

WORLD METEOROLOGICAL ORGANIZATION

COMMISSION FOR CLIMATOLOGY

THIRTEENTH SESSION

GENEVA, 21–30 NOVEMBER 2001

ABRIDGED FINAL REPORT WITH RESOLUTIONS AND RECOMMENDATIONS

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Congress and Executive Council

- 883 — Executive Council. Fiftieth session, Geneva, 16–26 June 1998.
902 — Thirteenth World Meteorological Congress. Geneva, 4–26 May 1999.
903 — Executive Council. Fifty-first session, Geneva, 27–29 May 1999.
915 — Executive Council. Fifty-second session, Geneva, 16–26 May 2000.
929 — Executive Council. Fifty-third session, Geneva, 5–15 June 2001.
932 — Thirteenth World Meteorological Congress. Proceedings, Geneva, 4–26 May 1999.

Regional associations

- 882 — Regional Association VI (Europe). Twelfth session, Tel Aviv, 18–27 May 1998.
890 — Regional Association V (South–West Pacific). Twelfth session, Denpasar, 14–22 September 1998.
891 — Regional Association I (Africa). Twelfth session, Arusha, 14–23 October 1998.
924 — Regional Association II (Asia). Twelfth session, Seoul, 19–27 September 2000.
927 — Regional Association IV (North and Central America). Thirteenth session, Maracay, 28 March–6 April 2001.
934 — Regional Association III (South America). Thirteenth session, Quito, 19–26 September 2001.

Technical commissions

- 870 — Commission for Climatology. Twelfth session, Geneva, 4–14 August 1997.
879 — Commission for Atmospheric Sciences. Twelfth session, Skopje, 23 February–4 March 1998.
881 — Commission for Instruments and Methods of Observation. Twelfth session, Casablanca, 4–12 May 1998.
893 — Commission for Basic Systems. Extraordinary session, Karlsruhe, 30 September–9 October 1998.
899 — Commission for Aeronautical Meteorology. Eleventh session, Geneva, 2–11 March 1999.
900 — Commission for Agricultural Meteorology. Twelfth session, Accra, 18–26 February 1999.
921 — Commission for Hydrology. Eleventh session, Abuja, 6–16 November 2000.
923 — Commission for Basic Systems. Twelfth session, Geneva, 29 November–8 December 2000.
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GENERAL SUMMARY OF THE WORK OF THE SESSION

1. OPENING OF THE SESSION (agenda item 1)

1.1 The thirteenth session of the Commission for Climatology (CCI) was held at the World Meteorological Organization (WMO) Headquarters in Geneva from 21 to 30 November 2001. It was opened at 10 a.m. on 21 November by the president of the Commission, Mr Y. Boodhoo (Mauritius). Having expressed the pleasure of the participants at meeting in Geneva, Mr Boodhoo highlighted a few issues that he suggested should be in focus during the present session of the Commission. In particular, he mentioned the further development of CLIPS, the issues related to the deteriorating climatological observational networks and the lack of appropriate quality control of data in the various databases as those datasets formed an important basis for climate assessment. He referred to the outcome of the Technical Conference on Climate Services for the Twenty-first Century (Geneva, 19–20 November 2001), which preceded the CCI session and stressed the necessity to consider the real needs of the various users of climate services.

1.2 The president continued by stressing that, as CCI was one of the eight WMO Technical Commissions and as it built on the concept of cooperation among WMO Members, there were several issues bearing cross-commission interest that needed to be considered. Among those were that CCI was an intergovernmental body with the functions and responsibilities spelled out in the Convention and General Regulations. The Commission also had a set of terms of reference approved by higher bodies, Congress and the Executive Council of WMO. In conclusion, he emphasized further that as representatives of respective Governments, the delegates were all encouraged to participate fully in the debates, especially the new members, each of whom might bring a new and important perspective to the issues at hand.

1.3 In his opening statement, Professor G.O.P. Obasi, Secretary-General of WMO, welcomed the participants to Geneva and to the WMO Headquarters. He pointed to a number of important developments of worldwide significance and of special relevance to the climate-related activities of WMO. In particular he mentioned that the work during the past intersessional period became especially challenging as climate and climate change came to occupy the forefront of the world scene.

1.4 Professor Obasi further emphasized that the Commission needed to consider the rapidly changing global framework for services, which was expected to emerge in the years ahead, and the increasing exigencies of users of climate services. It was also important to recognize the potential contribution of climate services to the different traditional sectors of the economy, as well as the important role that climate services could play in

new spheres such as disaster management, food security, improving human well being and mitigating poverty. The Secretary-General was pleased to note that CCI had responded to the challenges and opportunities provided by developments in climatology and had taken significant steps to ensure that its programme and work plan were adjusted so as to address adequately the priority areas adopted.

1.5 The Secretary-General further urged the Commission to give increased attention to the human resource needs of NMHSs for climate-related activities. He then praised the Commission on the Technical Conference which had just concluded and noted that the results of the Conference might assist the Commission in focusing on results-based strategies and work plans during the next four years.

1.6 There were 149 participants at the session, including representatives of 82 Member countries of WMO and 7 international organizations. A complete list of participants is given in [Appendix A](#) to this report.

1.7 The Commission was pleased to witness the Secretary-General presenting certificates for outstanding long-period services to CCI to Messrs T. Oke and J. Maunder and to Ms N. Kobysheva.

2. ORGANIZATION OF THE SESSION (agenda item 2)

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

In accordance with General Regulation 22, a list of the persons present and the capacities in which they were attending the session was prepared on the basis of the examination of credentials and presented to the session. That list was unanimously accepted as the report on credentials and it was consequently decided not to establish a Credentials Committee.

2.2 ADOPTION OF THE AGENDA (agenda item 2.2)

Following some minor amendments to the provisional agenda, the Commission adopted a revised agenda, which is given in [Appendix B](#) to this report.

2.3 ESTABLISHMENT OF COMMITTEES (agenda item 2.3)

2.3.1 A Nomination Committee was established, consisting of Messrs W. Kirchhofer (Switzerland), H. Kondo (Japan), R. S. Masika (Kenya) and Ms T. Cegnar (Slovenia). Mr Kirchhofer was elected chairperson of the Nomination Committee.

2.3.2 A Committee for the Selection of Working Group Members and Rapporteurs was established, consisting of the following delegates: Ms J. Masterton (Canada) and Messrs Yong Pok Wing (Malaysia), M. S. J. Harrison (United Kingdom), A. A. Maximov (Russian Federation) and M. V. Laing (South Africa). Ms Masterton was elected chairperson of that Committee.

2.3.3 In accordance with General Regulation 28, a Coordination Committee was established, consisting of the president and vice-president of the Commission, the chairpersons of the committees established for the duration of the session other than the Nomination Committee, and the representative of the Secretary-General.

2.3.4 Two working committees were established to examine in detail various agenda items:

- (a) Committee A to examine agenda items 5 and 6. Messrs M. Crowe (United States), M. Z. Shaimardanov (Russian Federation) and M. I. Also (Niger) were elected co-chairpersons of the committee;
- (b) Committee B to examine agenda items 7 and 8. Ms M. Voice (Australia) and Mr P. Hechler (Germany) were elected co-chairpersons of the committee;
- (c) Items 10, 14 and 15 were discussed in the Committee of the Whole, chaired by the president and, on his behalf, the vice-president.

2.4 OTHER ORGANIZATIONAL MATTERS (agenda item 2.4)

2.4.1 It was agreed that the working hours of the session would be 8.45 to 11.45 a.m. and 2 to 5 p.m.

2.4.2 The Commission felt that, in accordance with General Regulation 111 and in view of the technical nature of its discussions, it was not necessary to prepare minutes of its plenary meetings. The Commission therefore decided that such minutes would not be prepared for the thirteenth session.

3. REPORT OF THE PRESIDENT OF THE COMMISSION (agenda item 3)

3.1 The Commission noted with appreciation the report of its president, which contained a review of the activities of the Commission and its various bodies and rapporteurs since the twelfth session. The Commission further noted that the in-depth report on those activities had been submitted by the president to the fifty-second session of the Executive Council (May 2000).

3.2 The president of CCI reported that there were 138 members of the Commission as of October 2001, while in 1997 there were 137. Most of the members had corresponded with the president at least once during the intersessional period.

3.3 The president of CCI made several suggestions in his report and reviewed the extensive activities of the working groups and rapporteurs since the twelfth session of the Commission. It was agreed that regarding technical matters those would be considered under the relevant agenda items in order to avoid unnecessary duplications. The Commission expressed its appreciation for the prompt posting of the reports on the CCI Web site, noting that that process made them available and accessible to those interested in the work of the Commission. It also noted with appreciation that a CD-ROM containing all the reports had been provided to delegates and urged that that practice be continued in the future.

3.4 The Commission expressed appreciation for the comprehensive and useful periodic reports issued as circular letters by the president and posted on the CCI

Web site, which had provided detailed information on the Commission's activities. Those reports also served as background information during the present session.

3.5 It was noted that the AWG had held two sessions: the first was in Mauritius in March 1998 and the second was in Reading, United Kingdom, in April 2000. The reports of the meetings were published on the CCI Web site and were widely circulated. The first AWG reviewed the decisions of CCI-XII and concentrated on the following three activities, as well as several other issues:

- (a) Prioritizing CCI activities, especially in the light of the financial constraints within the WMO Secretariat budget;
 - (b) Building partnerships to achieve successes in implementing components of the WCP. One of the venues for that was the Climate Agenda;
 - (c) Revising the individual terms of reference of CCI.
- The considerations during the second AWG meeting dealt with the following issues, as well as with others:
- (a) The Showcase Project: Heat/Health Warning Systems;
 - (b) The need to harmonize the collection and homogenization of data for the different WMO Programmes and other organizations, such as IPCC and UNFCCC, and for the purpose of devising and verifying climate change indices;
 - (c) The publication of the book *Climate into the 21st Century*;
 - (d) Evaluation of the need for RCCs;
 - (e) Creating greater visibility for rapporteurs' reports;
 - (f) Preparations for the thirteenth session of the Commission;
 - (g) Enhancing participation in the Commission's meetings.

The Commission concluded that it was important to continue an advisory function, and its conclusions were described in agenda item 11.

3.6 The Commission was informed that there had been a wide range of consultation among the AWG members and others both inside and outside the Commission on several issues. That was made possible by the use of electronic media but also and mainly by the willingness of experts to recognize the issue at hand concerning climate.

3.7 The Commission was informed of the status of the ACCAD. It had been concluded that the advisory functions of the ACCAD could be effectively carried out through the Meetings of the Presidents of Technical Commissions or other mechanisms within WMO. It was therefore decided that ACCAD could be disbanded.

3.8 The Commission agreed that integrated data management was an inter-commission issue and that the development of database management systems could benefit from increased collaboration both between Global or Regional Climate Centres and NMHSs. It was noted that CCI was now playing an important role in the development of many climate issues, which had taken on wider, sometimes global, perspectives. The Commission was informed that Russia was planning a World Climate Conference in 2003.

3.9 On the issue of allowing greater participation of women in the work of the Commission, the president informed that there were three women on the AWG who had played key roles in providing guidance and advice. Several women-rapporteurs were encouraged to participate in the work of the Commission by being supported to participate in related meetings and workshops.

4. REPORTS OF THE CCI WORKING GROUPS AND RAPPORTEURS (agenda item 4)

4.1 The Commission recalled that at its previous session several working groups had been established and a number of rapporteurs appointed, as described in Resolutions 1 and 3–17 (CCI-XII). The Commission decided that although the reports received from chairpersons of working groups and rapporteurs were introduced under the present agenda item, they would primarily be considered and discussed under the relevant agenda items and new resolutions, establishing working structures for the next intersessional period, would be considered under agenda item 11.

4.2 It was pointed out that there were two types of reports, namely those related to the evaluation of the CCI structure and activities and those related to the state-of-the-art of climatology. The first part should be part of the text of the Commission meeting, while the second should more appropriately be part of a technical note to be produced at a later date.

5. CLIMATE SYSTEM MONITORING (agenda item 5)

5.0.1 The Commission noted that climate issues continued to be high on the international agenda, including the impacts of the 1997–1998 *El Niño* event, the subsequent sequence of *La Niña* events and the presentation of the IPCC Third Assessment Report with its findings linking recent climate change to human influences. The Commission recognized that climate system monitoring and climate change detection in those areas remained high priority activities and acknowledged that the work of the Commission was a key activity within the totality of the international response to the challenges.

5.0.2 The Commission welcomed the close cooperation that existed with other United Nations and international agencies in climate system monitoring, particularly the financial support of UNEP for the publication of the sixth *Global Climate System Review* (WMO-No. 856) and of UNEP, IOC of UNESCO and ICSU for their collaboration with WMO and ISDR on the United Nations Task Force on *El Niño* and the publication *The 1997–1998 El Niño Event: A Scientific and Technical Retrospective* (WMO-No. 905). The Commission particularly welcomed the continuing close collaboration with WCRP/CLIVAR on the Joint Working Group on Climate Change Detection, which had been very active, and with GCOS in the development of GSN and GUAN. The Commission especially welcomed the support given by CBS in meeting the climate needs within the framework of the operational systems of the WWW.

5.0.3 The Commission noted with appreciation the high standard of the annual WMO Statements on the status of the global climate and welcomed the increasing participation of Members in contributing to its content, and urged all Members to contribute information. The Commission noted the lead role of the Joint Working Group on Climate Change Detection in identifying key issues and expressed appreciation to working group members and those representatives of National Climate Centres who had assisted in the development and review of each Statement. The Commission noted that the press releases on the annual WMO Statements were timely and provided a summary of the significant events of the previous year and welcomed the wide media publicity achieved. The Commission also noted that, for the 2000 Statement, the published Statement was available in both English and French for the first time. The Commission recommended that the graphics and photographs used in the future Statements be made available as individual files on the WMO Web site, to aid those Members who translated the statement for distribution in other languages.

5.0.4 The Commission received with appreciation an overview presentation on a variety of activities of the Working Group on Climate Data given by its chairperson Mr R. Basher (New Zealand), as well as reports from a number of rapporteurs on topics related to climate observations and networks, data rescue, data from automatic observing stations and oceanic and satellite data. The Commission noted the written reports of those rapporteurs and those of a few rapporteurs who were absent, that had been published in the WCDMP report series.

5.1 CLIMATE CHANGE DETECTION (agenda item 5.1)

5.1.1 A comprehensive report on the activities of the joint CCI/CLIVAR Working Group on Climate Change Detection and related rapporteurs was presented. Reports were also received from a number of rapporteurs on topics that related to climate change detection, including statistical methodologies and indices. The Commission noted that the Working Group had focused its activities around the three broad questions of: What observations are needed; what analyses of those data could provide information that was useful; and what international coordination would improve detection and attribution of climate change?

5.1.2 The Commission was informed that a workshop in Bracknell in 1998 had identified a set of climate change indices that could be derived from daily data and that would provide insights into changes in climate extremes; some of those had been incorporated into the IPCC Third Assessment Report. The Commission welcomed the initiative of the Working Group, at its meeting in Geneva in November 1999, to coordinate a series of regional capacity building workshops designed to facilitate the development and exchange of climate indices, primarily for the purpose of assisting in the detection of climate extremes, as well as of providing a more detailed picture of climate variations. The

Commission noted that regional workshops, which built upon the successful model pioneered by the Asia-Pacific Network for Global Change Research through the Australian Bureau of Meteorology, had been held for the Caribbean in Kingston, Jamaica (January 2001) and for Africa in Casablanca, Morocco (February 2001) and used software provided for the workshops by the Australian Bureau of Meteorology and the United States NCDC.

5.1.3 The Commission noted that the regional workshops had acted as a catalyst for the identification of digitized daily climate records and had provided participants with valuable hands-on experience working with internationally-recognized climate change experts assisting in the quality control and analysis of the data in standard ways. The Commission noted that the results of the analyses provided new insights into changing climate extremes in previously unanalysed regions and that the workshops had built new capacity for further analysis in those regions. The Commission supported the proposal from the Working Group to hold further regional climate change workshops to provide training and analysis, with priority on South America and South-West Asia, and stressed that such workshops were essential components of capacity building efforts. It noted that the software used in the workshops further added to NMHSs' capacity for climate service, but stressed that the software was for research purposes and should only be used in conjunction with specific climate change detection training activities. The Commission welcomed the continued close involvement of CLIVAR and the Asia-Pacific Network for Global Change Research in those activities.

5.1.4 The Commission recalled that one of the Working Group's objectives was to forge closer links with the modeling community and ensure that the data analysis methods were closely aligned with the model assessments, particularly where those related to extreme events. The Commission decided to give high priority to that work. Guidelines for the calculation of climate variables (e.g. daily mean air temperature) and new climate indicators (e.g. intra-daily climate variability) should be developed, which made use of the higher resolution data that would be widely available in the twenty-first century and data homogeneity would need to be preserved. It further noted the need to assess trends of tropical cyclones and other extreme events.

5.1.5 The Commission noted the expanding use of AWS in the meteorological observing networks of many countries and accepted the CBS invitation to specify a full suite of sensors for automated observing of climate parameters. The Commission recognized the likely continuation of a trend by Members to use AWS when establishing new observing sites and in the replacement of manual observing instruments at existing sites. The Commission urged Members who were planning to change instrumentation to provide for a sufficiently long period of overlap (preferably two years) to enable the identification of biases and other inhomogeneities between old and new systems. The Commission urged Members to give careful attention to standards and

maintenance of new instrumentation at, and after, the changeover to ensure that benefits from automation, particularly in the frequency and regularity of observations, were realized without jeopardy to the homogeneity of the climate record. The Commission urged Members to maintain Reference Climate Stations, even in cases where AWSs were introduced.

5.1.6 The Commissions recalled that the fifty-second session of the Executive Council had expressed the need for close collaboration between WMO Commissions with AWS-related activities in the development of appropriate specifications and practices for AWS. Special attention was required to ensure that the recording and storage of data covered the full range of parameters essential for climate purposes.

5.1.7 The Commission welcomed the information that the United States was establishing an AWS network of 250 Reference Climate Stations, following the WMO *Guide on the Global Observing System* (WMO-No. 488).

5.1.8 The Commission noted the work done to develop a questionnaire on homogeneity tests, on the homogenization of climatological time series and on metadata. Two questionnaires, on climatological metadata and on homogenization issues, were designed by the Rapporteur on Data Homogeneity, Statistical Properties of Data, Dataset Registration and Metadata, Mr G. Mueller-Westermeier, and were distributed to WMO Members in mid-2001. A preliminary analysis by the Rapporteur showed that, to date, 40 per cent of Members had responded, and of those nearly all (93 per cent) possessed some climatological metadata holdings. The Commission agreed that the results of the survey would facilitate the development of guidelines to help National Services upgrade their data records and improve the international comparability of climatological time series. The Commission noted that the lack of homogeneity in climatological data records was a very important issue and that the value of high precision of data records for climate change and variability studies in many instances had been severely diminished as a result of insufficiently documented site and instrument changes. It urged that research be undertaken on homogenization of daily datasets, that guidelines be established on homogenization methods for climate datasets, and that special attention be given to homogenization of datasets following the introduction of AWSs.

5.1.9 The Commission expressed its appreciation to the Hungarian Meteorological Service for hosting the second and third Seminars on Homogenization and Data Quality Control in Climatological Databases, and was pleased to receive the information that Hungary intended to host a fourth seminar in 2003.

5.1.10 The Commission noted that CHy-XI had appointed an Expert on Statistical and Spatial Analysis of Hydroclimatological Variability and Trend, and recommended that CCI and CHy maintain close collaboration on issues associated with climate change detection.

5.2 REQUIREMENTS FOR, AND DEVELOPMENT OF, OBSERVING NETWORKS FOR CLIMATE MONITORING (agenda item 5.2)

5.2.1 The Commission noted the progress achieved in the implementation of GSN and GUAN for the detection of global climate change and other climate applications such as climate prediction, impact assessment and support to research. In that regard, the Commission was informed on the monitoring activities on GSN by Germany and Japan. The Commission was pleased to note that Japan confirmed that 14 observing stations were to be registered as GSN stations. The Commission was informed that the *Manual on the Global Observing System* (WMO-No. 544) had been amended to include new sections on best practices for the GSN stations (Part III, paragraph 2.10.3.17) and best practices for the GUAN stations (Part III, paragraph 2.10.4.9) and urged Members to adhere to them. The Commission endorsed the GCOS/GOOS/GTOS Climate Monitoring Principles (included in [Annex I](#) to this report), which had also been endorsed by the UNFCCC. The Commission urged Members to monitor closely the performances of their designated GSN and GUAN stations and to ensure that nominated GSN and GUAN stations within their national networks adhered to the new standards of the *Manual* and that CLIMAT messages were disseminated with the correct code.

5.2.2 The Commission noted that the exchange of current and historical daily data from designated GSN and GUAN stations was essential for the purposes of the UNFCCC. It recalled that at CCI-XII there was agreement that the historical daily data and CLIMAT reports should be forwarded to World Data Centres A and B as the appropriate repositories and that the data and metadata for each of the sites be deemed essential for the purposes of Resolution 40 (Cg-XII) — WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities. The Commission was informed that a letter had been sent by the Secretary-General in September 1999 requesting the submission of historical GSN daily data and station metadata to the World Data Centre for Meteorology, Asheville, and that such data had been received for only about 25 per cent of GSN stations. The Commission strongly supported the efforts of the WCP and the GCOS Secretariat to improve that level of data submission and strongly encouraged them to continue cooperation in that and other issues of climate data collection, analysis and management. Noting the significance of verified, highest quality data in climate monitoring and climate change assessment, the Commission urged those Members not yet complying with the request to forward their metadata and historical data.

5.2.3 The Commission expressed its support for the joint efforts by GCOS and CBS concerning the practical aspects of monitoring the availability and quality of data from GSN and GUAN stations, including the meeting to be hosted by DWD in May 2002 to address that

issue. It expressed appreciation in particular for the contributions of the agencies which were performing the roles of GSN Monitoring Centres (DWD and JMA), GUAN Monitoring Centre (ECMWF), GSN Analysis Centre (NCDC, Asheville), GUAN Analysis Centre (NCDC and the UKMO Hadley Centre), and the GSN and GUAN Archives (NCDC). It noted with concern that monitoring results to date had shown no significant improvement in the percentages of GSN CLIMAT (about 55 per cent) and GUAN CLIMAT TEMP (about 60–70 per cent) reports received by the monitoring centres in comparison with the reception rates for the GOS CLIMAT and CLIMAT TEMP networks as a whole, and that those low percentages were in many cases due to various systematic errors. The Commission was pleased that the Secretary-General had sent notification of that monitoring activity and of recent results to Members in June 2001 and had encouraged them to take note of them with a view to their improvement. It was also pleased that the Secretary-General had sent a letter to WMO Members in March 2001 urging improvements in the submission of real-time CLIMAT and CLIMAT TEMP reports. The Commission encouraged Members to respond positively to those requests and to other efforts to improve the reporting level. The Commission noted that a pilot project involving a few Members had demonstrated that feedback of information pertinent to Members was an effective way of removing some persisting errors, such as in coding and in the listing of station information. The Commission urged that regular feedback between the monitoring centres and country focal points should be established to improve further the quality and quantity of global exchange of CLIMAT and CLIMAT TEMP messages and requested the Secretariat to establish and forward to the Monitoring Centres a list of country focal points so that prompt corrective actions could be taken on data errors and transmission errors.

