

Belo Horizonte
15–21 July
2010

Commission for Agricultural Meteorology

Fifteenth session



**World
Meteorological
Organization**

WMO-No. 1062

Weather • Climate • Water

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Abridged final report with resolutions and recommendations

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ISBN 978-92-63-11062-6

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This report contains the text as adopted by Plenary and has been issued without formal editing.

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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (*agenda item 1*)

1.1 The fifteenth session of the Commission for Agricultural Meteorology was held in Belo Horizonte, Brazil, from 15 to 21 July 2010. It was opened at 10 a.m. on 15 July 2010 by Dr Jim Salinger (New Zealand), president of the Commission.

1.2 Dr Salinger extended a hearty welcome to all the participants. He welcomed Mr José Gerardo Fontelles, acting Minister and Executive Secretary of the Ministry of Agriculture, Livestock and Supply, Government of Brazil, Dr Antonio Divino Moura Permanent Representative for Brazil with WMO, Dr Luiz Claudio Costa, Rector, Federal University of Viçosa, Brazil, Mr M. Jarraud, Secretary-General of WMO, Mr Avinash Tyagi, Director Climate and Water Department of WMO and Dr Mannava Sivakumar, Director, Climate Prediction and Adaptation Branch of WMO.

1.3 Dr Salinger expressed his sincere appreciation to Dr Antonio Divino Moura, Permanent Representative of Brazil with WMO and his colleagues on the local organizing committee for the efficient logistical arrangements and for making all the participants feel very welcome and comfortable in Brazil. He thanked the many officials in Brazil and the WMO Secretariat for their hard work and dedicated planning, and expressed the hope that it would be a productive and successful meeting.

1.4 Dr Salinger stated the importance of the Commission's mandate in enhancing food security, reducing the impacts of natural disasters such as droughts, heatwaves and floods etc on agriculture, livestock, forestry, rangelands and fisheries, promoting sustainable land management and devising strategies to cope with climate variability and change and their impacts on agriculture, livestock, forests, rangelands and fisheries.

1.5 Dr Salinger mentioned that the global population is projected to grow from 6.8 billion today to 8.3 billion in 2030 and nearly 9.2 billion in 2050. All of that growth will be concentrated in developing countries. Global food production will therefore need to increase by more than 50 per cent by 2030, and nearly double by 2050. He pointed out that the latest figures from the Food and Agriculture Organization of the United Nations (FAO) indicate that the cereal stocks-to-utilization ratio in 2008, at 19.6 per cent, is at its lowest level in 30 years. The developing countries only recorded an increase of 1.1 per cent in cereal production in 2008. In fact, if China, India and Brazil are excluded from the group, production in the rest of the developing world actually fell by 0.8 per cent. Agriculture's share of Official Development Assistance fell from 17 per cent in 1980 to 3 per cent in 2006.

1.6 Dr Salinger stressed the importance of fish and fisheries for food supply, food security and income generation. According to the Food and Agricultural Organization (FAO), fish is a major source of protein diets, and comprises about 20 per cent of animal protein in the diets of over 2.8 billion people – and can reach 50 per cent in the world's poorest regions and up to 90 per cent in small island developing states and coastal areas. Fisheries are threatened by climate change with higher water temperatures, melting glaciers, changes in ocean salinity and changes in cyclone patterns: developing countries that depend on fish for food and exports will have a real challenge in adjusting to changes.

1.7 Dr Salinger emphasized that the Intergovernmental Panel on Climate Change (IPCC) in its 4th Assessment Report concluded that climate change and variability is likely to modify the productivity and distribution of oceanic fisheries, with unpredictable consequences. Colder water species productivity may be reduced in subtropical waters. Warmer water species productivity may be enhanced in subtropical waters and distribution of more tropical species may expand southward. Increasing climate variability will make fisheries predictability and management more challenging.

1.8 Dr Salinger pointed out several issues are threatening the livelihoods of 450 million smallholder farms in the world. During 2009 alone a variety of natural disasters have affected all

continents such as floods in central Europe, drought in China affecting 4 million people, weak monsoon in India with rainfall 23 per cent below normal across the nation, drought in east Africa which lead to massive food shortages in Kenya with the loss of 150,000 livestock and a 40 per cent decrease in maize harvests affecting 23 million people, drought in Mexico, heavy rainfall in Uruguay, northern Argentina and southern Brazil producing severe flooding, breaking heatwaves across southern Australia accompanied by very dry conditions combined to produce deadly wildfires. It could be affirmed that 2000–2009 was the warmest decade on record for the globe.

1.9 Dr Salinger urged the Commission to take up the key recommendations emerged from the International Workshop on Addressing the Livelihoods of Farmers, held prior to the commission session, and to convert them into action plans to assist NMHSs increase food and fibre production.

1.10 Dr Salinger proposed to continue the three main work programmes in Agrometeorological services, Agrometeorological Support Systems and Climate Change and Variability and Natural Disasters effects on agriculture, livestock, forestry, rangelands and fisheries. As new initiatives he suggested a joint venture with JCOMM to examine the effects of weather and climate on fisheries. He proposed to combine with CHY and CCI on integrated drought management and form a working group with the three Technical Commissions on climate, water and food.

1.11 Dr Salinger underlined the importance of supporting developing countries – especially the least developed countries in Africa, the Americas and south and East Asia – in their capacity-building which is central to the Commission's education and outreach programmes. Scientific expertise is only of use in improving food security if it is understood and implemented by the people who produce and harvest the food.

1.12 Dr Salinger stressed that the challenges for CAgM are many and that it has an extremely important role in assisting food and fibre production adapt to climate variability and change. CAgM has a critical role to play for developing countries especially in the Americas, Africa, south and East Asia.

1.13 Dr Antonio Divino Moura, Permanent Representative for Brazil with WMO, extended a very warm welcome to all the foreign delegates in Belo Horizonte. He thanked WMO for choosing Belo Horizonte as the venue for the 15th Session of CAgM.

1.14 Dr Moura mentioned that WMO has played a very significant role in the dissemination of knowledge and CAgM has a key role in disseminating information, experience, and scientific knowledge and in bringing the scientific community together to minimize the impact of weather uncertainties to the farmers.

1.15 Dr Moura hoped that the Belo Horizonte Session of the Commission would bring out far reaching results for the agricultural economy of the world.

1.16 Mr Michel Jarraud, Secretary-General of WMO, expressed his personal appreciation, and that of WMO, to the Government of Brazil for hosting this session along with the International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services. He thanked Dr Antonio Divino Moura, Director of Brazil's Instituto Nacional de Meteorologia (INMET), WMO's Third Vice-President and Permanent Representative of Brazil with WMO, as well as Dr Luiz Claudio Costa, Rector of the Federal University of Viçosa, and to all their staff, for the warm hospitality and the excellent arrangements. He also thanked Dr Jim Salinger and Dr L.S. Rathore for their leadership of the Commission over the intersessional period since the fourteenth session of CAgM (New Delhi, 2006), as well as the chairs, members and rapporteurs of the Open Programme Area Groups and Expert Teams.

1.17 Mr Jarraud referred to the role of the Millennium Development Goals (MDGs) and the commitment of the international community in combating poverty, hunger, disease, illiteracy, environmental degradation and discrimination against women. He mentioned that at the High-level Conference on World Food Security (Rome, June 2008), the United Nations Secretary General

Ban Ki-Moon called upon world leaders to take “bold and urgent” steps to tackle the global food crisis, in particular by boosting food production and revitalizing agriculture. According to FAO, the chronically hungry reached one billion in 2009, while 31 countries are in a state of severe food crisis requiring emergency aid, of which 20 are in Africa.

1.18 Mr Jarraud emphasized the urgent need to increase agricultural productivity through a more efficient use of three fundamental natural resources: soil, crop and climate, especially in developing countries. He underlined the relative lack of awareness in the farming community on the actual and potential benefits of weather and climate services. He added that fortunately, climate predictions and services are being developed as a result of enhanced collaboration between this community and the National Meteorological Services (NMSs) of WMO’s 189 Members.

1.19 Mr Jarraud mentioned that enhanced applications of science and technology, including the use of climate and weather information as well as prediction and early warning on impending weather and climate hazards, are truly vital in enhancing agricultural production. Capacity-building in agricultural meteorology can also make significant contributions to food security, in particular through workshops like the one held in Belo Horizonte just prior to this session, which has contributed to facilitate the exchange of experience among all stakeholders.

1.20 Mr Jarraud explained that since the approval by the WMO co-sponsored IPCC of its Fourth Assessment Report, which at the end of 2007 received the prestigious Nobel Peace Prize, there has been much higher awareness of climate change and the associated risks and vulnerabilities. In 2009 the third World Climate Conference-3 (WCC-3), held in Geneva, unanimously approved the establishment of a Global Framework for Climate Services (GFCS), in particular to strengthen science-based climate predictions and services, and a High-level Taskforce (HLT) is actively developing proposals to be submitted to the Sixteenth World Meteorological Congress next year.

1.21 Mr Jarraud stated that GFCS will facilitate the provision of climate information to agriculture and food security, based on risk evaluation and information delivery, cooperation and partnerships, adaptation strategies for resilient agricultural systems and climate change mitigation. One of WMO’s key goals is to ensure that its Agricultural Meteorology Programme will provide an essential contribution to GFCS development.

1.22 Mr Jarraud referred to the number of ongoing agrometeorological activities especially relevant in this context. The METAGRI Project – consisting of roving seminars for farmers in the countries of West Africa, to reinforce the interaction between NMHSs and rural farmers and the sustainable use of natural resources for agricultural production – has been developed by Spain’s State Agency for Meteorology (AEMET) and WMO. Over 100 seminars were held in eleven countries and more are scheduled to take place this year in five additional WMO Member countries. Moreover, roving seminars were held in Ethiopia, India and Sri Lanka, while other agrometeorological projects are about to be launched with similar objectives in the Caribbean, in Ethiopia and the Lake Victoria region of East Africa. The Drought Management Centre for South-Eastern Europe (DMCSEE) in Slovenia, has been established in partnership with the United Nations Convention to Combat Desertification (UNCCD) and WMO to counter some of most damaging hazards to agriculture. Based on the success of this key effort, WMO, UNCCD and the Organization for Security and Cooperation in Europe (OSCE) are now exploring the possibility of establishing another Regional Drought Management Centre in Central Asia.

1.23 Mr Jarraud mentioned that WMO recently organized workshops on drought indices and early warning systems in the United States of America and Spain, while another expert meeting is scheduled to be held in India this year. In addition to that, WMO continues to sponsor its World AgroMeteorological Information Service (WAMIS), which makes it possible to disseminate the agrometeorological products of its Members.

1.24 Before concluding, Mr Jarraud stressed the importance of including appropriate experts from developing countries in the working groups which are about to be established by the

Commission and the Director of WMO's Climate Prediction and Adaptation Branch, Dr Mannava Sivakumar to represent him during the Commission.

1.25 Mr José Gerardo Fontelles, acting Minister and Executive Secretary of the Ministry of Agriculture, Livestock and Supply, Government of Brazil, expressed his delight in participating in the Opening Ceremony of the Fifteenth Session of CAgM and emphasized that the choice of Brazil to host this world event that occurs every four years, and that takes place for the first time in South America is a joyful event.

1.26 Mr Fontelles addressed the importance of Brazilian agriculture for the global context. In 2009–2010 the grain harvest in Brazil is estimated to be 147.75 million tons, 8.6 per cent higher than the harvest in 2008/2009. Soybean harvest has increased 20.2 per cent compared to grain harvest. Such data indicate great productivity. Mr Fontelles stated that weather was a main factor in favour of productivity. Brazil can rely on accurate climate monitoring and forecast for the whole country provided by the National Meteorological Institute (INMET).

1.27 Mr Fontelles outlined the remarkable cooperation between Brazil and several African Countries. INMET and EMBRAPA are promoting training programmes for local and institutional personnel in Africa. Remarkable is also the Brazilian effort to provide sustainable energy alternatives as ethanol from sugar cane, thus contributing to a reduction of CO₂ emission in atmosphere and contributing to reduce air pollution in metropolises such as the city of Sao Paulo. Mr Fontelles emphasized the importance of the Agricultural and Livestock Plan 2010/2011 promoted by President Lula in June 2010 and consisting in 100 billion of Reais (around US \$ 77 billion). Its main measures are the extension of rural credit, better conditions for access to finance for the average producer and increased storage capacity of grains in the farms.

1.28 Mr Fontelles underlined the process of modernization undergone by INMET – there are now about 50 automatic weather stations that provide real time data – and the collaboration between INMET and neighbouring South American countries in the development of an effective network, in the form of a “Virtual Centre for Climate Services” as recommended by the World Climate Conference-3 held in Geneva in September 2009.

1.29 Mr Fontelles drew attention to the publication of new Atlas of Climatology, edited by INMET, that provides historical data for all seasons with maps of all the measurement stations. He presented a copy of this atlas to Mr Jarraud.

1.30 Fontelles stated that the Government of Brazil is well aware and active on issues concerning potential impacts of climate change and now accounts a network of researchers working on alternatives to adapt agriculture to future climate.

1.31 Mr Fontelles concluded his speech by congratulating with WMO for its immeasurable effort to involve 189 countries of the world in sharing experiences and elaborating feasible solutions for monitoring, forecasting and mitigating and adapting extreme weather patterns with the aim to protect lives and increasing food production in the world. It is important to increase technical and scientific exchange between researchers and research institutes such INMET, EMBRAPA, International Institutions and United Nations agencies.

1.32 The CAgM Award Ceremony took place after Mr Fontelles's speech. The WMO Commission for Agricultural Meteorology, through its Member States, awarded Dr H. P. Das, Vice-President of the International Society of Agricultural Meteorology (INSAM) and Dr Raymond L. Desjardins, Principal Research Scientist Agriculture and Agri-Food Canada, for their outstanding contributions and exceptional services to the Commission. In addition, Mr Fontelles presented each awardee with a memento from INMET.

1.33 Dr Luiz Claudio Costa, Rector, Federal University of Viçosa, Brazil thanked all the speakers and everyone in the Commission for their commitment and support in making the event a big success.

1.34 There were 118 participants at the session, including representatives from 62 countries and five international organizations/observers. A complete list of participants is given in the [appendix to the present report](#).

2. ORGANIZATION OF THE SESSION (*agenda item 2*)

2.1 CONSIDERATION OF THE REPORT ON CREDENTIALS (*agenda item 2.1*)

In accordance with WMO General Regulation 22, a list of participants and the capacities in which they were attending the session was prepared on the basis of an examination of the credentials. The list, prepared by the representative of the Secretary-General, was accepted unanimously as the report on credentials. Consequently it was decided not to establish a Credentials Committee.

2.2 ADOPTION OF THE AGENDA (*agenda item 2.2*)

The Commission adopted the provisional agenda as contained in CAgM-XV/Doc. 2.2(2) with amendments.

2.3 ESTABLISHMENT OF COMMITTEES (*agenda item 2.3*)

2.3.1 In accordance with WMO General Regulation 24, the Commission established the following committees for the duration of the session:

Plenary A and Plenary B

2.3.2 Two committees were established to examine in detail the various agenda items:

- (a) Plenary A to examine items 6, 7, and 11 with Dr L.S. Rathore (India) selected as chair;
- (b) Plenary B to examine items 4.6, 5, 8, and 9 with Dr Byong-Lyol Lee (Republic of Korea) selected as chair;

Nomination Committee

2.3.3 A Nomination Committee was established consisting of the following delegates:

RA I	Mr J. Spencer (Cape Verde)
RA II	Mr S. Bazgeer (Islamic Republic of Iran)
RA III	Mr C. Alarcón Velazco (Peru)
RA IV	Dr R. Desjardins (Canada)
RA V	Mr V. Carr (Australia)
RA VI	Mr I. Cacic (Croatia)

Dr R. Desjardins was elected as chair of the Nomination Committee.

Coordination Committee

2.3.4 In accordance with WMO General Regulation 28, a Coordination Committee was set up consisting of the president and vice-president of the Commission, the chairs of the Plenary A and Plenary B committees and the representative of the Secretary-General, and Dr Reinaldo Gomide from the host country.

Special Committee for the Nomination of Members of Implementation/Coordination Teams and Expert Teams

2.3.5 A special committee, consisting of:

The President
The Vice-President

Mr M. Gamedze (Swaziland)
 Mr X. Yu (China)
 Mr R. Gomide (Brazil)
 Mr R. Motha (United States)
 Mr P. Napwatt (Vanuatu)
 Mr G. Sterk (Netherlands)
 Mr. P. Wiley (Australia)

was established to formulate proposals for the nomination of members of implementation/coordination teams and expert teams. Mr Mduduzi Gamedze was elected chair of this Committee.

2.4 OTHER ORGANIZATIONAL MATTERS (*agenda item 2.4*)

2.4.1 The working hours were adopted from 9.30 a.m. to 12.30 p.m. and from 2.30 p.m. to 5.30 p.m.

2.4.2 The Commission decided that, in accordance with WMO General Regulation 111 and in view of the technical and specific nature of its discussions, it was not necessary to prepare minutes of the plenary meeting of the current session.

3. REPORT OF THE SECRETARY-GENERAL ON THE AGRICULTURAL METEOROLOGY PROGRAMME (*agenda item 3*)

3.1 During the fourteenth intersessional period of the Commission for Agricultural Meteorology, the Agricultural Meteorology Programme (AgMP) focused on improving agrometeorological services for agricultural production, improving support systems for these services and focused on the impact of climate change/variability and natural disasters on agriculture. Specifically, progress was made on establishing a drought management centre in South-East Europe, identifying consensus indices for meteorological, agricultural, and hydrological drought, increasing interactions between NMHSs and the agricultural community, increasing donor support for agrometeorological projects, and increasing interactions between United Nations agencies and NGOs.

Implementation of the Agricultural Meteorology Programme (AgMP) – Drought

3.2 The Commission noted with satisfaction the good progress that had been accomplished during the past four years on drought and adopted [Recommendation 1 \(CAgM-XV\) – Drought and desertification](#).

3.3 The Commission noted with appreciation the collaborative work of WMO and UNCCD in the establishment of a Drought Management Centre for South-East Europe in Slovenia and the proposed Drought Management Centre in Central Asia. The Commission noted that both CAgM Expert Teams in OPAG 3 mentioned the need for the development of standards for drought indices. The Commission noted that the ET on Drought and Extreme Temperatures: Preparedness and Management for Sustainable Agriculture, Rangelands, Forestry and Fisheries held in Beijing, China (February 2009) recommended the need for appropriate arrangements to identify the methods and marshal resources for the development of standards for agricultural drought indices in a timely manner.

3.4 The Commission expressed its appreciation to the Secretariat in providing resources to organize an Interregional Workshop on Indices and Early Warning Systems for Drought at the University of Nebraska-Lincoln in Lincoln, United States (11–15 December 2009). The Commission noted that different drought indices are useful in different regions and applications, but that some expert guidance is needed to help Members in the evaluation of proven indices that could be useful in their Service. The Commission supported the “Lincoln Declaration on Drought Indices” from this workshop which recommended that the Standardized Precipitation Index (SPI) should be used to characterize meteorological droughts by all NMHSs, in addition to other drought indices that are

already in use in their Service and noted that the sixty-second session of the WMO Executive Council approved Resolution 15 (EC-LXII) – Use of the Standardized Precipitation Index for characterizing meteorological droughts by all National Meteorological and Hydrological Services, and that this resolution will be sent to the Sixteenth WMO Congress in 2011 for approval.

3.5 The Commission also supported the recommendations from the “Lincoln Declaration on Drought Indices” which included the development of a comprehensive user manual for the SPI and the establishment of two working groups with representatives from different regions around the world and observers from United Nations Agencies and Research Institutions to further discuss and recommend, by the end of 2010, the most comprehensive indices to characterize the agricultural and hydrological droughts. The Commission noted that WMO and the United Nations International Strategy for Disaster Reduction (UN-ISDR) organized an Expert Meeting on Agricultural Drought Indices in Murcia, Spain (2–4 June 2010) which recommended that countries investigate using a composite drought approach and that WMO conducts a survey to compile and assess the capacities and future needs of NMHSs around the world in building such common frameworks for national agricultural drought early warning systems. The Commission noted that the Expert Meeting on hydrological drought indices is expected to take place in August 2010 and acknowledged that the outcomes of these meetings will be compiled by WMO in collaboration with UN-ISDR for a chapter on drought risks for the 2011 United Nations Global Assessment Report on Disaster Risk Reduction (GAR11)

3.6 The Commission noted that WMO and the Global Water Partnership have a close working relationship and have developed the Associated Programme on Flood Management (APFM – www.apfm.info). The APFM promotes the concept of Integrated Flood Management (IFM) as a new approach to flood management. The Commission supported the efforts of the Secretariat and the Global Water Partnership in developing the proposed Integrated Drought Management Programme and urged the Secretariat to find other partners for this proposal. The Commission noted that this programme would target intergovernmental, governmental and non-governmental organizations involved in drought monitoring, prediction, drought risk reduction and management. The principal approach is to develop a global coordination of efforts to strengthen drought monitoring, risk identification, drought prediction and early warning services and development of drought management knowledge base.

