Principal Delegate
Katongo KANYANGA	Delegate
Bathsheba MUSONDA (MS)	Delegate

Zimbabwe

A. MAKARAU	Principal Delegate
E. BUNGARE	Alternate

3. Representatives of WMO Members outside Region I (observers)**Finland**

Petteri TAALAS	Principal Delegate
Outi HOLOPAINEN	Delegate
Joanna SAARINEN (MS)	Delegate
Alioune NDIAYE	Advisor

United States of America

James PERONTO	Delegate
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4. Representatives of international organizations (observers)**ACMAD**

Adama Alhassane DIALLO	Delegate
André KAMGA FOAMOUHOUE	Delegate

Agrhymet

Mamadou SAMAKE	Delegate
Henri SONGOTI	Delegate

ASECNA

Dieudonné NGOUAKA	Delegate
Simeon ZOUMARA	Observer

EAC

John MUNGAI	Observer
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GEO

Andiswa MLISA	Delegate
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ICAO

Akoa Benoit OKASSI	Principal Delegate
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SADC

Bradwell J. GARANGANGA	Delegate
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5. Invited experts

David GRIMES	Observer, President of WMO
Nzioka John MUTHAMA	Observer

For more information, please contact:

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