5.2.4 The Commission received with appreciation an overview presentation on the GCOS Programme, by the chairperson of the GCOS Steering Committee, Mr P. Mason, in which he elaborated on the common objectives of CCI and GCOS and on the activities under way. The Commission noted, in particular, the shared objective of reversing the decline of observing stations and networks and recommended that GCOS be encouraged to continue the important series of regional workshops leading to Regional Action Plans, which would identify priority capacity-building needs in developing countries related to participation in systematic observation. The UNFCCC SBSTA had endorsed the proposal by GCOS to prepare a second report on the adequacy of the global climate observing system. The Commission encouraged GCOS to complete the adequacy report in the shortest possible time in order to provide a framework for further work to improve climate observing systems. The Commission also urged its members to contribute to the completion of national reports detailing the status of their climate observing systems and for identifying deficiencies.

5.2.5 The Commission welcomed the initiatives of CBS, with regional associations, to designate RBCN stations and noted the assistance that that would provide to the data exchange needs of climatology. The Commission urged Members to take a lead in the identification of meteorological observing stations within their national networks appropriate to the purpose and to ensure that station metadata for such stations were correctly specified and that CLIMAT messages were correctly coded and transmitted. The Commission noted the requirement for a routinely updated Web-based catalogue of metadata on climate datasets and requested that CBS consider incorporating that requirement into its plan of work. The Commission recognized that the RBCN would provide support to climate system monitoring and, at the same time, was important for the identification of regional aspects of climate change. The Commission urged Members to include national Reference Climate Stations within the RBCN structure.

5.2.6 The Commission noted the active participation of its own as well as of GCOS experts on the CBS Expert Team dealing with the Observational Data Requirements and Redesign of the Global Observing System. It welcomed the issue of initial Statements of Guidance on observational needs for various applications areas, including the networks and sensors needed to provide land, atmospheric and marine data for input to seasonal to interannual climate prediction models. The Commission proposed that the work should be extended to consider the data needed for climate variability and change studies, including for mesoclimate-scale studies, in close cooperation with GCOS. The Commission further considered that the Statements of Guidance should be taken into account by the regional associations in determining the networks of meteorological observing stations and requirements for data exchange in support of WMO Programmes.

5.2.7 The Commission noted with pleasure the request from the president of CBS for CCI representation at the recent session of CBS. The Commission noted that one outcome of that participation was the understanding that CCI should provide effective global expertise on various CBS Expert Teams whose terms of reference related in part to climate issues, particularly the:

- (a) Implementation/Coordination Team on Integrated Observing Systems;
- (b) Expert Team on Observational Data Requirements and Redesign of the Global Observing System;
- (c) Expert Team on Requirements for Data from Automatic Weather Stations;
- (d) Inter-Programme Task Team on Future WMO Information Systems.

The Commission requested its president to ensure that the nominated experts were supported by CCI Expert Teams so that they could provide a global perspective of the various climate requirements.

5.2.8 The Commission noted with appreciation the reports prepared by Messrs C. Merlier and R. Sneyers and suggested that those be considered for publication jointly as a technical document by WMO.

5.3 FUTURE WMO CLIMATE INFORMATION SYSTEM (agenda item 5.3)

5.3.1 The Commission was informed of the layout and extent of the linkages from the WCDMP Web pages to international and national centres providing global and regional products for climate system monitoring. The Commission expressed its gratitude to those Members who had responded positively to the request of the Secretary-General to provide Web page addresses for that purpose. In addition to increasing the availability of CSM products to a huge number of users and to increasing the visibility of NMHSs, it also served to stimulate Members in developing the scope and quality of their own sites. Noting that the *Climate System Monitoring Monthly Bulletin* was no longer being produced, the Commission urged Members to continue to support the WMO Web page initiative and encouraged those Members with additional national, regional and global operational products to make those available on the Internet and to advise the Secretariat of the Web page linkages to ensure maximum usage. The Commission requested that visibility and access to the CSM Web page be improved.

5.3.2 The Commission noted with appreciation the suggestions presented by the various rapporteurs addressing issues relating to GTS and Internet utilization. From the results of a survey, the Rapporteur on GTS and Internet Utilization, Ms E. Farman (Islamic Republic of Iran), reported that the number of NMHSs with Internet access had grown from 34 per cent in 1997 to over 70 per cent in 1999. It was recognized that, although more and more NMHSs in developing countries were gaining access to the Internet, many still needed assistance to implement fully the Internet's capabilities. It was furthermore recognized that as CBS was also working on that requirement, there was a need for close inter-commission coordination.

5.3.3 The Commission expressed its appreciation to the National Climate Centres and to individual scientists who had contributed to the sixth *Global Climate System Review* (WMO-No. 856) covering the period 1993–1996, published in 1998, and *The 1997–1998 El Niño Event: A Scientific and Technical Retrospective* (WMO-No. 905), published in 1999. The Commission recognized the series of *Reviews* as an important contribution for drawing attention to the major climate processes affecting communities and the relevant scientific issues that were currently being addressed. The Commission noted that the *Retrospective* provided in-depth coverage of the major climatic event of the period. The Commission urged early commencement of preparation for a seventh *Review* to cover the period mid-1998 through mid-2001 (i.e. the major *La Niña* sequence following the 1997–1998 *El Niño* event) and to give in-depth coverage to other climatic issues not covered in the IPCC Third Assessment Report over the full period mid-1996 through mid-2001.

5.3.4 The Commission was informed of progress of the book *Climate into the 21st Century*, including the involvement of a professional science writer and the

contractual arrangements with Cambridge University Press as co-publisher of the book with responsibility for layout, printing and distribution. The Commission was informed that direct contact would need to be made by anyone with an interest in translating the book, from English into another language. The Commission noted the intention to have the book published in time for the World Summit on Sustainable Development, to be held in Johannesburg in September 2002. The Commission welcomed the financial contributions made by several Members and noted that those had been essential for its progress. The Commission expressed appreciation to the NMHSs, to individual scientists and to section leaders who had contributed in many ways, including through participation in the Task Group, by providing material, writing and reviewing text.

5.4 REQUIREMENTS FOR CLIMATE DATA EXCHANGE (agenda item 5.4)

5.4.1 The Commission re-affirmed the necessity for Members to exchange data for climate purposes in the wider interests of community welfare and safety of lives, both now and in the future. In doing so, the Commission noted that climate purposes of public benefit included monitoring of the current state of the climate system, such as persisting drought; the prediction of seasonal and longer-scale climate events, such as *El Niño* and other climate variations; the detailed review of recent climate events and their socio-economic impacts; the detection of climate change; and research into the climate system and its processes, and its relationship to a variety of human activities. In that regard, the Commission stressed the importance of cooperative linkages among the scientific research, operational meteorology and user communities in stating the need for adequate climate data and in addressing the necessary steps to ensure its availability.

5.4.2 The Commission noted that the GPCC was established at the DWD on the recommendation of CCI-X and at the invitation of WMO, to provide WCRP and GCOS with gridded precipitation data for the global land surface. Sensitivity studies documented by WMO in the *Review of Requirements for Area-averaged Precipitation Data, Surface-based and Surface-based Estimation Techniques, Space and Time Sampling, Accuracy and Error Data Exchange* (WMO/TD-No. 115, WCP-100) implied that raingauge-observed data were required from a number of stations larger than that which was disseminated via the GTS. The Commission noted with appreciation that 160 countries had contributed additional data and the Commission urged Members to continue to support the GPCC by supplying the requested data.

5.4.3 The Commission was informed of instances of difficulties being encountered in accessing climate data for public good activities in research and education, often exacerbated by insufficient resources within developing country Meteorological Services which took the form of inadequate responsiveness of those holding the data or the high cost of data provision. The Commission agreed that such barriers resulted in a loss of benefits of

new knowledge and new applications and, effectively, lower returns on the heavy public investments in past data gathering. The Commission recognized that there was a wide range of policies and practices on data provision among Members and that there were pressures on many NMHS to employ their data archives for revenue generation. It noted that the true economics of the various policies used by different countries with respect to both the administration and pricing elements of climate data were probably unknown at present. The Commission considered that in order to provide better guidance to Members there was a need for WMO to develop a better fundamental understanding of the economics of the different policy options. That would include, where possible, quantitative information on Members' policies and practices with respect to data provision and their outcomes in terms of costs and benefits of the different options. The Commission emphasized that the accessibility and use of climate data was at least as important as its collection and archiving, and that WMO and NMHS policy and activity should reflect that comparable importance.

5.4.4 The Commission noted that in response to a request from the forty-ninth session of the Executive Council, the president of CCI had established an ad hoc task team to give consideration to the need for exchange of climate data and products in the context of Resolution 40 (Cg-XII) — WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities. The Commission noted that the task team had clarified various aspects of the Resolution, as well as concluded that a separate resolution governing climate data was not necessary and that the EC-AGE had accepted that conclusion. The Commission further noted that the *Report of the Meeting of the CCI Task Team on Climate Aspects of Resolution 40* (WMO/TD-No. 925, WCDMP-36) had been reviewed by the Working Group on Climate Data (*Report of the Meeting of the CCI Working Group on Climate Data*, WMO/TD-No. 970, WCDMP-39) and its recommendations and guidance had been generally endorsed although the Working Group had noted that Resolution 40 (Cg-XII) did not reflect all needs.

5.4.5 The Commission also noted that the Task Team and the AWG of the Commission had considered the application of Resolution 40 (Cg-XII) to climatological information, particularly with respect to data exchanged prior to the date of its adoption. In that context, the AWG of the Commission had concluded that it would be difficult to apply Resolution 40 (Cg-XII) in a consistent way and proposed to the EC-AGE that the following text best reflected the situation relating to data exchanged prior to the adoption of the Resolution:

Climatological data, datasets and products exchanged prior to the date of adoption of Resolution 40 (Cg-XII) are not subject to the terms of the Resolution and may be distributed freely and without restriction by a receiving Member, unless any conditions regarding onwards distribution were stated by the supplying Member at, or

prior to, the date of exchange. Data, datasets and products exchanged after the date of adoption may also be distributed freely and without restriction by the receiving Member, unless the supplying Member explicitly classifies them as "additional" under the terms of the resolution, or places other conditions on their further distribution at, or prior to, the date of exchange. Members are reminded that the minimum set of climatological data and products which Members shall exchange without charge and with no conditions on use are specified in paragraph 5 of Annex 1 of Resolution 40 (Cg-XII).

5.4.6 The Commission noted that in supporting the use of the above text, EC-AGE had agreed that the distinction between data exchanged before and after the adoption of Resolution 40 (Cg-XII) should not result in a discontinuity in the availability or distribution of climatological data to meet the needs of WMO Programmes and those of the UNFCCC and other environmental conventions. The Commission agreed that the recommendation made by its AWG to the EC-AGE embodied the most practical approach to data exchanged without restriction at the time of supply.

5.4.7 The Commission noted that its AWG had also brought to the attention of EC-AGE the increasing need for daily data to be exchanged for climate change research. EC-AGE had reiterated that the unrestricted availability of climatological data for research and educational purposes, as endorsed by the fifty-third session of the Executive Council, remained a cornerstone of WMO policy on data exchange. The Commission fully supported the view of EC-AGE on the ongoing need for high quality and comprehensive datasets to characterize variability and change within the climate system. The Commission therefore strongly supported the need for the climate research community to have ready access to data at appropriate temporal and spatial resolutions required for answering specific questions, consistent with Annex 1 of Resolution 40 (Cg-XII). The Commission welcomed the recent decision of the JMA to change the category of the grid-point global data output of its numerical weather prediction model from the "additional data" to "essential data" under Resolution 40 for free exchange. The Commission endorsed a proposal that standard climate datasets be identified as essential for exchange and decided to ask one of the Expert Teams to consider the issue and to identify such datasets.

5.4.8 The Commission noted with interest the report of the delegate of the Netherlands on the need for climatologists to maintain close collaboration with climate researchers. He cited the experience in which the research community had made a compelling case that datasets required for climate research should be made available through free and open exchange of data.

5.4.9 The Commission noted the urgent need for posting a list of names of potential centres generating climate products on the CCI Web site. The links would enable users to explore the generated products available from each centre as well as their accessibility. The list of those centres should be updated periodically.

5.4.10 The Commission urged Members that had not done so to establish Reference Climate Stations in accordance with the guidelines set out in the *Guidelines on the Selection of Reference of Climatological Stations (RCSs) from the Existing Climatological Stations Network* (WMO/TD-No. 130, WCP-116) and noted that where CLIMAT messages based on those observations were disseminated regionally and globally, the stations could also serve as RBCN stations (see general summary paragraph 5.2.5). The Commission noted that world, regional and national archives of meteorological data with necessary metadata quality control and access to the data supported many different climate purposes. The Commission noted the report of the first session of JCOMM and the several areas identified for collaboration and coordination with CCI. Those included cooperation in the development of services from JCOMM with climate elements; the publication in the *Guide to Climatological Practices* (WMO-No. 100) of marine climatological data; and the development of infrastructure to support operational seasonal-to-interannual prediction.

5.4.11 The Commission noted the many activities of WCRP which enabled research in areas relevant to the Commission. Those included research on seasonal-to-interannual prediction and the study of decadal to centennial variability within CLIVAR as well as research on CLiC and GEWEX. The Commission agreed that it needed to maintain and strengthen its cooperation with WCRP in order to draw maximum benefits from its research activities.

5.4.12 The Commission noted with satisfaction the offer from the United States to supply all Members with a copy of the interactive global-database CD-ROM containing updated meteorological tables for engineering applications. The Commission encouraged other centres which collected data to prepare and distribute their files in an appropriate way.

5.5 INTERACTIONS WITH OTHER WMO AND UNITED NATIONS COMMISSIONS AND PROGRAMMES (agenda item 5.5)

5.5.1 The Commission noted that progress of its work was substantially facilitated through cooperative activities with other WMO Programmes and with related organizations.

5.5.2 The Commission noted that close cooperation with CBS was essential to ensure that the implementation and operation of the WWW also met the needs of climatology, including the provision of climate services. To meet that objective, the Commission requested its president and the WMO Secretary-General to facilitate appropriate CCI representation at relevant planning and implementation meetings of CBS and, where possible, to assist in monitoring and improving the performance of operational data exchange systems.

5.5.3 The Commission welcomed the development of datasets of indices produced and the valuable training in statistical methods that was given during regional workshops on climate change detection. The Commission urged continuing support by the WCRP

and WCP Secretariats to ensure that those activities continued and were available in more regions.

5.5.4 The Commission noted the applications of climate monitoring information in the water and agriculture sectors and supported the initiatives to strengthen the coordination between relevant bodies to ensure that the sectors' needs were being met.

5.5.5 Noting the importance of knowledge of ocean dynamics in monitoring and predicting the seasonal anomalies of climate, the Commission agreed to collaborate with JCOMM in the area of marine climatology and urged Members to collaborate in relevant national programmes.

5.5.6 The Commission concluded that collaboration with GCOS was crucial to their common objectives and decided that action was required to strengthen the current working arrangements (see general summary paragraph 11.18).

5.5.7 The Commission noted the inter-boundary nature of hydrological issues and the related importance of climate monitoring. It commended CHY for its work aimed at ensuring that Thirteenth Congress adopt Resolution 25 (Cg-XIII) — Exchange of hydrological data and products.

6. CLIMATE DATA MANAGEMENT (agenda item 6)

6.0.1 The Commission stressed that efficient and effective climate data management provided essential underpinning of national climate applications and services and that it was fundamental within the framework of the WCP. The Commission urged Members to give high priority to searching for existing data and metadata; retrieving, documenting, preserving and archiving them; performing quality control; forming datasets of original and derived data (including homogenized and gridded datasets); and making data and metadata accessible to potential users.

6.0.2 The Commission noted the projects within the WCDMP that gave support to Members' data management activities, including DARE for rescuing data in the meteorological archives, ARCHISS for discovering meteorological data in public archives, CLICOM for the management of meteorological data in computer format, and INFOCLIMA as a public archive of information on national datasets. The Commission noted with appreciation that in many countries, national capabilities had been advanced through support from WMO technical cooperation and the VCP.

6.0.3 The Commission urged Members to review their systems for managing climate data, noting the benefits of a computer-based climate data management system. The Commission welcomed the advances in computer technology that had become available for climate data management and the provision of service products and urged development of modern climate database management systems for wide application among NMHSs.

6.1 GENERAL REQUIREMENTS (agenda item 6.1)

6.1.1 The Commission noted with appreciation the work done by the NCDC, United States (hosting the

World Data Centre A for Meteorology) towards finalizing the remaining volumes of the *World Weather Records* for the period 1981–1990. The Commission was informed that Volume 4 (Asia), Volume 5 (Africa), Volume 6 (Islands of the world) and Volume 3 (West Indies, South and Central America) were completed and distributed. The Commission endorsed the proposal to reconfigure the *World Weather Records* volumes for the ninth series (1991–2000) to match precisely the WMO regional associations and welcomed the offer of NCDC to prepare the 1991–2000 series and to make the dataset available on CD-ROM. To that objective, the Commission urged individual Members to volunteer to act as Regional Data Collection Centres to facilitate the task of delivering the data to NCDC in the appropriate format.

6.1.2 The Commission noted with satisfaction that the 1961–1990 Standard Normals were now complete and expressed its appreciation to NCDC for assembling the data as well as to those Members who had contributed data. It further noted that the 1961–1990 Standard Normals would remain in use for global purposes until the next Standard Normals for the period 1991–2020 were completed.

6.1.3 The Commission noted that, in addition to the 1961 to 1990 WMO Standard Normals, many countries had produced climatic normals using the 1971 to 2000 period. The Commission also noted the discussion held among Members on whether the standard 30-year normals should be accompanied by normals calculated over a more current period or a shorter period to reflect recent climate variability. The Commission noted the usefulness of periods other than the contiguous 30-year period for certain analyses below the global scale. However it decided to maintain the Climatological Standard Normals process, as it provided a common reference period for climate research and monitoring worldwide.

6.1.4 The Commission was informed of the significant work that was being carried out in various institutes to develop and maintain global and regional baseline databases for climate purposes and urged Members to continue to contribute to those datasets. The Commission welcomed the re-analysis project just launched by the JMA, in coordination with the Central Research Institute of Electric Power Industry in Japan, for the data from 1979 to 2004, based upon the operational global model. It also welcomed information from the Netherlands that the regional ECA/ECD dataset now comprised 125 long daily climatic time series of the EUMETNET countries and that it would be enlarged to the whole of RA VI (approximately 250 series). The Commission noted with satisfaction the availability of monthly radiosonde data, based on CARDS, which had been compiled by the World Data Centre B — Obninsk, in collaboration with the World Data Centre A — Asheville.

6.1.5 The Commission noted that non-climatic influences and biases had been removed from many global datasets in an effort to create a homogeneous record and that the datasets were generally supported by station history, instrumentation and other metadata. Members

were urged to ensure that metadata of observing sites, including instrumentation and observing procedures, be maintained to ensure that homogeneous records were available into the future. In addition, Members were urged to include information about the methods used for homogenization when providing homogenized datasets or, alternatively, should send the metadata along with any dataset of original data provided. The Commission recognized the requirement to develop and adopt an international format for the exchange of station metadata and that that was likely to require a collaborative effort with other Commissions. The Commission noted the initiative of a survey of Members to improve and update the current metadata files for upper-air stations included in the CARDS project.

6.1.6 The Commission was informed of the ongoing developments by the JMA regarding the digitizing project for the Kobe Collection data (historical marine meteorological data on microfilms in the form of log-books over the period of 1890–1961 covering world oceans). The Commission was informed that the JMA had just completed the digitization of one million data values, in addition to the one million data values already digitized since 1995. The newly digitized data would be donated to WMO Members on a CD-ROM by the end of 2001. The Commission was informed of the results of the project being implemented by the World Data Centres in the Russian Federation and the United States to put into digital form approximately 1.5 million marine meteorological observations.

6.1.7 The Commission was informed of the new project, Climate of the World Oceans (CLWOC), that was carried out in the framework of the European Union in cooperation with the University of Madrid (Spain), the University of Sunderland (United Kingdom) and the Royal Netherlands Meteorological Institute. The aim was to digitize meteorological data over the world oceans from ships' logbooks from France, Netherlands, Spain and the United Kingdom for the period 1750–1850. After completion of the project in early 2004, the data envisioned to contribute to the pre-1850 extensions of COADS.

6.1.8 In noting the similar aims of the INFOCLIMA project and the GOSIC, the Commission called for closer collaboration between WMO Programmes and the GOSIC initiative to avoid duplication of effort. It encouraged contributors to update routinely the information contained in INFOCLIMA and in other inventory sites.

6.2 DATA PROCESSING, INCLUDING CLIMATE COMPUTING (agenda item 6.2)

6.2.1 The Commission noted with appreciation the contribution of Algeria, Chile, France, Malaysia and the Russian Federation in coordinating development of CLICOM 3.1, which was the final version. It also noted that the support of Algeria, France and ACMAD had enabled the release of the French version of CLICOM 3.1 in March 2001, and its development was now complete, and that the Russian version was completed and was in

use. The Commission noted that the migration to CLICOM 3.1 was well under way in the NMHSs of the many WMO Members using CLICOM. The Commission recommended that the English, French and Russian versions of CLICOM 3.1 software continue to be supported by WMO.

6.2.2 The Commission noted with appreciation that the CLICOM ASCs — ACMAD for RA I, Chile for RA III, the Caribbean Institute for Meteorology and Hydrology for RA IV, Malaysia for RA V and the Russian Federation for RA VI — had continued to assist actively in the maintenance of CLICOM systems and in the development of national capabilities through training seminars and on-site support. The Commission was also informed of the CLICOM group mailing list maintained by the Secretariat that had proven beneficial to users, both when building their capabilities in using CLICOM and when experiencing technical problems.

6.2.3 The Commission expressed appreciation to France and the United Kingdom for their support and noted with satisfaction the successful completion of the jointly sponsored France/United Kingdom/WMO Project on Improving the Capacity for National Climate Data Management and Developing Drought Preparedness and Management Strategies in 11 African Countries Affected by Desertification. The Commission noted that the Project included training seminars on climate data that focused on applications for drought preparedness. The Commission was pleased to see the emphasis in the Project, which was based on CLICOM systems, on the development of applications relevant to each country. Given the success of the drought preparedness project, the Commission expressed the need for similar projects in other developing countries and urged that capacity building workshops focusing on climate applications continue to be an integral component of the implementation process. The Commission welcomed the planning of similar projects as followed: in Region I — Cameroon, Congo, Gambia, Madagascar, Rwanda, Sao Tome and Principe, Tanzania, Uganda and Zambia; in Region II — Cambodia, Myanmar and Viet Nam; and in Region V — Niue, Papua New Guinea and Tonga. The Commission, noting the WMO thrust in promoting disaster prevention and taking account of severe droughts such as in western Asia, requested the Secretariat to support the necessary actions including assisting with international coordination and resource mobilization in the affected regions.

6.2.4 The Commission noted with appreciation the work of the CCI Task Team on Future WMO CDMS and supported the emphasis on agreed standards of functionality, capability and the ability to use commonly used WMO data exchange formats. The Commission thanked Australia, Brazil, the Czech Republic, Jordan, the Russian Federation, Tunisia and Zimbabwe, who were offering their systems for evaluation, and encouraged Members to consider using one of the systems for their future CDMS. The Commission noted that Members who had not done so might submit their own CDMS systems for evaluation. As the Team's evaluations

became available, Members would be able to examine which of the systems might best meet their needs and, as necessary, seek funding through the WMO VCP. The Commission noted that the transition to more powerful client/server multi-tier database systems was a welcome innovation for the already successful CLICOM project and would enable NMHSs making the change to avail themselves of a wide range of flexible applications for climate data and to enhance NMHS abilities to employ tools such as GIS. The Commission noted that that CDMS initiative by CCI was a significant step toward the recommendation of the presidents of technical commissions that an integrated approach to data archiving and data management be adopted by all concerned in WMO. The Commission noted, that the Czech Republic system, CLIDATA, was, through bilateral agreements, now operational in Ghana, Latvia, Lithuania and The former Yugoslav Republic of Macedonia. Noting the critical needs of NMSs for more advanced capabilities, the Commission decided that work be accelerated to ensure availability of future WMO CDMS as a matter of some urgency.