Implementation of the AgMP – National Agrometeorological Station Network (NASNET)

3.7 The Commission noted that during the meeting of the Implementation/Coordination Team (ICT) on Agrometeorological Services (OPAG 1) Hanoi, Viet Nam (12–14 December 2007) the participants discussed the issue of density of agrometeorological station networks at the national level. The meeting also noted that the network of agrometeorological stations around the world, especially in the developing countries, is currently on decline and given the pressing need for improved agrometeorological services and applications, it is crucial that this issue be addressed with some degree of urgency. The Commission expressed its appreciation that the sixtieth session of the WMO Executive Council adopted Resolution 6 (EC-LX) – Establishment of a National Agrometeorological Station Network, which decided to take action on the recommendations of the ICT which stated that agrometeorological stations, whether maintained by the NMHSs or universities or national, regional and international institutes engaged in agricultural research, should be considered as a valuable national resource and that Directors of NMHSs should engage in a dialogue with universities and with Directors of national, regional and international institutes engaged in agricultural research as to how a National Agrometeorological Station Network (NASNET) could be established by bringing all the stations being operated by the different entities under one common umbrella in coordination with the implementation of the WMO Integrated Global Observing System.

Implementation of the AgMP – Adaptation to Climate Change

3.8 The Commission noted that an International Symposium on Climate Change and Food Security in South Asia was held in Dhaka, Bangladesh (August 2008) which was attended by nearly 250 participants from 17 countries. The Commission agreed with the recommendations of

the Symposium for the creation of a Climate Change and Food Security in South Asia Network (CCFSSANet) and the establishment a South Asia Climate Outlook Forum (SACOF), both maintained by WMO. The Commission also noted that the Symposium recommended the initiation and strengthening of cooperation among academic, research and policy institutions, international organizations and NGOs, to provide opportunities for human resource development and relevant training needs and to strengthen regional institutional and policy mechanisms to promote and facilitate implementation of location specific adaptation and mitigation practices.

3.9 The Commission noted that an International Workshop on Adaptation to Climate Change in West African Agriculture was held in Ouagadougou, Burkina Faso (27–30 April 2009) which brought together over 70 experts and key decision-makers to discuss and recommend climate change adaptation options for the agriculture, livestock, forestry, rangelands and fisheries sectors in West Africa. The Commission noted the principal Workshop recommendations that called for the establishment a West and Central African Network on Climate Change and Food Security (ROCACCSA) and a Technical Secretariat, as part of the ECOWAS Sub-regional Action Programme on Climate Change, comprising of competent institutions at the national and regional level in West Africa and with international institutions and organizations.

Implementation of the AgMP – Interactions with Other WMO Programmes

3.10 The Commission noted that WMO's Atmospheric Research and Environment Programme (AREP) and the Commission for Atmospheric Sciences (CAS) have been developing a Sand and Dust Storm Warning and Advisory System (SDS-WAS). The Commission expressed its appreciation that the Secretariat had provided input into this project with regards to potential agricultural applications for SDS-WAS. It noted that the Secretariat had made a presentation on this topic at the WMO/GEO Expert Meeting on an International Sand and Dust Storm Warning and Assessment System (SDS-WAS) held in Barcelona, Spain (7–9 November 2007) and published a paper in the workshop proceedings. It also noted that the Secretariat had organized a Side Event at the UNCCD COP-9 on "Global Perspective on Sand and Dust Impacts." The Commission encouraged the Secretariat to continue to liaise with AREP and CAS on this issue.

3.11 The Commission noted that issues of air pollution impact not only human populations, but can negatively impact agricultural production including the impacts on human population centres with the burning of agricultural fields and during forest and grass fires. The Commission urged the AgMP and AREP to work together on these important issues.

3.12 The Commission noted that the World Bank Development Grant Facility (DGF) has approved and funded a project entitled "Towards a Regional Framework for Weather and Climate Services for Food Aid, Food Security, Maritime Transport Safety Contributing to Disaster Risk Reduction in Lake Victoria Region". It noted that the goal of the project is to enhance the security of the livelihoods of farmers and fishermen in and around Lake Victoria. The Commission noted that the specific agricultural related activities include the development of a drought index that can take into account historical occurrence of drought event and the development of in-season crop yield forecasts for food security and food aid. The Commission acknowledged that the project will support the Global Framework for Climate Services (GFCS) and that the project will link with other WMO and World Bank projects, specifically with the Severe Weather Demonstration Forecast Demonstration Project (SWFDP) which is a Commission for Basic Systems (CBS) activity. The Commission urged the AgMP to continue to provide linkages between weather forecast products (Numerical Weather Predictions) and the applications for agricultural decision makers.

Regional Activities in Agrometeorology

3.13 The Commission noted that the regional associations have established or are in the process of establishing new Working Groups on Climate Services, Adaptation and Agricultural Meteorology or Working Groups on Climate and Hydrology with Sub-Groups or Sub-tasks on Agrometeorology. The Commission noted that the recommendation at CAgM-XIV to reappoint Working Groups on Agricultural Meteorology for all regional associations had been implemented but only two working groups were able to meet. The Commission urged the Secretary-General to

ensure that these groups are able to meet in the next intersessional period. The Commission emphasized that the vitality of the Working Groups on Agricultural Meteorology in the regional associations is crucial for the Commission to be able to address the needs of the Regions. It emphasized that the Commission benefited immensely from the inputs provided by these working groups in each of the Regions where they were facilitated to meet during previous intersessional periods.

3.14 The Commission noted that a meeting of the RA II Working Group on Agricultural Meteorology was held in Hanoi, Viet Nam (17–19 December 2007) and that the group reviewed the approaches in promoting the more active use of agrometeorological research products by the end users for sustainable agriculture in the region. The group also reviewed and summarized the status of seasonal and early warning prediction as well as the monitoring of drought in the region by conventional and remote sensing techniques.

3.15 The Commission noted that a meeting of the RA VI Working Group on Agricultural Meteorology was held in Vienna, Austria (24 June 2009) in conjunction with an International Symposium on Climate Change and Adaptation Options in Agriculture (2–24 June 2009).

World Agrometeorological Information Service (WAMIS)

3.16 The Commission noted that the World AgroMeteorological Information Service (WAMIS; www.wamis.org) has products from over 50 countries and organizations and provides over 77 links of tools and resources to help countries improve their bulletins and services. Considering the benefits of WAMIS to Members, the Commission urged Members to participate and disseminate their products to the global community as these products can also aid in natural disaster assessments by providing bulletins in both real-time and from a historical perspective. The Commission acknowledged the assistance of Italy and the Republic of Korea in providing WAMIS mirror servers. The Commission acknowledged and supported the development of an ISO compatible search engine on WAMIS, which is required to provide WAMIS information as a component of the WMO Information System (WIS).

World Climate Conference-3

3.17 The Commission noted that the World Climate Conference-3 (WCC-3) was held in Geneva, Switzerland (31 August to 4 September 2009) and that the theme of the Conference was 'Climate Prediction and Information for Decision Making'. The Commission also noted that the outcome of the Conference was to develop a Global Framework for Climate Services (GFCS). The Commission supported the coordination of its activities with the goals of GFCS. In particular, the activities of the Commission will provide a major contribution to the development of the Climate User Interface Programme (CUIP) of GFCS. A High Level Task (HLT) was established in January 2010 to further define the GFCS.

International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services

3.18 The Commission acknowledged with appreciation the work of the Secretariat for the organization of the International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services that preceded the Commission meeting. The Commission thanked the following organizations for co-sponsoring the workshop: the Asia-Pacific Network for Global Change Research (APN); International Federation of Agricultural Producers (IFAP); the Food and Agriculture Organization of the United Nations (FAO); Météo-France; National Center for Agrometeorology (NCAM, Seoul National University, Republic of Korea); and United States Department of Agriculture (USDA). The Commission expressed its deep appreciation to the following Brazilian organizations who were involved in hosting the workshop and Commission session: the Instituto Nacional de Meteorologia (INMET-Brazil); the Brazilian Ministry of Agriculture, Livestock, and Food Supply; Government of Minas Gerais, Brazil; the Federal University of Viçosa (UFV), Minas Gerais, Brazil; and the Brazilian Society of Agrometeorology.

3.19 The Workshop was developed to take stock of a number of important issues facing the agricultural communities around the world including rising populations with the consequent increase in demand for food; the pressures on the world's food producers due to climate variability and change, as well as socio-economic conditions; the need to use natural resources productively, but sustainably; and the need within the agriculture communities for increased knowledge and better tools for risk management and adaptation. One hundred and thirty four participants from fifty-seven countries participated in the workshop. The Workshop was organized in seven technical sessions in which twenty-six papers were presented. These generated considerable discussion on a number of issues relevant to the Commission. The Workshop developed a set of key recommendations addressing the following issues: user liaison/training/communications; NMHSs, extension services and partners; research; seasonal forecasts for farming community; roving seminars and policy and cross-cutting issues. The Commission urged the Management Group of the Commission to take into account these recommendations in the future work of the Commission for the next intersessional period.

4. REPORT OF THE PRESIDENT OF THE COMMISSION (*agenda item 4*)

4.1 The Commission noted with appreciation the report of the president, which contained a review of the activities of the Commission and its various bodies and rapporteurs since its fourteenth session. The Commission further noted that the in-depth report of the activities had been submitted by the president to the sixty-second session of the Executive Council (June 2010).

4.2 There is no other WMO constituent body which links more directly to the human population than the CAgM. The Commission agreed that, in order to raise the profile of the CAgM, a smaller set of key priorities is necessary for the next intersessional period. These priorities will be designed to address the issues that will be referenced in other session documents. Given that "agrometeorological services very often fail to meet farmer's needs", and the importance of this gap between services and farmers, the Commission agreed to address it by establishing a small number of key priorities and these will be reflected in the CAgM planning document (see agenda item 6) and in the structure of the CAgM (see agenda item 10). These priorities will connect directly with the WMO Strategic Plan and key programs such as GFCS and WMO Information System WIS/WIGOS.

4.3 The Commission expressed its appreciation for the comprehensive and useful periodic reports issued as circular letters by the president and posted on the CAgM Website, which had provided detailed information on the Commission's activities. Those reports also served as background information during the present session.

CAgM Management Group

4.4 The Commission expressed its satisfaction that the CAgM Management Group completed all its assigned tasks based upon the terms of reference for its re-establishment. The Commission appreciated the efforts of the Management Group during its meeting in February 2010 where it discussed the future work of the Commission and proposed to keep the current OPAG structure in place.

Status of Open Programme Area Group activities

4.5 The Commission noted that there was outstanding support from the host nations, not only logistically, but also by scientists and technical experts involved in the meetings of different Expert Teams (ETs) of the Commission. Quality deliverables were authored by participants in a timely manner. These deliverables have resulted in publications in scientific journals and a technical book. The Commission noted with satisfaction that the implementation/coordination teams (ICTs) evaluated the expert team reports and produced a large number of recommendations for implementation at the regional level.

Open Programme Area Group 1: Agrometeorological Services for Agricultural Production

Implementation/Coordination Team for Agrometeorological Services (ICAS)

4.6 The Commission was pleased to note that the report of the chair of OPAG 1, Ms Sue Walker, provided an overview of progress made on the work of the implementation/coordination team (ICT) and expert teams (ETs) in OPAG 1 according to their terms of reference.

4.7 The Commission noted that OPAG 1 had the responsibility to maintain an active and responsive overview of all the activities related to the provision of improved agrometeorological services by farmers and extension services and agrometeorological aspects of sustainable agricultural development. The ICT of OPAG 1 is mainly based on regional representations and focuses on coordinating operational and implementation aspects of agrometeorological services in each of the six Regions of WMO.

4.8 The Commission emphasized that the meeting of the two ETs under OPAG 1, i.e. ET on the Content and Use of Agrometeorological Products by Farmers and Extension Services (ETCUAP) and the ET on Agrometeorological Aspects of Sustainable Agriculture Development (ETASAD) have been held and produced useful reports. The Commission noted that these two meetings of ETs were co-sponsored by other organizations and agencies and were held in conjunction with International Workshops. The Commission congratulated the Secretariat on the initiative taken to seek co-sponsorship for these two meetings and for having held them in conjunction with international workshops, thus enhancing the standing of the CAgM in the scientific community around the world.

4.9 The Commission emphasized that strengthening operational meteorological services and having open discussions to develop projects for implementation for each Region was important for CAgM. In this connection, the Commission noted that the ICT, at its meeting held in Hanoi, Viet Nam in December 2007, proposed to improve agrometeorological services through establishing Agrometeorological Advisory Committees at different levels (national/state/provincial/district/local) and that this was approved by EC-LX.

4.10 The Commission agreed that capacity-building is important aspect of its work and that it would be useful to conduct one-day workshops for policy makers at national and provincial/state level on the application of climate information for sustainable development of agriculture using the programme developed by ICT members. The Commission considered it important to combine the various existing weather station networks to increase the density of agrometeorological weather stations so as to improve the spatial resolution and quality of agrometeorological products by bringing all the stations under one common umbrella.

4.11 The Commission concurred with the recommendation of the ICT to continue and promote training and education in the area of agrometeorological services, taking into account the content and the educational level of students with different needs and capabilities.

4.12 The Commission stressed the importance of roving seminars and workshops both for farmers and extension or intermediary personnel and of the importance of transferring agrometeorological skills and knowledge in association with experts from all aspects of agriculture.

4.13 The Commission congratulated on the selection made by the members of the current ICT concerning the projects developed by the previous ICT that deserved more consideration. Such projects were from RA I (to promote the off-farm use of seasonal rainfall outlooks to increase household food security via the production of the grain staple food) and from RA IV (determination and demonstration of benefits associated with Integrated Crop Management techniques in support of agriculture).

4.14 The Commission encouraged the members to contribute effectively to the formulation and implementation of the projects.

Expert Team on Content and Use of Agrometeorological Products by Farmers and Extension Services (ETCUAP)

4.15 The Commission thanked Roger Stone, Leader of the ET on Content and Use of Agrometeorological Products by Farmers and Extension Services.

4.16 The Commission noted that there is evidence of considerable and prolific output of agrometeorological information from NMHSs and associated agricultural institutions but that this information needs to be provided to the extension services in an appropriate format.

4.17 The Commission agreed on the lack of effective and successful linkages between agrometeorological information and individual farm decision-making. Agrometeorological services output at the federal level may not always meet the demands for more specific needs in the farming community. Closer collaboration should be developed between federal agencies and state agencies. The Commission stated that a key concern remains that agrometeorological services very often fail to meet farmer's needs due to lack of connection to effective extension services.

4.18 The Commission suggested that regular contact between weather and climate service providers and the farming community should be enhanced and that an increase in the availability of information to the user communities through farmer fairs, traditional festive occasions, media contacts, Internet, advanced learning systems ('eLearning'), roving seminars, open days etc., should be provided.

4.19 The Commission noted that training in media capabilities by NMHSs personal and similar agencies should be increased. It is also very important to inculcate the use of IT and similar electronic technologies such as 'texting'/SMS for enhancing the output of appropriate weather and climate products.

4.20 There is a strong need for innovative systems such as specialized call centres for farmers where qualified personnel are available to answer all queries which should be promoted alongside weather and 'climate field schools' in order to deliver extension of weather and climate products. A curriculum of meteorology and climate change at the school level should be developed and involve school teachers in aspects of agrometeorological extension.

4.21 The Commission encouraged NMHSs and other service providers to organize 'open days' for farmers which may also include short training programmes, to promote interaction with users, especially the agricultural sector (resources need to be allocated to NMHSs) and to identify champion farmers at the local level who can interact closely with NMHSs and other agencies and provide information to his/her community.

4.22 Noting that all countries should establish 'extension climatologist' positions at the state/provincial level, the Commission urged farmer associations/industry organizations to identify a focal point who, with the relevant training, can interact with weather and climate service providers for product development and communication of agrometeorological information.

Expert Team on Agrometeorological Aspects of Sustainable Agricultural Development (ETASAD)

4.23 The Commission thanked Mr Antonio Mestre (Spain), leader of the ET on Agrometeorological Aspects of Sustainable Agricultural Development (ETASAD) for his comprehensive report. The Commission note that relevant inputs were provided by the organization of the meeting of this ET in conjunction with the International Workshop on Advances in Operational Weather Systems for Fire Danger Rating held in Edmonton, Canada, from 14 to 16 July 2008.

4.24 The Commission noted that a wide range of topics had been covered during this ET meeting: i.e. the review and evaluation of the status of agrometeorological applications to conserve and manage natural and environmental resources, the collection and evaluation of

case studies of successful measures to manage land use, the establishing of operational guidelines for fire weather agrometeorology and the review of the impact of weather and climate information on fisheries.

4.25 Regarding the agrometeorological applications to conserve and manage natural and environmental resources, the Commission identified the need for effective and easy to understand meteorological forecasts for farmers and the need for a formal service delivery structure. This effort should be designed to facilitate decision making and should be coordinated with the CBS OPAG on Public Weather Services.

4.26 The Commission underlined the need to properly define the term “sustainability” and the context of the policy environment in which the production system operates. The Commission recommend that tools and services should be designed as to balance the components of the sustainability triangle.

4.27 The Commission recommended the implementation of tools and services aimed at multiple stakeholders and for assisting with risk management. Tools and services should address long-term (strategic), seasonal (tactical) and short-term (operational) forecasting and the distinct differences between these services. Service delivery should assume a basic minimum access to ICT and should build up from the minimum in a progressive manner.

4.28 The Commission recognized that there are many agricultural management practices to avoid water and wind erosion such as growing forage crops as permanent cover, increased use of contour furrows and terraces, and installing wind breaks and shelterbelts. The Commission recommended that these practices be promoted by Members and that the climate information should be used in the planning and development of these practices.

4.29 The Commission strongly recommended the establishment of operational guidelines for fire weather agrometeorology. In this regard, the Commission stressed the importance of organizing more workshops to fully discuss weather observations and networks in fire weather.

4.30 The Commission agreed with the recommendations of the ET for the need to calculate Fire Danger Rating (FDR) from interpolated weather analyses and the need to use NWP ensemble products in FDR forecasting products. Historical weather analyses should be used to provide the context on the impacts of the upper atmosphere on fire behaviour and Digital Elevation Models (DEMs) should be implemented into FDR methodologies for moisture content estimations and fire behaviour prediction. The Commission urged the exploration of FDR systems based on attributes of climatic zones and the establishment of a catalogue regarding main fuel types and models.

4.31 The Commission urged the compilation of a literature review on wild land fire emissions factors, the collection of unpublished information and the development of a dissemination method to researchers and users.

4.32 The Commission strongly suggested to make use of existing data management resources and to use established international standards, data collection standards and standard data models coordinated with and incorporated through the WMO Information System (WIS) and the WMO Integrated Global Observing System (WIGOS) recognizing that consideration for non-meteorological data such as crop yields, etc needs to be accommodated. With regards to FDR systems, a contingency plan is recommended to be developed to acquire alternate data sources due to the changing technology and data sharing agreements.

4.33 The Commission agreed that more support for capacity-building is needed and this could be achieved by supporting e-infrastructure to provide access to systems and existing education sites such as UCAR-COMET, and through the use of open source GIS tools. The Commission recommended that practical training sessions/workshops to field personnel for operational FDR or fire behaviour systems should be organized and an institutional framework for a global FDR system should be developed.

4.34 The Commission noted the impact of weather and climate on aquaculture and fisheries and suggested that the effects of El Niño should be further studied in relation to this sector in the different countries in order to minimize the impacts on national economies. It also acknowledged that a base line to measure the effects of climate change on marine-coastal biodiversity should be established. The Commission recognized that studies should be undertaken at quantifying the regional and global consequences of natural and human-induced changes on the sea and marine ecosystems.

4.35 The Commission agreed that agrometeorological tools should also be used to inform policy makers on the unsustainability of current agricultural production systems as well as using these tools to manage production systems in the future.

Open Programme Area Group 2: Support Systems for Agrometeorological Services

Implementation/Coordination Team on Support Systems for Agrometeorological Services (ICSAS)

4.36 The Commission was pleased to note that the report of the chair of OPAG 2, Ms Federica Rossi (Italy) provided a detailed overview of progress made on the work of the ICT and ETs in OPAG 2 according to their terms of reference.

4.37 The Commission noted that OPAG 2 had the responsibility to maintain an active and responsive overview of all activities related to the data support systems for agrometeorological services including technologies such as Geographical Information Systems (GIS), remote sensing for agroclimatic characterization and sustainable land management, data management, validation and application of models and research method at the ecoregional level.

4.38 The Commission was pleased to note that efforts were made to manage communication and interdependencies between members to achieve the OPAG 2 main goals and seek for ways to ensure effective implementation of activities and recommendations within the Member Countries.

4.39 The Commission noted that meetings of both the Expert Teams (ETs) under OPAG 2, i.e. the ET on the Collection and Evaluation of Operational Agrometeorological Tools and Methodologies (ETATM) and the ET on Communication of Agrometeorological Products and Services for Sustainable Agriculture produced useful reports.

4.40 The Commission noted that ICT meeting was held in conjunction with the International Conference on Challenges and Opportunities in Agrometeorology (23–25 February 2009), organized by the Indian Agrometeorological Society and that the basis concepts of the conference were incorporated into the analysis of the team members.

4.41 The Commission observed that the implementation activities of ICT on Support Systems for Agrometeorological Services (ICSAS) were mainly based on operational applications of current agrometeorological data, analytical tools, and information delivery systems at the national and regional levels and in making recommendations on procedures, methodologies and resources to improve the regional-based capability for operational applications.