6.2.5 The Commission noted that the recent session of CBS had established an Expert Team to deal with information system requirements of all WMO Programmes, including communication networks and non real-time data exchange, and databases. The Commission welcomed the proposed participation of a CCI expert on that team and requested the CCI president to ensure that nominated experts were supported by other CCI experts in order to guarantee a global perspective of the various climate requirements. In particular, the Commission requested that the special needs of data management related to climatology, especially regarding metadata, data homogeneity and security, were strongly reflected in the outcomes of the team's discussions.

6.2.6 The Commission welcomed the request by the presidents of technical commissions at their October 2000 meeting, that all WMO Programmes should adopt an integrated approach to data management. The Commission was of the opinion that such an approach would be in the best interests of WMO and would help optimize the use of resources in that area. It therefore decided that that should be a guiding principle in its work on data management during the intersessional period.

6.3 DATA RESCUE ACTIVITIES (agenda item 6.3)

6.3.1 The Commission noted that the DARE pilot project in Region IV (Jamaica and Honduras) to evaluate digital camera technology for use in preserving climate data and in facilitating its digitization had started and that WMO RA II had decided to launch a DARE II project in the Region. The Commission welcomed the proposal for an international DARE meeting to harmonize data rescue in the different regions and to develop a coherent strategy to create and enhance digital archives using new technology. The Commission also expressed its gratitude to the Hungarian Meteorological

Service for having promoted a programme to enable data to be rescued in digital form.

6.3.2 The Commission noted with appreciation the project by France, beginning in 2002, to restore from its archives a considerable set of surface and upper-air climatological data from 14 west African countries whose own holdings had been lost or were no longer readable. The sets comprised 143 stations and the earliest data were nearly 150 years old. The sets would be made available to the countries in CLICOM database structure. The Commission noted the desirability of replicating that project to cover the entire Region I. It stressed the importance of collaboration with the World Data Centres in data rescue projects.

6.3.3 The Commission expressed its support for the conclusions of the Inter-agency Meeting on the ARCHISS Project, held in Geneva in November 2000, and welcomed the proposal to extend ARCHISS activities beyond RAs III and IV to include Regions I, II and V, and recommended that activities be planned for RA VI. The Commission endorsed the recommendation of the fifty-third session of the Executive Council that, to improve the visibility and potential for enhanced funding, more emphasis should be placed on the practical benefits of using ARCHISS data collections. For example, those data would significantly enhance adaptation studies on the effects of climate change and variability on social and economic systems.

6.3.4 The Commission endorsed a recommendation from the Inter-agency Meeting on the ARCHISS Project to combine the ARCHISS project and DARE in order to economize resources and provide synergy between the two activities. The Commission recommended that future activities under that combined effort should focus on locating and digitizing high priority climatological and hydrological data and accompanying metadata.

6.3.5 The Commission noted that the objective of data rescue was to have climate data in digital form and make it accessible for statistical processing using computer methods. The Commission urged Members with CLICOM and other more powerful computer-based climate database management systems to process all of their data records in computer format.

6.4 INTERACTIONS WITH OTHER WMO AND UNITED NATIONS COMMISSIONS AND PROGRAMMES (agenda item 6.4)

6.4.1 The Commission noted that meteorological observations were made for a variety of purposes and that the collection and archival of those data formed the basis of each Members' climate archive. The Commission welcomed the cooperation of CBS and CIMO to develop instrumentation and observing procedures and practices that supported climate objectives to the maximum extent possible.

6.4.2 The Commission welcomed the suggestion by the presidents of technical commissions that the use of phenological data be increased in operational climatology. It endorsed the suggestion that appropriate methods and procedures be explored and implemented

for the observation, collection, codification and exchange of that form of data. The Commission called for cooperation with other Commissions in that respect, with the possible establishment of a group of experts from CHy, CAgM and CCl. It further noted the need to liaise with programmes such as GTOS, GOOS and organizations such as UNESCO, in their efforts to archive and make accessible the datasets in other fields of science that might serve as indicators for climate change. Noting the work under way by the Scientific Committee on Antarctic Research, the Commission recommended that WMO also liaise with that body in ensuring full representation of high latitude southern hemisphere data in global datasets.

6.4.3 The Commission noted the valuable contributions of WMO to the activities of the ISDR, which included leadership of the ISDR's Working Group on Climate and Disasters, and participation in its other Working Groups on Early Warning, Risk and Vulnerability Assessment, and on Wildland Fires. The Commission urged Members to continue to contribute to the development of that important United Nations activity.

7. CLIMATE APPLICATIONS, IMPACTS AND RESPONSE STRATEGIES (agenda item 7)

7.0.1 The Commission recognized that there was an increasing need to focus the outcomes of its scientific and technical endeavours in terms of the benefits they brought to the safety of life, to social and economic development, and to the protection of the environment. It noted the increasing realization among Governments and partner agencies that weather and climate were opposite ends of a continuum of variability and that climate change would manifest itself in terms of shifts in climate patterns and statistics including the frequency and intensity of extreme events. Climate variability in the shorter timescales, and changes in the longer term, significantly affect peoples' access to clean water, adequate food and a healthy environment. In that regard, the Commission noted WMO's leading roles in the implementation of the WCASP and the Agricultural Meteorology Programme, as well as in collaborating with other international partners in the implementation of the WCIRP (UNEP) and the WCP-Water activity (jointly with UNESCO) as well as with the IPCC.

7.0.2 The Commission recalled Resolution 12 (Cg-XI) — World Climate Programme and its coordination, which "urged Members to take all possible steps to promote National Climate Programmes and activities..." and subsequent discussions concerning the potential benefits of National Climate Committees. It urged all Members to establish National Climate Committees, which should comprise membership from different economic sectors. That would allow the formulation and effective transmission of new and beneficial ideas in climate applications areas from NMHSs to those sectors, and vice versa.

7.0.3 Given the success of pilot projects in various areas of the Commission's activities, the Commission urged the development of applications pilot projects in

all of the applications areas. It also urged continued efforts by partner agencies to collect, compile and make available improved meteorological and applications data to support climate services development. The analysis of economic benefits of the various applied climate services was also encouraged.

7.0.4 The Commission encouraged strengthening collaboration with other international organizations such as WHO, UNEP and UNESCO, as well as with the IPCC, and their programmes. In addition, it also encouraged improvement of internal linkages between WMO Commissions and climate applications programmes.

7.0.5 The Commission urged the WMO Secretariat to consider ways to contribute to the World Summit on Sustainable Development, to be held in Johannesburg in September 2002.

7.0.6 The Commission recommended that bibliographies in the area of climate applications, impacts and response strategies should be published as WMO Technical Documents.

7.0.7 Given the special requirements of the new and growing weather derivatives industry, the Commission recommended the investigation and development of services to that industry within all relevant climate applications programmes.

7.0.8 The Commission noted that for improved decision making, there was a need to assess better the appropriate roles for the use of weather and climate information within an application area. More effort should be devoted to integrating those roles into the design of future services, which would require more attention to interdisciplinary studies.

7.1 HUMAN HEALTH (agenda item 7.1)

7.1.1 The Commission noted with appreciation the reports and reference material provided by the Rapporteurs on Climate and Human Health, Ms T. Cegnar (Slovenia), Messrs G. Jendritzky (Germany), L. Kalkstein (United States), A. McMichael (United Kingdom) and V. Razuvaev (Russian Federation). Special thanks were expressed for their contributions through Mr A. McMichael in the preparation of the World Meteorological Day 1999 brochure, *Weather, Climate and Health* (WMO-No. 892). In that regard, the Commission noted with appreciation the attention that was given to weather, climate and human health as the theme of World Meteorological Day 1999 and in various publications.

7.1.2 The Commission noted the coordination mechanisms that had been established with other United Nations organizations and other organizations with responsibilities in the fields of climate and health, especially with WHO and UNEP. It noted with satisfaction that those mechanisms had achieved significant progress, particularly in the topic of heat stress, and recommended that they be continued and strengthened. The Commission urged Members to establish national coordination mechanisms, with the assistance of their national CLIPS Focal Points, to ensure strong links between their climate services, their public health services and related community activities.

7.1.3 The Commission endorsed the establishment of a Memorandum of Understanding between WMO and ISB, and noted with satisfaction that several activities had already been enhanced through the interaction. The Commission recommended that collaboration with ISB continue and requested the Secretary-General to consider providing support to the preparation and conduct of the ISB Sixteenth Congress.

7.1.4 The Commission noted the work of the ISB directed toward determination of the requirements and recommended standard for a universal thermal climate index, under the leadership of Mr G. Jendritzky (CCI Lead Rapporteur on Climate and Human Health). The Commission agreed that CCI should assist with determining the efficacy and validity of such an index for the operational assessment of human stress in extreme thermal environments and that it should work with CBS to make recommendations to Fourteenth Congress on standard thermal indices.

SHOWCASE PROJECTS: HEAT/HEALTH WARNING SYSTEMS

7.1.5 The Commission was informed of progress in the Showcase Projects on Heat/Health Warning Systems and was particularly impressed with the practical results that had demonstrated the benefits of the Projects' self-sustaining nature and ability to translate climate knowledge into users' actions. Noting that Thirteenth Congress had requested the Secretary-General to ensure progress in organizing Showcase Projects as a matter of urgency, the Commission expressed appreciation to Mr L. Kalkstein and the other Rapporteurs on Climate and Health for the very significant progress and noted that they had acted very effectively as an expert and implementation team. It considered that the efficiency with which the team had addressed their terms of reference had been instrumental in promoting and advancing the aims and objectives of the WCASP.

7.1.6 The Commission was informed that the fifty-second session of the Executive Council had noted that the applications and methodology used in the Showcase Projects provided the means to demonstrate the WMO's strengths and basic technologies within meteorology and hydrology to influence positively the decisions and actions that must be taken in the user sectors. It also noted with appreciation that Mr Kalkstein had described the philosophy and operational realization of the Showcase Projects in his scientific lecture presented during the fifty-second session of the Executive Council. The Commission noted further the common aspects of the Projects: that they involve multidisciplinary teams, that they use proven climate applications that correlated historical climate and health information, that they result in an integrated warning system that saved lives and that the ongoing responsibility of the resulting system lie wholly within the local organizations. It was particularly gratified by the multi-agency coordination and expressed its appreciation for the participation of WHO and UNEP in addition to the respective NMSs.

7.1.7 The Commission endorsed the activities planned in Phase I, including the incorporation of an

evaluation component in every project to demonstrate the value and benefit of that use of climate information and predictions. It encouraged Members from developed countries to join in the Showcase Project by pairing with Members from developing countries and Members from countries with economies in transition in a mentoring relationship to implement the system in at-risk cities. The Commission also gave strong support to the activities conceived for Phases II and III. It recommended that Expert Teams be used in the design and implementation of activities in the Phase I, Phase II and Phase III activities of the Showcase Project, with clear terms of reference. In particular, the Commission urged acceleration of Phase II activities.

OTHER ASPECTS OF CLIMATE AND HEALTH

7.1.8 The Commission was pleased to receive the report of Mr McMichael, Rapporteur on Climate and Human Health. The Commission agreed that, in light of the outcome of the IPCC Third Assessment Report (Working Group 2), the dialogue between WMO and the WHO should be further enhanced in the field of climate and human health, including research, applications and operational/warning services, and including those areas that related to environmental changes, e.g. ozone depletion. The Commission welcomed the recent WHO report on climate-related early warning systems and supported, in particular, the proposal for WMO and WHO to collaborate in producing a companion volume to the earlier successful publication *Climate Change and Human Health* produced in association with UNEP. The Commission also noted the findings of IPCC that some increases were possible in the geographic range of potential transmission of malaria and dengue — two vector-borne diseases, each of which currently impinged on 40–50 per cent of the world's population — and that many infectious diseases would tend to increase in incidence and seasonality. It noted, however, that actual disease occurrence was strongly influenced by local environmental conditions, socio-economic circumstances and public health infrastructure.

7.1.9 The Commission highlighted the increasing need for climate indices that were health relevant and simple to produce and to interpret. While the more prominent interest in such indices lied in their potential for assessing the impacts of climate change on human health, they were increasingly demanded in health applications related to climate variability. The Commission requested the Joint CCI/CLIVAR Expert Team on Climate Change Detection to consider the development of climate indices that would be of particular relevance to health effects. The Commission further decided to establish an Expert Team, inviting WHO representation, to determine indices custom built for alerts on particular health outcomes of climate variations and to encourage regional associations to establish a climate and health focus in their working structures involving health authorities.

7.1.10 The Commission strongly recommended the need for an interdisciplinary approach in considering the impacts of climate variability and climate change on

human health. Emphasis was made for more support on studies related to the impacts of climate variability on vector-borne diseases and on phenomena such as heat waves in the tropical regions. The Commission also noted the requirement for future studies on the impacts of climate variability on human health in all regions of the globe. It further noted that while there were deficiencies in the availability of climatological data, those developing applications in that area required, in addition, better epidemiological data and also improved access to such data that already existed.

7.1.11 The Commission strongly supported a proposal to engage the broad community in drafting an action plan for the twenty-first century, to be developed in conjunction with the Conference on Improving Health in a Changing Climate and Environment (tentatively planned for July 2003, venue to be determined).

7.2 URBAN CLIMATOLOGY (agenda item 7.2)

7.2.1 The Commission noted the increasing urbanization occurring worldwide, the associated impacts on populations and environment and the related potential implications of climate variability and climate change. Projections showed that virtually all the population growth (more than 2 billion persons) expected during the next 30 years would be concentrated in the urban areas of the world, with 90 per cent of the growth expected to occur in countries of the developing world that were mostly located in the tropical and subtropical areas.

7.2.2 The Commission was pleased to learn of the activities that addressed environmental issues related to megacities and urban areas, in particular those which dealt with urban issues in the context of human health. The Commission approved the president's proposal that that theme be given increased focus in the work of the Commission and requested that it be developed as appropriate in collaboration with the urban-related projects of other Commissions, e.g. CAS, CBS and CHY. Noting furthermore the IPCC assessments with respect to human settlements, the Commission supported a proposal to increase its involvement in work related to human settlements in collaboration with other groups and agencies, as appropriate.

7.2.3 The Commission noted with satisfaction the activities in enhancing climate services related to urban issues, especially regarding the success of the WMO-cosponsored International Congress of Biometeorology/International Conference on Urban Climatology (ICB/ICUC'99) (Sydney, 8–12 November 1999). It was informed of the appreciation of delegates at ICUC of the support of WMO and, therefore, of CCI. With the help of funding from UNEP, WMO printed the publication entitled *Biometeorology and Urban Climatology at the Turn of the Millennium: Selected Papers from the Conference ICB-ICUC'99* (WMO/TD-No. 1026, WCASP-50). The Commission noted the special importance of fostering international communication in research and application on urban climatology and recommended that WMO continue co-organizing other International Conferences on Urban Climatology.

7.2.4 Noting that NMHSs needed to act to preserve the scientific integrity of climate observations in support of urban activities and to provide guidance for partner organizations, the Commission recommended that the president of CCI consult with the presidents of CBS, CIMO, CHY and CAS to adopt coordinated programmes to enhance Members' capabilities to monitor effectively the urban atmospheric and hydrologic environment and to provide urban-related climate services. In that regard, the Commission tasked the CCI Expert Team on Observing Requirements and Standards to work closely with the urban climatology community to develop a detailed statement of requirements for urban climate observing systems. Close cooperation with relevant experts in CIMO, CBS, and CAS would then be required, as a specification for urban climate stations was developed. Guidelines for implementing meteorological and climatological measurements in urban areas should be added to the *Guide to Meteorological Instruments and Methods of Observation* (WMO-No. 8).

7.2.5 The Commission emphasized the need to enhance the CCI Web site to include a section on urban climatology in order to improve the information exchanged among communities involved in that field.

7.2.6 The Commission endorsed the initiative of the president of CCI to build awareness of the relationship between human habitat and climate. It noted the recommendation of the fifty-second session of the Executive Council (general summary paragraph 4.1.35 of the *Abridged Final Report with Resolutions of the Fifty-second Session of the Executive Council* (WMO-No. 915)) to the effect that building construction be done in harmony with climate, and therefore of the necessity for meticulously devising proper building codes that were compatible with the local climate, and for judiciously choosing the proper building material for enhancing human comfort and well-being. The Commission endorsed the proposal that regional conferences/workshops should be held in cooperation with Habitat (UNCHS). The Commission called upon its president to facilitate the assembly of the necessary material for the implementation of those proposals.

7.2.7 The Commission took note of, and commended the work of, its Rapporteurs on Urban and Building Climatology, Messrs K. Gallo (United States), E. Jáuregui (Mexico), B. Padmanabhamurty (India) and Ms N. Kobysheva (Russian Federation).

7.2.8 The Commission also commended the preparation of a curriculum and background material for specialized studies in the field of urban and building climatology at the request of the WMO Education and Training Programme. As that was an evolving topic, the Commission recommended that the curriculum, as well as the related content in the *Guide to Climatological Practices* (WMO-No. 100), be kept under constant review.

7.2.9 The Commission noted the importance of increasing research on both high latitude and tropical urban environments and of identifying appropriate mechanisms to fully implement TRUCE.

7.2.10 The Commission noted that the United States NCDC had produced a new interactive CD-ROM global database containing updated meteorological tables, new summarized parameters and graphical displays oriented towards engineering applications. The delegate of the United States informed the Commission that copies of the CD-ROM could be made available to Members of the Commission upon request.

7.2.11 Recognizing the impacts of weather, climate and hydrology on human health and comfort and urban design, the Commission agreed that it should promote collaboration and, where appropriate, integration of programmes and projects related to air quality. The activities of GAW and GURME, where atmospheric chemistry, physics and meteorology were being studied from an integrated perspective, were welcomed and commended.

7.2.12 Noting the need to support urban communities in the areas of air quality, health and the impacts of the urban heat island effect, and recognizing the complex interactions between city design, transport, buildings/architecture, land use planning, vegetation, local climate and topography, the Commission:

- (a) Agreed to link more closely with town planners, energy managers, transport managers, public health officials and epidemiologists in the development of relevant climate services;
- (b) Requested the OPAG on Climate Applications, Information and Prediction Services to consider developing a five-year plan for that important activity.

7.3 FOOD AND AGRICULTURE (agenda item 7.3)

7.3.1 The Commission was informed of the outcome of the twelfth session of CAgM (Accra, 18–26 February 1999). It noted with appreciation the work accomplished on weather and climate issues related to agricultural production and those activities of the AgMP that were planned to be implemented in the future. In that respect, the Commission encouraged the harmonization of the activities of the two Commissions.

7.3.2 The Commission was further informed of the emphasis placed on the applications of seasonal to inter-annual forecasts, as well as on climate change scenarios, and of the products and services that were becoming available based on those forecasts and scenarios. Through the CLIPS programme, and in many countries, climate centres were starting to produce specialized climate products tailored to assist agriculture, forestry and fishery managers in their strategic decisions. The Commission therefore supported the decision of CAgM to promote, survey and summarize, using case studies, the current applications of climate forecasts in agriculture, forestry and livestock management and recommend ways and means to use climate forecasts more optimally in operational agriculture with emphasis on user needs especially in the developing countries. In that context, the Commission was pleased to note the initiative taken by the AgMP to collaborate closely with START of IGBP, WCRP and IHDP in the CLIMAG project

and encouraged WMO's continued participation in the activities of the CLIMAG Steering Committee. The Commission strongly endorsed continued collaboration between the AgMP and CLIPS in that important area. Further development of awareness programmes for users of those new services was strongly encouraged as part of all of those activities.

7.3.3 The Commission noted the recommendation made by the meeting of the CAgM Advisory Working Group (Florence, Italy, 2–5 April 2001), that there was a need to promote agrometeorology and agrometeorological applications for efficient and sustainable food, fodder and fibre production for an increased world population in a rapidly changing environment. The Commission also emphasized strongly the need for an integrated approach to servicing the complete value chain of agricultural and food production in order to support improved food quality and safety. The Commission agreed that reliable and accurate data, efficient data processing and rapid exchange of data and products were crucial to the development of short- and long-range forecasts and to applications of agrometeorology. The Commission encouraged its members to provide real-time data and indices relevant to agriculture by Internet and in graphical format. It acknowledged the important role played by the Working Group on Agrometeorological Data Management in identifying trends in new technologies for data products and services. Resolution 9 (CAgM-XII) — Joint Rapporteurs on Agrometeorological Data Management, established those Joint Rapporteurs and requested that they continue to address those issues.

7.3.4 The Commission was informed that the CLICOM system and the related software package INSTAT continue to be, within limitations, good tools for operational activities. It was further informed of the need to develop wider agrometeorological and other applications that linked with future climate database management systems. That approach would be consistent with the spirit of the recommendation from the presidents of technical commissions for an integrated approach to data management across all WMO Programmes.

7.3.5 The Commission noted with appreciation the initiative taken by the AgMP to organize a number of training events on data management and expressed its strong support to continuing the roving seminars and workshops so as to enhance capability in the application of meteorological knowledge and information to agriculture. The Commission noted that CAgM intended to hold the International Workshop on Reducing Vulnerability of Agriculture and Forestry to Climate Variability and Climate Change in the later part of 2002.

7.3.6 The UNCCD emphasized the importance of providing early warning systems that enabled rural communities to take early and timely action to reduce the damage caused to life and property. Article 16 dealing with information collection, analysis and exchange called on Parties to integrate and coordinate the

collection, analysis and exchange of relevant short-term and long-term data and information, as it would help accomplish, inter alia, early warning and advance planning for periods of adverse climatic variation. Augmenting the growing ability to provide seasonal to interannual forecasts was necessary to mitigate the effects of drought and desertification. Article 17 relating to research and development called for promoting technical and scientific cooperation in the fields of combating desertification and mitigating the effects of drought. In that regard, research into the causes and effects of climate variations and long-term climate predictions with a view to providing early warning was an important issue. Addressing those issues required a multi-disciplinary approach. Recognizing the need to enhance climate monitoring networks and provide more reliable seasonal to interannual predictions in the fight against desertification and drought, the Commission expressed its strong endorsement of continuing support by WMO to the UNCCD. The Commission called for increased collaboration between the AgMP, CLIPS and the Hydrology and Water Resources Programme in implementing relevant activities, and in particular, for improving the exchange of climate data and information.

7.3.7 The CBD was inspired by the world community's growing commitment to sustainable development. Climate variability leading to droughts, floods, hurricanes, etc., had a great impact on biological diversity in all ecosystems, in particular in the semi-arid and savannah ecosystems. In addition, a better understanding of climate variability was very important for developing effective in situ biodiversity conservation strategies. Coral bleaching events had increased in intensity, frequency and geographic distribution in the last two decades and the Commission recognized the importance of the use of early warning systems for coral bleaching and for developing approaches for assessing the vulnerability of coral reef species to global warming. The Commission therefore encouraged the continued participation of WMO and the NMHSs in the activities of CBD in order to address the climate-related issues in the Convention. Members were also encouraged to note the synergies between the requirements for climate support to the United Nations environment-related conventions CBD, UNCCD and UNFCCC.