4.42 The Commission agreed that support systems for agrometeorological services must be considered for taking decisions at different levels and scales such as at the farm, catchment, provincial, country, marketing, and policy scales. It also acknowledged that support systems in agrometeorology (GIS and RS in specific) should be considered as tools effective to generate a more eco-efficient agriculture which reconciles production with a reduction in resource degradation. The Commission suggested that Members consider agrometeorological support systems in the view of their potential to support science-based tools for determining strategies designed to help policymakers and managers to evaluate the best options for reducing vulnerability of food production systems to global environmental change, while minimizing further environmental degradation.

4.43 The Commission recognized that meteorological support systems must be promoted to maintain successful local traditions in agriculture.

4.44 The Commission acknowledged that the use of remote sensing to monitor agricultural and natural resources of a region must be extended, since it may support more efficient agricultural practices and positively affect the decision making processes. The Commission urged that NMHSs and their partners to find a more cost-effective means for incorporating satellite data into operational agrometeorological activities. The Commission recommended that a training workshop be organized on MODIS tools and products for agrometeorology and that EUMETSAT could be a possible partner in this training.

4.45 The Commission suggested that targeted research and dissemination programmes to foster the development of monthly to seasonal prediction systems suitable for agricultural decision-making be done under the guidance of the GFCS.

4.46 The Commission agreed with the ICT that improved interactions between users and NMHSs should be promoted and that NMHSs could allocate necessary resources to improve these interactions. The Commission noted that information provided to users must be timely, accurate, cost-effective and feedback mechanisms could facilitate the effective management. The Commission stressed that implementation could be assisted by user needs assessment and active users dialogues. This can only be achieved through active cooperation among NMHSs, agricultural extension services, farmers and their associations, research institutes, universities, industry and enterprises. The Commission noted that NMHSs could be more proactive in getting involved with existing agricultural fora in order to further improve user interactions.

4.47 The Commission noted that there were several existing websites that focus on disseminating agrometeorological products and information. It acknowledged that WAMIS should be addressed as a pro-active, common instrument to share bulletins, geospatial information, crop models and to disseminate training material and that INSAM should be supported and utilized as a common exchange base for agrometeorological information and products, information on innovation and potential utilities, and as a free-source of shared resources. The Commission urged Members to support and utilize both of these efforts. The Commission agreed that WAMIS should be incorporated as a component of the WIS.

Expert Team on the Collection and Evaluation of Operational Agrometeorological Tools and Methodologies (ETATM)

4.48 The Commission thanked Mr Roger Stern, leader of the Expert Team on Collection and Evaluation of Operational Agrometeorological Tools and Methodologies (ETATM) for his comprehensive report.

4.49 The Commission noted with appreciation that the meeting was held in Nairobi, Kenya from 21 to 24 October 2008 because the terms of reference of this group were consistent with a research project led by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) entitled "Managing Uncertainty: Innovation systems for coping with climate variability and change".

4.50 The Commission agreed with the interpretation provided by the meeting of the word "operational tool" and came to the conclusion that an operational tool or methodology is one that is widely used – and not exclusively by developers – and has a verified impact on the farming sector. The Commission agreed with the ET that only tools that have been scientifically validated should be used.

4.51 The Commission underlined the importance of the topics discussed during the meeting, such as data acquisition, data management and analysis, agrometeorological models, capacity development, and dissemination tools. The Commission stressed the need to promote the use of historical data and existing climate records by NMHSs in climate change studies and to encourage the use of tools such as simple rainfall analysis for coping and adapting to current

climate variability as well as the use of crop simulation models to investigate the impact of climate change scenarios on agriculture.

4.52 The Commission stressed the need to promote capacity-building and the full implementation of new agrometeorological tools in developing countries. It also noted that capacity-building is needed on the use of modern agrometeorological tools to address the persistent food insecurity in Africa and other developing countries.

4.53 The Commission noted that the most advanced tool or output is not always the best and acknowledged that capacity development should be problem driven in order to concentrate on the use of the most appropriate tools to solve agrometeorological problems, rather than on the learning of new techniques.

4.54 The Commission acknowledged the priority to build better partnerships between Agricultural Research Centres, agricultural universities, and NMHSs. The Commission agreed that if the role of the historical data were fully recognized then NMHS staff might be recognized as key players, therefore making use of the existing climate records would become more relevant to climate change.

4.55 The Commission noted that agricultural users need to have improved understanding of climate change versus climate variability and urged the WMO Secretariat to develop guidance material to help users understand this important difference.

Expert Team on Communication of Agrometeorological Products and Services for Sustainable Agriculture (ETCAPS)

4.56 The Commission noted with appreciation the work accomplished by the ET on Communication of Agrometeorological Products and Services for Sustainable Agriculture. The Commission complimented the ET leader, Peter Hayman (Australia).

4.57 The Commission was pleased that the ET met in Toowoomba, Australia on 21 May 2009 following the International Workshop on the Content, Communication and Use of Weather and Climate Products and Services for Sustainable Agriculture which took place from 18 to 20 May 2009 at the University of Southern Queensland, Toowoomba. The workshop brought together members from the Communication of Agrometeorological Products and Services (ETCAPS-OPAG 2) and members from the Content and Use of Agrometeorological Products by Farmers and Extension Services (ETCUAP-OPAG 1).

4.58 The Commission agreed with the ET members that although there are differences between regions in terms of communication of agrometeorological products and services, there is also substantial overlap. Television and radio tend to be local; however there is an increasing amount of 'narrow casting' whereby more local and specific information can be made available. The content needs to match the form of communication, for example specific disease information has to be at a scale appropriate to weather conditions for major crops in the region.

4.59 The Commission agreed that there is a need to improve communication content and how to make it effective in all regions. The Commission noted that it is very important to provide feedback from end users to the providers of information and that Web 2.0 technologies could have a pivotal role in achieving this objective.

4.60 The Commission noted that tools for information transmission need to be improved. It also noted a recent move towards digital forms of communication especially the Internet and mobile telephones. This does not mean that older forms of communication are automatically replaced. The Commission stressed that communication remains a human process and despite the many technological improvements, there is an increasing need for skilled human communicators. The changes in technology are more dramatic in developing countries. The Commission acknowledged that Information and Communication Technologies (ICT), in particular mobile phones, have a recognized role in development work and agrometeorology is

one of the examples where such technologies have been thoughtfully applied. The Commission recommended that the CBS OPAG on PWS can collaborate on this issue.

4.61 The Commission agreed that there is a need for closer collaboration between meteorological and agricultural agencies. The Commission stressed that local intermediaries are essential for communication and noted that the relationship between public-private partnerships is complex. Private firms play an important role in disseminating information through television, sponsored websites, grower networks or through mobile telephone. The Commission noted that there is a need for more involvement of indigenous knowledge. A holistic approach integrating all technical, ecological, socio-economic and educative aspects should also be fostered.

4.62 The Commission agreed that Web 2.0 technologies, which allow the communication from many to many, represent interesting opportunities which need to be monitored. Some Web 2.0 applications, such as Facebook and Twitter, may become a valuable non-official climate resource to complement the official quality controlled climate databases. They also enable communities to learn from each other. The Commission recognized the need for leadership in how agrometeorological information is made useful in the Web 2.0 environment.

4.63 The Commission acknowledged that the decline in the economic fortunes of many farmers and the dramatic decline in the number of farm holdings in the developed countries should not be underestimated. This has implications for the marketing of agrometeorological information.

4.64 The Commission agreed that it should continue to monitor and report on technological and sociological aspects of the rapid changes in ICTs in both developed and developing countries. There is a need to 'prove' to both meteorological services and to agricultural organizations that resources spent on agrometeorology lead to improvements in sustainable agriculture.

4.65 The Commission acknowledged that communication relies on skilled people and therefore training courses on media and communication for agrometeorologists and on agricultural applications for meteorologists and communication personnel should be promoted and that similar PWS courses be used or modified for this purpose.

4.66 The Commission recognized the importance of information and communication technologies (ICTs) and for strengthening its coordination and collaboration with CBS to provide improved communications for agrometeorological products and services especially through the WIS.

Open Programme Area Group 3: Climate Change/Variability and Natural Disasters in Agriculture

Implementation/Coordination Team on Climate Change/Variability and Natural Disasters in Agriculture (ICCND)

4.67 The Commission was pleased to note that the report of the chair of the Open Programme Area Group 3 (OPAG 3), Mr Ray Motha (United States) provided an overview of progress made on the work of the Expert Teams (ETs) in OPAG 3 according to their terms of reference.

4.68 The Commission noted that OPAG 3 had the responsibility to maintain an active and responsive overview of all the activities related to improve short-, medium- and long-term weather forecasting for agriculture: determining the impact of climate change/variability on climate predictions: research on the impact of natural climate variability and the reduction of the impact of natural disasters on agriculture: and to help reduce the contributions of agricultural production to global warming.

4.69 The Commission noted that a meeting of the ICT on Climate Change/Variability and Natural Disasters in Agriculture (ICCND) was held in conjunction with the Workshop on Climate

Change Impacts and Adaptations to Agriculture, Forestry and Fisheries at the National and Regional Levels held in Orlando, Florida, United States on 18–21 November 2008.

4.70 The Commission acknowledged the good quality of the state-of-the-art papers presented by the members of the ICT. The papers presented the operational applications and innovative techniques on climate change adaptation and developed recommendations for producing and using weather and climate information for planning and implementing effective climate change adaptation strategies at the national and regional levels.

4.71 The Commission noted the comprehensive set of recommendations based on several themes that were developed during the ICT meeting and that have long term implications.

4.72 With regards to climate change/variability studies and potential impacts, the Commission agreed that there is an urgent need to implement stronger national agricultural meteorology programmes to monitor natural disasters that specifically impact agriculture, livestock, forestry, rangelands and fisheries. It also agreed that more studies should be carried out regarding the impact of climate change on the potential range of crop and animal pests and diseases. Efforts should also be made to understand the relationship between increasing temperature and variability in precipitation on agricultural productivity, which should provide a sound basis for meeting the challenges of optimizing the benefits of changing climatic resources.

4.73 Pertaining to the current capabilities in the analysis of climate change and variability, the Commission agreed that common standards and a comprehensible monitoring index of agricultural drought (e.g., Palmer Drought Severity Index (PDSI), Crop Moisture Index (CMI), and remote sensing data) are necessary. It also agreed that more attention should be devoted to studying the relationship between the increasing frequency of extreme climate events and associated natural disasters, and to develop appropriate adaptation strategies to mitigate their impact on the agricultural sector.

4.74 As for regional climate change and variability impacts, the Commission acknowledged the need to standardize and adopt climate impact assessments at a regional level in order to identify common issues and find common solutions and comparable results e.g., impact of high temperatures on emergence and growth cereal crops. It noted that climate impact studies on aquaculture and fisheries are needed at the regional scale for sustainable management of the stock and to meet the nutritional needs of the population and especially the poor, particularly for small island states. The Commission acknowledged the urgent need to develop skills and tools in downscaling that are appropriate to the local user needs.

4.75 With regards to mitigation/adaptation strategies, Commission noted that extreme events are currently poorly monitored and barely recorded and that NMHSs should include their monitoring and recording of extreme events as part of their mandate. The Commission recommended that Disaster Risk Reduction Programme should be involved in this activity. The Commission stressed the importance of developing a comprehensive set of agrometeorological adaptation strategies for operation implementation at the local and national level for agriculture, livestock, forestry, rangelands and fisheries. The Commission noted that there is a general lack of simulations of livestock adaptation to climate change which is needs to be addressed.

4.76 As for the deficiencies in the operational applications of long-range predictions for agriculture, the Commission agreed that there is a need for a clear interpretation of seasonal climate prediction information (e.g. probabilities, climatological context) in easily understandable language to user communities. It stressed that capacity-building is required for development of institutional structures and communication lines in regards to methodologies and applications (climate/agriculture) and access to necessary software, hardware, data and decision tools. The Commission noted that tailored training is required for researchers, and decision makers (farmers and policy) on statistical methods, climate variability, change, predictions and applications (including “train the trainers”). The Commission pointed that that these activities should be coordinated through the GFCS.

4.77 The Commission concurred with the ICT members that particular special focus and aid should be given to research areas which include an interaction between climate change, agricultural production and the relevant preventive and mitigating mechanisms that must be established, such as in the form of decision support systems and modelling. The Commission noted that research for an effective control method and preventive measures for pests and diseases under an entirely different farm environment must be developed. It also acknowledged that there must be a concerted effort to critically isolate the effect of climate variability on agriculture through a standardized methodology. The Commission stressed that improved access be provided to technical and financial resources to strengthen national scientific capability of the relevant departments and institutions to strengthen their monitoring and predictive capabilities. The Commission highlighted the need towards the establishment of a coordination and planning committee at national level to address issues related to climate variability and climate change.

Expert Team on Climate Risks in Vulnerable Areas: Agrometeorological Monitoring and Coping Strategies

4.78 The Commission acknowledged the work accomplished by the ET on Climate Risks in Vulnerable Areas: Agrometeorological Monitoring and Coping Strategies. The Commission complimented the leader of the ET, Mr Simone Orlandini (Italy), in conducting the meeting.

4.79 The Commission noted that the ET on Climate Risks in Vulnerable Areas: Agrometeorological Monitoring and Coping Strategies met in conjunction with the WMO/COST ACTION 734 "Symposium on Climate Change and Variability- Agrometeorological Monitoring and Coping Strategies for Agriculture" that was held in Oscarsborg, Norway from 3 to 6 June 2008. The Commission expressed its appreciation that the ET was held with the COST ACTION 734 on Impacts of Climate Change and Variability on European Agriculture.

4.80 The Commission agreed that, since climate change will affect agriculture and will have important regional impacts, both the public and the private sector are called to play a role in facilitating adaptation and mitigation and in providing infrastructures.

4.81 The Commission stressed the importance of climate predictions for user communities in agriculture, livestock, forestry, rangelands and fisheries. It noted that obtaining feedback is equally important. The Commission agreed that a report on Climate Forecasts for User Communities in Agriculture, Rangelands, Forestry and Fisheries would be highly beneficial, particularly given the increasing need for adaptation to a changing climate.

4.82 The Commission noted the specific recommendations that were outlined for each terms of reference. With regards to determining critical areas for climate change and variability, the Commission agreed that it would be important to strengthen climate variability/change monitoring, develop/improve decision support systems and seasonal climate prediction by applying innovative techniques and approaches at local and regional levels. It also noted the importance of developing common methodologies for determining vulnerable regions, develop/improve/update and utilize adaptation and mitigation options for agriculture under climate variability/change, and bring science to society by transmitting the climate variability/change and related impacts research results in an appropriate way to the society including policy makers, stakeholders, end users and the broad community.

4.83 As for defining strategies for mitigation, adaptation and sustainability, the Commission stressed that it would be important to develop a portfolio of agricultural strategies that includes adaptation, mitigation, technological development and research (climate science, impacts, adaptation and mitigation) to combat climate change, integrate mitigation and adaptation frameworks into sustainable development planning on a priority basis, and assess long-term consequences of mitigation and adaptation strategies in agriculture and determine how these actions are affected by climate. This should be done with a view to support the development of the GFCS.

4.84 The Commission highlighted the issue of biofuels and noted that the ET recommended that biofuel production could be a viable adaptation and mitigation measure when it is not in conflict

with essential food production, biodiversity issues and land conservation. The Commission noted that several agrometeorological techniques such as crop modelling and agroclimatic zoning can assist in determining suitable areas for biofuels that would not be in direct competition with land for food production.

4.85 As for coping with climate risks and impacts in agriculture, the Commission acknowledged that it would be necessary to encourage agrometeorologists to improve impact studies of climate variability and change, ensure that coping strategies address negative impacts, regionalize climate change impact studies through regional organizations since climate variability is increasing and will be different in different regions, promote the establishment of knowledge circles at different levels (scientists, decision-makers and farmers at the local, regional, and national levels), and try to reinvigorate agrometeorological and related agricultural research in the light of climate change.

4.86 With regards to improving the current capabilities of climate risk analysis and adaptation, the Commission agreed with the ET to undertake a comprehensive review of the existing drought indices and to recommend a limited set of indices that are universally acceptable and which could serve the needs of different regions and classes of droughts. The Commission acknowledged the need to develop cost effective frost protection systems, and raise awareness among the farmers about the frost damages and undertake the assessment of the impacts of cyclones/hurricanes on agriculture, livestock, forestry, rangelands and fisheries systematically to develop operational systems in order to limit the losses to property, farms and farm animals.

4.87 The Commission also recommended that seasonal climate outlooks include forecasts for the risks of forest fires and encouraged the forest fire fighting community to be a part of the user community. The Commission recommended that the most comprehensive information that could assist the locust-control community should be developed to address the increasing incidence of locusts.

4.88 The Commission stressed that climate variability and change affect all sectors with a different level of their impacts and that the most vulnerable agricultural regions are those adversely affected by current and projected climate variability and change and those damaged by occurrence of new pests, diseases and weeds faced by insufficient financial resources and methodological experience.

Expert Team on Drought and Extreme Temperatures: Preparedness and Management for Sustainable Agriculture, Rangelands, Forestry and Fisheries (ETDRET)

4.89 The Commission thanked Luis Claudio Costa, (Brazil), Leader of the ET on Drought and Extreme Temperatures: Preparedness and Management for Sustainable Agriculture, Rangelands, Forestry and Fisheries (ETDRET) for his comprehensive report. The Commission noted with appreciation that a meeting of the ETDRET was held at the Chinese Meteorological Administration (CMA) Conference Center in Beijing, China and was preceded by an International Workshop (16–17 February 2009) in order to give further input to the Expert Team.

4.90 The Commission noted that most of the presentations were focused on the presentation of indices in order to measure the drought and describe its size in comparison to other drought episodes. The Commission agreed with the experts that there is no uniform approach for drought monitoring in Europe, although it seems that Standardized Precipitation Index (SPI) is better than Palmer Drought Severity Index (PDSI). Therefore, the Commission recommended the need for appropriate arrangements to identify the methods and marshal resources for the development of standards for agricultural drought indices in a timely manner.

4.91 The Commission stressed the importance of more proactive drought preparedness planning and the use of more water efficient coping strategies such as new drought tolerant, crop varieties, water harvesting, use non-conventional water collection (i.e. dew and fog), micro irrigation techniques, and agroforestry.

4.92 The Commission underlined the importance of making use of more efficient groundwater supplies for agriculture (aquifers), as well as of weather and climate information and early warning systems to implement coping strategies (determine where and when to use the strategies).

4.93 The Commission agreed to establish and develop new agrometeorological observations in order to collect required data, to strengthen national capacities for drought preparedness, to promote the use of crop insurance products and to employ appropriate delivery systems in order to disseminate information in a timely manner to decision makers (government and farmers).

4.94 The Commission recommended countries to make independent assessments on climate variations based on the results of the Global Producing Centres for Long Range Forecasts, which is an integral part of the Global Data-Processing and Forecasting System (GDPFS), in determining trigger points for starting inter-agency committees.

4.95 The Commission stressed the importance of appropriate use of crop varieties and alternate land uses (e.g. soil moisture data) taking account of climate change and variability. The Commission agreed on the need to combine locally adapted traditional farming technologies, and seasonal climate prediction and warning/forecast methods to help farmers improve productivity and incomes and on the need of more capacity-building activities, especially in the developing countries, to develop better drought impact assessments.

Activities of vice-president

4.96 The Commission agreed that the role of the CAgM vice-president is to liaise with the regional associations and specifically with new Sub-Groups or Sub-tasks on Agrometeorology of the regional associations (RAs). This role is to improve communication and collaboration between the CAgM programme and these groups in the RAs. The Commission urged the president to notify the RAs on the role of the vice-president.

Coordination for Policy Support in Capacity-Building

4.97 The Commission pointed out the need for more emphasis on policy coordination in capacity-building as the ETs and ICTs become institutionalized. The Commission suggested that OPAG chairs and co-chairs, as part of their routine responsibilities, continue to coordinate their activities with the Coordinator for Policy Support in Capacity-Building to ensure appropriate linkages between their respective programmes and the broader policy for capacity-building implications. This is essential for the long-term goals of the Commission. The report of the coordinator for policy support in capacity-building mentions eight preliminary conclusions that can be drawn from the modest beginnings of the INSAM contest on “good examples of agrometeorological services”. They can be found in http://www.api.pasca.ugm.ac.id/en/data/Makalah_Prof._Kees.pdf. These lessons lead to the conclusion: that Farmer/Climate Field Classes would serve many purposes in applying all these lessons. Climate Field Schools can provide the missing links between farmers and the products from the public, and in the future for some subjects private (service) providers, such as agrometeorological services. For this to happen, seven requirements were formulated in the same reference as given above, as policy support issues for Climate Field Schools. The Commission acknowledged the work of the Coordinator for Policy Support in Capacity-Building, Prof Kees Stigter, and thanked him for his service to the Commission.

Other coordination issues

4.98 The Commission acknowledged the need for Coordination for Bridging the Gaps between Products/Methods and Producers. The Commission acknowledged the work of the Special Advisor on Issues related to Information Technology, Dr Byong-Lyol Lee, and thanked him for his service to the Commission.

Guide to Agricultural Meteorological Practices

4.99 The Commission noted with great appreciation the completion of the Guide. The Commission congratulated Dr Kees Stigter on his excellent work as ET Leader and overall coordinator of the Guide. The Commission agreed the MG decision that an electronic version will be freely available on the Internet and that CD-ROM versions be made available through the Secretariat. The Commission requested the Members to mobilize resources to translate the Guide into other languages.

Norbert Gerbier-MUMM International Award

4.100 The Commission noted that since the eleventh session of the Commission, submissions for the Norbert Gerbier-MUMM International Award had improved. It requested the Members to continue to give wider coverage to the announcement regarding the submissions for the award to ensure good quality as well as an adequate number of submissions.

International Society for Agricultural Meteorology (INSAM)

4.101 The International Society for Agricultural Meteorology (INSAM) is an international web-based society for agricultural meteorologists to exchange scientific news and communicate information of their professional activities with their peers. INSAM serves to facilitate the interactions and exchanges with agrometeorologists around the world to increase the role of agrometeorology.

Interactions with other technical commissions

4.102 The Commission emphasized the need for continuing strong collaboration with related WMO Programmes and other Commissions of WMO in the implementation of the WMO Agricultural Meteorology Programme and it noted with appreciation the participation of CAgM representatives in inter-Programme and inter-Commission activities. It encouraged the members to participate in such activities and urged its Management Group to pursue increased collaboration with other technical commissions and the regional associations. The Commission thanked the following CAgM Experts who served on teams of other technical commissions:

- (a) Byong-Lyol Lee (Republic of Korea) – Inter-Commission Coordination Group on WMO Information System (ICG-WIS);
- (b) Emmanuel Cloppet (France) – Inter-Programme Expert Team on Metadata Implementation (IPET-MI);
- (c) Francesco Sabatini (Italy) – Inter-Commission Task Team on Quality Management Framework (ICTT-QMF) and Commission for Basic Systems (CBS) Expert Team on Requirements and Implementation Automatic Weather Station (AWS) Platforms;
- (d) Mark Brusberg (United States) – CAgM Representative to Group on Earth Observations (GEO);
- (e) Roger Stone (Australia) – Commission for Climatology (CCI) Rapporteur on Climate and Agrometeorology to liaise with CAgM.

4.103 The Commission noted that the terms of reference for the Commission relate to the applications of meteorology to the management of agriculture, forestry, livestock, rangelands and fisheries. Most of the work of the Commission has been focused on the field crops. The Commission supported the proposed Joint CAgM/JCOMM Expert Team on Climate and Fisheries which will be discussed in agenda item 10.

4.104 The Commission appreciated the efforts of the presidents of the Commission for Climatology (CCI), the Commission for Agricultural Meteorology (CAgM), and the Commission for Hydrology (CHy) in the creation of the Working Group on Climate, Food, and Water. The

Commission supported the proposal to have representation from all three Commissions in the working group and urged the Secretariat to facilitate the work of this Group. The Commission also noted the proposed Integrated Drought Management Programme that is under discussion with the Global Water Partnership. The Commission urged the Secretary-General to continue these discussions and work with CCI, CHy, and other organizations and partners to further develop this concept.

Review of Technical Regulations

4.105 The Commission recalled its general terms of reference that includes a review of the Technical Regulations and the development of proposals for amendments to meet the science and technology requirements in the field of the Commission, a task that was included in the terms of reference of the CAgM Management Group (MG). The Commission decided not to propose any specific amendments to the Technical Regulations.

5. NATIONAL PROGRESS REPORTS ON AGRICULTURAL METEOROLOGY (*agenda item 5*)

5.1 The Commission noted with appreciation the work and actions taken by the WMO Secretariat in preparing and circulating a detailed questionnaire for the preparation of the National Progress Reports on Agricultural Meteorology as per Recommendation 1 (CAgM-XIV). It expressed its satisfaction that 51 Members had provided such reports. However, the Commission expressed its concern that 62 Members responded last time and urged all Members who have not responded to send their completed questionnaires to the WMO Secretariat.

5.2 The Commission noted that the latest questionnaire now consists of nine parts. The Commission expressed its appreciation that user-friendly online database of responses were made available on the World Agrometeorological Information Service web server. This information can be accessed through the WMO web page at: http://www.wmo.int/pages/prog/wcp/agm/progress_reports/index_en.html.

5.3 The Commission noted that training activities by Members remained about the same from the previous survey. About 50 per cent of the Members have trained people with advanced degrees compared to 48 per cent in 2005. However, fewer staff were attending long-term training courses than in the previous survey. The Commission therefore urged Members to promote long- and short-term training activities, seminars and workshops, with a view to developing the required human resources.

5.4 The Commission noted that the number of stations in the network of agrometeorological observations has remained relatively stable. In comparison with 2002–2005, 16 Members reported increases in the number of stations while only six reported a decline. However, there is a continued growing trend towards installation of automatic weather stations. For 2006–2009, 72 per cent of the Members reported installing at least one AWS compared to 61 per cent in 2002–2005. The Commission was encouraged by the increasing trend in the use of GIS. For 2006–2009, 79 per cent of Members reported using GIS facilities compared to 70 per cent in 2002–2005. The use of remote sensing facilities showed a slight decrease.

5.5 The Commission noted with interest the research activities being undertaken by Members, particularly in areas such as drought and desertification, the influence of meteorological factors on the growth, development, yield and quality of crops, and potential impacts of climate change. It also noted the extensive range of publications developed by Members during the 2006–2009 period, and encouraged Members to continue placing emphasis on regularly publishing research papers and information generated by the agrometeorological services.

5.6 The Commission noted that the provision of agrometeorological services through bulletins (decadal, weekly, or monthly), brochures and information pamphlets, workshops and

seminars, press releases, radio and television, and interactions with farmers and/or farmer groups remained at a high level and was the same as in the previous survey.

5.7 The Commission was encouraged by the increased collaboration of its members with other institutions at the national level, in particular with government agencies such as the Ministry of Agriculture and NGOs in their country and region. For 2006–2009, 75 per cent of the Members that responded had media interaction via television and radio (compared to 55 per cent in 2002–2005), electronic means by 81 per cent (compared to 60 per cent), and newspaper and magazines by 80 per cent (compared to 77 per cent).

5.8 The Commission noted that the most used crop-yield, irrigation, and disease/pest models are DSSAT, CropWat, AgrometShell, and AquaCrop. The most used drought indices are the Standardized Precipitation Index (SPI), General Water Balance, and Hydrothermal coefficient.

5.9 The Commission requested the WMO Secretariat to continue to compile the information provided in the reports in a comprehensive database and provide updated summaries of the Members' responses for 2006–2009. Noting the importance of such a database covering as many Members as possible, the Commission adopted [Recommendation 2 \(CAgM-XV\) – National reports on progress made in agricultural meteorology](#).

5.10 The Commission requested that the Management Group establish a mechanism to analyse the contributions from Members on their National Progress Reports in Agricultural Meteorology and take this analysis into account in developing its strategy and activities during the next intersessional period.

6. COMMISSION FOR AGRICULTURAL METEOROLOGY STRATEGIC PLANNING (agenda item 6)

6.1 The Commission noted that WMO had adopted the results-based management (RBM) approach and that Strategic Planning, the WMO Operating Plan as well as Monitoring and Evaluation were an integral part thereof. The RBM approach included the implementation from 2008 of the Strategic Plan that defined three Top Level Objectives, five Strategic Thrusts and eleven Organization-wide Expected Results. The Commission noted that, within the 2008–2011 Strategic Plan, WMO Agricultural Meteorology Programme activities were covered as Expected Result 6 (Enhanced capabilities of Members in multi-hazard early warning and disaster prevention and preparedness), ER 7 (Enhanced capabilities of Members to provide and use weather, climate, water and environmental applications and services), ER 8 (Broader use of weather-, climate- and water-related outputs for decision-making and implementation by Members and partner organizations) and ER 9 (Enhanced capabilities of National Meteorological and Hydrological Services in developing countries, particularly least developed countries, to fulfil their mandates). The Commission recalled that Cg-XV, through Resolution 27 (Cg-XV) on the WMO Strategic Plan, requested the technical commissions to adhere to the direction and priorities set forth in the Strategic Plan and to organize their programme structures and activities so as to pursue the top-level objectives and to achieve the Expected Results.

6.2 The Commission further noted that the Executive Council, at its sixty-first session (EC-LXI), had endorsed the use of a “results chain”, i.e., Strategic Thrusts (ST) → Expected Results (ER) → Key Outcomes (KO) → Deliverables → Activities, as the structure for the strategic planning process. EC-LXI endorsed the framework for the next Strategic Plan for the period 2012–2015 consisting of five STs and eight ERs, and called for the development of Key Performance Indicators which should remain stable and be measurable over the longer term enabling the monitoring and performance evaluation process. The Commission noted that draft WMO Strategic Plan (2012–2015) will focus on improving the support systems of Members to provide improved agrometeorological services, including evaluation of the impacts of climate change/variability and natural disasters on vulnerable sectors to their respective communities to meet identified needs, especially in decision-making in support of the sustainability of their activities. In addition it noted that within the new Strategic Plan, several of ERs were in line with the objectives of the

Commission. To that end, the Commission decided to align its future work plan to WMO's overall strategy to complement the service delivery climate-related components of the WMO Strategic Plan 2012–2015.

6.3 The Commission noted the request of EC-LXI to involve regional associations and technical commissions in the development of ERs and Key Performance Indicators (KPIs), KOs and a manageable number of related performance measurement parameters and to ensure that those are based on Members' needs and adequately reflect the programme areas of the Organization. Keeping in view the fact that both the present and the future WMO Strategic Plans cover the forthcoming intersessional period in two equal halves, the Commission recognized the need to appropriately align its activities to meet the corresponding monitoring and evaluation requirements. The Commission agreed the Management Group should address activities as well as monitoring and evaluation requirements as needed during the intersessional period.

6.4 The Commission noted that its activities will be further guided by the outcomes of the World Climate Conference-3 (WCC-3) and the relevant elements of the Global Framework for Climate Services (GFCS). WCC-3 has identified several recommendations which can enhance the contribution of climate information to land management, agriculture and food security including risk evaluation and information delivery, cooperation and partnerships, adaptation strategies for resilient agricultural systems, and climate change mitigation. The Commission recognized that the OPAG 3 on Climate Change/Variability and Natural Disasters in Agriculture has already been quite active in several of these activities. The Commission supported the coordination of its activities with the goals of GFCS. In particular, the activities of the Commission will provide a major contribution to the development of the Climate User Interface Programme (CUIP) of GFCS.

6.5 The Commission adopted [Resolution 1 \(CAgM-XV\) – Priorities \(2011–2014\) of the Commission for Agricultural Meteorology](#), establishing a core set of priorities for the coming intersessional period. The Commission directed the CAgM Management Group to add additional detail and performance indicators to these priorities. Further, the Commission recommended that the composition and Terms of Reference for the implementation/coordination teams and expert teams be modified to reflect these new priorities.

6.6 The Commission agreed that its terms of reference should adequately reflect the emerging global societal needs for climate information in line with the broad strategic direction of WMO. The Commission therefore adopted [Resolution 2 \(CAgM-XV\) – Terms of reference of the Commission for Agricultural Meteorology](#).

6.7 The Commission noted that with regards to the Agricultural Meteorology Programme (AgMP) there will be policy shifts between the current and proposed future Strategic Plan with a focus on more guidance materials in many aspects of agrometeorological data management, preparation and dissemination of agrometeorological information, products and services, and on measures for the prevention and mitigation of the effects of extreme events on agriculture and water resources. The Commission expressed its satisfaction that during the next intersessional period, the AgMP will continue, as before, in providing strategic guidance to agricultural meteorology related matters through the Commission for Agricultural Meteorology and other relevant constituent bodies.

6.8 The Commission also noted that its activities will provide contributions to the development of Climate Services Information System by placing emphasis on enhancing capacity at the national level to produce and disseminate products targeted to user needs in support of climate adaptation and risk management. This can be accomplished by focusing on more guidance materials on best practices in the use of climate information for climate adaptation and risk management in agriculture, the development of user-targeted products, and a better understanding of the impacts of climate variability and change on agriculture and water resources. Efforts will continue as before to provide guidelines for the mitigation measures and adaptation strategies of agriculture, livestock, forestry, rangelands and fisheries to cope with climate change in different regions.

6.9 The Commission recognized that in the years ahead there will be increased demand for food and competition for land and crops for bioenergy. Climate change can pose a severe additional threat to food security and development and therefore more research on the links between climate change and food security should be explored, including on adaptation measures. The links between climate and food production will be a key area where CAgM can make significant contributions to sustainable food production in the future by dealing with the livelihood crisis for farmers with improved weather and climate services.

6.10 The Commission stressed the need to focus on improving agrometeorological observation systems, enhancing the application of techniques in preparing the agrometeorological service products (such as remote sensing, GIS), improving the dissemination methods and increasing capacity through human resources development in NMHSs in order to support climate change adaptation and resilience to climate variability in their countries. The Commission urged the Secretariat to focus on more training in agrometeorology and roving seminars for farmers and of NMHSs staff to develop climate information, products and services for the agricultural community.

6.11 The Commission noted that WMO would increase coordination among various agencies of the United Nations system, particularly under the United Nations Delivering as One initiative which had brought a new impetus to the coordination of climate related activities among the United Nations organizations and its specialized agencies. The session further took note that WMO's contribution to the work of agricultural related activities within the United Nations System could mainly build on the technical capacity and inputs from the Commission, as appropriate. The Commission noted that WMO would continue to fulfil commitments under multilateral climate and environmental agreements such as the UNCCD and the CBD through provision of scientific and technical advice. To that end, it attached great importance to the role of the Commission in the development of technical guidelines and materials which could deepen and improve the understanding on the role of climate knowledge in science-based decision making processes.

6.12 The Commission recognized the need to make concerted efforts to clearly define the various elements within the results chain of WMO Strategic Plan relevant to the Commission's priorities. The Commission therefore agreed that the CAgM Management Group continues to work with the Secretariat to contribute to all aspects of the RBM process as an explicit component of their terms of reference.

7. CAPACITY-BUILDING (*agenda item 7*)

7.1 The Commission noted that education, training and extension in agricultural meteorology are a significant part of the Commission activities. The Commission stressed that training and education in agricultural meteorology continues to be of great importance to Members, particularly to the least developed and developing countries, and should, therefore, be given a high priority. The Commission therefore adopted [Recommendation 3 \(CAgM-XV\) – Training and education in agricultural meteorology](#).

7.2 The Commission acknowledged the need for new guidelines for curricula in agricultural meteorology which are a vital input for universities and other education institutions dealing with agricultural, meteorological, climatological and environmental sciences. The Commission expressed its appreciation with the work of the Expert Meeting on Review of Curriculum in Agricultural Meteorology held in India in March 2007 and for the Guidelines for Curricula in Agricultural Meteorology which the Meeting produced. The Commission urged the Secretary-General to widely disseminate the new publication on *Guidelines for Curricula in Agricultural Meteorology* (WMO-No. 258) and translate this publication into as many official languages as possible. The Commission further urged the Secretary-General to advise institutions in Member countries, to consult these guidelines so as to ensure harmonized curricula in agricultural meteorology.

7.3 The Commission stressed the need for further capacity-building activities, including expert services and equipment installation, to facilitate the strengthening of the agrometeorological infrastructure. Increased attention should also be paid to the needs of developing and least developed countries.

Training events organized/co-sponsored by WMO

7.4 The Commission noted that several training events were organized during the intersessional period in the area of agrometeorology and hosted by national or international institutions, with WMO acting as co-sponsor or providing partial financial support. This included the Capacity-Building Workshop for Downscaling Climate Prediction Products for Agriculture and Food Security held in Kenya.

7.5 The Commission expressed its satisfaction that the WMO Secretariat was able to provide support to the NMHSs of Ethiopia, India, and Sri Lanka to organize Roving Seminars on Weather, Climate and Farmers. These seminars strive to secure rural farmers' self reliance by raising their awareness about effective weather and climate risk management and the sustainable use of natural resources for agricultural production and provide a forum for farmers to give feedback to NMHSs on their products and services. The Commission urged the WMO Secretariat to provide financial resources to support roving seminars in other countries and regions.

7.6 The Commission, in particular, was pleased with the financial support by Meteorological Agency of Spain (AEMET) for the METAGRI project which supported West African NMHSs to organize Roving Seminars on Weather, Climate, and Farmers in their countries. The Commission was encouraged that over 100 seminars took place in 11 West African Countries (Benin, Burkina Faso, Cape Verde, Gambia, Guinea, Guinea-Bissau, Mali, Mauritania, Niger, Senegal, and Togo) and that five more countries (Liberia, Sierra Leone, Côte d'Ivoire, Ghana and Nigeria) will organize these roving seminars in 2010. The Commission also thanked the National Meteorological Service of Mali for their assistance in the project by fabricating raingauges for distribution to the farmers participating in the seminars. The Council urged Members to support roving seminars in their regions.

7.7 The Commission noted that the ANADIA (Assessment of the Natural Disaster Impacts on Agriculture) task force at its meeting held in Italy in 2006 provided a much needed framework for assessing the impacts of natural hazards on agriculture. The Commission acknowledged the support of Italian Cooperation for funding the ANADIA-MALI project and noted that a Drought Monitor Training Workshop was held in Mali in September 2009. The Commission urged the Secretariat to find donor funding for ANADIA activities in other regions similar to the ANADIA-Mali project.

7.8 The Commission expressed its gratitude to all those Members who made available their training facilities and/or experts in order to implement these training events.

WMO Projects related to Training and Capacity-Building

7.9 The Commission expressed its appreciation to the Rockefeller Foundation for providing a grant of \$323,000 to WMO to manage and support the implementation of a project on training of trainers on weather and climate information and products for the Agricultural Extension Services in Ethiopia. The objective of the project was to support the National Meteorological Agency (NMA) of Ethiopia to engage with and provide training to agricultural extension agents and agricultural experts and to assist them in providing practical knowledge of agrometeorological services and applications to farmers in order to improve farming practices. This project was developed from a previous WMO Roving Seminar on Weather, Climate and Farmers held in Ethiopia in 2007.

7.10 The Commission welcomed the Caribbean Agrometeorological Initiative (CAMI), developed jointly by the WMO Secretariat and the Caribbean Institute for Meteorology and Hydrology (CIMH), which was approved for approximately 720,000 Euros funding by the European Union's African, Caribbean and Pacific Group of States Science and Technology Programme. CAMI supports capacity development both in the NMHSs and the farming community with the aims

of improving collaboration between the two sectors and improving the profitability and sustainability of the farming and national food production. CAMI will organize agrometeorology field schools that will be held in the 10 countries participating in CAMI. The project partners include the NMHSs of Antigua and Barbuda, Barbados, Belize, Dominica, Grenada, Guyana, Jamaica, Saint Lucia, Saint Vincent and the Grenadines, and Trinidad and Tobago under the overall coordination of the CIMH and WMO. The Caribbean Agricultural Research and Development Institute (CARDI) is another regional institute which is collaborating in this project.

7.11 The Commission urged the WMO Secretariat to continue to explore various funding opportunities with donors to assist Members with the development of similar training projects in all the WMO Regions.

Coordination for Policy Support in Capacity-Building

7.12 The Commission expressed its appreciation for the contribution of the Coordinator for Policy Support in Capacity-Building, Prof Kees Stigter, in providing direction to the CAgM Management Group on this topic. The Commission noted that the Coordinator listed several lessons which can help strengthen the provision of agrometeorological products to farmers in the less developed countries. The Commission also noted the conclusions of the Coordinator that information and communication technologies (ICTs) and Farmer/Climate Field Classes could play very important roles in capacity-building and services.

Other training resources and promoting distance learning

7.13 The Commission noted that there were several training events organized or managed by other institutions in which WMO was represented at or funded lecturers or participants. The Commission urged the Secretary-General to support these training events by funding CAgM experts to attend and/or give lectures at these events.

7.14 The Commission appreciated the kind offer of COMET (Cooperative Organization for Meteorological Education and Training, United States) to freely make available some of their training modules. The Commission urged the Secretary-General to provide input to COMET to identify new modules or modify existing modules to an international audience with an agricultural meteorology theme (i.e. drought, fire danger, etc.).

7.15 The Commission noted the updated ETRP Website and the development of an interface to facilitate online access to worldwide training resources, as well as exchange of meteorological case studies and related documentation between advanced and less advanced training institutions. It encouraged Members possessing relevant expertise and experience in this domain to assist the Secretariat in providing input for that interface.

WMO Regional Training Centres (WMO-RTCs)

7.16 The Commission noted that a large number of WMO-RTCs were offering training courses in agrometeorology at various levels. It expressed its gratitude to those Centres and also encouraged the Secretariat to continue to seek donor funding to support agrometeorological training at WMO-RTCs. The Commission acknowledged the support that the WMO Secretariat provided to the WMO-RTC in Nanjing, China for the International Training Course on Agrometeorology held in November and December 2009. The Commission urged its Members to make the maximum use of the training programmes offered by the WMO-RTCs. The Commission requested Members to assist WMO-RTCs in organizing courses, using such ways and means as the provision of instructors for short-term assignments, the provision of relevant training materials, and other sorts of assistance under bilateral or multilateral arrangements.

Awarding and implementation of fellowships

7.17 The Commission noted with appreciation that WMO continues to award fellowships in various fields, including agrometeorology, to assist Members in strengthening and developing

human resources of their NMHSs. The Commission noted with satisfaction the continued efforts being made to further enhance the Agricultural Meteorology Programme and to improve effectiveness and transparency in the granting and implementation process of fellowships. The Commission requested the Secretary-General to continue his efforts to increase the conventional fellowships fund by tapping extrabudgetary resources and by exploring new potential sources of funding for the fellowships activities.