7.3.8 The Commission noted the need to consider the effects of microclimatology on agricultural production and was informed of such efforts made in Russia. Where possible, collaborative efforts should be promoted to develop the linking of fine-mesh meteorological models to agricultural production models. For macro-economic purposes, it was important to consider the links between climate and agricultural output. The Commission was informed of such analyses made in Algeria and presented to the Working Group on CLIPS.

7.3.9 The Commission encouraged increased effort to develop new understandings of intra-seasonal climate timescales for the provision of agroclimatic services and information.

7.4 WATER RESOURCES (agenda item 7.4)

7.4.1 The Commission was informed of the range of activities related to climate which had been undertaken and were planned as part of the Hydrology and Water Resources Programme of WMO.

WORLD CLIMATE PROGRAMME – WATER

7.4.2 The Commission was informed of the first session of the Steering Committee of the WCP-Water, which had been held in Geneva in October 2000. It noted that the goal for WCP-Water was to promote hydrological activities in the WCP and related conventions and to provide the water community with current data and information on hydrological and water resources conditions and variations, in a climatic context, over a wide range of time and spacescales. The broader perspective of WCP-Water aimed to:

- (a) Enhance understanding of the relationship between climatic and hydrological processes;
- (b) Improve availability of data required to achieve success in all WCP-Water activities;
- (c) Enhance understanding of climatic variability and change within hydrological systems and evaluate the impact of such variations and changes on water resources systems;
- (d) Promote more effective use of hydrological information, visibly associated with climatic variability and change, in water resources management;
- (e) Promote the more effective use of hydrological information in climate research, analysis, and interpretation;
- (f) Encourage closer collaboration between the hydrological and climatological communities, with special effort to foster links between CCI and the national OHP/IHP Committees, counterparts of WMO and UNESCO, respectively, that comprised membership from institutions outside NMHSs;
- (g) Encourage interaction among decision makers and the producers and users of hydroclimatological information in the provision of policy guidance.

7.4.3 The Commission noted that WCP-Water was a joint activity of UNESCO and WMO and that it made use of synergies of the expertise of both Organizations in climate and water. The Commission was informed that initial efforts in WCP-Water would therefore concentrate on implementing activities in three priority areas of social concern: climate, water and health; climate, water and food security; and climate-related natural disasters and hydrological extremes in vulnerable basins.

7.4.4 The Commission noted that WCP-Water was of value to the work of CCI and that appropriate activities should be included in the terms of reference of the relevant working groups and rapporteurs of CCI.

7.4.5 The Commission was informed on the outcome of the Workshop on Climate Variability, Climate Change and Water Resources Management (Tokyo, 8–9 June 2001). The Workshop was organized as a major step towards the third World Water Forum to be held in Kyoto in 2003. The purpose of that Workshop was to

provide guidance to the water resources community on how to respond to climate variability and climate change issues. It provided a valuable inter-disciplinary forum between the climate community and that of water resources management. The Commission welcomed the major follow-up initiative to the water and climate dialogue, which was being coordinated by a Netherlands-based secretariat, and encouraged its members and experts to contribute fully to that dialogue. The International Freshwater Conference would be held from 3 to 7 December 2001 in Bonn, Germany. The impact of climate change was one of the subjects to be discussed at that Conference.

GLOBAL WATER-RELATED DATA

7.4.6 The Commission noted with concern that access to global water-related data was often restricted and generally insufficient to support the advancement of knowledge and expertise needed by the global community, including Members themselves, to develop mitigation and adaptation strategies in a changing environment.

7.4.7 In that context, the Commission was informed that a range of monthly products was available from the GPCC, many of them free. The Commission noted with interest the outcome of an expert meeting on the establishment of a global hydrological network for climate, which had been held in Geisenheim, Germany in June 2000. The Commission noted the conclusion of the expert meeting that the most desirable approach would be to bring together those currently active in the collection of climatological data and hydrological data, respectively, to obtain maximum benefit in planning for further improvements. To that end, a Global Terrestrial Network for Hydrology had been proposed by the expert meeting to complement terrestrial networks already established for permafrost, glacier and ecological observations.

COMMISSION FOR HYDROLOGY

7.4.8 The Commission was informed of the results of the eleventh session of CHY (Abuja, Nigeria, 6–16 November 2000), in particular with regard to those activities of CHY which were of relevance to the work of CCI.

7.4.9 The Commission recalled its earlier discussion with respect to interactions between climate and water resources at CCI-XII and expressed the view that closer interactions between rapporteurs of the two Commissions, CCI and CHY, would have the potential to enhance the effectiveness of both their programmes.

7.4.10 In that regard, the Commission identified the following areas of interest for cooperation with CHY, namely:

- (a) Collaboration between hydrologists and climatologists to develop procedures and make available information, including seasonal to inter-annual climate predictions, for use in water resource assessment and management, including management of hydroelectric power generating systems;
- (b) Observation networks for monitoring and predicting long-term changes in hydrological cycles;

- (c) Coordination of modeling work for understanding and forecasting impacts of climate variability on flooding and water resources;
- (d) Closer liaison among CHY and CCI rapporteurs to enhance the interaction between service providers and users;
- (e) Provision of support to global climate and water observing systems, such as GCOS, GTOS and WHYCOS, etc.;
- (f) Development of improved climate prediction tools that reduced the uncertainty in outlooks;
- (g) Research activities oriented towards helping agriculture prevent, reduce or manage the soil salinization problem;
- (h) The development of climate forecasting capabilities that addressed variability at decadal and inter-decadal timescales, which impacted on water resource management and associated systems;
- (i) Continued collaboration on data rescue.

7.5 ENERGY AND OTHER APPLICATIONS (agenda item 7.5)

7.5.1 The Commission agreed that it should expand its activities in climate services for energy beyond solar and wind energy.

7.5.2 Activities should also be expanded to support climate services to energy-related areas such as weather derivatives. Also, special attention should be given to the needs of developing countries for climate information to support renewable energy production and use.

7.5.3 The Commission urged the Secretariat to consider ways of developing, with assistance from the Expert Team on Climate Services for Energy, a poster or a brief report on opportunities for using climate data and services to support renewable energy development, as part of a WMO contribution to the World Summit on Sustainable Development.

7.5.4 The Commission recognized the growing demand for climate data and services to support the various energy sectors. It also noted that initiatives to limit greenhouse gas emissions, driven by international concerns and agreements about climate change, were likely to lead to greater demand for services to support the development and operation of renewable energy generation.

7.5.5 The Commission noted with appreciation the significant reports and recommendations made by the CCI Rapporteurs on Energy–Meteorology, Mr H. Dobesch (Wind Energy — Austria) and Ms S. Robles-Gil (Solar Energy — Mexico). The Commission drew attention to user reports that awareness of the benefits of climate information for design, construction, planning and operation of their energy systems could improve capacity to cope with extreme events. The Commission urged Members to update their instrumentation, to enhance or establish networks for solar radiation and wind measurements, including by using satellite remote-sensing data, to incorporate modelling to describe better atmospheric conditions at the required locations and to initiate or enhance the provision of energy-related climate services.

7.5.6 The Commission recommended the increased use of satellite data in renewable energy applications and encouraged the development of interpolation methods, interpolated datasets and mapping techniques to overcome the problems of providing site specific climate information. The Commission also urged Members to promote the use of climate information for energy related applications, infrastructure planning and the design of comfortable and energy efficient buildings.

7.5.7 The Commission requested its Expert Team on Climate Services for Energy to prepare a status report on climate data needs for supporting renewable energy development. The report should include comments on the adequacy of WMO specified instruments and observing systems to support such development and on the opportunities to use modelling, data interpolation and satellite observation methods to overcome problems of providing site-specific information.

7.5.8 The Commission, in noting those developments, decided to establish an Expert Team on Climate Services for Energy.

7.5.9 The Commission noted that CCI members had participated in numerous relevant international conferences. In that regard, it noted with appreciation that participants from 20 CCI member countries had attended the Second European Conference on Applied Climatology (ECAC-2) in Vienna in 1998 and that 18 CCI members had attended ECAC-3 (Pisa, Italy, 16–20 October 2000) in which both the research and user communities participated actively. The Commission considered that such conferences provided an excellent opportunity for an updated discussion on the most recent research results in applied climatology and for a profitable exchange of information between the research and operations communities.

7.6 INTERACTIONS WITH THE UNITED NATIONS ENVIRONMENT PROGRAMME AND OTHER BODIES (agenda item 7.6)

7.6.1 The Commission noted with satisfaction the progress made in the implementation of the WCIRP and, more broadly, on UNEP's continuing contribution to the Climate Agenda. It noted that UNEP's activities were centred on both support to IPCC, GCOS, UNFCCC, and support to atmosphere-related conventions and protocols. In particular, UNEP was developing a new strategic plan for a more vigorous engagement in future activities of IPCC's Working Groups II and III, including the dissemination of the findings of the Third Assessment Report. The Commission noted with satisfaction the recent high level of activity by UNEP in the area of climate change which could only further increase collaboration with WMO. With regard to renewable energy activities such as those related to solar and wind energy and other activities involving the climate resources, the Commission noted that the fifty-third session of the Executive Council had recommended that UNEP liaise with NMHSs as those could add value to such activities. The Commission requested Members to

continue their support to IPCC assessments, especially in the preparation of IPCC technical papers.

7.6.2 The Commission was briefed on the activities of the Environmental Management Group, which had been established as an initiative of UNEP to enhance United Nations coordination on issues in the field of environment and human settlements. The Group had, thus far, held three meetings, on 22 January, 15 June and 10 October 2001, at which discussion had focused on harmonization of national reporting processes across the various environmental conventions, education and training issues, and support for capacity building activities. The third meeting on 10 October 2001 also considered and discussed the Status Report on International Environmental Governance and a presentation by UNIDO on municipal solid waste management. The fourth meeting, to be held in January 2002, would draw-up an action plan for consideration by UNEP in collaboration with its partner agencies.

7.6.3 The Commission was informed that the eleventh Asia-Pacific Seminar on Climate Change (Kitakyushu, Japan, 28–31 August 2001) had recognized the important role of the application of climate change information to address environmental issues such as impacts and adaptation.

7.6.4 The Commission expressed its satisfaction with the continuing cooperation that existed between WMO and UNEP in those and other areas.

8. CLIMATE INFORMATION AND PREDICTION SERVICES (agenda item 8)

8.0 REPORT OF THE CHAIRPERSON OF THE WORKING GROUP ON CLIMATE INFORMATION AND PREDICTION SERVICES (agenda item 8.0)

8.0.1 The Commission received the report of the chairperson of the Working Group on CLIPS, Mr O. Moch, and congratulated him and the Group for their contribution to that important WCASP project.

8.0.2 The Commission was informed of the recommendations of the Working Group on CLIPS for restructuring and realigning of its activities. The Commission agreed with the Group's assessment that the wide scope of activities, the rapid developments in technology, the expansion in the number of organizations involved and the increasing demand for services, particularly with respect to predictions, necessitated a new approach to the oversight of the CLIPS Project. The Commission recalled that the original terms of reference for the Working Group on CLIPS had focused on applications and end-user issues, with membership appointed accordingly. The Commission noted, however, that from the outset, the CLIPS Project had also had to focus on the production and improvement of climate forecasts, including the establishment of the necessary infrastructure for forecast delivery and capacity building.

8.0.3 The Commission noted the necessity of enhancing the validation and verification processes that would improve assessments of climate forecast systems. It further noted the requirement to facilitate strategic research activities in Member countries in consultation

and collaboration with WCRP/CLIVAR and to promote user engagement and build confidence in climate forecasting systems.

8.1 IMPLEMENTATION OF CLIMATE INFORMATION AND PREDICTION SERVICES (agenda item 8.1)

8.1.1 In reviewing developments in both the science and the approaches to delivering climate information and prediction services over the period since CCI-XII, the Commission noted that many significant advances had taken place. Those included overall progress and specific achievements in observing the climate system, in modeling and forecasting seasonal to interannual timescales, and in interpreting, combining and distributing climate forecasts from different centres. There had also been significant growth in the Regional Climate Outlook Forum process, in understanding the links between the climate system and socio-economic activities, in identifying beneficial applications, in estimating the potential value of climate services, and in collaborating with decision makers in specific applications sectors. An increasing demand for climate services in many parts of the world had accompanied those developments, encouraged in part by the Forum process. Other concerns driving the increased demand for services included a sharpening of the focus on the potential impacts of climate change and more specifically, recognition of the widespread impacts associated with *El Niño*/Southern Oscillation events. The Commission recalled, in particular, the occurrence of the major 1997–1998 *El Niño* event during the early part of the intersessional period. It commended the Secretary-General for the significant efforts in ensuring an important role for WCP in assessing both the scientific and socio-economic aspects of the event.

8.1.2 The Commission recognized the need to open a Web site for CLIPS to promote, inter alia, the sharing of information among Member countries, relevant OPAGs and the Secretariat. In order to promote further the sharing of information on data management, climate prediction, applications and user requirements and capacity building, the Commission requested those regional associations that had not already done so to appoint CLIPS Focal Points. It noted that a process was under way to request Members to appoint national CLIPS Focal Points who could then interact with the Regional Focal Points in supporting networks formed on the basis of common geographical concerns and needs (see also general summary paragraph 8.6.3).

8.1.3 In the view of the Commission, the development of climate information and prediction services represented one of the fastest growing areas in meteorology, and many opportunities existed for enhancing social and economic benefits through services derived from the core activities of the NMHSs of WMO Members. Through the provision of climate services, NMHSs could contribute significantly to the development and testing of adaptation measures to deal with longer-term climate change. The Commission recognized that, in order to exploit the opportunities, close

coordination and cooperation with many sectoral organizations would be necessary.

8.1.4 Noting the growth in developing climate services among numerous organizations, including those directly linked to WMO Programmes, the Commission urged all NMHSs to create plans for the development of such services where those did not yet exist, taking into consideration current activities throughout their respective countries and regions. The Commission recommended that the development and the progression of those plans be given as high a priority as possible. Within that context, the Commission stressed the importance of the CLIPS project for underpinning the improvement of climate services in a wide range of sectors. Considering that critical role of CLIPS, the Commission highlighted the need for adequate financial support for the project, including support to the Project Office and, in terms of resources, made available within NMHSs to CLIPS-related activities. The Commission acknowledged the support provided by various Member States, organizations and institutions such as IRI, ECMWF and others to the delivery of CLIPS outcomes. The Commission agreed that a commitment should be made to the continuation of CLIPS project office activities and that emphasis in the terms of reference for CLIPS should be placed, inter alia, on:

- (a) Further development of the concepts and the operations of RCCs, taking note of the activities of Regional Climate Outlook Forums;
- (b) Provision of guidance material for education and training;
- (c) Assisting with the development of supporting activities, especially at a regional level, including data collection and management.

8.1.5 The Commission observed that one objective of the CLIPS project, namely the fostering of an end-to-end approach to the development and delivery of climate services, would benefit from a focused research agenda. The Commission therefore decided that attention should be given to a CLIPS research agenda covering end-to-end the activities of the project. The research agenda should be broadly based, encompassing the development of operational forecasting, application techniques, communication and presentation methods, and verification. The agenda should therefore integrate and complement the existing research agenda on the climate system being conducted within the WCRP. It should be developed through broad consultation and its implementation should be planned with the WCRP.

8.1.6 The Commission was informed of the outcome of the Expert Meeting on Climate Information Exchange in the Asia-Pacific Region (Tokyo, 30 October–1 November 2001), which was organized by JMA and included inviting experts from the Region and representation of WMO. The Meeting identified needs for higher quality climate services, more exchange of climate information and better capacity building activities in the Region. The Meeting also recommended the establishment of a broad-based cooperative framework including

the establishment of RCCs, and building on strengthened coordination among existing regional climate activities.

8.2 REQUIREMENTS FOR INTEGRATED DATA AND PRODUCTS (agenda item 8.2)

8.2.1 The collection, storage and primary analysis of climatological data from several sources that could be linked to other data specific to particular applications sectors were important prerequisites for the development of effective climate services. The Commission perceived a value in identifying such data requirements, which were often not satisfied in all countries for various user sectors. The Commission noted that a set of requirements for seasonal to interannual climate predictions and supporting observational data had been developed, that dealt with the needs for the input of information to NMHSs, RCCs and other meteorological information delivery centres. The Commission expressed its appreciation to the vice-president of the Commission, Mr J. M. Nicholls, for his efforts at spearheading that compilation. It agreed that CLIPS could perform a useful benefit to climate service providers by extending that activity to include the additional data and product requirements for developing applications in major sectors such as water, agriculture, health and energy. The Commission therefore recommended that consideration be given to the development and consolidation of those broader requirements, in association with other WCP projects and WMO applications programmes, as appropriate.

8.2.2 Noting the position with regard to the provision of climatological data taken by the fifty-third session of the Executive Council (agenda item 12.2), the Commission stressed that progress in developing application services was critically dependent on ready access to climatological data by those concerned with the development of those services. It urged NMHSs to examine their data distribution policies with the objective of eliminating any impediments to the provision of climatological data, within the terms of Resolution 40 (Cg-XII) — WMO policy and practice for the exchange of meteorological and related data and products including guidelines on relationships in commercial meteorological activities.

8.3 DEVELOPMENTS IN OPERATIONAL SEASONAL TO INTER-ANNUAL CLIMATE PREDICTION (agenda item 8.3)

8.3.1 The Commission acknowledged with gratitude the survey on the present status of climate forecasting undertaken by the Rapporteur on Methods of Climate Prediction including Models Output (with special reference to criteria for evaluating skill), Mr Y. Kimura. That survey had provided the first comprehensive overview of the rapidly developing state of operational seasonal climate prediction among WMO Members. The fact that over 75 per cent of the responding Members had, or expected to introduce, facilities to issue seasonal forecasts attested to the high level of interest. The Commission urged that that survey be repeated at

appropriate intervals and requested the Secretariat to examine how future surveys, such as those available on verification methodologies, might be coordinated with existing annual reviews covering long-range or seasonal forecasts carried out by CAS and CBS.

8.3.2 The development of improved methods of integrating predictions into the decision processes, decision models of users was an important activity of CLIPS. The Commission noted that, while several projects were currently examining that integration, there was a need for further work and that many conversions of forecasts into decisions for applications were currently made by employing subjective processes of unproven validity. Hence the Commission requested the Secretary-General to consider as a matter of priority the organization of a multi-disciplinary conference on decision processes in climate applications. The structure of the conference should be designed to ensure that its outcomes and recommendations were applicable to the roles and functions of NMHSs.

8.3.3 The Commission recalled that Thirteenth Congress had requested the president of CCI to examine the need for an ethical code related to the delivery of seasonal to interannual predictions. The Commission noted that some countries already had detailed procedures to make certain that seasonal to interannual predictions were delivered in an ethical way. It was also noted that approaches to that issue varied between countries and that it would be very difficult for CCI to prepare an ethical code that would be applicable in all circumstances. It was considered, however, that the matter could be further examined in the light of experience gained from the operation of RCCs. The Commission decided, therefore, that there was no current requirement for CCI to develop an ethical code related to the delivery of seasonal to interannual predictions.

8.3.4 In consideration of the current state of development of seasonal to interannual prediction and the need to advise users of improved methods for using available forecast information, the Commission requested that:

- (a) Additional techniques be developed to provide the full probability distributions of seasonal to interannual predictions;
- (b) Further attention be given to the development of ensemble prediction techniques and downscaling methods using, for example, nested limited area climate models;
- (c) Efforts continue on the development of methods for reaching consensus on the optimal approaches to combining predictions from the diverse seasonal to interannual methodologies in use.

8.3.5 Verification of forecasts was a key activity that provided useful advice to model developers, forecast producers and the users of forecasts. The Commission, recognizing current limitations of seasonal to interannual climate prediction, stressed that diagnostics chosen for the information of users should be consistent with user needs. The Commission agreed that verification methods for quality assessment of probability forecasting and the communication of uncertainties, scope and

limits of forecasts to users would need to be addressed by an Expert Team. It suggested that it might be appropriate to schedule a workshop to explore those subjects.

8.4 INTEGRATING CLIMATE INFORMATION AND PREDICTION SERVICES WITH CLIMATE APPLICATIONS AND SERVICES (agenda item 8.4)

8.4.1 The Commission was pleased to note the successful outcome of the CLIPS Food Chain Showcase Project and expressed its gratitude to the United Kingdom for its support of that work. Of particular interest were the demonstrations of the need for close coordination and cooperation between meteorologists and users and of the effectiveness of objective methods for determining forecast value and for defining application strategies. The Commission commended the methodology used in that project for pilot and demonstration projects in other parts of the world, noting that for different geographical and economic situations there existed other methods that might be more suitable. The Commission also encouraged NMHSs to make further efforts to collaborate with users, including other government bodies, at all levels from local through national for the application of climate information. The Commission further noted the outcome of the Technical Conference on Climate Services for the Twenty-first Century (held prior to CCI) that also drew attention to the many opportunities for collaborating with universities and the broader academic community in the area of climate applications.

8.4.2 The organization of end-to-end demonstration and pilot projects constituted a major outstanding need in the development of climate services, particularly those dependent upon predictions. The Commission requested that methodologies with wide geographical and sector applicability be explored within the CLIPS project and that those methodologies objectively assess the benefits achieved. The Commission urged all WMO Members to consider their needs for developing pilot projects in coordination with users in their countries or regions and to employ identified CLIPS Focal Points as appropriate to help instigate those projects (see agenda item 8.6). Noting that other Commissions, especially CAgM and CHy, had interests in the application of seasonal forecasts, the Commission requested the president to explore with his counterparts how best to improve the level of cross-commission coordination in that area.

8.4.3 The Commission recognized that, for some regions of the world in some seasons, advances in prediction capabilities in recent years had been converted into substantial benefits. That applied especially to nations in and around the Pacific Basin during *El Niño* and *La Niña* events, but also to parts of Africa and the Americas. The Commission recognized, however, that such advances in seasonal prediction capabilities were yet to be realized for other parts of the world. The Commission therefore called for more research, e.g. through CLIVAR, into determining the potential for seasonal predictability in such regions. Additionally, the Commission strongly encouraged the expansion of

collaborative work between climatologists and economists to demonstrate quantitatively the benefits of various seasonal prediction capabilities.

8.4.4 The Commission expressed its appreciation for the contribution of other Commissions in fostering the ideals of CLIPS, noting in particular the CLIMAG project, a joint initiative of the international global system research programmes such as START, and supported also by CAgM. It further recognized the need for CLIPS to foster or align itself with similar activities in other application areas. The Commission acknowledged the very positive contribution of a number of research groups to the development of the CLIPS project and looked forward to continued and enhanced collaboration in that regard. The Commission was informed that the Hellenic Meteorological Service in Greece was participating in the preparations of the Olympic Games to be held in Greece in 2004. It had already prepared climatological information guidebooks for a number of cities that would be involved for hosting the games.

8.4.5 Recognizing that climate was a national resource which could be quantitatively described, the Commission agreed that there would be value in the preparation of a handbook on world climate resources which could help decision makers in formulating structural changes of their economies. The Commission was informed that the Russian National Meteorological Service had produced such a handbook and that it would be ready to provide help in its preparation. Within that context, the Commission agreed to appoint a rapporteur on climate indicators for input to sustainable development strategies. Furthermore, noting the importance of reducing vulnerability to disasters stemming from climate anomalies, the Commission agreed that there would be value in investigating the development and provision of climate watch systems.