Symposia, Seminars and Workshops in Agricultural Meteorology / Climatology

7.18 The Commission noted with appreciation that a large number of seminars and workshops were organized by WMO, including training seminars, six international workshops, two interregional workshops, one expert group meeting, one technical meeting, three symposia on climate change related topics, and that several workshops were co-sponsored by WMO, but organized by other institutions.

7.19 The Commission congratulated the Secretary-General for bringing out the proceedings of the different international workshops and expert group meetings within a short time after their organization and for ensuring the timely distribution of these proceedings to the members. These publications are of great interest to the members and serve as a very useful source of reference in their work. The Commission requested, when financially feasible, to translate all documents into the official languages.

7.20 The Commission recorded its appreciation for the participation and collaboration of several international, regional and national organizations in WMO activities related to training in agricultural meteorology, in particular CTA, FAO, IFAD, UNCCD, OSCE, the United States Department of Agriculture (USDA), and the Group on Earth Observations (GEO). The Commission requested that the Secretary-General continue to seek co-sponsorship for the organization of such events.

7.21 Noting the success of the different symposia, seminars and workshops held during the intersessional period, the Commission requested the Secretary-General to continue to provide full support for the organization of such events. The Commission proposed the following topics of current interest for the organization of such events within the available financial resources:

Symposia/workshops

- (a) Subregional Seminars on Agroclimatic Risk Management
- (b) Subregional Seminars on Provision of Services to Farmers
- (c) Improvement of practical applications of agrometeorological and agroclimatic products for the sustainable development of agriculture under changing climate conditions
- (d) Adaptation opportunities and limits – global and regional aspects in agriculture
- (e) Dissemination and Delivery of Agrometeorological Information (including forecasts and assessments) Product and Services
- (f) Sand/Dust Storms impacts on Agriculture
- (g) Data and Remote-sensing Techniques for Agricultural Assessments.
- (h) WAMIS workshop in collaboration with the George Mason University (United States)
- (i) Weather and climate insurance for farmers
- (j) Climate information and weather assessment for disaster monitoring and warnings
- (k) Disaster risk reduction management and vulnerability assessment
- (l) Global Framework for Climate services for agriculture: Progress and way forward

Training events

- (a) Use of remote sensing in crop condition monitoring
- (b) Methodologies on the assessment of climate change impacts to agriculture
- (c) MODIS tools and products for agrometeorology
- (d) Agrometeorological Forecasting (RMTC in Israel in Russian)
- (e) Agrometeorological Disasters (including pests and diseases) Monitoring, Prediction, Assessment and Control
- (f) Roving seminars on weather climate and farmers in West Africa and other parts of the world
- (g) Training seminar on agricultural meteorology for extension services
- (h) Advanced remote sensing training
- (i) Media Training in collaboration with PWS
- (j) Training event in agricultural meteorology at the RTC Pune, India in 2011–2012
- (k) Pest and disease modelling for crops

8. COLLABORATION WITH INTERNATIONAL ORGANIZATIONS (*agenda item 8*)

8.1 The Commission expressed its appreciation for the initiative taken by the Secretariat in establishing collaborative activities with a number of international organizations in implementing the Agricultural Meteorology Programme (AgMP).

Intergovernmental Panel on Climate Change (IPCC)

8.2 The Commission noted that the Fourth Assessment Report (AR-4) of the WMO/UNEP Intergovernmental Panel on Climate Change (IPCC) was published in 2007. The Commission was appreciative that eight papers from the proceedings of an International Workshop on Reducing the Vulnerability of Agriculture and Forestry to Climate Variability and Climate Change held in 2002 in Slovenia preceding CAgM-XIII were cited in five chapters of the IPCC AR4 Working Group II Report on "Impacts, Adaptation and Vulnerability". The papers were published in the journal *Climatic Change* (Volume 70, Nos. 1–2, 2005). The Commission stressed that this is exactly the outcome that the Commission strives to produce and fulfils the mandate of the Commission by providing technical advice to policy and decision makers.

Food and Agriculture Organization of the United Nations (FAO)

8.3 The Commission commended both WMO and FAO for the many fruitful collaborative activities undertaken during the intersessional period, in particular, the joint co-sponsorship of international symposia and participation at technical meetings of mutual interest.

8.4 The Commission noted the collaboration between FAO and WMO in addressing the Desert Locust plague in 2004 and was appreciative that FAO and WMO are working to produce a joint brochure on Weather and Desert Locusts in 2010.

8.5 The Commission expressed its appreciation to FAO for co-sponsoring several events organized by WMO, especially the International Symposium on Climate Change and Food Security in South Asia Dhaka, Bangladesh (25–29 August 2008) and the International Workshop on Adaptation to Climate Change in West African Agriculture Ouagadougou, Burkina Faso (27–30 April 2009). This collaboration was most productive in bringing together experts from the agricultural research and NMHSs, especially from developing countries, to address the important issue of climate change and agriculture.

8.6 The Commission also noted that WMO representatives participated in FAO events in Rome such as the FAO Expert Meeting on Climate Change Adaptation and Mitigation (5–7 March 2008), High-Level Conference on World Food Security and the Challenges of Climate Change and Bioenergy (3–5 June 2008), and the Workshop on Climate Change and Agriculture: Setting the Scene (24–25 July 2009). This participation allowed WMO and the Commission to provide input into these important deliberations. The Commission encouraged stronger collaboration between the two agencies in the future, which would certainly benefit the user communities in both the organizations.

8.7 The Commission stressed that there needs to be more collaboration between FAO and WMO in the area of training and capacity-building. The Commission emphasized the benefits from joint training activities especially in bringing together the agricultural research and agrometeorological communities and sharing the knowledge and expertise available in the two organizations. The Commission strongly emphasized the need for continued collaboration between the two organizations in organizing training activities in future.

8.8 The Commission noted that Members should be made aware of the FAO-WMO Agrometeorology Internet Email List which aims to help the agrometeorological community exchange news, data and know-how, and to discuss operational problems. The Commission stressed that the list is unmoderated and encouraged Members to publicize the list and to use it to publicize their agrometeorological and agroclimatological activities. For further information, Members should go to the WMO Agrometeorology Home page (www.wmo.int/agm).

International Fund for Agricultural Development (IFAD)

8.9 The Commission noted the important role of the International Fund for Agricultural Development (IFAD) in providing resources to countries to develop their agriculture. The Commission supported the interaction between WMO and IFAD and encouraged WMO to participate in IFAD meetings such as the session of their Governing Council and workshops organized by IFAD on specific topics of interest to the Commission such as climate change impacts and adaptation in agriculture.

United Nations Convention to Combat Desertification (UNCCD)

8.10 The Commission expressed its support for the continuing productive collaboration between WMO and the Secretariat of the UNCCD and it requested the Secretary-General to continue to support implementation activities in support of the Convention.

8.11 The Commission expressed its appreciation to the Secretary-General for the active collaboration with UNCCD to help establish the Drought Management Centre for South-Eastern Europe (DMCSEE). The Commission noted the various meetings jointly organized with the UNCCD Secretariat on the subject of the DMCSEE such as the one held in Geneva for the choice of the host country for the Centre (26 September 2006); a meeting to discuss follow-up actions in Geneva (15 November 2006); a meeting on the draft project proposal for the DMCSEE held in Geneva (16 January 2007); the Project Kick-Off Meeting for the DMCSEE held in Ljubljana, Slovenia (17–19 April 2007); and the first and second International Steering Committee (ISC) Meetings for the DMCSEE held in Bled, Slovenia (March 6–7 2008) and Portorož, Slovenia (6–8 April 2009). The Commission also acknowledged the work of various consultants who worked on establishing the DMCSEE, especially Dr Don Wilhite, former Director of the National Drought Mitigation Centre, Nebraska, United States, who prepared the draft project proposal for the DMCSEE.

8.12 The Commission noted that the objective of DMCSEE is to integrate input from the UNCCD focal points, NMHSs, and independent drought researchers from each participating country to develop a subregional drought management strategy, implement an effective drought monitoring and early warning system, provide reliable and timely information to national decision makers, and share the information and lessons learned. The Commission expressed its appreciation to the WMO Secretariat that the DMCSEE was promoted at the Fifth Session of the Committee on Review of the Implementation of the Convention (CRIC 5) of UNCCD and at a Side

Event on DMCSEE at the Fifteenth WMO Congress in 2007. The Commission urged the Secretariat to continue to promote the DMCSSE and its activities.

8.13 The Commission noted that drought and desertification is also important issue in Central Asia and that the Organization for Security and Cooperation in Europe (OSCE), UNCCD and WMO have discussed the possibility of establishing a Regional Drought Management Centre in this region. The three organizations collaborated in organizing a Technical Seminar on preparation towards Terms of Reference for a Regional Drought Management Centre in Central Asia (DMCCA) in Tashkent, Uzbekistan (20 to 21 November 2007). The Commission expressed satisfaction that a Second WMO/UNCCD/OSCE Technical Workshop on Regional Drought Management Centre for Central Asia was held in Bishkek, Kyrgyzstan (29–30 May 2008) where a draft Ministerial Declaration of Intent on the establishment of the DMCCA was developed. The Commission noted that a consultant was hired in December 2009 to draft a project proposal for the establishment of DMCCA, in close consultation with the governments of Uzbekistan, Kazakhstan, Kyrgyzstan, Tajikistan and Turkmenistan. The Commission encouraged the WMO Secretariat to continue its efforts to work for the establishment of DMCCA with UNCCD and OSCE.

8.14 The Commission noted the importance of climatic factors in land degradation and the measures that need to be taken to enhance the applications of weather and climate information to combat land degradation. The Commission expressed its appreciation to UNCCD and the WMO Secretariat for organizing an International Workshop on Climate and Land Degradation in Arusha, United Republic of Tanzania (11–15 December 2006) on this subject and thanked the Tanzania Meteorological Agency for hosting the workshop. The Commission welcomed the publication of the proceedings of the workshop. The Commission agreed with the workshop in recommending that the network of climatological, hydrological and agrometeorological stations around the world should be increased and strengthened to provide data on rainfall intensities, soil temperature and soil moisture for land degradation monitoring, assessment and for the implementation of the UNCCD National Action Plans. It also agreed that direct interactions between National Meteorological and Hydrological Services (NMHSs) and the land users are needed to enhance the direct communication of weather and climate information.

8.15 The Commission urged the Secretariat to explore opportunities for collaborating with scientific institutions around the world with regards to the issues of drought, desertification, sand/dust storms, and desert locusts.

8.16 The Commission noted that WMO attended the 5th Session of the Committee for the Review of the Implementation of the Convention (CRIC) of the UNCCD held in Buenos Aires, Argentina (11–21 March 2007) and was invited to participate in a panel discussion on drought and desertification monitoring and assessment. WMO also attended CRIC-7 and First Special Session of the Committee on Science and Technology (CST S-1) held in Istanbul, Turkey (5–7 November 2008).

8.17 The Commission noted that WMO actively participated in COP-8, which was held in Madrid, Spain (2–14 September 2007) and presented the findings of the International Workshop on Climate and Land Degradation that was requested by COP-7. The Commission noted with appreciation that the Springer book based on the proceedings of this workshop was published and distributed and that the COP cited this Workshop as a useful model to reform the Committee on Science and Technology (CST) of UNCCD. The WMO Secretary-General participated in the Ministerial Roundtable Discussion at COP-8 on Desertification and Climate Change which brought together 11 ministers, deputy ministers and heads of United Nations agencies in which he stressed on integrating risk prevention in policy making in the context of the conventions' synergies.

8.18 The Commission acknowledged the active participation of WMO in COP-9, which was held in Buenos Aires, Argentina (21 September–2 October 2009) which included the First UNCCD Scientific Conference. The Commission expressed its appreciation that the WMO Secretariat organized a Side Event on "Global Perspective on Sand and Dust Impacts" which presented the WMO Sand and Dust Storm Warning Advisory and Assessment System to COP-9 participants along with a perspective on sand and dust impacts in Asia from a UNCCD representative. The

Commission encouraged the WMO Secretariat to organize more side events at United Nations meetings which promote the various WMO projects and programmes.

8.19 The Commission appreciated the initiative taken by the Secretary-General to inform the Members of the major decisions taken at COP-8 and COP-9.

Convention on Biological Diversity (CBD)

8.20 The Commission noted the participation of WMO at the 12th Meeting of SBSTTA, which was held in Paris, France (2–6 July 2007) which focused on biodiversity and climate change, climate change and emerging diseases, and the emerging issue of liquid biofuel production. The Commission agreed with SBSTTA on the importance of studying potential climate change impacts and impacts of response activities on biodiversity. The Commission recognized that understanding and developing better preventive measures and responses to current seasonal variations will enable Members to better address the various climate impacts on biodiversity in the future. The Commission encouraged the WMO Secretariat to participate further in the activities and meetings of the Convention and recommended that WMO presents the issue of GFCS in relation to biodiversity to the Convention.

8.21 The Commission noted that 2010 was declared the International Year for Biodiversity (IYB) by the United Nations General Assembly through Resolution 61/203. The Commission urged Members to raise public awareness of the importance of biological diversity to human well-being and how weather- and climate-related issues related to biological diversity.

8.22 The Commission noted that WMO, along with Environment Canada and the Smithsonian Institution, were co-sponsors of the Climate Change and Biodiversity Symposium held in Panama City, Panama (5–29 February 2008) at the Smithsonian Tropical Research Institute (STRI). This Symposium addressed regional themes on climate change and biodiversity as well as approaches, techniques and integrated studies. The Commission acknowledged the conclusions of the Symposium that it was difficult for many researchers to obtain IPCC model data, IPCC climate model data are not archived and that downscaled climate projections are needed by the biodiversity community for the next 30–40 years. The Symposium also recommended that an information and communication network be established among the climate, biological, and biodiversity disciplines. The Commission expressed its appreciation that WMO was able to contribute to the proceedings of this Symposium.

United Nations Development Programme (UNDP)

8.23 The Commission noted the recent developing collaboration between WMO and UNDP and urged the Secretary-General to further this collaboration with regards to agricultural meteorology, particularly in the area of climate change adaptation for agriculture, livestock, forestry, rangelands and fisheries and in supporting activities in the least developed countries (LDCs) and small island developing states (SIDS).

United Nations Environment Programme (UNEP)

8.24 The Commission was pleased to note that WMO was a member of the Issue Management Group on post 2010 biodiversity targets organized by the Environment Management Group of UNEP. This group held meetings in Rome, Italy (10 November 2009) and in Geneva, Switzerland (14–15 April 2010) to prepare a draft report on the ongoing contributions, processes and initiatives of United Nations agencies on post 2010 biodiversity targets. The final report is to be presented at the CBD COP-10 in Japan (18–29 October 2010). The Commission noted its satisfaction that WMO was the lead agency in the Climate Change chapter of this report.

United Nations International Strategy for Disaster Reduction (UN-ISDR)

8.25 The Commission noted that drought is one of the main natural hazards which negatively impacts agricultural production. The Commission acknowledged that the United Nations

International Strategy for Disaster Reduction (UN-ISDR) was collaborating with WMO on drought, especially by funding participants to two meetings on agricultural and hydrological drought indices in Murcia, Spain (June 2010) and New Delhi, India (August 2010) respectively. The Commission noted with satisfaction the collaborative work of WMO with UN-ISDR in contributing to a chapter on drought risks for the 2011 United Nations Global Assessment Report on Disaster Risk Reduction (GAR11).

International Federation of Agricultural Producers (IFAP)

8.26 The Commission noted that one of the benefits of WMO participating in meetings of other organizations was the potential to develop new partnerships. During the UNCCD COP-8 in Spain, the International Federation of Agricultural Producers (IFAP) and WMO started discussions on how to work closer together. The Commission expressed its appreciation to the Secretary-General for his keynote address at IFAP's 38th World Farmer Congress held in Warsaw, Poland (4 June 2008) and to other WMO Secretariat staff who also participated in IFAP events. The Commission was encouraged that IFAP and WMO are in the process of signing a MOU, that the IFAP President, Mr Ajay Vashee, gave the opening address of the International Workshop and that IFAP assisted WMO in nominating farmers for the workshop's session on farmers. The Commission expressed its appreciation that WMO and IFAP produced a joint Issue Brief for the UNFCCC COP-15 in Copenhagen. The Commission urged the WMO Secretariat to further collaborate with IFAP to assist farmers and their organizations in the better use of weather and climate information and to assist NMHSs in liaising with the agricultural community.

World Food Programme (WFP)

8.27 The Commission recognized that ensuring food security and providing food aid remain an important role of many United Nations agencies. The Commission noted its appreciation that WMO and the World Food Programme (WFP) have signed a MOU to foster closer collaboration. This increased collaboration has been evident in cooperation on various agrometeorological projects including the World Bank Project for the Lake Victoria Region of eastern Africa. The Commission noted that the terms of reference of an ET in OPAG 1 specifically addresses the use of agrometeorological products and services for policy decision makers of government and international NGOs and urged the WMO Secretariat to continue to foster this collaboration with agencies such as WFP.

Group on Earth Observations (GEO)

8.28 The Commission noted that the Fifteenth WMO Congress requested Members and the WMO Secretariat to closely liaise with the Group on Earth Observations (GEO) on areas of mutual benefit. The Commission expressed its appreciation to the WMO Secretariat for their support of GEO related activities such as the Workshop on Developing a Strategy for Global Agricultural Monitoring in the framework of GEO held in Rome (16–18 July 2007) and the Developing of an Agricultural Monitoring System of Systems – GEO Workshop held in Beijing, China (11–13 February 2009). The Commission expressed its support to the WMO Secretariat in leading the sub-task on Agricultural Risk Management and in being involved in GEO tasks related to drought.

European Institutions

8.29 The Commission noted with appreciation WMO's participation in the COST Action 734 on "Impacts of Climate Change and Variability on European Agriculture (CLIVAGRI)" of The European Science Foundation. The Commission commended the collaboration between COST Action and WMO in jointly organizing two events: the Symposium on Climate Change and Variability – Agrometeorological Monitoring and Coping Strategies for Agriculture held in Oscarborg, Norway (4–6 June 2008) and the International Symposium on the Impact of Climate Change and Adaptation in Agriculture held in Vienna, Austria (22–23 June 2009). The Commission noted with appreciation that the proceedings of the Norway workshop were published as a special issue of *Idojaras* journal and that co-sponsorship of these two events by COST Action facilitated the participation of a larger number of experts from Europe to participate in the Commission

activities and the Commission encouraged continued collaboration between the two organizations in future. The Commission also noted the participation of WMO in the Management Group of the COST Action 734 and at meetings of “Adaptation of Agriculture in European Regions at Environmental Risk Under Climate Change (ADAGIO)”.

8.30 The Commission requested the Secretariat to engage the European Commission (EC) in line with the goals of the EC and CAgM with regards to joint activities in improving agrometeorological services in the region.

European Meteorological Infrastructure (EMI)

8.31 The Commission urged the Secretariat to explore collaboration with the various entities of the EMI such as ECMWF, EUMETSAT, and EUMETNET in regards to training and scientific workshops as related to agricultural meteorology.

African Centre of Meteorological Applications for Development (ACMAD)

8.32 The Commission noted the collaborative activities of WMO with the African Centre of Meteorological Applications for Development (ACMAD) located in Niger. Recognizing the importance of agrometeorological applications to promote sustainable agricultural production in Africa, the Commission supported the continued participation of WMO in the Scientific Advisory Committee (SACOM) of ACMAD.

Regional Centre for Agrometeorology and Hydrology in Niamey, Niger (AGRHYMET)

8.33 The Commission noted the collaborative activities of WMO with the Regional Centre for Agrometeorology and Hydrology in Niamey, Niger (AGRHYMET) such as the Centre hosting an Expert Meeting on Agrometeorology in the Service of West African Agriculture in Niamey, Niger (April 2008). This meeting was the seminal meeting where the METAGRI project was developed by WMO, the State Meteorological Agency of Spain (AEMET), ACMAD and other regional and national institutions. The Commission expressed its appreciation to AGRHYMET that WMO can rely on AGRHYMET experts to assist in regional and global activities such as the International Workshop on Adaptation to Climate Change in West African Agriculture held in Ouagadougou, Burkina Faso (27–30 April 2009) and the Interregional Workshop on Indices and Early Warning Systems for Drought held in Lincoln, United States (December 2009).

Technical Centre for Agricultural and Rural Cooperation (CTA)

8.34 The Commission noted the importance of improving communications with the agricultural community for its members. Therefore, the Commission was encouraged that WMO participated in the activities of the Technical Centre for Agricultural and Rural Cooperation (CTA) such as the CTA International Seminar on the Implications of Global Climate Change for Sustainable Agricultural Production Systems in ACP countries held in Ouagadougou, Burkina Faso (26–31 October 2008) and the Second Steering Committee Meeting of CTA held in the Netherlands (9–10 September 2008). CTA promotes the integrated use of communication channels, old and new, to improve the flow of information (e.g., e-communities, web portals, seminars, and study visits) and providing information products and services (e.g., publications, question-and-answer services and database services). The Commission urged the WMO Secretariat to continue its collaboration with CTA to help promote and improve communication strategies for the agricultural community.