8.5 INFRASTRUCTURE FOR SEASONAL TO INTERANNUAL CLIMATE PREDICTION (agenda item 8.5)

8.5.1 The Commission recognized the important role played in recent years by the Regional Climate Outlook Forums, and especially the CLIPS contribution, in providing some infrastructure for delivering authoritative forecast information to NMHSs and, ultimately, to end users. The Commission noted that more than 30 forums had been held throughout Africa, South and Central America, the Caribbean and Asia. The forums were now a regular feature of the calendar in most of those regions, operating either as scheduled meetings or increasingly through various forms of electronic communications. In that regard, the Commission was informed of the joint meeting for East-Asia Summer since 1997 and Winter Monsoon Prediction since 2000, organized by China, Korea and Japan. The Commission also noted the contribution made by various stakeholders, including the private sector, to the success of the Regional Climate Outlook Forums.

8.5.2 The Commission commended the organizers and participants to the Global Review International Expert Meeting on Regional Climate Outlook Forums

(Pretoria, 16–20 October 2000) and expressed its appreciation to the Government of South Africa for hosting the event. The Commission endorsed the recommendations of the Review and urged its Management Group, OPAGs and Expert Teams to contribute to their implementation. The Commission noted the proposal that the main groups involved in the review, covering meteorological user and donor communities, form a committee comprising regional and international stakeholders, including developing countries. That proposal would stimulate wider support and facilitate the transition of the forum process to NMHSs in Africa, mandating regional centres during the transfer process. The Commission noted that that proposal would also apply to other Regions. It requested that the president of the Commission and the Secretary-General ensure that WMO and the interests of its Member NMHSs and their national and regional partners were appropriately represented in the deliberations and work of that committee.

8.5.3 The Commission noted that the Intercommission Task Team on RCCs, established by the fifty-second session of the Executive Council, had proposed that RCCs might undertake some of the responsibilities of organizing Regional Climate Outlook Forums. At the same time, the Commission requested that any development in the forum process itself take due consideration of progress towards establishing the role and functions of RCCs. Accordingly, the Commission requested the president of CCI to ensure a close liaison between the Intercommission Task Team and the multiparty committee referred to in general summary paragraph 8.5.2 to promote international developments in the Regional Climate Outlook Forums process. The Commission also recognized the important role that the commercial sector could play in providing value-added services designed to benefit specific industries and interests. The Commission agreed that that aspect should be included, as appropriate, in the overall context of an infrastructure for the provision of climate services.

8.6 CAPACITY BUILDING (agenda item 8.6)

8.6.1 The Commission noted the success of the CLIPS training workshops on regional climate applications and prediction in RA I and RA V and acknowledged the support of contributing Members, and other institutions. Additionally, the Commission expressed its appreciation to the Cooperative Institute for Mesoscale Meteorological Studies at the University of Oklahoma (United States), for arranging follow-up training for focal points from RA V. The increased potential for the Internet to provide facilities to assist NMHSs to undertake climate prediction research was noted and the Commission agreed that further development of new and existing Web sites for that purpose by Members would be a tangible contribution to the implementation of the CLIPS objectives. The Commission urged that training workshops be arranged for the remaining regions and subregions as quickly as resources permitted.

8.6.2 The Commission was pleased with the development of the CLIPS Focal Point programme and stressed

that basing concentrated training and development on identified individuals was an effective way to build capacity, given the relative complexities in handling seasonal to interannual forecasts and their applications. It was agreed that the appointment by Permanent Representatives of Focal Points throughout all Regions should be carried out in parallel with the development of other regional training and capacity building opportunities. The Commission noted that RAs I, II, IV and V had agreed to the concept of appointing CLIPS Focal Points and urged all Permanent Representatives to make nominations at the appropriate time.

8.6.3 Recognizing the value of developing a culture of mutual support among CLIPS Focal Points, the Commission recommended that subregional groupings of Focal Points be developed, based around appropriate rapporteurs and climate working groups appointed by the regional associations. The Commission urged each Association to consider an approach appropriate to its Region and to establish mechanisms by which such subregional coordination could be best achieved. The Commission requested that capacity building activities within CLIPS also include an exploration of the current and potential use of GIS. The establishment of a network of those currently using GIS for climate applications could serve as a very practical starting initiative (see also general summary paragraph 10.5.4). The Commission noted that the two reports on GIS activities provided by the CCI Rapporteurs on Capacity Building, Messrs B. Dahlstrom and G. Marrachi, provided a good basis for capacity building activities in that area.

8.6.4 The Commission commended the development of the CLIPS curriculum as an effective means for involving a large number of organizations in the CLIPS project and also for making available a high level of expertise in all aspects of capacity building within the CLIPS project. The Commission requested all organizations with the appropriate level of expertise to cooperate to the maximum possible extent in the further development of the curriculum. Additionally, the Commission stressed the importance of making the curriculum available in as many of the official languages as possible and requested the Secretary-General to explore the options for facilitating the translation of the material.

8.6.5 One of the prime requirements in developing climate and information services globally was to build a cadre of experts in all involved countries. The Commission acknowledged that the CLIPS curriculum, in association with the Focal Point programme, represented an important step in developing the necessary capacity. Accordingly, the Commission requested that sectoral awareness programmes be organized through the CLIPS Focal Points to facilitate the promotion both of existing climate services and of the potential value of new climate services under development. The Commission agreed that, to the extent possible, CLIPS should be active in all the WMO Regions, and to facilitate that Members were urged to consider hosting future CLIPS-related activities.

8.7 INTERACTIONS ON SEASONAL TO INTERANNUAL CLIMATE PREDICTION (agenda item 8.7)

8.7.1 The Commission recognized that the scope of the CLIPS project was sufficiently wide for close and essential cooperation to exist with other WMO Programmes and with programmes and projects of other organizations. In terms of the basic research needed to support the CLIPS project, the Commission was pleased to note the links already established with the WCRP CLIVAR programme in the areas of modeling and prediction and in better understanding regional climate variability, notably in RA I. The Commission further recognized the work of WCRP/CLIVAR in coordinating much of the research on the climate system that underpinned the CLIPS project, and in particular the Working Group on Seasonal to Interannual Prediction, through which important research initiatives on dynamical prediction were being undertaken. The Commission urged that such links be maintained and further expanded. The Commission was also pleased to note the success of the WMO International Workshop on Applications of Long-range Weather Forecasts (Cairo, Egypt, 23–27 January 2000) that was arranged jointly with AREP.

8.7.2 The Commission noted that issues relating to the infrastructure for seasonal to interannual climate prediction currently lied within the remit of the Intercommission Task Team on RCCs and had been handled in coordination with CAS, CBS and CAgM. The Commission recalled that CHy-XI had appointed an Expert on Medium- and Long-term Forecasting and, therefore, had decided that CCI and CHy should maintain close collaboration on the potential contribution from improved seasonal to interannual prediction capabilities to water resources management. The Commission further noted that many organizations were now involved in the development, production and delivery of climate services. The Commission stressed the need for the CLIPS project to engage in as wide a dialogue as possible with those organizations in order to develop effective climate services for WMO Members in the most efficient way possible and with a minimum of duplicative effort. The Commission noted that in developing and refining the designation of RCCs, there were considerable advantages in expanding the roles of existing meteorological centres with adequate infrastructure and the necessary means to provide a range of climate services.

9. ELECTION OF OFFICERS (agenda item 9)

9.1 Mr Y. Boodhoo (Mauritius) was unanimously elected president of CCI.

9.2 Mr V. Vent-Schmidt (Germany) was unanimously elected vice-president of CCI.

10. OTHER ACTIVITIES OF THE COMMISSION (agenda item 10)

The priorities of the Commission were largely reflected in the taskings of the teams and rapporteurs it had established for the intersessional period, as discussed in agenda item 11. The Commission considered

the following additional factors that had a bearing on its work programme.

10.1 REPORT OF THE INTERCOMMISSION TASK TEAM ON REGIONAL CLIMATE CENTRES (agenda item 10.1)

10.1.1 The Commission noted the activities being undertaken through the Executive Council and relevant technical commissions to consider the possible roles of RCCs in the provision of climate information and prediction services. It supported the concept of RCCs and agreed on the need to define carefully the roles, functions and designation criteria for RCCs within an overall infrastructure for delivering climate services to end users. The Commission noted that detailed tasks for the RCC's were listed in *General Summary of the Session of the Intercommission Task Team on Regional Climate Centres* (WMO/TD-No. 1070, WCASP-No. 52). Recognizing that the delivery of services proceeded through a series of stages beginning with the capture of the basic data needed and ending with the application of information, and acknowledging that each stage required specific expertise and competencies, the Commission endorsed the notion that RCCs could be hosted by regional specialized centres within the WMO system and could perform a crucial role in addressing the objective of full competencies in all countries. It expressed its appreciation to the president for bringing the issue forward within WMO, to its vice-president for representing the Commission on the Intercommission Task Team and for drafting both the Statement of User Requirements for Seasonal to Inter-annual Forecast Products and Training and a summary document of possible functions of RCCs, and to Mr H. Kondo for also representing the Commission on the Intercommission Task Team. It recommended continued support of the Intercommission Task Team in its work toward the designation of RCCs. The Commission noted that CAS, CAgM and CBS were also represented on the Intercommission Task Team. The Commission expressed its appreciation to Japan, China and the Russian Federation for their proposals to establish RCCs. In that regard, it requested its Members to review the report and subsequent report(s) of the Intercommission Task Team, and to provide comments and recommendations to the president at least one month prior to its future meeting(s). The Commission requested the president to work with the Secretariat to ensure the incorporation of appropriate text on that matter into the Sixth WMO Long-term Plan.

10.1.2 The Commission further noted that:

- (a) There existed the opportunities for RCCs to help achieve the goals of GCOS through regional approaches to observations, networks and data management;
- (b) The needs of the regions were different, and that that might result in the corresponding RCCs being different. Some RCCs, for example, might develop as virtual centres (meaning that the activities would be distributed among the Members within the Region) while other Regions might require a centralized centre;

- (c) The designation of RCCs could be accomplished in consultation with the relevant regional association by either CCI or CBS;
- (d) There might be requirements for more than one RCC in some Regions;
- (e) CCI should consult with WCRP on recommendations for research activities that could be conducted within RCCs.

10.2 WMO CONTRIBUTION TO CLIMATE AND SUSTAINABLE DEVELOPMENT (agenda item 10.2)

10.2.1 The Commission noted with satisfaction the actions taken by the Secretary-General to ensure the active participation of WMO and the NMHSs of its Member countries in the work of UNFCCC. It also noted that WMO, on its own and in collaboration with other organizations and agencies participating in the Climate Agenda, provided scientific and technical reports and information to various sessions of the Conference of the Parties to the UNFCCC and to its SBSTA. The Commission appreciated the information provided by the Secretary-General through regular circular letters to the Members of the Organization on the decisions and activities of the UNFCCC and its bodies on research and systematic observation of the climate system. The Commission urged its members to advise their Permanent Representatives on the various issues related to the UNFCCC so that NMHSs might participate more effectively at the national, regional and international levels, including the implementation of the relevant decisions of the Conference of the Parties. The Commission commended the Secretary-General and the GCOS programme for ensuring that systematic observations for climate remained an important issue for the success of the Convention. It urged Commission members to contribute to their national reporting on that issue, which would assist GCOS in its preparation of a second adequacy report on systematic observations of the climate system. The Commission also noted that its work was relevant to the implementation of the UNCCD. In that regard, the Commission recognized that it should work closely with CAgM, which had primary responsibility for WMO support to that Convention.

10.2.2 The Commission was informed of the overall coordination of the WCP. In that regard, the Commission noted with satisfaction the decisions made by Thirteenth Congress and the Executive Council relating to the enhancement of the activities within the framework of the Climate Agenda. The Commission also noted the establishment of an Executive Council Advisory Group on Climate and Environment and requested that the president maintain cooperation with it and report its findings to the members of the Commission.

10.2.3 The Commission noted the preparations under way within the United Nations system for the World Summit on Sustainable Development that was planned to take place in Johannesburg, South Africa in September 2002. The Commission recognized the

importance of that 10-year review of the outcomes of the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992. It agreed that CCI Members should assist the NMHSs of its Members to participate to the fullest extent in their national preparations for the Conference, which included the preparation of national reports and the convening of regional meetings. The Commission requested the Secretariat to keep Members informed of specific activities being planned by the United Nations system and to facilitate the active participation of the climatological community wherever possible within current budget resources. The Commission noted that extensive information about events and activities leading up to the World Summit was available on the Web. The Commission was informed that the South African Weather Service had appointed focal points for that important Summit who would work closely with the WMO Secretariat to ensure that WMO Programmes and activities received due prominence.

10.2.4 The Commission noted with interest the information provided by the delegation of the Russian Federation, that at the G-8 meeting held in Genoa, Italy in July 2001, the President of the Russian Federation had stated the intention to organize a world conference on climate change in Russia in July 2003.

10.2.5 The Commission was informed that the National Climate Committee of China would hold the International Scientific Conference on Climate Change to address the issues to be faced in preparing the IPCC Fourth Assessment Report. The Commission encouraged Members to take an active part in such activities.

10.3 USES OF SATELLITE INFORMATION (agenda item 10.3)

10.3.1 The Commission noted the increasingly important role of satellite information in climate monitoring and prediction and in applications that served socio-economic and agricultural activities and products. In that regard, it noted with appreciation the significant reports and recommendations made by its vice-president (CCI member of the CBS Expert Team on Observational Data Requirements and Redesign of the GOS), by the CCI Working Groups and by the different CCI Rapporteurs — Messrs P. Bessemoulin (International Exchange of Climate Data and Products), M. Crowe (Global and Regional Climatological Datasets and Station Networks), B. Dahlstrom (Capacity Building with emphasis on the use of GIS), K. Gallo (Urban) and Ms S. Robles-Gil (Energy).

10.3.2 The Commission noted the benefit to CCI programmes of having established observational data requirements for seasonal to interannual predictions within the WMO/CEOS database, and of the rolling requirements review through the work of the Expert Team on Observational Data Requirements and Redesign of the GOS. It noted that other applications mentioned by the Rapporteurs had included the surveillance of meteorological systems that might affect the operation of energy systems; the identification of climate stations based on their environment (urban, rural or suburban)

with the Defense Meteorological Satellite Program–Operation line scan and IGBP land cover datasets; the estimation of urban-rural differences in monthly maximum, minimum and average temperature and derivation of urban biases; and the construction of global baseline datasets and reanalysis datasets (both satellite-based, and mixed satellite and in situ data).

10.3.3 The Commission also noted that several CCI rapporteurs and members of working groups had reported on uses of satellite information and the corresponding requirements for satellite data, and had made substantive recommendations for future work. The Commission was informed of the activities carried out by Germany and its partners in the EUMETSAT Satellite Application Facility on Climate Monitoring towards the use of satellite data especially for climate monitoring purposes. The Commission further noted that satellite information offered great hope for future climatological activities. The CCI Working Group on Climate Data recognized the growing importance of climate data derived from satellite information, specifically noting the work being done at NCDC in Asheville in blending satellite data and in situ data into climate products. The Commission also recognized the need for daily data of many types including gridded satellite information.

10.3.4 The Commission concluded that the requirements of additional climate applications should be entered into the WMO/CEOS database, and that future rolling requirements reviews should include those requirements and the performance of the satellite systems in meeting them. The Commission further concluded that:

- (a) Satellite data and products offered great potential for climatology;
- (b) Satellite data could serve to fill in data gaps and offered an excellent complement to the current in situ datasets, especially in data-sparse areas of the world;
- (c) More work was necessary in blending and integrating satellite data and in situ data;
- (d) The Commission should seek to collaborate further with the space agencies of the world through existing bodies and organizations.

10.4 GUIDE TO CLIMATOLOGICAL PRACTICES (WMO-No. 100) (agenda item 10.4)

10.4.1 The Commission noted with appreciation that Part I of the revision to the *Guide to Climatological Practices* (WMO-No. 100) had been substantially completed. It recognized the significant contributions of Mr K. Davidson, then-Deputy Director of the NCDC, Asheville, in editing the completed chapters, and of the four chapter editors who compiled, reviewed and completed the work of the many contributors from within CCI ranks (Messrs Y. Boodhoo, J. M. Nicholls, K. Davidson, and V. Vent-Schmidt). It noted that the completed chapters had been placed on the CCI Web page pending final review and publication. The Commission further noted that the fifty-third session of

the Executive Council had expressed support for the Commission's intention to start preparations of the second part of the *Guide* in the near future and urged that that be completed as rapidly as possible. The Commission pointed out that the *Guide to Climatological Practices* was a key resource that would assist Members to provide a seamless stream of crucial environmental information and stressed the need for the *Guide* to be translated into other languages. It also noted the offer of the Russian Federation to provide information on work conducted in the field of specialized requirements with respect to the provision of climate services.

10.4.2 The Commission considered how it should proceed with Part II of the *Guide*, and recognized that a starting point would be a review of the requirements and associated estimated costs of that part of the *Guide*. It was recommended that that should be an early task for the Expert Group on the *Guide to Climatological Practices*.

10.5 CAPACITY BUILDING AND TRAINING ACTIVITIES (agenda item 10.5)

10.5.1 The Commission noted with appreciation the significant reports and recommendations made by the CCI Rapporteurs on Capacity Building, Messrs G. Maracchi and B. Dahlstrom (emphasis on the use of GIS), L. du Pisani (emphasis on conditions in developing countries) and N. Ward (emphasis on prediction quality and CLIPS).

10.5.2 The Commission supported the Russian Federation's proposal concerning the need to develop a new scientific direction for climatic applications. That new direction included climate applications on energy resources, which had the potential to solve specific problems in the various socio-economic sectors. The Commission noted the willingness of the Russian Federation to share methodologies already developed on the quantitative assessment of climatic resources.

10.5.3 The Commission noted that the *Guidelines for the Education and Training of Personnel in Meteorology and Operational Hydrology* (WMO-No 258) offered considerable help in standardization of training that was particularly relevant for developing country Members. Distance and virtual Web-based education could also be of significant benefit to trainees in developing countries if experienced officers of contributing NMSs were used as mentors. It also noted the contribution through its president to the WMO Education and Training Programme. That was being achieved through the preparation of a curriculum for specialized training on urban and building climatology.

10.5.4 The Commission noted again the potential offered by improved methods of using GIS tools to assist in the whole chain from basic data handling to advanced Web-based and decision modelling, and the potential of those tools to enhance much of the internal production work flow at the NMHSs. Capacity building within the GIS sphere through enhanced and structured use of information contained on the Web was of extraordinary importance for the upgrading of the production

capacity of NMHSs (see also general summary paragraph 8.6.3). The Commission encouraged Members both to join Web-based GIS user groups that focused on the climatological and hydrological fields and to participate with CCI and regional associations in creating such user groups for regional needs, in concert with the CLIPS project.

10.5.5 The Commission noted that, with regard to building CLIPS-related expertise in the meteorological community, a large number of experts well versed in the nature of climate variability and prediction would need to be involved.

10.5.6 The Commission noted with satisfaction that many excellent CLIPS-related education and awareness initiatives had taken place during the intersessional period. Several of those educational activities were associated with the Regional Climate Outlook Forums and with seminars conducted through the CLIPS project.

10.5.7 The Commission was informed of the Israel Regional Meteorological Training Centre and its various activities. That Centre was a joint WMO and Israeli Meteorological Service Centre. It offered training in database management and several other areas of interest to the Commission.

10.6 OUTCOME OF THE TECHNICAL CONFERENCE ON CLIMATE SERVICES FOR THE TWENTY-FIRST CENTURY (agenda item 10.6)

10.6.1 The Commission received with satisfaction the report of Mr P. Lamb, chairperson of the Technical Conference on Climate Services for the Twenty-first Century (Geneva, 19–20 November 2001). Three major points had been emphasized in the report. Firstly, WMO's programme of climate data collection and archival stood in stark contrast to the often largely undeveloped or fragmented systems operating in many application areas, but more work to establish the climate baseline was needed and that required the sustained efforts of all the Members. Secondly, the fullest possible interactions with the ultimate users of climate services were needed to exploit the technological advances and to incorporate innovative local solutions. The third major point identified was the need to increase in many countries the involvement of universities in the research and related activities that must underpin the development of climate services.

10.6.2 The Commission was informed that 116 participants from all WMO Regions had attended the Conference, in addition to the speakers and Secretariat participants, and that 88 of those had stayed on to participate in the thirteenth session of CCI. In addition, the dialogue forums and panel discussions had resulted in a large number of specific recommendations of relevance to all aspects of the WCDMP and the WCASP. The Commission noted that the Conference experience, together with the resulting recommendations, had formed a very useful preparation for the session of the Commission, and noted with appreciation the significant role the Conference had played in enhancing

participation from developing countries in the thirteenth session of CCI. It expressed its sincere appreciation to the CCI leadership and the AWG, the chairperson of the Conference, the Members and partner organizations who had provided staff and financial resources, and the Secretariat for the considerable efforts which had made the Conference successful.

10.7 LINKAGES AND COLLABORATIVE ACTIVITIES WITH OTHER TECHNICAL COMMISSIONS AND REGIONAL ASSOCIATIONS (agenda item 10.7)

10.7.1 The Commission was informed about the decisions of the fifty-third session of the Executive Council regarding linkages and collaborative activities with other technical commissions and regional associations. The Executive Council had noted that the Meeting of the Presidents of Technical Commissions (Geneva, 4–6 October 2000) had focused on consideration of joint priority activities and projects, which would require coordinated actions by several or all technical commissions. The Commission also noted that the Council had endorsed the nine strategies and associated goals contained in the framework of the draft 6LTP and, in that regard, it endorsed the emphasis on the importance of linkages and collaborative activities that was contained in the ninth strategy and its associated goals.

10.7.2 The Commission recognized that the presidents of the technical commissions had agreed to cooperate in the area of urban meteorology (including climatology), agricultural meteorology and hydrology through flexible joint activities. The Commission further recognized the importance of expanding, whenever possible, the collaboration with the regional associations. Such collaborations would ensure that the commissions and Regions obtained leverage from each other's work and would eliminate duplicative efforts.

10.8 QUALITY MANAGEMENT AND QUALITY ASSURANCE (agenda item 10.8)

The Commission noted with appreciation the report on quality management in an NMS made by the CCI Rapporteur on Interaction with Users and Public Awareness, Ms E. Koch, and recognized the value and application of such practices to climatological services and proposed that a guidance report be assembled with the help of suitable experts and that it be distributed to Members.

11. STRUCTURE OF THE COMMISSION FOR CLIMATOLOGY, WMO STRUCTURAL ISSUES AND LONG-TERM PLANNING (agenda item 11)

WORKING STRUCTURE OF THE COMMISSION FOR CLIMATOLOGY

11.1 The Commission considered structures that would enable it to meet the needs of Members most effectively during the next intersessional period. In doing, so it took account of its performance over the previous period, of the recommendations of its working groups and rapporteurs, of the developing roles and

expertise of other WMO constituent bodies including the regional associations in climate issues and of the roles of other international agencies and groupings. The Commission also took note of the discussions taken at Thirteenth Congress and at the Executive Council on the WMO structure, including that of the technical commissions and the Long-term Plan.

11.2 The Commission noted the discussions held on the WMO structure at the fifty-third session of the Executive Council, in which it was agreed that structural changes should better facilitate the realization of WMO's Long-term Plans. The Executive Council also agreed that in the light of rapid changes, new structures should allow for flexibility, responsiveness and delegation. In that connection, the Council noted that the implementation of a new structure within CBS had been successful in achieving the objectives of the WWW Programme and in improving links with other technical commissions and regional associations. The Council considered that the CBS experience might also be useful to other Commissions, but that it was up to each Commission to consider its appropriateness, in all or in part, to its particular requirements.