Other organizations

8.35 The Commission noted with appreciation that many international organizations have come forward to co-sponsor the International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services, organized by WMO in conjunction with this session, which has greatly helped in the participation of members from many developing countries in the workshop as well as the session.

8.36 The Commission encouraged the Secretariat to explore collaboration with the various space agencies with regards to the remote sensing and satellite applications.

8.37 The Commission recommended that collaborative activities with international organizations should be actively pursued during the next financial period.

9. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF REVELANT EXECUTIVE COUNCIL RESOLUTIONS (*agenda item 9*)

The Commission examined the resolutions and recommendations adopted at its previous sessions that were still in effect at the time of the fifteenth session. It also examined the Executive Council resolutions based on previous recommendations of the Commission that were still in effect. The decisions of the session were incorporated in [Resolution 3 \(CAgM-XV\) – Review of previous resolutions and recommendations of the Commission for Agricultural Meteorology](#) and [Recommendation 4 \(CAgM-XV\) – Review of resolutions of the Executive Council based on previous recommendations of the Commission for Agricultural Meteorology](#).

10. FUTURE WORK OF THE COMMISSION INCLUDING THE ESTABLISHMENT OF EXPERT TEAMS (*agenda item 10*)

10.1 The Commission evaluated its performance over the fourteenth intersessional period and noted that the existing working structure was effective and enabled the Commission to address a number of issues. The structure enabled the participation of a number of experts from the NMHSs, agricultural research agencies and institutions as well as Regional Scientific Projects. Such wider participation of experts gave a true meaning to the concept of the Open Programme Area Groups (OPAGs) and enriched the workings of the different Expert Teams (ETs) of CAgM.

10.2 The Commission appreciated that the meetings of the Management Group (MG) of CAgM, the three implementation/coordination teams (ICTs) and the six ETs were organized during the intersessional period in an efficient and effective manner.

10.3 The Commission noted that ICTs of all the three OPAGs met and had carefully considered the reports of the different ETs under their responsibility, especially the recommendations for regional implementation of some of the recommendations. The Commission was pleased that all three ICTs identified specific projects and case studies for implementation in different Regions in the next intersessional period. The Commission also noted the recommendation of the MG regarding the preparation of concept notes for different projects with information on goals, specific objectives, expected outcomes, and indicative budget for each project. The Commission urged that the ICTs that will be established following the CAgM-XV session take immediate action on the implementation of these projects, which could be of considerable use to the members in promoting agrometeorological applications in different Regions.

10.4 Several of the ETs also are in the process of producing significant deliverables such as the publication of proceedings, e.g. the work of the ET on Drought and Extreme Temperatures: Preparedness and Management for Sustainable Agriculture, Rangelands, Forestry and Fisheries. Also, many of the ETs were held in conjunction with larger workshops which help to broaden the inputs to the work of ETs. The Commission urged the Secretariat to continue this process during the next intersessional period.

10.5 The Commission noted that at the meetings of the MG of CAgM held in Obninsk, Russian Federation (11 to 13 June 2008) and in Geneva, Switzerland (1 to 3 February 2010) the group reviewed the WMO restructuring and strategic plan in relation to the Commission and developed a draft revised terms of reference (see agenda item 6).

10.6 The Commission also noted that the roles and responsibilities of future OPAGs, ETs, Coordinators, and vice-president were discussed at the MG meetings held in Obninsk and Geneva. The MG suggested that the new OPAGs and ETs should finish their work and organize their meetings by the end of 2012. ICTs should meet in 2013 and develop recommendations for regional projects to be implemented before the Commission meets in 2014 and reviews the reports.

10.7 The Commission also took note of the recommendations of the MG regarding the role of the vice-president of the Commission. The vice-president needed to take an active role in facilitating the coordination between the three OPAGs, the Coordinators, the regional associations, and the new Working Groups on Climate Services, Adaptation and Agricultural Meteorology or Working Groups on Climate and Hydrology with Sub-Groups or Sub-tasks on Agrometeorology. The responsibilities of the vice-president in this regard would be to ensure that the OPAG chairs send status reports of their programme areas related to the respective Coordinators at least once a year and coordinate regional activities. The Coordinators would then include these summaries in their reports to the president in the annual circular letter.

10.8 In light of these assessments and considerations, the Commission reviewed the CAgM working structure and the Terms of Reference for the OPAGs and Expert Teams and decided:

- (a) To re-establish the three OPAGs and the three ICTs associated with them:
 - (i) Agrometeorological services for agricultural production;
 - (ii) Support systems for agrometeorological services;
 - (iii) Climate change/variability and natural disasters in agriculture;
- (b) To minimize the number of ETs within the new structure and to revise the ToRs to reflect the upcoming priorities of the Commission;
- (c) To make it possible to initiate ET activity soon after CAgM-XV.

10.9 The Commission therefore adopted [Resolution 4 \(CAgM-XV\) – Working structure of the Commission for Agricultural Meteorology](#), and its annex, on the future work of the Commission. This resolution replaces Resolution 2 (CAgM-XIV). The Commission urged the Secretary-General to ensure adequate support for the World Climate Programme for timely and efficient administration of CAgM activities including meetings, publications and, development and maintenance of CAgM Websites.

10.10 The work of CAgM is carried out through a number of mechanisms in addition to the OPAGs. The Commission noted that a number of initiatives for cross representation with CBS, CCI, CHy, JCOMM, and GEO had been effective, and that Meetings of the Presidents of Technical Commissions had fostered information sharing and collaborative projects between programmes. The Commission strongly encouraged that these activities be strengthened with the regional associations and for the WMO cross-cutting themes of Disaster Risk Reduction Programme (DRR), WMO Space Programme, Public Weather Services (PWS) Programme, GEO, and least developed countries/small island developing states (LDCs/SIDS). The Commission requested its president to facilitate the continuation of active and appropriate representation of its interests on relevant expert teams in other technical commissions, but to manage this prudently, in collaboration with the Secretariat, and in keeping with the Strategic Plan, within available resources.

10.11 The Commission highly commended the Secretariat for developing the proposals and helping to implement various projects such as CAMI, METAGRI, the Rockefeller Grant in Ethiopia, the Lake Victoria World Bank Project, and the Assessment of Natural Disaster Impacts in Agriculture (ANADIA) activities in Mali. The Commission urged the continued support of these projects and efforts to develop synergies among these projects and, if possible, with CAgM ICTs and ETs activities.

10.12 On the issue of interregional, inter-agency and interdisciplinary conferences and workshops, the Commission supported the initiative taken to organize such activities in close collaboration with key partners such as FAO, IFAP, WFP, IFAD, UNDP, UNEP, USDA, COST Action, and Institute of Biometeorology (Italy), etc., to bring together experts from a wide range of disciplines and exploit the synergies offered by such partnerships. The Commission emphasized the need for targeting clear deliverables from these joint activities (reports and proceedings, brochures, recommendations and decisions, etc.), especially through the CAgM Website.

10.13 To strengthen the role of regional associations and increase the effectiveness of regional input to the work of the Commission, the Members agreed to invite the Chairs of the regional Task Teams on Agricultural Meteorology to actively participate in CAgM ICT activities. This would ensure active implementation of projects at the regional level and also facilitate the exchange of information on planned activities, reports, etc.

10.14 The Commission agreed to retain the principles for the work of the OPAGs, ICTs and ETs that had been in effect since CAgM-XIV:

- (a) The OPAGs, ICTs and ETs will work as much as possible through e-mail or other form of correspondence;
- (b) Members of ETs will be regularly consulted and informed of CAgM activities by the OPAG Chairs and through the CAgM Website;
- (c) OPAG Chairs and ET leaders will coordinate and guide the work described in the various terms of reference;
- (d) Expert Teams must be constituted so as to ensure that the highest level of scientific and technical expertise is available to serve the needs of users and current operational activities. Candidates for Expert Teams must therefore be selected based on the expertise needed, from within the Commission and other bodies, for developing proposed projects, solutions or outputs and for which specific knowledge would be required. Wherever possible, however, balance across representation by Region, gender and discipline will be taken into account, and the Commission noted that the second WMO Conference on Women in Meteorology and Hydrology urged that Permanent Representatives nominate qualified women for roles in technical commissions;
- (e) The three OPAGs will liaise as appropriate with each other, and will ensure that each ET identifies and liaises with relevant groups (some in other Commissions or other agencies) with shared interests, with a particular focus on developing and implementing WMO cross-cutting initiatives for DRR, PWS, Space/GEO and LDCs/SIDS;
- (f) Each ET will review its terms of reference and will, within three months, advise the CAgM MG of any changes it would suggest, and why;
- (g) The ICTs will ensure regional representation with a focus on operational and implementation aspects of the work of the Commission;
- (h) OPAG chairs and co-chairs would serve an initial term of two years renewable, with continuation to be based on workload and work requirements;
- (i) Some ETs may be required for single or short-term activities, and may not be required for the full intersessional period. Ad hoc groups can be established for such tasks by the CAgM MG, or at the request of the president of the Commission;
- (j) It was noted that General Regulation 33 provides the appropriate guidance should an OPAG chair be unable to continue in that role.

10.15 The Commission agreed that some overarching activities would be the responsibility of the CAgM MG. ETs and experts in such activities would report directly to the CAgM president or MG.

10.16 The Commission identified the main elements of the work programme and agreed on the Terms of Reference of ETs of each OPAG as listed in [Annex I to the present report](#). In addition, the Commission established at least partial membership of the ICTs and ETs as listed in [Annex II to the present report](#). The Commission authorized the president, with assistance from the MG, ET Leaders and the Secretariat, to complete or to determine (where required) appropriate membership and to initiate activities on a priority basis. The WMO Secretariat will develop and maintain a database of experts for the Commission, and will keep this up to date on the CAgM Internet site.

10.17 The Commission endorsed the proposals of the presidents of the Commission for Climatology (CCI), Commission for Hydrology (CHy) and CAgM in creating a joint CCI/CAgM/CHy Experts Group on Climate, Food and Water and nominated two experts to the Group. The Commission requested that the Management Group should decide the terms of reference of the Experts Group in consultation with the other two Commissions. It urged the Secretariat to facilitate the work of this Group.

10.18 The Commission reiterated the conclusions of CAgM-XIV, and agreed that the CAgM MG was responsible for integration of the CAgM programme areas, evaluation of progress achieved, deciding upon priorities with regard to available resources, coordination of strategic planning and deciding on necessary adjustments to the working structure during the intersessional period, and further agreed to maintain the overall membership of not more than 10 persons, inclusive of the president, vice-president, the chairs and co-chairs of the three OPAGs of the Commission and additional members to provide advice on specific major issues. The Commission established the new CAgM Management Group by adopting [Resolution 5 \(CAgM-XV\) – Management Group of the Commission for Agricultural Meteorology](#) and further agreed to establish the OPAGs, along with their chairs and co-chairs by adopting [Resolution 6 \(CAgM-XV\) – Open Programme Area Groups of the Commission for Agricultural Meteorology](#). These resolutions replace Resolution 3 (CAgM-XIV) and Resolution 4 (CAgM-XIV).

10.19 The Commission urged that special efforts be made to explore extrabudgetary resources from the VCP donors and other United Nations agencies and bodies, to support the work programme. Members further urged that all ETs minimize their requirements for travel, work as much as possible through electronic means and explore all possible options for stimulating the work under their Terms of Reference by initiating small individual tasks or by setting up an Internet forum for each ET to share interests, experience, progress reports, issues, documents, CVs, and individual bibliographies, etc.

10.20 The Commission recognized that it has a responsibility to serve the greater good of the Members, and that all products and information developed are to be shared freely and in a timely manner with the Members for their use and development. The Commission urged that the Secretary-General support publication of CAgM outputs (including reports, Guidelines, brochures and Technical Notes) and support, with Member's assistance, translation of these products into as many official languages as possible.

11. OPEN FORUM (*agenda item 11*)

11.1 There were several sessions of the Open Forum during the Commission session, which gave an opportunity to participants to share their experiences with others.

11.2 The following presentations were made at the Open Forum:

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| (a) | C.J. Stigter | International Society of Agricultural Meteorology (INSAM) |
| (b) | A. Tyagi | Associated Programme on Flood Management (APFM) |
| (c) | M. Bernardi | Data, Methods, Tools for Climate Impact Assessment |
| (d) | J. Qu | New Challenges of Environmental and Climate Change Detection with Remote Sensing Measurements |

- (e) B.K. Bhattachary Indian National (Weather) Satellites for Agrometeorological Applications
- (f) A. Howard Agroclimatic Service in Canada
- (g) B. Lee Strategic Visions of CAgM for GFCS
- (h) L. Núñez Use of Statistics in the National Meteorological Service of Argentina
- (i) A. Kleschenko Drought Issues in the Russian Federation

11.3 During the discussion on INSAM, the Commission urged that all efforts be made to legalize INSAM as soon as possible.

12. ANY OTHER MATTERS (*agenda item 12*)

There were no issues raised under this agenda item:

13. ELECTION OF OFFICERS (*agenda item 13*)

13.1 The Commission established a Nomination Committee which was chaired by Dr Ray Desjardins (Canada) and was composed of the delegates from each of the WMO regions.

13.2 Dr Byong-Lyol Lee (Republic of Korea) was elected president of the Commission.

13.3 Dr Federica Rossi (Italy) was elected as vice-president of the Commission.

14. DATE AND PLACE OF THE SIXTEENTH SESSION (*agenda item 14*)

The Commission received the offer(s) from Turkey to host the sixteenth session of the CAgM in Antalya, Turkey, from February to March 2014.

15. CLOSURE OF THE SESSION (*agenda item 15*)

The fifteenth session of the CAgM closed at 11:56 a.m. on 21 July 2010

RESOLUTIONS ADOPTED BY THE SESSION

Resolution 1 (CAgM-XV)

PRIORITIES (2011–2014) OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Recognizing:

- (1) The next WMO Strategic Plan for the period 2012–2015 consisting of five Strategic Thrusts and eight Expected Results,
- (2) The desire to raise the international profile of the Commission for Agricultural Meteorology (CAgM) to a level commensurate with the importance of its user group who is responsible for food production and for meeting the nutritional needs of the human population,
- (3) The expressed priorities from the International Workshop on Addressing the Livelihood Crisis of Farmers: Weather and Climate Services and those at the CAgM session,
- (4) The limited resources available to the CAgM and to the Agricultural Meteorology Programme,
- (5) The need to have clear and relevant priorities to mobilize international resources,
- (6) The outcomes of the World Climate Conference-3 (Geneva, 31 August–4 September 2009) including its declaration on the establishment of a Global Framework on Climate Services,

Recommends the following key priorities for the intersessional period 2011 to 2014 are adopted as part of the CAgM Strategic Plan:

- (1) Support agrometeorological training at regional, national and local levels;
- (2) Develop enhanced services for the agricultural, livestock, forestry, rangelands and fisheries communities and partner agencies, for example:
 - (a) Climate services and specifically the development of the climate user interface as part of the Global Framework on Climate Services;
 - (b) Human services including agrometeorological consultation;
 - (c) Technological applications to communicate information to the decision-makers;
 - (d) Identification of innovative risk-management systems in global food production;
- (3) Encourage development of a knowledge sharing interface between forecasters/scientists, extension services and the agricultural decision-makers;
- (4) Encourage the sharing of resources among WMO Members and other organizations in order to create synergies and to support human health and economic development;

Requests the Secretary-General to take the necessary action to make these priorities known to constituent bodies and throughout the Secretariat, and to approve resource utilization which targets these priorities.

Resolution 2 (CAgM-XV)

TERMS OF REFERENCE OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) The *Abridged Final Report with Resolutions and Recommendations of the Fourteenth Session of the Commission for Agricultural Meteorology* (WMO-No. 1014),
- (2) The *Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026), Resolution 13 (Cg-XV) – World Climate Applications and Services Programme, including the CLIPS project,
- (3) The *Abridged Final Report with Resolutions of the Sixty-first Session of the Executive Council* (WMO-No. 1042),
- (4) The outcomes of the World Climate Conference-3 (Geneva, 31 August–4 September 2009) including its declaration on the establishment of a Global Framework on Climate Services (GFCS),
- (5) Food and Agriculture Organization of the United Nations High-Level Conference on World Food Security and the Challenges of Climate Change and Bioenergy (Rome, 3–5 June 2008),

Recognizing:

- (1) The need to improve the support systems for Members to provide better agrometeorological services for agricultural decision-makers based on accurate, reliable and timely weather and climate information,
- (2) The need for better evaluation of the impacts of climate change/variability and natural disasters on the agricultural sector and communities to meet identified needs, especially in decision-making that supports the sustainability of their activities,
- (3) The long-standing recognition of WMO as the authoritative voice on weather, climate and water in the United Nations System,
- (4) The decisive role of the Commission for Agricultural Meteorology (CAgM) in guiding WMO activities in agricultural meteorology, especially the Agricultural Meteorology Programme,
- (5) That global food production must be increased and CAgM can therefore make a very significant contribution to dealing with the livelihood crisis for farmers with improved weather and climate services,

Recommends the following revised Terms of Reference to be adopted for CAgM:

- (1) Support applications of meteorology to the management of agriculture, livestock, forestry, rangelands and fisheries sectors (herein after referred to as agricultural subsectors), taking into account developments in both the scientific and operational fields;
- (2) Assist the Member countries in developing and establishing their agrometeorological services (and, where necessary, encourage and assist National Meteorological and Hydrological Services in realigning/restructuring their services to provide effective

agrometeorological services) through transfer of knowledge, methodologies and techniques, and by providing advice, particularly on:

- (a) The most operational use of knowledge concerning weather and climate for sustainable agricultural management through conservation and better use of natural resources;
 - (b) The use of weather and agrometeorological observations, forecasts and warnings for operational purposes;
 - (c) The use of climate observations and predictions;
 - (d) Adaptation to climate variability and change, in particular in developing countries;
 - (e) Combating unfavourable influences of weather and climate on agricultural subsectors, including weather-related pests and diseases;
 - (f) The protection of agricultural produce in storage or in transit against damage or deterioration due to direct and indirect influences of weather and climate;
 - (g) Effective means of communication and fostering coordination and collaboration activities between weather and climate service providers and users in subsectors;
- (3) Improve coordination and collaboration mechanisms through which users of weather and climate information in agricultural subsectors can liaise actively with weather and climate service providers and vice versa;
 - (4) Formulate data and information requirements for agricultural purposes;
 - (5) Foster the development and use of effective communication methods and channels for acquiring and disseminating agrometeorological information, advice and warnings to agricultural subsectors and obtaining feedback;
 - (6) Promote a better understanding of the interactions and impacts of weather and climate in regards to drought and desertification;

Requests the Secretary-General to take the necessary action to seek the endorsement of the Congress for the adoption of the above Terms of Reference and their inclusion in WMO General Regulations.

Resolution 3 (CAgM-XV)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) That all of its previous resolutions are now obsolete,
- (2) That the substance of some of its previous recommendations have been included in recommendations of the fifteenth session,

Decides:

- (1) Not to keep in force any of its resolutions adopted prior to its fifteenth session;
 - (2) To note with satisfaction the action taken by the competent bodies on the recommendations of its previous sessions, which are now redundant.
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Resolution 4 (CAgM-XV)

WORKING STRUCTURE OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) The adoption by the Commission for Agricultural Meteorology at its fourteenth session (CAgM-XIV) in 2006 of a structure for the CAgM consisting of a Management Group and three Open Programme Area Groups (OPAGs) as described in Resolution 2 (CAgM-XIV) – Working structure of the Commission For Agricultural Meteorology,
- (2) The overall success of this approach in terms of the enhanced participation of experts from National Meteorological and Hydrological Services and from other bodies with relevant interests, and strong participation of experts from developing countries and of women in the work of the Commission,
- (3) The improved linkages with the regional associations through the activities of the working groups on Agricultural Meteorology and through regional representation on the CAgM Management Group,

Considering the need to:

- (1) Maintain the numbers of expert teams in each OPAG in order to provide sufficient resources for training and capacity-building activities, within the available resources,
- (2) Maintain and improve the role of the regional associations in decisions of the Commission,
- (3) Improve the flow of technical information concerning the activities of the Commission to all Members,

Decides to amend the working structure of the Commission, as given in the annex to this resolution, with immediate effect;

Authorizes the president to activate expert teams in accordance with priorities agreed by the Commission and the Management Group taking into account the availability of necessary resources;

Authorizes further the president, with the assistance from the Management Group, to establish, implementation/coordination and expert teams during the intersessional period, additional to those agreed by the Commission, if a requirement has been established;

Requests the president of the Commission, with the assistance from the Management Group, to keep the impact and effectiveness of the amended working structure under review and to provide

an interim intersessional report to members of the Commission and a final report to the next session of the Commission;

Requests that the Secretary-General arranges, within available resources, a level of support for the amended structure that will facilitate the participation of the members of the OPAGs, implementation/coordination and expert teams.

Annex to Resolution 4 (CAgM-XV)

WORKING STRUCTURE OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

1. The Commission agreed that the working structure adopted by Resolution 2 (CAgM-XIV) was quite effective, and that, with some modification, it could be improved as a flexible and responsive means of carrying out the work of CAgM.
2. The activities of CAgM shall be grouped under the following programmatic areas for the next intersessional period:
 - (a) Agrometeorological services for agricultural production;
 - (b) Support systems for agrometeorological services;
 - (c) Climate change/variability and natural disasters in agriculture.

Open Programme Area Groups, the members of which will be regularly consulted and informed by correspondence, shall handle the activities under each of these programme areas. Each OPAG shall be structured with one or more expert teams and may include an implementation/coordination team. This achieves a broad ownership of the plans, concepts, procedures and outputs developed by CAgM through the active involvement of a large number of individual experts from among the CAgM members. The chair of each OPAG is also the coordinator of the work of the small teams related to that specific programme area.

CAgM Management Group

3. The Management Group shall consist of the president and vice-president, the chairs and co-chairs of the OPAGs, along with the minimum additional members needed to ensure regional representation. The number of official members of the Group shall not normally exceed 10, but the president may invite to its sessions experts on specific major issues, subject to available funding. The Group has a strong, active and pivotal role in guiding the activities of the Commission between sessions. It is responsible for ensuring the integration of the programme areas, for strategic planning issues, for the evaluation of the progress achieved in the agreed work programme and for related necessary adjustments to the working structure in the intersessional period. Given the necessary resources, the Management Group should meet twice in the intersessional period. The Commission, by means of a resolution, decides the terms of reference for the Management Group. The reports of the sessions of the Management Group will be distributed in a timely way to members of the Commission.

Open Programme Area Groups

4. CAgM shall define, by a resolution, the number and scope of activities of each OPAG to be established for the following intersessional period. The Terms of Reference, terms of office and designation of the chairs and co-chairs of the OPAGs are also decided by CAgM by means of a resolution. The Terms of Reference are normally of a general nature. The chairs will submit their reports to each session of the Management Group and to the next session of CAgM. Provision

exists for a change of chair or co-chair to be authorized by the president, with guidance from the Management Group, in the intersessional period, for example because of a heavy workload.

5. The OPAGs do not hold sessions and their members are consulted and informed, in particular about the activities and progress of implementation/coordination and expert teams, through correspondence. The information flows from the chairs to the members through suitable means of distribution such as circular letters from the CAgM president or the chairs, and the WMO Website.

Implementation/coordination teams and expert teams

6. An implementation/coordination team (ICT) focuses on coordinating operational and implementation aspects of the work of the Commission, and provides regional oversight and guidance. An expert team (ET) develops solutions to scientific/technical problems and studies issues for which specific expert knowledge is needed. The OPAG chairs will coordinate the activities of all teams.

7. The activities of the implementation/coordination and expert teams of the OPAGs will be guided by Terms of Reference that will, for the most part, be established by the session of the Commission. However, the president, under guidance from the CAgM Management Group, may revise the Terms of Reference for an ET, or create a new or ad hoc ET, when a substantiated new need arises.

8. The presidents of regional associations will be consulted about ICT membership to help identify representatives familiar with implementation issues in each WMO Region. The leaders of the ICT will normally be the chair and/or co-chairs of the OPAG, otherwise they will be designated by a session of CAgM or by the president. Members may include the chairs of the task teams on agricultural meteorology in different Regions. Up to two additional members may be invited by the team leader, on an ad hoc basis, as a source of expertise on major technical issues. The team leader, in consultation with the chairs of the regional task teams on agricultural meteorology, may designate another two members from developing countries as a capacity-building measure. For an ICT, the total number of members should be between seven and eleven.

9. The leaders of the ETs are normally designated by a session of CAgM. If this is not possible, or if a change is required during the intersessional period, then the team leaders will be designated by the president upon a recommendation from the chair of the OPAG concerned. Members of the ETs will be designated by their team leaders in consultation with the chair of the OPAG, or if this is not possible by an alternative mechanism agreed by the president. This will be done, as much as possible, at the session of the Commission, based on the proposals made by the Permanent Representatives in advance of or during the session. The chair of the OPAG will take full account of the need to invite suitable experts from other interested bodies to participate in CAgM teams, and will, where experts of equal experience and expertise are available, give consideration to representation from developing countries and to women candidates. As an approximate guide, the total number of members of an expert team should not exceed eight.

10. Implementation/coordination and expert teams are created to perform agreed tasks and to provide specific outputs within a specific time period. Once established and activated, the teams will perform their tasks and provide their reports to their parent body. Much of the work is expected to be achieved through correspondence. The nature and the urgency of the task(s) entrusted to the teams and the availability of funds will, to a large extent, determine whether meetings are feasible. It is expected that an ICT would have at least one meeting during an intersessional period. Activation of teams established by a session of the Commission and the timing of any meetings will be decided by the Management Group in consultation with the Secretariat. Team reports will generally be accessible through the WMO Website and be distributed by regular mail, as necessary.

Liaison between CAgM and the regional associations

11. This working structure is designed to foster efficient and effective links to the regional associations and ensure their involvement in the planning, implementation and coordination of the

Agricultural Meteorology Programme at the regional level. It is intended to facilitate participation and build joint activities of regional associations in the CAgM decision-making process and to improve the two-way communication between CAgM and the Regions. The CAgM Management Group and the ICTs in each OPAG will enhance efficient and effective liaison between the task teams related to agricultural meteorology in each Region and will be coordinated by the vice-president of the Commission.

Roles of developing countries and women in the work of the Commission

12. The Commission recognizes the importance of the involvement of experts from developing countries and women in CAgM activities, from the perspective of strengthening knowledge and capacity, but more importantly because of the unique and important experience and perspectives offered by these experts.

Resolution 5 (CAgM-XIV)

MANAGEMENT GROUP OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) The *Abridged Final Report with Resolutions of the Sixty-second Session of the Executive Council* (WMO-No. 1059), general summary, paragraphs 2.5.27 to 2.5.30,
- (2) The *Abridged Final Report with Resolutions of the Thirteenth World Meteorological Congress* (WMO-No. 902), general summary, paragraph 6.4.3,

Recognizing:

- (1) That the effectiveness of the Commission depends to a large extent on the effective management of its activities between sessions,
- (2) That an ongoing management function is required to ensure the integration of programme areas, decide upon priorities taking into account the availability of resources, evaluate the working progress achieved, coordinate strategic planning, and decide on necessary adjustments to the working structure of the Commission during the intersessional period,

Decides:

- (1) To establish the CAgM Management Group with the following Terms of Reference:
 - (a) Advise the president on all matters related to the work of the Commission;
 - (b) Keep the internal structure and working methods of the Commission under review and make necessary adjustments to the working structure in the intersessional period;
 - (c) Ensure the overall integration of the programme areas and coordinate strategic planning issues;
 - (d) Review and decide upon priorities and schedules for the activation of Open Programme Area Group (OPAG) teams taking into account the requirements

expressed at the session of the Commission, and assess and evaluate the progress achieved and provide continuing guidance on timescales for their work and outputs;

- (e) Advise the president of the Commission on matters related to cooperation with other technical commissions and support for other WMO and related programmes;
 - (f) Advise the president of the Commission on requirements arising between its sessions for new appointments of OPAG chairs and co-chairs, the establishment or activation of teams, and the designation of team leaders;
- (2) That the composition of the Management Group (approximately ten members in total) shall be as follows:

President of CAgM (chair)
 Vice-president of CAgM
 Chairs and co-chairs from each of the three OPAGs

The following additional members (as required) to provide advice on specific major tasks, as follows:

- (a) Coordinator for Interregional Training and Information Services for Capacity-building;
 Task: Closer collaboration with regional associations to connect the scientific activities of CAgM with the specific training and capacity-building needs of each Region;
 - (b) Coordinator for Interregional Technology Applications;
 Task: Identify and encourage existing and new technological applications that may assist agrometeorological services in each Region;
 - (c) Coordinator for Global Framework for Climate Services Implementation for Agriculture;
 Task: Establish a proactive linkage with GFCS to ensure CAgM fully engages with this new initiative;
- (3) That the Management Group, subject to available resources, should meet at least twice during the intersessional period and that the members of CAgM shall be informed of its decisions within eight weeks following its meetings.

Resolution 6 (CAgM-XV)

OPEN PROGRAMME AREA GROUPS OF THE COMMISSION FOR AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Considering the need for continued development and coordination of activities within WMO relating to:

- (1) Agrometeorological services for agricultural production,
- (2) Support systems for agrometeorological services,
- (3) Climate change/variability and natural disasters in agriculture,

Decides:

- (1) To establish the Open Programme Area Group (OPAG) on Agrometeorological Services for Agricultural Production with the following Terms of Reference:
 - (a) To maintain an active and responsive overview of all activities related to the provision of improved agrometeorological services to the agricultural, livestock, forestry, rangelands and fishery sectors including effective transfer of agrometeorological products to farmers and extension services, and promoting agrometeorological applications to conserve and manage natural and environmental resources;
 - (b) To ensure that the subsidiary bodies of the OPAG are well informed of global and regional activities within the areas of responsibility of the OPAG;
 - (c) To monitor the roles, activities and priorities of the implementation/coordination teams (ICTs) and expert teams (ETs) established by the Commission under the responsibility of the OPAG, to ensure coordination of work between the teams and to advise on changes;
- (2) To establish the Open Programme Area Group on Support Systems for Agrometeorological Services with the following Terms of Reference:
 - (a) To maintain an active and responsive overview of all activities related to the data support systems for agrometeorological services including collection and evaluation of operational agrometeorological tools and methodologies and effective communication of agrometeorological products and services for promoting sustainable agriculture;
 - (b) To ensure that the subsidiary bodies of the OPAG are well informed of global and regional activities within the areas of responsibility of the OPAG;
 - (c) To monitor the roles, activities and priorities of the ICTs and ETs established by the Commission under the responsibility of the OPAG, to ensure coordination of work between the teams and to advise on changes;
- (3) To establish the Open Programme Area Group on Climate Change/Variability and Natural Disasters in Agriculture with the following Terms of Reference:
 - (a) To maintain an active and responsive overview of all activities related to climate change/variability and natural disasters in agriculture including determination of climate risks in critical areas and agrometeorological coping strategies, and preparedness and management of droughts and extreme temperatures to promote productivity and sustainability of agriculture, livestock, forestry, rangelands and fisheries;
 - (b) To ensure that the subsidiary bodies of the OPAG are well informed of global and regional activities within the areas of responsibility of the OPAG;
 - (c) To monitor the roles, activities and priorities of the ICTs and ETs established by the Commission under the responsibility of the OPAG, to ensure coordination of work between the teams and to advise on changes;
- (4) To appoint a chair and co-chair of each OPAG with the following Terms of Reference:
 - (a) To facilitate and assist the work of the OPAG in particular with respect to providing overall guidance to, and monitoring and coordinating the work of, the expert teams in liaison with the expert team leaders;

- (b) To establish, in consultation with the president and Management Group (MG), priorities for the activation of teams (taking account of decisions of the previous session of the Commission), and schedules for their outputs;
 - (c) To chair the ICT(s);
 - (d) To act upon matters referred to the OPAG by the president of the Commission, and to advise the president on the composition of teams established between sessions of the Commission, including their leadership;
 - (e) To provide advice to team leaders on the membership (designation and numbers) of their teams, including representation of other interested bodies;
 - (f) To provide feedback to the members of the OPAG, including an activity report by the end of 2013;
 - (g) To submit reports for MG meetings and for the next session of the Commission;
- (5) To select, in accordance with WMO General Regulation No. 32, a chair and co-chair for each OPAG as follows:
- (a) For the OPAG on Agrometeorological Services for Agricultural Production, Dr Sue Walker (South Africa) and Dr L.S. Rathore (India);
 - (b) For the OPAG on Support Systems for Agrometeorological Services, Dr Orivaldo Brunini (Brazil) and Dr Harlan Shannon (United States);
 - (c) For the OPAG on Climate Change/Variability and Natural Disasters in Agriculture, Dr Roger Stone (Australia) and Dr Simone Orlandini (Italy);

Notes:

- (1) That the chair and co-chair of each OPAG will be expected to divide their tasks, as specified above, on an equitable basis;
 - (2) That the terms of office for the chair and co-chair of each OPAG will normally be two years, with the option of renewal for the full intersessional period.
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RECOMMENDATIONS ADOPTED BY THE SESSION

Recommendation 1 (CAgM-XV)

DROUGHT AND DESERTIFICATION

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) The United Nations Conference on Environment and Development (UNCED), Rio de Janeiro, Brazil, 3–14 June 1992, Rio Declaration on Environment and Development and relevant parts of Agenda 21,
- (2) Resolution 49/234 – Elaboration of an International Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa, adopted by the United Nations General Assembly in 1994,
- (3) The ratification of the United Nations Convention to Combat Desertification (UNCCD) in December 1996,
- (4) The *Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026), general summary, paragraphs 3.2.2.12 to 3.2.2.18,
- (5) Resolution 54/223 – Implementation of the United Nations Convention to Combat Desertification in those countries experiencing serious drought and/or desertification, particularly in Africa, adopted by the United Nations General Assembly in 1999,
- (6) Decision 8/COP.9 – Promotion and strengthening of relationships with other relevant conventions and international organizations, institutions and agencies, of the Conference of the Parties to the UNCCD at its ninth session, October 2009,
- (7) Decision 26/COP.9 – Programme of work of the tenth session of the Committee on Science and Technology, from the Conference of the Parties to the UNCCD at its ninth session, October 2009,
- (8) The recommendation from the Lincoln Declaration on Drought Indices, December 2009, that National Hydrological and Meteorological Services around the world are encouraged to use the Standardized Precipitation Index to characterize meteorological droughts and provide this information on their websites, in addition to the indices currently in use,
- (9) The WMO/GEO Expert Meeting on an International Sand and Dust Storm Warning and Assessment System, Barcelona, Spain, 7–9 November 2007,
- (10) The *Abridged Final Report with Resolutions of the Sixty-second Session of the Executive Council* (WMO-No. 1059), Resolution 15 (EC-LXII) – Use of the Standardized Precipitation Index for characterizing meteorological droughts by all National Meteorological and Hydrological Services,
- (11) The proposed collaboration with the United Nations International Strategy for Disaster Reduction (UN-ISDR) on the preparation of a chapter on drought risks in the 2011 United Nations Global Assessment Report on Disaster Risk Reduction (GAR-11),

Considering:

- (1) The role played by climate and climatic factors in desertification processes and the importance of meteorology and hydrology in many aspects of the combat against desertification,
- (2) That drought, desertification and sand/dust storms are increasingly affecting many countries negatively,
- (3) That drought, desertification and sand/dust storms have serious implications for socio-economic development and the environment in many countries, especially in arid, semi-arid and dry sub-humid areas,
- (4) That WMO has for many years contributed to the combat against the adverse effects of drought and desertification at national, regional and international levels,
- (5) Articles 10, 16 and 19 of the United Nations Convention to Combat Desertification,
- (6) That WMO has participated effectively in sessions 1 to 9 of the Conference of the Parties to the UNCCD, and will continue to do so in future sessions,
- (7) That WMO and UNCCD have successfully collaborated to establish the Drought Management Centre for South-eastern Europe,

Recognizing that the subjects of drought, desertification and sand/dust storms have been considered in detail by UNCCD,

Urges Members of WMO:

- (1) To continue to strengthen national and regional meteorological and hydrological networks and monitoring systems to ensure adequate gathering and dissemination of basic data and information nationally, regionally and internationally;
- (2) To support, as appropriate, national, regional and global programmes for integrated data collection and to carry out assessment and research related to land degradation, desertification, sand/dust storms and mitigation of drought problems;
- (3) To continue to review, study and undertake research on the interactions between climate, drought and desertification, and their socio-economic impacts;
- (4) To review, study and undertake research on the possibility of using sand/dust storm forecasting systems in mitigating the impacts of these events on agriculture;
- (5) To draw the attention of appropriate authorities and experts to the use and applications of meteorological and hydrological information in National Action Programmes for the implementation of UNCCD;
- (6) To stimulate education and training on the meteorological and hydrological aspects of the multidisciplinary fields in the combat against desertification;
- (7) To support the Secretary-General in the further implementation of the recommendations of UNCCD;
- (8) To support the implementation actions of the Global Framework on Climate Services in regards to drought risk management and the proposed climate user interface programme (CUIP);

Requests the Secretary-General:

- (1) To continue to circulate to Members, for information and appropriate action, any relevant decisions of the Conferences of the Parties to the UNCCD which may have implications for Member countries of WMO;

- (2) To continue to take steps towards the implementation of actions recommended by UNCCD that are of direct relevance to WMO;
 - (3) To cooperate, as appropriate and within the budgetary resources, with other relevant international and regional organizations in the implementation of the UNCCD;
 - (4) To ensure that WMO continues to participate effectively, as appropriate, in the implementation activities in support of the UNCCD;
 - (5) To continue collaboration with UNCCD in the implementation actions of the Drought Management Centre for South-eastern Europe and the potential establishment of a similar centre in Central Asia and in other regions of the world;
 - (6) To promote the WMO Sand and Dust Storm Warning Advisory and Assessment System to the agricultural communities in the semi-arid and arid areas of the world.
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Recommendation 2 (CAgM-XV)

NATIONAL REPORTS ON PROGRESS MADE IN AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) Recommendation 1 (CAgM-XIV) – National reports on progress made in agricultural meteorology,
- (2) The responses so far received from the Members to the questionnaire on the National Reports on Progress Made During 2006–2009,
- (3) The creation by the WMO Secretariat of a comprehensive database of the status of agrometeorological activities in Member countries based on the information provided in the reports from Members,

Recommends:

- (1) That Members:
 - (a) Who have not so far submitted their responses to the current questionnaire do so as soon as possible for inclusion in the comprehensive database on agricultural meteorology being compiled by the WMO Secretariat;
 - (b) Submit regularly and at least six months before the next session of the Commission their responses to the questionnaire on progress which has taken place in agrometeorology since the preparation of the previous national report;
- (2) That the Secretary-General:
 - (a) Circulate the list of Members who have sent their reports to all other Members with a note asking them to submit their reports by 31 December 2010;
 - (b) Arrange for the update of a comprehensive database on agrometeorology based on the responses provided by the Members before 31 May 2011;

- (c) Explore the possibility of more frequent updates of the progress reports while not overburdening Members with requests for updates;
- (d) Utilize new technologies and harmonize these reports within the Secretariat;
- (e) Publish brief summaries of progress in agricultural meteorology for information for Members before the next session of the Commission.

Recommendation 3 (CAgM-XV)

TRAINING AND EDUCATION IN AGRICULTURAL METEOROLOGY

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting:

- (1) *The Abridged Final Report with Resolutions of the Fifteenth World Meteorological Congress* (WMO-No. 1026) general summary, paragraphs 3.4.2.13 and 3.4.2.16,
- (2) *The Abridged Final Report with Resolutions of the Sixty-first Session of the Executive Council* (WMO-No. 1042) general summary, paragraph 4.2.45,
- (3) *Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology, Volume 1, Supplement No. 2 – Guidelines for Curricula in Agricultural Meteorology* (WMO-No. 258),

Considering:

- (1) That there are insufficient numbers of trained personnel in some countries, particularly Class I agricultural meteorologists, to effectively serve the agricultural community, in general, in these countries,
- (2) That an improvement of the training standards is a prerequisite for the provision of comprehensive agrometeorological services to agriculture,
- (3) That there is inadequate agrometeorological observation infrastructure in developing and least developing countries,
- (4) That training manuals have been developed for a number of priority areas, such as crop modelling, agroclimatic data management and Geographical Information Systems (GIS), by the WMO Agricultural Meteorology Programme,
- (5) That funding was provided by the State Meteorological Agency of Spain (AEMET) for the Roving Seminars on Weather, Climate and Farmers in West Africa (METAGRI project),
- (6) That the Rockefeller Foundation Grant for Training of Trainers on Weather and Climate Information and Products for Agricultural Extension Services in Ethiopia is being implemented,
- (7) That WMO is partnering with the Caribbean Institute for Meteorology and Hydrology (CIMH) in the implementation of the Caribbean Agrometeorological Initiative (CAMI),

Requests the Secretary-General:

- (1) To strengthen programmes within the regional training centres and specialized centres by encouraging training in agricultural meteorology as a matter of great importance, to expand training programmes, as appropriate, in order to provide training of WMO Meteorologists (agrometeorologists), and to seek assistance where required, for example through the Voluntary Cooperation Programme funds;
- (2) To train an adequate number of qualified agrometeorological technical personnel, nationally or regionally, to provide the basic services required by agriculture;
- (3) To strengthen external relations by improving collaboration among the meteorological, climatological, agricultural and research institutions in various regions in the world;
- (4) To promote more dialogue between farming communities and the National Meteorological and Hydrological Services to understand decision-making process and to disseminate weather and climate information and their applications, for example roving seminars;

Requests the Executive Council Panel of Experts on Education and Training to promote the use of modern technology, such as distance learning visual aids and multimedia (CD, DVDs, etc.), in the teaching methods in agrometeorology;

Requests Members:

- (1) To implement the new guidelines for the inclusion of graduate and postgraduate level education in agricultural meteorology in the curriculum of universities, colleges and agricultural and forestry institutes (that is, WMO-No. 258, Volume 1, Supplement No. 2);
- (2) To provide training in the use of remote sensing and GIS for agrometeorological applications;
- (3) To provide better dissemination of weather and climate information to the agricultural extension services of their country;
- (4) To improve agricultural meteorological infrastructure in developing and least developed countries through regional and international support;
- (5) To improve collaboration among the various meteorological, climatological and agricultural research, education and extension institutions in various regions in the world.