11.3 The Commission noted the Congress request to the presidents of the technical commissions to develop collaborative projects in order to improve effectiveness and efficiency. It welcomed the initiatives taken by the presidents of CCI, CBS, CAgM and CAS to develop jointly the proposals for RCCs, and the participation of CCI Experts on CBS Expert Teams. The Commission requested its president to facilitate the continuation of active and appropriate representation of its interests on those teams. The Commission encouraged further cooperation between the presidents of CCI and CBS on methods to ensure that the linkages became fully effective and to ensure that the basic structures of the WWW Programme provided appropriate support to the WCP. The Commission further requested its president to seek expertise from other Commissions, when that would be beneficial, to the work of its own expert groups. The Commission recognized however that the practice of cross representation had to be carefully managed in order for it to function effectively within available resources.

11.4 The Commission reviewed its performance over the previous intersessional period. It considered that significant progress in assisting many Members had been achieved in several areas. Those included the development of climate change indices, the development and testing of new climate database management systems, the development and operational introduction of heat/health warning systems, the assembly of a new edition of the *Guide to Climatological Practices* (WMO-No. 100), the generation of an agreed initial framework for the establishment of RCCs, and the agreement of guidance on the application of Resolution 40 (Cg-XII) to climate data. It noted that a common characteristic of those activities was the establishment of task-focused teams of experts to deal with particular issues or projects, with appropriate Secretariat support.

11.5 The Commission took note of the recommendation of the Working Group on CLIPS with regard to improving the management structure for CLIPS. The Working Group proposals included the establishment of a CLIPS Steering Committee supported by task-focused expert teams. The Commission noted that the proposed structure involved the addition of new skills at the proposed Steering Committee level and wider representation of countries than at present, with more frequent meetings than had been possible. The Commission considered that the effective implementation of CLIPS in NMHSs required active and wide regional participation in its overall management, with representatives being well briefed on successes and problems of implementation within their regions. It also agreed that the encouragement of Members to establish national CLIPS Focal Points should continue and requested the Secretariat to assist in the process of establishing active CLIPS Focal Points networks in all regions. It welcomed the use of CCI-led Expert Teams to examine specific issues, for example those related to product verification, training and research topics, and noted that that should involve expertise from other areas such as the WCRP CLIVAR programme. In considering the Working Group's proposal for a CLIPS Working Group on Applications, the Commission considered that care and rationalization would be needed regarding the work of other groups established to deal with applications in other WMO programme areas, for example, in agricultural meteorology and in hydrology.

11.6 The Commission recognized the valuable work carried out by many of the rapporteurs appointed at its last session and through the meetings of the AWG and the Working Group on Climate Data. The Commission was informed that arrangements for providing leadership and guidance to rapporteurs not associated with its technical working groups (individual rapporteurs) had been set up by the AWG. The Commission agreed that a new structure must provide for closer guidance and coordination mechanisms for all rapporteurs and for the review of outputs including reports submitted for publication. The Commission agreed that tasks identified for individual rapporteurs should be focused on the specific outputs required by the Commission and that more careful consideration was needed when identifying rapporteurs, who might be considered as "one-person" Expert Teams. The Commission further agreed that the number of individual rapporteurs and experts must be related to its programme of work and priorities, taking close account of the roles and membership it established for other working teams and the key strategies of the Long-term Plans. Additionally, the numbers appointed should be commensurate with what was manageable by the resources available within its structure. Noting that its priorities included capacity building in the NMHSs and the regions, the Commission considered that individual rapporteurs could play a significant role in providing reports on national and regional implementation requirements and problems.

11.7 The Commission recognized the success of the conferences sponsored by WMO, including for example the International Congress of Biometeorology and the International Conference on Urban Climatology, both held in Sydney (November 1999) and the various conferences on applied climatology, in bringing together and in informing climatologists in a productive way from around the world. The Commission believed that such conferences played an important role in achieving the objectives of WCDMP and WCASP. The Commission expressed appreciation to the president and Secretary-General for facilitating the attendance of CCI rapporteurs. In consideration of the WMO resources devoted to sponsoring those conferences, the Commission requested that when such support was given in future, the Secretariat should arrange for post-conference overviews, including evaluations and recommendations, to be assembled and circulated to Members, for example, through the WMO CCI Web site.

11.8 The Commission took account of the increasing role of the regional associations and other regional groupings, such as Regional Climate Outlook Forums, in the development and implementation of the WCP. It welcomed the activities and outputs of climate-related working groups established by some regional associations and urged others to create such groups, noting that for the WWW, Planning and Implementation Groups did exist for each region. For the WCDMP, regional activities could relate to the establishment and maintenance of observing networks and the specification of global standards to meet the needs of the WCP, for monitoring the performance of the networks and data exchange, climate data management system implementation including to the Area Support Centres, data collection and rescue for regional and global needs, the publication of regional climate reviews and the coordination of support for global reviews. Within the WCASP, regional coordination was important with regard to meeting the needs for services to support sustainable development, including warning systems relating to human health and natural disasters, and services relating to social and economic development and the protection of the environment. Regional associations were critical of the establishment and performance of RCCs. In addition, coordination of climate outlook forums were also likely to benefit from the involvement of the regional associations, as would the activation of networks of CLIPS Focal Points. The Commission concluded that in any new structure, its linkages with the regional associations must be strengthened by inviting direct representation of the Regions on its Management Group and to teams concerned with the implementation of its Programmes. The Commission requested its Management Group to give further early consideration on how to maximize the value of linkages to the regional associations.

11.9 The Commission recognized the joint and, sometimes, overlapping interests it had with other WMO bodies. Those included issues relating to observing networks and standards and data management, e.g. with the joint WCRP/GCOS AOPC and with JCOMM. The

Commission agreed that continuing efforts would be required to ensure harmony of its own observational and data interests with those of other programmes and activities such as GCOS and the emerging, more broadly based, IGOS. In matters related to climate change and its impacts, the Commission had already worked effectively with WCRP/CLIVAR on climate change indices in support of the work of the WMO/UNEP IPCC. Additionally, some issues could not be progressed without the direct involvement of major user groups, for example from WHO. The Commission recognized the importance and value of involving such interests, as well as those of other Commissions, in various task-focused expert groups. The Commission also had a responsibility to ensure that expertise was available for adequate representation by WMO on external bodies when required.

11.10 The Commission noted again that any structure, together with its schedule of activities and meetings, would have to operate within the limits of available funds. It agreed that priority areas identified for support must be consistent with the priorities identified in the Long-term Plans, and mandated its Management Group to ensure that that would be so.

11.11 The Commission concluded that the most effective, flexible and responsive means of carrying out well-defined CCI tasks would be a system of small teams and rapporteurs complemented by suitable ways to inform and involve all CCI members in the process. The Commission agreed that its activities and teams should be grouped together under three programme areas, as described later, and the activities in each should be handled by OPAGs whose members would be regularly consulted and informed by the chairperson of each group by e-mail or other form of correspondence. That would achieve a broad ownership through the involvement of experts from among members. The Commission noted that the success of that system would depend on the selection of an active and committed chairperson and co-chairperson of each OPAG, for whom there would be a need for committed Secretariat support. The role of the chairpersons would be to coordinate the work of the teams and rapporteurs established by the Commission to carry out specific tasks derived from the overall work programmes. Expert Teams would be based mainly 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. Implementation/Coordination Teams or equivalent structures would also be required, especially for substantial activities such as CLIPS implementation and regional climate data networks, and would be based mainly on regional representation with a focus on operational and implementation aspects. It would be very important for the Management Team and the Implementation/Coordination Teams, including the chairpersons of OPAG's, to meet early in the intersessional period. The Commission decided that the OPAG chairpersons and co-chairpersons would serve an initial term of two years renewable, with continuation to be based on workload

and work requirements. The Commission recognized that Expert Teams would serve as required for specific activities and might or might not be active for more than short periods. It was noted that General Regulation 33 provided the appropriate guidance should an OPAG chairperson be unable to continue in that role.

11.12 The Commission decided to form three programme areas for the next intersessional period based largely on the existing WCDMP and WCASP programmes. Programme areas (a) and (b) were aligned with the WCDMP and programme area (c) was aligned with WCASP (and CLIPS), as outlined below and in more detail in [Annex II](#) to this report.

(a) Climate Data and Data Management:

Activities within that area would include climate observing and metadata requirements, climate networks and systems (including those providing remotely-sensed data), climate observing practices, data rescue, data collection and monitoring of the exchange, climate data management including database management systems, data quality, standardization and availability, and data system evaluation;

(b) Monitoring and Analysis of Climate Variability and Change:

Activities within that area would comprise climate system monitoring including access to, and publication of, necessary data, the cataloguing of datasets, climate monitoring reports, data homogeneity, climate analysis techniques, climate change indices, and necessary dataset development;

(c) Climate Applications, Information and Prediction Services:

Activities in that area would include a range of sectoral applications, product and service development applications-oriented climate indices, and CLIPS development including intraseasonal, seasonal and interannual predictions and utilization of climate information.

11.13 The Commission noted that there were several topics that overlapped among the programme areas, for example some data issues, and it therefore stressed the need for appropriate interactions to ensure that such topics were managed effectively. It requested the Management Group to keep the divisions under review in the light of the technical and scientific integrity of the programme areas and the availability of effort to manage each, and authorized the president, on such advice, to make the necessary adjustments as needs arose.

11.14 The Commission agreed that some overarching activities would be the responsibility of the Management Group. Those included the further development of Part 2 of the *Guide to Climatological Practices* (WMO-No. 100) and further work towards the review and designation of RCCs. Teams dealing with those issues would report directly to the president.

11.15 The Commission emphasized that the essential criterion for establishing Expert Teams and for defining their membership was the achievement of the identified tasks, and that for establishing the Implementation/

Coordination Teams was the assessment of how programmes should be implemented worldwide. The Commission identified the main elements of the work programme and agreed on the terms of reference of teams and rapporteurs of each OPAG as listed in [Annex II](#) to this report. The Commission also requested each of the OPAG chairpersons to ensure that specific work areas described in respective parts of the final report of the present session of the Commission be adequately addressed. The Commission further agreed that, taking account of available resources and of its priorities, not all teams and rapporteurs could, or needed, to be activated immediately and agreed that some could work by correspondence. The Commission established membership of the Implementation/Coordination Teams and Expert Teams and rapporteurs as listed in [Annex III](#) to this report. The Commission agreed that Expert Teams must be constituted so as to ensure that the highest level of scientific and technical expertise were available to serve the needs of users and current operational activities. With regard to the other teams, rapporteurs and work programmes, the Commission authorized the president, with the assistance from the Management Group, Expert Team Leaders and the Secretariat, to complete or to determine appropriate membership and to initiate activities on a priority basis. The Commission noted that a database of experts had been created and would be maintained by the Secretariat for use by the president and the Management Group. The Commission also 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.

11.16 The Commission agreed that a highly effective Management Group was needed to ensure proper integration of its programme areas, to evaluate progress achieved, to decide upon priorities with regard to available resources, to coordinate strategic planning and to decide on necessary adjustments to the working structure during the intersessional period. Achieving that result would entail balanced regional representation. However the Commission considered that that should be accomplished within an overall membership of 10 persons, inclusive of the president, vice-president and chairpersons of the OPAGs of the Commission. In that respect, it noted consistency with the views expressed by the fifty-second session of the Executive Council with respect to limiting the size of the CCI's AWG (previously 16 members), and with Congress's endorsement of the need to include regional representatives in AWGs, within available resources.

11.17 The Commission agreed and adopted the new working structure of the Commission through [Resolution 1 \(CCI-XIII\)](#), established a CCI Management Group by adopting [Resolution 2 \(CCI-XIII\)](#), and established the OPAGs and selected their chairpersons and co-chairpersons by adopting [Resolution 3 \(CCI-XIII\)](#).

11.18 Noting the current mandate of the joint WCRP/GCOS AOPC and the terms of reference of CCI with respect to national, regional and global climate networks, the Commission requested the president to

explore ways of establishing a joint mechanism (with the GCOS Steering Committee and the WCRP Joint Scientific Committee), i.e. by extending the AOPC mandate, including joint sponsorship, to achieve the following while avoiding duplication and optimizing resources:

- (a) To maintain for various climate purposes, an overall statement of requirements for observational networks, for data and metadata required and, with regard to the variables to be measured, for spatial resolution, frequency, accuracy and precision of measurements;
- (b) To consider requirements for observational networks in support of WMO global and regional climate-related programmes, and to assess shortcomings in network implementation on a regional basis;
- (c) To make proposals for the further development of climate networks including RBCNs, Reference Climatological Stations and GCOS networks in order to meet programmatic needs, and for collaborative activities that might achieve that;
- (d) To monitor and report on the operational performance of the networks including the collection, transmission and receipt of climate data, the usage and adequacy of WMO codes, and to identify deficiencies and means of overcoming them;
- (e) To consider the activities and outputs of Expert Teams and rapporteurs in relation to the above terms of reference and to provide comment and feedback;
- (f) To submit reports in accordance with timetables established by the chairperson on the OPAG and/or Management Group;
- (g) To coordinate and collaborate with other relevant groups, such as in the development of improved information systems on networks and observation requirements and on marine observations with a view to promoting the effective implementation of climate networks;
- (h) To consider observation requirements for emerging applications, including those requiring data from remote-sensing systems.

Once established, the president and Management Group would consider the advisability for an Expert Team on national networks.

11.19 The Commission recognized the possible need for a rapporteur on commercial climate activities in NMHSs and noted that the issue of commercialization was under review within the Executive Council. The Commission requested the Management Group to keep that under consideration and to propose appropriate actions in light of any developments emerging from the Executive Council Advisory Group on the Role and Operation of NMHSs that suggested a clear way forward. Thus, the Commission did not appoint a rapporteur on that issue at the present time.

WMO STRUCTURAL ISSUES AND LONG-TERM PLANNING

FIFTH WMO LONG-TERM PLAN

11.20 The Commission noted the adoption by Thirteenth Congress of the Fifth WMO Long-term Plan

covering the period 2000–2009. It further noted that the technical commissions, among others, were requested to adhere to the policies and strategies set forth in the Plan and to organize their activities to achieve the main long-term objectives as defined in the Plan.

11.21 The Commission took note that the monitoring and evaluation on the first four years (2000–2003) of the Fifth WMO Long-term Plan would be undertaken and that an assessment of its implementation would be considered by the fifty-fourth session of the Executive Council and subsequently by Fourteenth Congress based on Resolution 12 (EC-LIII) — Guidelines on monitoring and evaluation of the Fifth WMO Long-term Plan. The Commission requested its president to ensure the provision of the relevant contribution expected from CCI in the pertinent evaluation process.

PREPARATION OF THE SIXTH WMO LONG-TERM PLAN

11.22 The Commission recalled that Thirteenth Congress had decided that the 6LTP should be prepared. In so doing, Thirteenth Congress requested the technical commissions to lead the formulation of all scientific and technical aspects of WMO Programmes and activities falling within their respective responsibilities.

11.23 The Commission also recalled that the Executive Council established both its Working Group on Long-term Planning to assist it in connection with long-term planning and the Task Team on WMO Structure, and that both groups had held a second joint session from 12 to 16 March 2001. The fifty-third session of the Executive Council considered the report of the joint session.

11.24 The Commission noted that the president of CCI had attended a meeting in conjunction with the meetings of the presidents of technical commissions in October 2000 and October 2001 which reviewed draft proposals by the Executive Council Working Group on Long-term Planning relating to the draft 6LTP and provided further input.

11.25 The Commission noted the decisions of the fifty-third session of the Executive Council regarding the drafting of the 6LTP. The Council had adopted the WMO vision, a set of desired outcomes and a set of strategies and associated strategic goals which provided the framework for the formulation of the full draft of the 6LTP. The Council noted that it would be helpful to take into consideration the views of the broader international meteorological and hydrological community on those matters and agreed that the leadership role of WMO in providing expertise and in promoting international cooperation in relevant fields was a key element of the WMO vision. The Commission was informed that the WMO vision was formulated:

To provide world leadership in expertise and international cooperation in weather, climate, hydrology and water resources, and related environmental issues, and thereby to contribute to the safety and well being of people throughout the world and to the economic benefit of all nations.

11.26 The Commission noted that the Council had agreed on the set of six desired outcomes:

- (a) Improved protection of life and property;
- (b) Increased safety on land, at sea and in the air;
- (c) Enhanced quality of life;
- (d) Sustainable economic growth;
- (e) Protection of the environment; and
- (f) Enhanced WMO effectiveness.

It noted the objective of identifying the desired outcomes so that the 6LTP would be more strategic and outward-looking. The Commission endorsed the nine strategies with the associated strategic goals, as adopted by the Council, to meet the evolving global needs for expert advice and services pertinent to weather, water, climate and the natural environment.

11.27 The Commission recalled that the Council had agreed that the present programme structure be used as a basis for further developing the 6LTP and the programme and budget for the fourteenth financial period. The Council had recognized the importance of identifying lead responsibility for ensuring the carrying out (and/or coordination) of each of the programmes, as well as the strategies and associated strategic goals. The Council had also agreed that the major Programmes and component programmes thereof should be presented in the 6LTP, using a programme layout which included the purposes of the Programme and how they supported the 6LTP strategies and the associated goals.

11.28 The Commission endorsed the sense of the Council that the vision, desired outcomes, strategies and associated goals, as well as the programme structure of the 6LTP, would serve as a clear basis for the programme and budget. The achievement of expected results defined in the programme and budget would contribute to the realization of 6LTP strategies and associated goals. Those established the meaningful link between the 6LTP and the programme and budget.

11.29 The Commission noted with satisfaction the significance of its work programme in contributing to the four key areas that the Council decided should receive greater emphasis: (a) protection of life and property, especially disaster prevention and mitigation; (b) climate change and its impacts; (c) provision of services for the socio-economic benefits of people; and (d) hydrology and water resources.

11.30 In that connection, the Commission wished to emphasize the tasks and activities under the responsibility of the Commission which were expected to contribute to the realization of the WMO vision, desired outcomes, strategies and associated goals. In reviewing the draft contribution of the WCP to the 6LTP, the Commission noted with satisfaction the planned benefits of the Programme. It was noted that CCI's principal contribution to the achievements of the 6LTP would be through two components of the WCP, specifically through the WCDMP and the WCASP, including CLIPS. Those programmes would, under CCI direction, support all six of the 6LTP's desired outcomes. The Commission noted that the tasks of WCDMP and WCASP contributed to the achievement of the following major aims:

- (a) Support the strengthening of climate observing networks;
- (b) Support improvements in the exchange of climate data;
- (c) Improve individual country's ability to manage climate data, including metadata;
- (d) Coordinate the preparation and distribution of global and regional datasets, including metadata, to support investigations of climate variability and detection of climate change and climate predictions;
- (e) Develop procedures and processes for climate change detection, in coordination with CLIVAR, including the development of indices;
- (f) Provide assessments and authoritative statements on the status of the global climate system;
- (g) Improve the availability of, and access to, climate information and forecasts to NMHSs;
- (h) Support training and capacity building to improve within-country expertise to develop products and deliver services;
- (i) Recommend, and wherever appropriate, support research priorities in the development of climate services and applications, particularly with regard to seasonal-to-interannual predictions, climate change and extreme weather events;
- (j) Closely interact with the users and policy makers to improve the usage of climate information;
- (k) Support activities that contributed to sustainable development and reduced the impact of natural disasters.

The Commission concluded that to achieve those aims, it must identify a set of focused, high priority activities that would lead to an effective and efficient implementation of its contribution to the 6LTP. The Commission further concluded that that was a task that must be pursued urgently by the Management Team. The Commission requested the president and Management Group to develop a proposal for a well-structured vision for CCI, harmonized with the 6LTP, in order to guide more clearly the Commission's priorities.

11.31 The Commission recognized that it had a role to play in the implementation of the 6LTP as well as in its monitoring and evaluation. In that connection, the Management Group and the OPAGs had roles in serving as conduits from the NMHSs into the Long-term Plan monitoring and evaluation processes. The links from the CCI to the regional associations should also be strengthened for the implementation, monitoring and evaluation of the Long-term Plan. Specifically, the Management Group and the OPAGs would seek:

- (a) To enable the delivery to end-users through the NMHS's increasingly accurate and reliable warnings and monitoring products, of extreme events related to climate and the related natural environment throughout the world, and ensure that they were able to reach their target audience in a timely and useful manner;
- (b) To enable the provision of increasingly beneficial climate and related natural environmental services to the public governments and other customers throughout the world, including the assessment of climate resources;

- (c) To enhance WMO's role as the United Nations system's authoritative voice on the state and behaviour of the climate, including ensuring that it contributed to relevant international conventions, protocols and other legal instruments, and that relevant agreements were scientifically based;
- (d) To inform and educate the public, Governments and other interested parties about the socio-economic benefits of understanding the climate and related systems;
- (e) To work with other bodies to understand better and to improve the modelling of the processes which affected climate change and related environmental processes so as to better enable evaluation of climate change and to improve climate forecast products;
- (f) To observe, record and report on the climate and related systems, to use those data and to maintain and enhance systems to exchange those data, products and information;
- (g) To enhance NMHSs capabilities to deliver climate services and improve cooperation and collaboration between them;
- (h) To work more efficiently with international partners other relevant organizations, academia and the private sector in the fields of climate and related natural environment;
- (i) To improve the effectiveness, efficiency and flexibility of the structure and working mechanisms and practices of WMO in the field of climate and related natural environment, to enable it to respond more rapidly to the changing needs of society and to the new opportunities provided by technological advances.

In particular, that would require:

- (a) Strong coordination and support for climate networks including GCOS;
- (b) Consideration of the role of RCCs and their implementation;
- (c) Development of clear guidelines and projects on climatological practices, data management, data exchange, data rescue and climate monitoring;
- (d) Strengthened links to user communities;
- (e) Improved training and capacity building;
- (f) Integration of new observations (particularly from satellites and remotely-sensed systems) into the work of the Commission;
- (g) Close coordination and collaboration with other technical commissions.

WMO STRUCTURE

11.32 The Commission noted the views of the fifty-third session of the Executive Council, concerning the review of the WMO structure. The Commission further noted that Thirteenth Congress had endorsed a number of measures to encourage and promote overall participation in, and cooperation among, the technical commissions and regional associations, and that it had requested the presidents of technical commissions,

among others, to implement them, as appropriate, within available resources.

11.33 The Commission noted in particular that the Executive Council had requested its Task Team on WMO Structure to study further a number of areas, including the role and functions of technical commissions and regional associations and the further streamlining of the work and sessions of the Executive Council, the Executive Council subsidiary bodies, and the WMO Bureau. The Commission requested its president to work with the presidents of other technical commissions and of regional associations to consider the relevant issues and make recommendations, and to assure that the Commission's concerns were conveyed in future meetings of relevant task teams and working groups of the Executive Council.

GENERAL CONSIDERATION

11.34 The Commission recalled that the Executive Council recognized that the collaboration between technical commissions and regional associations should be improved. Particular attention was given to ensuring that the intersessional activities were effectively carried out. In that connection, the Commission emphasized that its participation and contribution in the long-term planning process during the intersessional period was a matter of utmost importance. It requested its president to ensure that appropriate actions were taken in that regard. The Commission also decided that the OPAG chairpersons would collaborate with their counterparts in the other commissions.

12. SCIENTIFIC LECTURES (agenda item 12)

12.1 Part of the session was devoted to scientific lectures and discussions under the chairpersonship of the president of the Commission. The lectures were as follows:

- (a) Climate observing systems: data system challenges (H. Landsberg Memorial Lecture) (T. Karl, United States);
- (b) European climate support network (ECSN) (Mr W. Kirchhofer, Switzerland);
- (c) Project: ECSN Climate Assessment/ECSN Climate Dataset (A. M. G. Klein Tank, Netherlands);
- (d) Project: Generate Climate Monitoring Products (V. Vent-Schmidt, Germany).

12.2 The Commission thanked the lecturers for their interesting presentations, which were reflected in the ensuing discussions of the corresponding technical-scientific items on the agenda.

13. NOMINATION OF MEMBERS OF WORKING GROUPS, INCLUDING THE ADVISORY WORKING GROUP, AND OF RAPPORTEURS (agenda item 13)

To carry out its programme during the intersessional period, the Commission established working groups, expert teams and appointed rapporteurs, as discussed under agenda item 11.

14. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT EXECUTIVE COUNCIL RESOLUTIONS (agenda item 14)

The Commission examined the resolutions and recommendations adopted at its previous sessions that were still in force at the time of the thirteenth session. It also examined those Executive Council resolutions based on previous recommendations of the Commission that were still in force. The decisions of the session were incorporated in [Resolution 4 \(CCI-XIII\)](#) and [Recommendation 1 \(CCI-XIII\)](#).

15. ANY OTHER MATTERS (agenda item 15)

Other items of concern to CCI-XIII were discussed under agenda item 10.

16. DATE AND PLACE OF THE FOURTEENTH SESSION (agenda item 16)

The Commission noted that the date and place of its fourteenth session would be determined in accordance with General Regulation 186.

17. CLOSURE OF THE SESSION (agenda item 17)

17.1 In his closing address, the president of the Commission thanked all those who had contributed to the successful completion of the work of the session, in particular the vice-president, the co-chairpersons of the working committees, the chairperson of the Nomination Committee and the chairperson of the Committee for the Selection of Working Group Members and Rapporteurs, to delegates, as well as the staff of the WMO Secretariat, including the interpreters, translators and those producing the documents behind the scenes. He congratulated the newly elected vice-president and wished him and all the elected Expert Team members and rapporteurs, a successful and fruitful intersessional period as they started to consider all the challenging issues facing the Commission at the turn of the century.

17.2 Many speakers expressed satisfaction at the results of the session achieved under the dynamic leadership of the president of the Commission. The president was congratulated on his re-election and the vice-president on his election.

17.3 The thirteenth session of the Commission for Climatology closed at 1.35 p.m. on 30 November 2001.

RESOLUTIONS ADOPTED BY THE SESSION

RESOLUTION 1 (CCI-XIII)

WORKING STRUCTURE OF THE COMMISSION FOR CLIMATOLOGY

THE COMMISSION FOR CLIMATOLOGY,

NOTING:

- (1) The endorsement by Thirteenth Congress (1999) of the need to encourage and promote overall participation in, and cooperation among, the technical commissions and regional associations,
- (2) The agreement at the fifty-third session of the Executive Council (Geneva, 2001) that structural changes would better facilitate the realization of WMO's Long-term Plans and, that in the light of rapid changes, that would allow for more flexibility, responsiveness and delegation,
- (3) The consideration of the fifty-third session of the Executive Council that the new structure within CBS had been successful in achieving the objectives of the WWW Programme and in improving the links with other technical commissions and regional associations,
- (4) The request of Thirteenth Congress to the presidents of technical commissions to develop collaborative projects to improve effectiveness and efficiency,
- (5) The need for far greater resources in terms of expertise to fulfil its responsibilities,

CONSIDERING the need to:

- (1) Provide a greater opportunity for experts, including representation from other bodies dealing with climate issues, to work in highly focused teams on important specific technical problems,
- (2) Enhance participation of experts from developing countries in the work of the Commission,

- (3) Build and maintain effective links to the regional associations,
- (4) Improve the flow of technical information concerning the activities of the Commission to all Members,

DECIDES to implement the new working structure 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 during the intersessional period, Implementation/Coordination Teams, Expert Teams and rapporteurs, 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 new 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 FURTHER that the Secretary-General arranges, within available resources, a level of support for the new structure that will facilitate the participation of the members of the OPAGs, the Implementation/Coordination Teams and the Expert Teams.

ANNEX TO RESOLUTION 1 (CCI-XIII)

WORKING STRUCTURE OF THE COMMISSION FOR CLIMATOLOGY

1. The Commission agreed that the most effective, flexible and responsive means of carrying out well-defined CCI activities is a system of small teams and rapporteurs complemented by suitable ways to involve and inform all CCI members in the process.
2. The activities of CCI shall be grouped under the following programmatic areas for the next intersessional period:
 - (a) Climate data and data management;
 - (b) Monitoring and analysis of climate variability and change; and

- (c) Climate applications, information and prediction services.

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 Implementation/Coordination Teams, Expert Teams and rapporteurs. This achieves a broad ownership of the plans, concepts, procedures and outputs developed by CCI through the active involvement of a large number of individual experts

from among the CCI members. The chairperson of each OPAG is also the coordinator of the work of the small teams and rapporteurs related to that specific programme area.

CCI Management Group

3. The Management Group shall consist of the president and vice-president, the chairpersons 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 Commission's activities 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 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. CCI shall define, by 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 chairpersons and co-chairpersons of the OPAGs are also decided by CCI by means of a resolution. The terms of reference are normally of a general nature. The chairpersons will submit their reports to each session of the Management Group and to the next session of CCI. Provision exists for a change of chairperson or co-chairperson to be authorized by the president, with guidance from the Management Group, in the intersessional period, for example because of 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 chairpersons to the members through suitable means of distribution such as circular letters from the CCI president or the chairpersons, and the WMO Web site.

Implementation/Coordination and Expert Teams, and rapporteurs

6. There are two types of teams. An Implementation/Coordination Team (ICT) is mainly based on regional representation and focuses on coordinating operational and implementation aspects. An Expert Team (ET) is mainly based on expertise for developing proposed solutions to scientific/technical problems

and for studying issues for which specific expert knowledge is needed (e.g. verification systems for objective climate forecasts). It may be more effective to establish a rapporteur instead of a team for certain specific tasks. The rapporteur should be seen within this working structure as a "one-member" team, for example either for providing expert guidance or input, or for enhancing the reporting of regional issues and implementation. Such individual rapporteurs shall provide specific outputs identified by the Commission, and the numbers established by the Commission will take account of the role and membership of the Teams and of the resources available to provide them with proper guidance and coordination.

7. The activities of the ICTs, ETs and rapporteurs of the OPAGs are mostly established by the session of the Commission, but may be established by the president under guidance from the CCI Management Group when a substantiated new need arises.

8. The leaders of the ICTs will normally be the chairperson and/or co-chairpersons of the OPAG. Otherwise they will be designated by a session of the CCI or by the president. The membership of the ICTs (including the team leader) will include representatives familiar with implementation issues in each WMO Region for the specific programme areas. The presidents of regional associations will be consulted about regional representation. Up to two additional members, may be invited as a source of expertise on major technical issues, designated by the team leader. The team leader in consultation with the chairpersons of the regional climate working groups 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 11.

9. The leaders of the ETs are normally designated by a session of CCI. If this is not possible, then the team leaders will be designated by the president upon a recommendation from the chairperson of the OPAG concerned. Members of the ETs will be designated by their team leaders in consultation with the chairperson of the OPAG, or if this is not possible by an alternative mechanism agreed by the president. This will be done as far as possible at the session of the Commission. The chairperson of the OPAG will take full account of the need to invite suitable experts from other interested bodies to participate in CCI teams. As an approximate guide, the total number of members of an Expert Team should not exceed eight.

10. ETs and ICTs 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. Correspondence or meetings, as necessary, may achieve this. The process is entirely determined by the nature and the urgency of the task(s) entrusted to the teams and by the availability of funds. It is expected that each ICT will 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 Web site and be distributed by regular mail, as necessary.

Liaison between CCI and the regional associations, and the roles of developing countries

11. It is expected that this working structure will significantly improve and strengthen the links to the regional associations and ensure their greater involvement in the planning, implementation and coordination of the WCP at the regional level and, most importantly, through an improved mechanism for providing feedback to CCI (see also paragraph 8 above). This will contribute to the process of consensus

building, achieve full participation in the CCI decision-making process and broaden the information flow. With further development of the climate working group concept at the regional level, these processes can be further improved.

12. Particular emphasis has been placed on the involvement of experts from developing countries in the activities of CCI. Many of the proposed Expert Teams, including those dealing with the utilization of seasonal predictions, the detection of climate change and the management of climate data, including data rescue, require input from developing countries in order to achieve their aims. This involvement is seen as an important means of strengthening the knowledge and capabilities in these countries. CCI has a strong interest to continue this practice because it improves, in the long run, the countries' ability to participate in, and contribute to, the work of the Commission.

RESOLUTION 2 (CCI-XIII)

MANAGEMENT GROUP OF THE COMMISSION FOR CLIMATOLOGY

THE COMMISSION FOR CLIMATOLOGY,

NOTING:

- (1) The *Abridged Final Report with Resolutions of the Fifty-second Session of the Executive Council* (WMO-No. 915), general summary paragraph 4.1.6,
- (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 account of 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 CCI Management Group with the following terms of reference:
 - (a) Advise the president on all matters related to the work of the Commission;
 - (b) Keep under review the internal structure and working methods of the Commission 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) Monitor the implementation of the WCASP and WCDMP in relation to the WMO Long-term Plans and advise the president on appropriate actions;
- (e) Review and decide upon priorities and schedules for the activation of OPAG teams and rapporteurs 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;
- (f) Advise the president of the Commission on matters related to cooperation with other technical commissions and support to other WMO and related programmes;
- (g) Advise the president of the Commission on requirements arising between its sessions for new appointments of OPAG chairpersons and co-chairpersons, the establishment or activation of teams and rapporteurs, and the designation of team leaders;

- (2) That the composition of the Management Group (normally not to exceed 10 members in total) shall be as follows:
 - President of CCI (chairperson)
 - Vice-president of CCI
 - OPAG chairpersons
 - Members from the following Regions:
 - Region II – W. Li (China), M. Sugi (Japan)
 - Region III – M. Araneda (Chile)

Region V – N. Plummer (Australia)

Region VI – A. Sterin (Russian Federation)

The following additional members (as required) to provide advice on specific major issues (to be decided);

- (3) That the Management Group, subject to available resources, should meet at least twice during the inter-sessional period and that the members of CCI shall be informed of its decisions within eight weeks of its meetings.

RESOLUTION 3 (CCI-XIII)

OPEN PROGRAMME AREA GROUPS OF THE COMMISSION FOR CLIMATOLOGY

THE COMMISSION FOR CLIMATOLOGY,

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

- (a) Climate data and data management;
- (b) Monitoring and analysis of climate variability and change;
- (c) Climate applications, information and prediction services,

DECIDES:

- (1) To establish the OPAG on Climate Data and Data Management with the following terms of reference:
 - (a) To maintain an active and responsive overview of all activities related to climate data and data management, including the implementation of climate networks, climate observing requirements and standards, the implementation of climate data management systems, the rescue, preservation and digitization of climate records, and metadata for climate applications;
 - (b) To ensure that the subsidiary bodies of the OPAG are well informed of global and regional activities within the OPAG's areas of responsibility;
 - (c) To monitor the roles, activities and priorities of the Implementation/Coordination Teams, Expert Teams and rapporteurs 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 OPAG on Monitoring and Analysis of Climate Variability and Change with the following terms of reference:
 - (a) To maintain a complete and responsive overview of all activities related to the analysis of climate variability and change, including climate system monitoring, dataset assembly and cataloguing, climate change and variability detection processes, including the assessment of homogeneity, climate change indices, and the role of satellite systems;
 - (b) To ensure that the subsidiary bodies of the OPAG are well informed of global and regional activities within the OPAG's areas of responsibility;

- (c) To monitor the roles, activities and priorities of the Implementation/Coordination Teams, Expert Teams and rapporteurs 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 OPAG on Climate Applications, Information and Prediction Services with the following terms of reference:
 - (a) To maintain an active and responsive overview of all activities related to climate applications (WCASP), information and prediction services, including the CLIPS project (research needs, operational activities, product verification, capacity building and end-user liaison), training, health warning systems including climate-related health indices, and applications of climatology to the urban environment, agriculture, disaster management, hydrology, and energy production and operations;
 - (b) To ensure that the subsidiary bodies of the OPAG are well informed of global and regional activities within the OPAG's areas of responsibility;
 - (c) To monitor the roles, activities and priorities of the Implementation/Coordination Teams, Expert Teams and rapporteurs 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 chairperson and co-chairperson(s) 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, monitoring and coordinating of, the work of the teams and the rapporteurs, in liaison with the Team Leaders;
 - (b) In consultation with the president and the Management Group, establish priorities for the activation of teams and rapporteurs (taking account of decisions of the previous session of the Commission) and schedules for their outputs;
 - (c) To chair the Implementation/Coordination Team(s);

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| <p>(d) To act upon matters referred to the OPAG by the president of CCI and to advise the president on the composition of teams established between sessions of the Commission, including their leadership;</p> <p>(e) To provide advice to Team Leaders on the membership (designation and numbers) of their teams, including representation of other interested bodies;</p> <p>(f) To provide feedback to the members of the OPAG including an activity report by the end of 2002;</p> <p>(g) To submit reports for Management Group meetings and for the next session of the Commission;</p> <p>(5) To select, in accordance with General Regulation 32, a chairperson and co-chairperson for each OPAG as follows:</p> | <p>(a) For the OPAG on Climate Data and Data Management, R. Masika (Kenya) and N. Plummer (Australia);</p> <p>(b) For the OPAG on Monitoring and Analysis of Climate Variability and Change, T. Peterson (United States), P. Zhai (China) and A. Mokssit (Morocco);</p> <p>(c) For the OPAG on Climate Applications, Information and Prediction Services, M. Harrison (United Kingdom), P. Bessemoulin (France) and (to be decided).</p> <p>NOTES:</p> <p>(1) The chairperson and co-chairperson of each OPAG will be expected to divide the tasks specified above on an equitable basis.</p> <p>(2) The terms of office of the chairperson and co-chairperson of each OPAG will normally be two years, with the option of renewal for the full intersessional period.</p> |
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RESOLUTION 4 (CCI-XIII)

REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION FOR CLIMATOLOGY

THE COMMISSION FOR CLIMATOLOGY,

NOTING the action taken on its previous recommendations,

CONSIDERING that all but one of its previous resolutions are now obsolete,

DECIDES:

- (1) To keep in force Resolution 18 (CCI-XII) — Participation of women in the work of the Commission, except the paragraph under **URGES**,

and with modification of the paragraph under **URGES FURTHER** to read as follows:

“Members who have not yet identified focal points in their NMHSs for this activity to do so and communicate the information to WMO”;

- (2) Not to keep in force other resolutions adopted prior to its thirteenth session;
- (3) That the recommendations of its previous sessions are now redundant.
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RECOMMENDATION ADOPTED BY THE SESSION

RECOMMENDATION 1 (CCI-XIII)

REVIEW OF RESOLUTIONS OF THE EXECUTIVE COUNCIL BASED ON PREVIOUS RECOMMENDATIONS OF THE COMMISSION FOR CLIMATOLOGY

THE COMMISSION FOR CLIMATOLOGY,

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

RECOMMENDS:

- (1) That the following Executive Council resolutions be maintained in force:
18 (EC-XXII), 6 (EC-XXXVI), 8 (EC-XXXVIII), 9 (EC-XXXVIII), 10 (EC-XXXVIII) and 5 (EC-XLVI);

- (2) That Resolution 5 (EC-L) be replaced by a new resolution, relating to the report of the thirteenth session of CCI;
 - (3) That Resolution 7 (EC-LIII), subject to satisfactory completion of the work of the Team, not be kept in force.
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ANNEXES

ANNEX I

Annex to paragraph 5.2.1 of the general summary

GCOS/GOOS/GTOS CLIMATE MONITORING PRINCIPLES

Effective monitoring systems for climate should adhere to the following principles:

1. The impact of new systems or changes to existing systems should be assessed prior to implementation.
 2. A suitable period of overlap for new and old observing systems is required.
 3. The results of calibration, validation, data homogeneity assessments and assessment of algorithm changes should be treated with the same care as data.
 4. A capability to assess routinely the quality and homogeneity, including high-resolution data and related descriptive information, of data on extreme events should be ensured.
 5. Consideration of environmental climate-monitoring products and assessments, such as IPCC assessments, should be integrated into national, regional and global observing priorities.
 6. Uninterrupted stations and observing systems should be maintained.
 7. A high priority should be given to additional observations in data-poor regions and regions sensitive to change.
 8. Long-term requirements should be specified to network designers, operators and instrument engineers at the outset of new system design and implementation.
 9. The carefully planned conversion of research observing systems to long-term operations should be promoted.
 10. Data management systems that facilitate access, use and interpretation should be included as essential elements of climate monitoring systems.
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ANNEX II

Annex to paragraph 11.12 of the general summary

OPAG TEAMS AND RAPPORTEURS AND THEIR TERMS OF REFERENCE

1. OPAG on Climate Data and Data Management

1.1 Implementation/Coordination Team for Climate Data Management:

- (a) To identify and specify new requirements for CDMSs, including standard applications software;
- (b) To monitor "in-service" capabilities and utilization of computer and manual systems in meeting Member's requirements;
- (c) To manage and report on the continued evaluation, installation, commissioning and training for the next generation CDMSs, especially in meeting the needs of developing countries;
- (d) To determine and specify the needs for further operational support of, and migration from, the CLICOM system;
- (e) To consider issues of cost, joint funding and assistance projects for CDMS installation and to assist in the solution of these issues;
- (f) To consider the adequacy of guidance on the preservation and management of climate data with particular emphasis on developing countries, and to make arrangements for developing and updating such guidance;
- (g) To consider the activities and outputs of Expert Teams and rapporteurs in relation to the above

terms of reference and to provide comments and feedback;

- (h) To provide guidance on methods and systems to quality control climate data;
- (i) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

1.2 Expert Team on Observing Requirements and Standards for Climate:

- (a) To review and make recommendations regarding the adequacy and choice of observing instruments and sensors to meet climate needs, including in situ and remote-sensing systems, and automated methods;
- (b) To review and develop recommendations on procedures and practices necessary to support the long-term homogeneity of climate data, including:
 - (i) Procedures to be carried out in the migration from man-made to automated measurements, and during changes to sensors and site;
 - (ii) Procedures to be carried out during instrument maintenance and calibration;
 - (iii) Instrument comparisons to identify biases, drift and sensitivity;
 - (iv) Maintenance, monitoring and reporting on observing environments including instrument exposure;

- (c) To coordinate with CBS, JCOMM, CIMO and GCOS;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

1.3 Expert Team on the Rescue, Preservation and Digitization of Climate Records:

- (a) To establish and record, through contact with interested parties including data users and data centres, general and specific needs for the rescue of historic, undigitized observational data and metadata records;
- (b) To investigate and document, under the DARE/ARCHISS Project, the existence and content of undigitized records in NMHS archives, in public archives and private collections;
- (c) To develop and present specific proposals for data rescue projects;
- (d) To make proposals for the harmonization of data rescue in different regions;
- (e) To develop a coherent strategy for the use of electronic means for data recording and collection and for migration to digitized archives;
- (f) To promote, monitor and report on the success of projects to rescue and digitize manuscript records and incorporate these data into long-term datasets;
- (g) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

1.4 Expert Team on Metadata for Climate Applications:

- (a) To update, develop and record the requirements for metadata, particularly in support of the homogenization of climate data, noting the needs of climate change detection;
- (b) To recommend procedures for the recording and reporting of metadata by Members;
- (c) To develop any coding requirements for the transmission of metadata;
- (d) To develop the basis of an implementation plan to facilitate the agreement of procedures for the international exchange of metadata and/or their deposition in major data centres;
- (e) To maintain close links with relevant groups such as CIMO, CBS, JCOMM and GCOS on related issues;
- (f) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

1.5 Rapporteurs on Regional Aspects of Data and Data Management:

- (a) To assist the Implementation/Coordination and Expert Teams within the OPAG by submitting to the C-OPAG annual reports on regional issues and problems, for example relating to observing networks, observing standards, data management (including CLICOM and CDMS systems), data rescue and digitization, the recording of metadata and the data needs of emerging climate applications;
- (b) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

1.6 Expert Team on National Networks and Observations in Support of Climate Activities (to be established subject to the need emerging from the consultations referred to in general summary paragraph 11.18):

- (a) To specify the basic characteristics of national climate networks and observations, including AWSS, remote sensing platforms and model output data, needed in support of national climate activities, which would include, inter alia, the description and monitoring of climate, climate model downscaling and verification, and applications to various sectors of the economy and the environment;
- (b) To help ensure the accuracy, consistency and dissemination of national climate data and metadata;
- (c) To coordinate with other relevant groups, such as with CBS on the development of improved information systems, with CIMO on networks and observation requirements and with GCOS/AOPC on addressing all aspects of implementation, maintenance and deficiencies of national network components that contribute to regional and global climate networks;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or the Management Group.

1.7 Rapporteur on the Use of Data from Remote-sensing Systems:

- (a) To review the availability of information on the location of data banks for data from surface and satellite remote-sensing systems and the suitability of the archived data for climate applications;
- (b) To identify differences in practices in major processing centres for the quality control and derivation of parameters from remotely-sensed data that may have an impact on climatological assessments;
- (c) To prepare a report on the above subjects in accordance with timetables established by the C-OPAG and/or Management Group.

2. OPAG on the Monitoring and Analysis of Climate Variability and Change

2.1 Implementation/Coordination Team on Datasets and Climate System Monitoring:

- (a) To establish and promote arrangements at due time for the collection of national datasets for the preparation of climatological standard normals, world weather records, and other global analyses of climatic conditions;
- (b) To establish and promote arrangements and mechanisms for the collection and transfer in digital form of national daily and monthly data, or statistical information based on daily data, and metadata from GSN and other stations as agreed with NMHSs for the purposes of climate change detection and prediction;
- (c) To investigate and document Members' requirements, and those of international agencies and academia, for regular (e.g. monthly, seasonal) climate system monitoring products, annual

statements of the status of the climate system, periodical climate system reviews, and reviews of major climatic events and their content;

- (d) To consider the adequacy and document the availability of regular regional and global climate analyses, for monitoring climate variability on the synoptic scale over monthly, seasonal and interannual timescales, and the adequacy of their distribution through Internet and other means;
- (e) To promote arrangements for the collection of relevant material to meet the requirements for content of CSM products and to consider and advise on the need for Expert Teams to coordinate the preparation of CSM publications (including Annual Statements and Periodical Reviews);
- (f) To consider the activities and outputs of Expert Teams, including that on Dataset Catalogues, and rapporteurs in relationship to the above terms of reference, and provide comment and feedback;
- (g) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

2.2 Expert Team on Dataset Catalogues:

- (a) To assess and report on the future needs for INFOCLIMA, its content and its relationship to GOSIC;
- (b) To make proposals regarding the future development of INFOCLIMA/GOSIC and data categories to be included;
- (c) To document guidance on dataset registration including national climate data catalogues;
- (d) To ensure that the *Manual on Codes* (WMO-No. 306) Volume I.1, Part A is current and complete for all climate observations;
- (e) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

2.3 Expert Team on Climate Change Detection, Monitoring and Indices (in coordination with CLIVAR):

- (a) To develop further and publicize indices and indicators of climate change and variability, with particular emphasis on the creation of indices of daily to seasonal extremes covering the global land surface using standardized software packages;
- (b) To develop further other indices of value to IPCC, related to changes in mean climate and its variability from the sub-surface of the oceans to the stratosphere;
- (c) To provide input on indices to WMO publications such as the annual *Statement on the Status of the Global Climate*;
- (d) To compare modelled and observed indices, and to report on the comparisons, with some emphasis on changing extremes;
- (e) To assist in the specification and implementation of observing system experiments with models used for global and regional climate change detection, with emphasis on the GUAN and GSN networks;
- (f) To arrange for, or make, assessments that identify and quantify the magnitude of biases introduced by automated means of measurement and their consequences for detection and monitoring;

- (g) To consider other issues of homogeneity, including methods for the detection of trends and extreme events, with emphasis on daily data;
- (h) To collaborate with, and provide inputs to, other groups, especially those set up under the auspices of the IPCC, regarding the adequacy of the global observing system for the purposes of supplying advice to the Conferences of the Parties to the UNFCCC, and regarding the development of indices;
- (i) To maintain plans for capacity building in developing countries in the above activities, particularly through workshops. In particular, to work closely with START on capacity building through its Monitoring Extreme Climate Events Group;
- (j) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group, and as agreed with CLIVAR participants.