Recommendation 4 (CAgM)**REVIEW OF RESOLUTIONS OF THE EXECUTIVE COUNCIL
BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR
AGRICULTURAL METEOROLOGY**

THE COMMISSION FOR AGRICULTURAL METEOROLOGY,

Noting with satisfaction the action taken on its previous recommendations by the Executive Council,

Recommends:

- (1) That Executive Council Resolution 6 (EC-LX) – Establishment of a National Agrometeorological Station Network, be maintained in force;
 - (2) That Resolution 9 (EC-LIX) – Report of the fourteenth session of the Commission for Agricultural Meteorology, be replaced by a new resolution, relating to the report of the fifteenth session of CAgM.
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ANNEXES

ANNEX I

Annex to [paragraph 10.16](#) of the general summary

OPEN PROGRAMME AREA GROUP TEAMS AND THEIR TERMS OF REFERENCE

1. OPAG 1: Agrometeorological Services for Agricultural Production

1.1 Implementation/Coordination Team for Agrometeorological Services

- (a) To review and coordinate the activities of the OPAG, as well as additional related activities of priority to the Commission, in order to ensure their effective implementation and adoption within Member countries;
- (b) To consider agrometeorological requirements for developing farm-level strategies and for making specific proposals for applications to agriculture, livestock, forestry, rangelands and fisheries, based on the output of the ETs;
- (c) To make recommendations on regional training needs to improve agrometeorological services to farms, forests and fisheries;
- (d) To ensure accurate, reliable and systematic procedures for regionalized services to agriculture;
- (e) To raise awareness of the work of the OPAG and to capture opportunities for promoting its work;
- (f) To liaise with the various coordinators of the CAgM MG, as appropriate, in the implementation of the activities of the team;
- (g) To prepare reports in accordance with timetables established by the OPAG and/or the MG.

1.2 Expert Team on Strengthening Operational Agrometeorological Services

- (a) To document case studies on use and development of operational agrometeorological services for different regions and agro-ecological zones;
- (b) To use examples of services to compile a protocol of essential components and procedures needed for successful agrometeorological services;
- (c) To prepare guidelines for operational interface between NMHSs and farmers (namely for farmer's field days, farmers field schools and roving seminars);
- (d) To better utilize media capabilities in order to develop and enhance agromet service delivery;
- (e) To establish more effective communication methods for interactions with farmers and obtain feedback to promote the use of operational agromet services;
- (f) To prepare reports in accordance with timetables established by the OPAG and/or the MG.

1.3 Expert Team on Application of Agrometeorological Products and Services for Sustainable Agricultural Development

- (a) To document the use of agrometeorological products and services for policy decision makers both government and international NGOs (Red Cross, Care, World Vision);

- (b) To collect case studies of agrometeorological products and services for grasslands, livestock, and natural resources management;
- (c) To review and summarize agrometeorological products and services using response farming principles;
- (d) To develop a list of agrometeorological products and services available to combat the influence of unfavourable weather and climate on sustainable agriculture;
- (e) To promote agrometeorological courses for wider use in universities and other educational institutions;
- (f) To prepare reports in accordance with timetables established by the OPAGs and/or MG.

2. OPAG 2: Support Systems for Agrometeorological Services

2.1 Implementation/Coordination Team on Support Systems for Agrometeorological Services

- (a) To review and coordinate the activities of the OPAG, as well as additional related activities of priority to the Commission, in order to ensure their effective implementation and adoption within Member countries;
- (b) To review the operational applications of current agrometeorological data, analytical tools, and information delivery systems at the national and regional levels;
- (c) To make recommendations on procedures, methodologies and resources to improve the regional-based capability for operational applications;
- (d) To raise awareness of the work of the OPAG and to capture opportunities for promoting its work;
- (e) To review and recommend as to how Members, especially those from developing and least developed countries, can be assisted in building their capacity and strengthening their infrastructure for agrometeorological activities;
- (f) To liaise with the various coordinators of the CAgM MG, as appropriate, in the implementation of the activities of the team;
- (g) To prepare reports in accordance with timetables established by the OPAG and/or MG.

2.2 Expert Team on Developing Agrometeorological Decision Support Systems at Different Scales

- (a) To review the various support systems for agrometeorological services for decision-making at different levels of scale (farm-scale, catchment scale, marketing scale and policy scale);
- (b) To prepare a comprehensive review on the use of weather forecasts and climate predictions including NWP products supplemented with GIS, RS information and ICT tools for agrometeorological applications;
- (c) To develop a framework of support systems for different decision-making scales by diverse Levels Of Farmers;
- (d) To develop guidance material on decision support systems for agrometeorological services at different scales;
- (e) To make recommendations on the use of weather forecast and climate predictions including NWP products supplemented with GIS, RS information and ICT tools for agrometeorological applications;

- (f) To prepare reports in accordance with timetables established by the OPAG and/or MG.

2.3 Expert Team on Software Resources For Operational Applications in Agrometeorology

- (a) To review the current software resources available and needed for operational applications in agrometeorology with appropriate delivery and feedback mechanisms at farmer's level;
- (b) To promote agrometeorological operational applications and information delivery systems that optimize knowledge about weather-climate-crop relations;
- (c) To review agrometeorological information that farmers need in order to adopt strategic and tactical planning;
- (d) To develop guidance material on agrometeorological operational applications and information delivery system;
- (e) To make recommendations on appropriate delivery and feedback mechanisms at farmer's level to providers of agrometeorological information;
- (f) To prepare reports in accordance with timetables established by the OPAG and/or MG.

3. OPAG 3: Climate Change/Variability and Natural Disasters in Agriculture

3.1 Implementation/Coordination Team on Climate Change/Variability and Natural Disasters in Agriculture

- (a) To review and coordinate the activities of the OPAG, as well as additional related activities of priority to the Commission, in order to ensure their effective implementation and adoption within Member countries;
- (b) To summarize the status of climate change/variability studies as they impact national and regional agriculture, livestock, forestry, rangelands and fisheries;
- (c) To appraise and report on current capabilities in the analysis of climate change and variability specifically as they relate to and affect agriculture, livestock, forestry, rangelands and fisheries at the national and regional levels;
- (d) To review the results of climate change and variability scenarios at the regional level and promote appropriate agrometeorological adaptation strategies to mitigate the impacts on the productivity of agriculture, livestock, forestry, rangelands and fisheries;
- (e) To identify deficiencies in the operational applications of long-range predictions for agriculture, and make recommendations for improving the technology for the benefit of agriculture at the national and regional levels;
- (f) To raise awareness of the work of the OPAG and to capture opportunities for promoting its work;
- (g) To liaise with the various coordinators of the CAgM MG, as appropriate, in the implementation of the activities of the team;
- (h) To prepare reports in accordance with timetables established by the OPAGs and/or MG.

3.2 Expert Team on Weather and Climate Extremes and Impacts and Preparedness Strategies in Agriculture, Livestock, Forestry, Rangelands and Fisheries

- (a) To determine the critical areas where agricultural production is vulnerable to extremes in different regions; and to suggest continuous monitoring strategies for early detection in vulnerable areas;

- (b) To appraise and report on current capabilities in the analysis of climate risks and to summarize the different strategies of coping with climate risks in agriculture, livestock, forestry, rangelands and fisheries in collaboration with CCI, where appropriate;
- (c) To evaluate and further develop methodologies for climate risk mapping for use by insurance industry;
- (d) To submit reports in accordance with timetables established by the OPAG and/or the MG.

3.3 Expert Team on the User Response to Climate Variability and Climate Change: Adaptation to Changing Climate at the Regional Level

- (a) To review and assess the response of agricultural communities to climate change, in order to improve their capacity to cope with climate change;
- (b) To review the integrated methodologies for the assessment of impacts, vulnerabilities and adaptation measures in order to develop the capacity of agricultural communities to cope with climate change/variability and risks management in agriculture;
- (c) To assess the current status of communication of climate alert information to the user communities in different Regions, and recommend ways and means of improving dissemination, in collaboration with CCI, where appropriate;
- (d) To summarize the status of preparedness and coping strategies as well as the impacts on sustainable agriculture and translate into user-friendly language;
- (e) To review the strengths and weaknesses of existing provisions in the national climate policies related to climate extremes impacting on agriculture;
- (f) To submit reports in accordance with timetables established by the OPAG and/or the MG.

4. ETs reporting directly to the president and/or Management Group

4.1 Joint Expert Team with JCOMM on Weather, Climate and Fisheries

- (a) To review the current data collection by JCOMM on marine meteorology, to assess how these data meet the current needs of the sustainable management in fisheries, and, as appropriate, encourage and assist fisheries vessels to make and report relevant marine meteorological and ocean observations to the WMO system;
- (b) To review the effects of climate and climate variability on seasonal to decadal time scales on fisheries;
- (c) To review the current climate change impacts and evaluate the impact of future climate change on fisheries;
- (d) To identify risk assessment or management evaluation tools that incorporate climate variability in order to improve the sustainable management of fisheries;
- (e) To review the effects of agricultural practices on coastal fisheries;
- (f) To submit reports in accordance with timetables established by the OPAG and/or MG of CAgM/JCOMM.

5. Experts reporting to the appropriate OPAG

5.1 CAgM Experts Serving on Teams of other Technical Commissions:

- (a) To determine actively the views of the Commission on issues relating to agricultural meteorology that are being addressed by working bodies of other WMO technical commissions;

- (b) To transmit these views at meetings of other Commissions, as appropriate;
 - (c) To work positively with their working bodies in developing guidance and implementation programmes that meet the overall needs of Members.
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ANNEX II
Annex to [paragraph 10.16](#) of the general summary
MEMBERSHIP OF OPEN PROGRAMME AREA GROUP TEAMS

1. OPAG 1: Agrometeorological Services for Agricultural Production

Chair: Dr Sue Walker (South Africa)
 Co-chair: Dr L.S. Rathore (India)

1.1 Implementation/Coordination Team for Agrometeorological Services

Leader: Dr Sue Walker (South Africa)
 Co-leader: Dr L.S. Rathore (India)

Dr Tohami Abogarsi (Libyan Arab Jamahiriya)
 Dr Lu Houquan (China)
 Dr Reinaldo Gomide (Brazil)
 Ms Berta Omeldo (Panama)
 Mr Stephen Lellyett (Australia)
 Ms Svetlana Korsakova (Ukraine)

1.2 Expert Team on Strengthening Operational Agrometeorological Services

Leader: Ms Elena Mateescu (Romania)

Mr Koffi Kouassi (Côte d'Ivoire)
 Dr N. Chattopadhyay (India)
 Dr Jose Maria Nogueira Costa (Brazil)
 Mr Adrian Trotman (British Caribbean Territories)
 Ms Nelly Florida Riama (Indonesia)

1.3 Expert Team on Application of Agrometeorological Products and Services for Sustainable Agricultural Development

Leader: Mr Constantino Alarcón (Peru)

Dr Pascal Yaka (Burkina Faso)
 Dr Kyu Rang Kim (Republic of Korea)
 Mr Allan Howard (Canada)
 Ms Edna Juanillo (Philippines)
 Ms Valentina Grigoryan (Armenia)

2. OPAG 2: Support Systems for Agrometeorological Services

Chair: Dr Orivaldo Brunini (Brazil)
 Co-chair: Dr Harlan Shannon (United States)

2.1 Implementation/Coordination Team on Support Systems for Agrometeorological Services:

Leader: Dr Orivaldo Brunini (Brazil)
Co-leader: Dr Harlan Shannon (United States)
Mr Yaya Bangoura (Guinea)
Dr T.H. Hantosh (Iraq)
Dr Roberto Seiler (Argentina)
Ms Arlene Aaron (Trinidad and Tobago)
Dr Azhar Ishak (Malaysia)
Mr Emmanuel Cloppet (France)

2.2 Expert Team on Developing Agrometeorological Decision Support Systems at Different Scales

Leader: Dr Nick Holden (Ireland)
Mr Isack Yonah (United Republic of Tanzania)
Dr Heidary Beni (Islamic Republic of Iran)
Dr Denise Fontana (Brazil)
Ms Elizabeth Pattey (Canada)
Mr Vernon Carr (Australia)

2.3 Expert Team on Software Resources for Operational Applications in Agrometeorology

Leader: Ms Olga Chub (Russian Federation)
Mr Tsegaye Ketema Haile (Ethiopia)
Dr Geetha Lakshmi (India)
Ms Gilma Carvajal (Ecuador)
Dr Hamid Farahani (United States)
Dr Peter Hayman (Australia)

3. OPAG 3: Climate Change/Variability and Natural Disasters in Agriculture

Chair: Dr Roger Stone (Australia)
Co-chair: Dr Simone Orlandini (Italy)

3.1 Implementation/Coordination Team on Climate Change/Variability and Natural Disasters in Agriculture

Leader: Dr Roger Stone (Australia)
Co-leader: Dr Simone Orlandini (Italy)
Mr Barnabas Chipindu (Zimbabwe)
Ms Kwon Hyojung (Republic of Korea)
Dr Flavio Barbosa Justino (Brazil)
Dr Clyde Fraisse (United States)
Ms Flaviana Hilario (Philippines)
Ms Cathleen Fruhauf (Germany)

3.2 Expert Team on Weather and Climate Extremes and Impacts and Preparedness Strategies in Agriculture, Livestock, Forestry, Rangelands and Fisheries

Leader: Mr Goolaup Premchand (Mauritius)
Dr S. Masoud Mostafavi Darani (Islamic Republic of Iran)
Ms Liliana Núñez (Argentina)
Dr John Prueger (United States)
Mr Shoni Maguire (Australia)
Ms Visnjica Vucetic (Croatia)

3.3 Expert Team on the User Response to Climate Variability and Climate Change: Adaptation to Changing Climate at the Regional Level

Leader: Mr Ward Smith (Canada)
Mr Mokhele Moeletse (South Africa)
Ms Lydia Grom (Uzbekistan)
M Edgar Imaña (Plurinational State of Bolivia)
Ms Rosalina de Guzman (Philippines)
Dr Pavol Nedjelic (Slovakia)

4. Expert Teams reporting directly to the president and/or Management Group

4.1 Joint Expert Team with JCOMM on Weather, Climate and Fisheries

Leader: Dr Jim Salinger (New Zealand)

Composition of the Joint Expert Team to be finalized by the Management Group of CAgM after consultation with JCOMM. Potential candidates are:

Mr Andrew Yaw Nkansah (Ghana)
Dr Yao Yiping (China)
Ms Karin Quevedo (Peru)

5. Experts reporting to the appropriate C-OPAG

5.1 CAgM Experts Serving on Teams of other Technical Commissions:

Joint CCI/CAgM/CHy Expert Group on Climate, Food and Water:

Dr Byong-Lyol Lee (Republic of Korea)
Dr Simone Orlandini (Italy)

APPENDIX

LIST OF PARTICIPANTS

1. Officers of the session

President	M.J. Salinger (New Zealand)
Vice-President	L.S. Rathore (India)

2. Representatives of WMO Members

Argentina

Liliana emí Núñez (Ms)	Principal Delegate
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Armenia

Valentina Grigoryan (Ms)	Principal Delegate
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Australia

Vernon Carr	Principal Delegate
Perry Wiles	Alternate
Roger Christopher Stone	Delegate

Austria

Elisabeth Koch (Ms)	Delegate
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Bhutan

Tashi Samdup	Principal Delegate
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Bolivia (Plurinational State of)

Edgar Imaña Maldonado	Principal Delegate
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Brazil

Orivaldo Brunini	Principal Delegate
Antônio Carlos Gonçalves	Delegate
Antonio Divino Moura	Delegate
Luiz Claudio Costa	Delegate
Elizabeth Matias Chagas (Ms)	Delegate
Flavio Barbosa Justino	Delegate
Fúlvio Cupolillo	Delegate
Gilman Rodrigues	Delegate
José M. N. da Costa	Delegate
Léa Medeiros (Ms)	Delegate
Magda Lazimar De Abreu (Ms)	Delegate
Maria T. Galhardo De Castro (Ms)	Delegate
Paulo Romano	Delegate
Reinaldo L. Gomide	Delegate
Luiz Santos	Delegate
Fabio C. Conde	Delegate

British Caribbean Territories

Adrian Trotman	Principal Delegate
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Burkina Faso

Bienvenue Judith Sanfo (Ms)	Delegate
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Cape Verde

Joao M. Spencer Semedo	Delegate
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Canada

Kent Johnson	Principal Delegate
Raymond Desjardins	Alternate

Central African Republic

Jacques Namfio Delegate
Aimé Pascal Ngoumbango-Nzabe Delegate

China

Guangsheng J. Zhou Principal Delegate
Jixin Yu Delegate
Zhenlin Chen Alternate
Wei Guo Delegate
Lihua Liu (Ms) Delegate
Liuxi Mao Delegate
Jianping Gou Alternate
Liangbiao Chen Delegate
Xinwen Yu Alternate
Jun Liao Alternate
Yanling Song (Ms) Delegate

Croatia

Ivan Čačić Principal Delegate
Višnjica Vučetić Alternate

Dominican Republic

Solángel Y. González Espiritusanto (Ms) Delegate

Ecuador

Gilma Carvajal (Ms) Principal Delegate

France

Emmanuel Cloppet Principal Delegate

Georgia

Ramaz Chitanava Principal Delegate

Germany

Ulrich Otte Principal Delegate
Cathleen Frühauf (Ms) Delegate

Ghana

Andrews Yaw Nkansah Principal Delegate

Guinea

Yaya Bangoura Principal Delegate

Guinea-Bissau

Francisco Gomes Principal Delegate

India

Ajit Tyagi Principal Delegate
Lexman S. Rathore Alternate
Radhkrishna Murthy Vasiraju Alternate
Bimal Bhattachary Delegate
Haripada Das Delegate
Peddanna Pentyala Observer

Indonesia

Nelly Florida Riama (Ms) Alternate

Iran, Islamic Republic of

Saeed Bazgeer Principal Delegate
Mehran Heidari Beni Alternate

Ireland

Sarah O'Reilly Principal Delegate

Italy

Federica Rossi	Principal Delegate
Simone Orlandini	Delegate

Libyan Arab Jamahiriya

Bashier A. Al Siebaie	Principal Delegate
Tuhami M. Abogharsa	Alternate
Jamal A. El Buaishi	Alternate

Malaysia

Azhar Ishak	Principal Delegate
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Mauritania

Hamidou Coulibaly	Principal Delegate
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Mauritius

Premchand Goolaup	Principal Delegate
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Namibia

Franz Uirab	Principal Delegate
Emmanuel N. Z. Kambueza	Delegate

Netherlands

Geert Sterk	Principal Delegate
Cornelis Stigter	Delegate

New Zealand

Jim Salinger	Principal Delegate
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Panama

Berta Olmedo	Principal Delegate
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Peru

Constanti Alarcón Velazco	Principal Delegate
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Republic of Korea

Byong-Lyol Lee	Principal Delegate
Kyu Rang Kim	Delegate

Republic of Moldova

Tatiana Mirova (Ms)	Principal Delegate
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Romania

Elena Mateescu (Ms)	Principal Delegate
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Russian Federation

Alexander Kleshchenko	Principal Delegate
Olga Chub (Ms)	Delegate

Rwanda

Jean B. Uwizeyimana	Principal Delegate
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Slovakia

Pavol Nejedlík	Principal Delegate
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South Africa

Ikalafeng Kgakatsi	Alternate
Kentse Setshedi (Ms)	Delegate
Lawrence Themba Dube	Delegate
Mosidi Jennifer Lekalakala (Ms)	Delegate

Spain

Antonio Mestre Principal Delegate

Swaziland

Mduduzi Sunshine Gamedze Principal Delegate

Turkey

Osman Şimşek Principal Delegate
Mesut Demircan Alternate

Ukraine

Viacheslav Lipinskiy Principal Delegate

United Kingdom of Great Britain and Northern Ireland

Allan Howard Delegate

United Republic of Tanzania

Deus Al. Kashasha Principal Delegate

United States of America

Raymond P. Motha Principal Delegate
Harlan Shannon Alternate
John Prueger Delegate
Clyde Fraise Delegate
John Qu Delegate
William E. Linzey Delegate
Fred Branski Delegate

Uzbekistan

Yanling Song (Ms) Delegate

Vanuatu

Peter Napwatt Delegate

3. Representatives of international organizations**Committee on Earth Observations Satellite (ISRO)**

Bimal K. Bhattacharya

Food and Agriculture Organization of the United Nations (FAO)

Michele Bernardi

International Society for Agricultural Meteorology (INSAM)

Cornelis Stigter
Haripada Das

Hydro-Meteorology Equipment Industry (HMEI)

Cornelis Stigter

Niger Basin Authority (NBA)

Oyewole Ogunmola

4. Other observers

Fred Branski President of CBS

5. Other participants

Cherif Negri	Algeria
Koffi Kouassi	Côte d'Ivoire
Tesfaye Gissila	Ethiopia
Tsegaye Ketema Haile	Ethiopia
Peter Gibba	Gambia
Adams Chavula	Malawi
Flaviana Hilario (Ms)	Philippines
James S. P. Angok	Sudan
Elijah Mukhala	Sudan
Wirat Waranuchit	Thailand
Mukufute Mukelabai	Zambia
Barnabas Chipindu	Zimbabwe

6. WMO Secretariat

Michel Jarraud	Secretary-General
Avinash Tyagi	D/CLW
Mannava Sivakumar	D/CLPA
Robert Stefanski	C/AGM
Leslie Malone (Ms)	SOW/CAS
Marc Peeters	C/CNF