2.4 Rapporteurs on Regional Aspects of Analysis of Climate Variability and Change, including Climate System Monitoring:

- (a) To assist the Implementation/Coordination and Expert Teams within the OPAG by submitting annual reports to the C-OPAG on regional issues and problems. These may relate, for example, to climate analysis in the context of a changing climate, climate system monitoring products, the availability of datasets for regional analyses, homogenization of data especially in relation to climate variability and change detection, data catalogues and the creation of applications-related indices;
- (b) To prepare a report on the above subject in accordance with timetables established by the C-OPAG and/or Management Group.

3. OPAG on Climate Applications, Information and Prediction Services

3.1 Implementation/Coordination Team for World Climate Applications and Services Programme, including CLIPS:

- (a) To monitor and review the development and implementation of WCASP including CLIPS on a global and regional basis;
- (b) To identify development needs in the CLIPS programme and make recommendations for achieving them, including demonstration and pilot projects;
- (c) To keep under review the status of the sciences underpinning WCASP, including the CLIPS project;
- (d) To consider further actions based on the reports of Expert Teams and rapporteurs relevant to the development of the CLIPS project;
- (e) To keep under review and update the list of RCC functions as given in the *General Summary of the Session of the Intercommission Task Team on RCCs* (WMO/TD-No. 1070, WCASP-52);
- (f) To advise the CLIPS Project Office and the C-OPAG on issues relating to the implementation of the project;
- (g) To ensure collaboration and coordination with CHy, GCOS, CBS, CIMO, WCRP and end-users;

(h) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.2 Expert Team on Research Needs for Intraseasonal, Seasonal and Interannual Prediction, including the Application of these Predictions:

- (a) To appraise and report on current intraseasonal, seasonal and interannual prediction systems, and their ability to meet the requirements of specific applications areas, and to provide an assessment of the likely capabilities achievable by the years 2006 and 2011;
- (b) To produce a critical review of the methodologies for the creation and the presentation to end-users of intraseasonal, seasonal and interannual products, including consensus methodology and downscaling, and to recommend improvements to the methods used;
- (c) To make recommendations on research and development activities needed in the areas of forecast systems, presentation of products, applications and user decision processes;
- (d) To provide guidance to the Implementation/Coordination Team for WCASP including CLIPS;
- (e) To coordinate research needs with WCRP;
- (f) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.3 Expert Team on CLIPS Operations, including Product Generation, with Emphasis on Countries in Need:

- (a) To keep under review and update the list of NMHS and RCC requirements, as listed in the *General Summary of the Session of the Intercommission Task Team on Regional Climate Centres (WMO/TD-No. 1070, WCASP-52)* for input of dynamic and statistical forecasts, observational data and training activities, to enable the generation of climate outlook products;
- (b) To produce a critical review of the status of monthly, seasonal to interannual predictions generated by Climate Outlook Forums, RCCs and NMHSs, regarding the background, the preparation and the presentation of forecasts;
- (c) To consider the implication and implementation of research recommendations, especially relating to consensus methodology, downscaling and multi-ensembles, and provide appropriate guidance on the development of improved forecast methods to support applications;
- (d) To assess continuously the status and opportunities of climate monitoring activities, in different scales and their potential to meet user requirements;
- (e) To make recommendations on the preparation and provision of both deterministic and probabilistic prediction information for sector specific uses, including formats used;
- (f) To develop definitions of terminology used in operational prediction in order to facilitate understanding of these terms;

(g) To produce and update a guide to best operational practices in the generation of products for end-users;

(h) To advise the Implementation/Coordination Group and submit reports in accordance with timetables established by the C-OPAG and/or Management Group;

(i) To maintain close links with CBS on the issues involved.

3.4 Expert Team on Verification:

- (a) To identify requirements of RCCs, NMHSs and end-users for verifying information on intraseasonal, seasonal and interannual predictions from the perspectives of both deterministic and probabilistic forecasts, including its presentation;
- (b) To identify requirements of end-users in different applications sectors for verifying information on products they receive;
- (c) To produce:
 - (i) A critical review of the methods of forecast verification currently used in both deterministic and probabilistic intraseasonal, seasonal and interannual prediction;
 - (ii) An appraisal of the information content of these methods from the perspective of applications;
 - (iii) A review of the methods by which verification information is currently presented to NMHSs and end users;

and to generate advice on the suitability of these methods from the perspective of both NMHSs and the end-users;

(d) To identify and develop, as necessary, appropriate verification techniques for seasonal to interannual predictions, as well as methods for their presentation in order to satisfy the user requirements;

(e) To promote the use of both standardized and recommended techniques through the development of verification intercomparison projects;

(f) To develop definitions of terminology used in verification in order to facilitate end-user understanding of these terms;

(g) To advise the Implementation/Coordination Group and submit reports in accordance with timetables established by the C-OPAG and/or Management Group;

(h) To maintain close links with CBS, CAS and WCRP on the issues involved;

(i) To prepare a review of methods for the assessment of forecast quality and to recommend methods for verifying intraseasonal, seasonal and interannual forecasts.

3.5 Expert Team on Capacity Building:

(a) To document the needs for capacity building in all regions;

(b) To review the design of the CLIPS curriculum including recommendations for improvements to the design and the methods of presentation, distribution and access;

(c) To examine the CLIPS Focal Point programme together with the formulation of recommendations

for strengthening the effectiveness of the regional networks of focal points;

- (d) To examine the role and effectiveness of rapporteurs in capacity building activities;
- (e) To prepare a strategy for capacity building in climate information and prediction services, taking into consideration developments in capacity over time, the need to develop professional knowledge and capability in climate modelling, the assessment of model outputs and downscaling methods, the need to develop links with research centres and to promote multidisciplinary cooperation in projects and services, and the need to implement and use new technology;
- (f) To advise the Implementation/Coordination Group and submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.6 Expert Team on End-user Liaison:

- (a) To provide guidance on, and make recommendations for, the design and conduct of specific demonstration and pilot projects, including the calculation of cost/benefits and value of seasonal forecasts from the end-user point of view;
- (b) To give guidance on the assessment of end-user needs;
- (c) To review current impacts of climate services on end-user decision processes, including those relating to monthly-to-seasonal predictions and to quality-checked minimum delay datasets;
- (d) To examine how decisions are taken and to recommend how best to advise on improving approaches to decision-making;
- (e) To draft a guide on best practices in end-user liaisons, in consultation with end-users;
- (f) To advise the Implementation/Coordination Group and to submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.7 Expert Team on Operational Heat/Health Warnings:

- (a) To finalize generalized guidance material on procedures that could be used worldwide to develop and operate heat/health warning systems in large cities, and to take note of the availability of appropriate databases and forecasts in developing this guidance;
- (b) To identify and report on the scope for, and use of, seasonal predictions in early warning systems, taking into account the need for end-user liaison;
- (c) To recommend further actions to make heat/health warning systems a fully integrated part of CLIPS operations;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.8 Expert Team on Health-related Climate Indices and their Use in Early Warning Systems:

- (a) To review critically and make recommendations on the efficacy and validity of universal thermal climate indices;
- (b) To review and make arrangements for the continued quantification of the relationship between health stressors such as ozone, other environmental

pollutants, vector and water-borne diseases, adverse radiative impacts, heat and cold stress on the one hand, and meteorological factors, including climate indices;

- (c) To identify or develop custom-built climate indices for vulnerability assessments, preparedness planning and alerts on particular health outcomes of climate variations;
- (d) To identify requirements for, and make recommendations on, the coordination of further research in the area of climate and human health;
- (e) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.9 Expert Team on Training on Urban Climatology:

- (a) To gather and develop further training material directed towards NMHS staff and local and regional planners, and to produce a comprehensive package covering:
 - (i) Measurement and monitoring of the urban environment;
 - (ii) Interactive nature of human activities and urban environments, including the adaptation to, and mitigation of, adverse effects;
 - (iii) Predictions of change in urban environments;
 - (iv) Climate services related to the urban environment, with particular reference to developing countries and to cities suffering major environmental impacts;
- (b) To identify requirements for, and make recommendations on, the coordination of research on items listed in (a) above;
- (c) To review the availability and adequacy of distance learning material on the above issues;
- (d) To produce specific guidance material aimed at local planners in developing countries covering the fundamentals of building design as they relate to local climate and building materials that are well adapted to local climates;
- (e) To make proposals for a series of regional workshops on issues listed above;
- (f) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.10 Rapporteur(s) on Use of Climate Indices in Various Application Areas:

- (a) To identify and report on the availability and utility of indices of climate and recent weather in applications to various sectors of the economy, e.g. insurance, land utilization, irrigation and drainage;
- (b) To specify and document new indices;
- (c) To develop and submit material on the assessment and use of climatic resources for various applications;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.11 Rapporteur for Climate and Agrometeorology:

- (a) To maintain liaison with CAgM on developments in the fields of climate monitoring, services and prediction that may have impacts on agrometeorological practices and services;

- (b) Identify and report on the scope for, and use of, seasonal predictions in agricultural production and food security systems, especially taking account of end-user liaison;
- (c) To recommend enhancements to climate services in support of agriculture and food security;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.12 Rapporteur for Climate and Hydrology:

- (a) To maintain liaison with CHy on developments in the fields of climate monitoring, services and prediction that may have impacts on hydrometeorological practices and services;
- (b) Identify and report on the scope for, and use of, seasonal predictions in water resources and flood management systems, especially relating to end-user liaison;
- (c) As requested, to provide guidance, especially relating to the use of climate information and predictions, for projects and case studies under the auspices of WCP-Water;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.13 Expert Team on Climate Services for Energy:

- (a) To report on case studies that demonstrate the benefits of, and problems related to, the use of climate information and predictions in support of energy operations, taking special account of end-user liaison;
- (b) To recommend enhancements to climate services in support of energy development and operations, paying particular attention to the needs of developing countries for making use of renewable energy;
- (c) To review and recommend related training material, including distance learning packages;
- (d) To prepare a poster or brief report on opportunities for using climate data and services to support renewable energy development, to be disseminated by WMO at the forthcoming World Summit on Sustainable Development, to be held in Johannesburg in September 2002;
- (e) To prepare a status report on climate data needs for supporting wind and solar energy development, on the adequacy of WMO-specified instruments and observing practices to supply these, and on opportunities to use modelling, data interpolation methods and satellite observations to overcome problems in providing site-specific information;
- (f) To review and report on requirements for climate and weather data from companies dealing in weather derivatives, and on implications for NMHSs;
- (g) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

3.14 Rapporteurs on Regional Aspects of Climate Services:

- (a) To assist the Implementation/Coordination and Expert Teams within the OPAG by submitting annual reports to C-OPAG on regional issues. These may relate for example to CLIPS implementation, the use in various application areas of seasonal to interannual forecasts, and other developments in applications areas such as human health, food security, disaster management, urban activities, building and design, wind and solar energy operation and water resources;
- (b) To advise the Implementation/Coordination Team of opportunities and problems regarding end-user liaison;
- (c) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

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

4.1 Expert Team on the *Guide to Climatological Practices*:

- (a) To establish, through the presidents of regional associations and Members, as necessary, the needs for Part 2 of the *Guide* and to report the outcomes to the president and the Management Group;
- (b) To determine the required content of Part 2 of the *Guide*, and develop a strategy for producing a first draft within a two-year timescale, including arrangements for acquiring and editing material;
- (c) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

4.2 Expert members of the Intercommission Task Team on Regional Climate Centres:

- (a) To determine actively the views of CCI on issues relating to the establishment, functions and performance of RCCs;
- (b) To transmit these views to the Intercommission Task Team;
- (c) To work positively with the other Commissions involved in order to develop a coherent structure and set of responsibilities that reflect the overall needs of WMO Members;
- (d) To submit reports in accordance with timetables established by the C-OPAG and/or Management Group.

5. Experts reporting to the appropriate C-OPAG

5.1 CCI experts serving on teams of other technical commissions:

- (a) To determine actively the views of CCI on issues relating to climatology 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.

ANNEX III

Annex to paragraph 11.15 of the general summary

MEMBERSHIP OF OPAG TEAMS AND RAPORTEURS

- | | |
|---|--|
| <p>1. OPAG – Climate Data and Data Management
Chairperson: R. Masika (Kenya)
Co-chairperson: N. Plummer (Australia)</p> <p>1.1 ICT – Climate Data Management
Lead: R. Masika (Kenya)
RA I: J. Ukeje (Nigeria)
RA II: S. Zhou (China)
RA III: E. Rangel-Mantilla (Colombia)
RA IV: R. Vose (United States)
RA V: T. Acebes (Philippines)
RA VI: R. Tolasz (Czech Republic)</p> <p>1.2 ET – Observing Requirements and Standards for Climate
Lead: N. Plummer (Australia)
Experts: (to be decided)</p> <p>1.3 ET – Rescue, Preservation and Digitization of Climate Records
Lead: L. S. Tan (Malaysia)
Experts: (to be decided)</p> <p>1.4 ET – Metadata for Climate Applications
Lead: J. Arnfield (United States)
Experts: (to be decided)</p> <p>1.5 RAPORTEURS – Regional Aspects of Data and Data Management
Experts: (to be decided)</p> <p>1.6 ET- National Networks and Observations in Support of Climate Activities (to be established subject to the need emerging from the consultations referred to in general summary paragraph 11.18)
Lead: R. Heino (Finland)
Experts: (to be decided)</p> <p>1.7 RAPORTEUR – Use of Data from Remote-sensing Systems
Experts: (to be decided)</p> <p>2. OPAG – Monitoring and Analysis of Climate Variability and Change
Chairperson: T. Peterson (United States)
Co-chairpersons: P. Zhai (China), A. Mokssit (Morocco)</p> <p>2.1 ICT – Datasets and Climate System Monitoring
Lead: T. Peterson (United States)
RA I: M. L. Saah (Cameroon)
RA II: H. Koide (Japan)
RA III: H. A. Enriquez Davila (Ecuador)
RA IV: J. Lawrimore (United States)
RA V: D. Collins (Australia)
RA VI: G. Gruza (Russian Federation)
Experts: (to be decided)</p> <p>2.2 ET – Dataset Catalogues
Lead: T. Owen (United States)
Experts: (to be decided)</p> <p>2.3 ET – Climate Change Detection, Monitoring and Indices (in coordination with CLIVAR)
Lead: A. Mokssit (Morocco)
Experts: (to be decided)</p> | <p>2.4 RAPORTEURS – Regional Aspects of Analysis of Climate Variability and Change, including Climate System Monitoring
Experts: (to be decided)</p> <p>3. OPAG – Climate Applications, Information and Prediction Services
Chairperson: M. Harrison (United Kingdom)
Co-chairpersons: P. Bessemoulin (France) and (to be decided)</p> <p>3.1 ICT – World Climate Applications and Services Programme, including CLIPS
Lead: M. Harrison (United Kingdom)
RA I: S. Baya (Mali)
RA II: C-K. Park (Korea)
RA III: G. Berri (Argentina)
RAIV: R. Perez Suarez (Cuba)
RA V: A. K. Chan (Malaysia)
RA VI: (to be decided)
Experts: (to be decided)</p> <p>3.2 ET – Research Needs for Intraseasonal, Seasonal and Interannual Prediction, including the Application of these Predictions
Lead: W. Landman (South Africa)
Experts: (to be decided)</p> <p>3.3 ET – CLIPS Operations, including Product Generation, with Emphasis on Countries in Need
Lead: (to be decided)
Experts: (to be decided)</p> <p>3.4 ET – Verification
Lead: S. Mason (United Kingdom)
Experts: (to be decided)</p> <p>3.5 ET – Capacity Building
Lead: J-P. Ceron (France)
Experts: (to be decided)</p> <p>3.6 ET – End-user Liaison
Lead: J. Helminen (Finland)
Experts: (to be decided)</p> <p>3.7 ET – Operational Heat/Health Warnings
Lead: L. Kalkstein (United States)
Experts: (to be decided)</p> <p>3.8 ET – Health-related Climate Indices and their Use in Early Warning Systems
Lead: G. Jendritzky (Germany)
Experts: (to be decided)</p> <p>3.9 ET – Training on Urban Climatology
Lead: M. Plantico (United States)
Experts: (to be decided)</p> <p>3.10 RAPORTEUR(S) – Use of Climate Indices in Various Application Areas
Experts: (to be decided)</p> <p>3.11 RAPORTEUR – Climate and Agrometeorology
Experts: (to be decided)</p> <p>3.12 RAPORTEUR – Climate and Hydrology
Experts: (to be decided)</p> |
|---|--|

<p>3.13 ET – Climate Services for Energy Lead: (to be decided) Experts: (to be decided)</p> <p>3.14 RAPPORTEURS – Regional Aspects of Climate Services Experts: (to be decided)</p> <p>4. Expert Teams reporting directly to the president and/or Management Group</p> <p>4.1 ET – <i>Guide to Climatological Practices</i> Lead: P. Bessemoulin (France) Experts: (to be decided)</p> <p>4.2 Expert members of the Intercommission Task Team on Regional Climate Centres Experts: (to be decided)</p>	<p>5. Experts reporting to the appropriate C-OPAG</p> <p>5.1 CCI Experts serving on teams of other technical commissions Experts: (to be decided)</p> <p>CCI Management Group</p> <p>President: Y. Boodhoo (Mauritius) Vice-president: V. Vent-Schmidt (Germany) Chairperson OPAG 1: R. Masika (Kenya) Chairperson OPAG 2: T. Peterson (United States) Chairperson OPAG 3: M. Harrison (United Kingdom)</p> <p>Members from the following Regions:</p> <p>Region II W. Li (China), M. Sugi (Japan) Region III M. Araneda (Chile) Region V N. Plummer (Australia) Region VI A. Sterin (Russian Federation)</p>
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APPENDIX A

LIST OF PERSONS ATTENDING THE SESSION

A. OFFICERS OF THE SESSION

Y. Boodhoo	President
J. M. Nicholls	Vice-president

B. REPRESENTATIVES OF WMO MEMBERS

<i>Member</i>	<i>Name</i>	<i>Capacity</i>
Algeria	M. S. Dembri	Principal delegate
	M. Kadi	Delegate
	A. Saci	Delegate
Armenia	H. Melkonyan	Principal delegate
Australia	G. B. Love	Principal delegate
	N. Plummer	Delegate
	R. Stone	Delegate
	M. Voice (Ms)	Delegate
Austria	E. Rudel	Principal delegate
Belgium	M. Vandiepenbeeck	Principal delegate
	R. Sneyers	Delegate
Benin	A. F. Lawson	Principal delegate
Bolivia	R. Maldonado R.	Principal delegate
Botswana	P. M. Lesolle (Ms)	Principal delegate
Brazil	E. Gomes Rebello	Principal delegate
Burkina Faso	F. N. Ouattara	Principal delegate
Cameroon	H. M. Bongmum	Principal delegate
	A. Tchouanwo	Alternate
	S. E. Tatah	Delegate
Canada	J. Masterton (Ms)	Principal delegate
	D. Ristic	Delegate
	W. Richards	Delegate
China	Zheng Guoguang	Principal delegate
	Li Weijing	Delegate
	Zhou Shuguang	Delegate
Colombia	E. Rangel-Mantilla	Principal delegate
Costa Rica	H. Herrera	Principal delegate
Côte d'Ivoire	A. Kignaman-Soro	Principal delegate
Croatia	Z. Katusin	Principal delegate
	M. Gajic-Capka (Ms)	Alternate
Cuba	L. Paz Castro	Principal delegate
Czech Republic	L. Coufal	Principal delegate
	R. Tolasz	Delegate

<i>Member</i>	<i>Name</i>	<i>Capacity</i>
Ecuador	L. Andrade Abdo (Ms)	Principal delegate
Egypt	M. S. Hammad	Principal delegate
	M. Y. Abd El-Megid Youssef	Delegate
Ethiopia	T. Wodajo	Alternate
Finland	R. Heino	Principal delegate
	J. A. U. Helminen	Delegate
France	O. Moch	Principal delegate
	P. Bessemoulin	Alternate
	J.-P. Ceron	Delegate
Georgia	N. Beradze	Principal delegate
Germany	V. Vent-Schmidt	Principal delegate
	G. Jendritzky	Delegate
	P. Hechler	Delegate
	B. Rudolf	Delegate
Ghana	A. Nkansah	Principal delegate
Greece	N. Karatarakis	Principal delegate
Hong Kong, China	W. L. Chang	Principal delegate
Hungary	S. Szalai	Principal delegate
Iran, Islamic Republic of	M. Amirshaghghi	Principal delegate
	L. Khazanehdari (Ms)	Delegate
	A. H. Delju	Delegate
Ireland	T. Sheridan	Principal delegate
Israel	A. Furshpan	Principal delegate
Italy	A. Giuffrida	Principal delegate
	V. Pelino	Alternate
	G. Maracchi	Delegate
	F. Mangianti de Angelis (Ms)	Delegate
	M. Bindi	Delegate
Japan	H. Kondo	Principal delegate
	S. Nakagawa	Alternate
	H. Nanao	Adviser
Jordan	M. Semawi	Principal delegate
Kazakhstan	N. Aliyakbarova (Ms)	Principal delegate
Kenya	R. S. Masika	Principal delegate
Kyrgyz Republic	I. A. Mayatskaya (Ms)	Principal delegate
Lebanon	A. Bejjani	Principal delegate

<i>Member</i>	<i>Name</i>	<i>Capacity</i>	<i>Member</i>	<i>Name</i>	<i>Capacity</i>
Lesotho	M. Maletjane	Principal delegate	Sierra Leone	A. Bockari	Principal delegate
Libyan Arab Jamahiriya	K. I. El Fadli	Principal delegate	Slovakia	P. Stastny	Principal delegate
Lithuania	P. Korkutis	Principal delegate	Slovenia	T. Cegnar (Ms)	Principal delegate
Macao, China	Tong Si Man	Principal delegate	South Africa	M.V. Laing R. K. K. Motshwane (Ms)	Principal delegate Alternate
Madagascar	S. Rahariveloarimiza (Ms)	Principal delegate	Spain	C. Almarza A. P. Paredes (Ms)	Principal delegate Delegate
Malaysia	Yong Pok Wing	Principal delegate	Sudan	I. A. Leimoon	Principal delegate
Mauritius	Y. Boodhoo B. K. Rudhee (Ms)	Principal delegate Delegate	Sweden	J. Nilsson B. Dahlström	Principal delegate Delegate
Mexico	S. Robles-Gil (Ms)	Principal delegate	Switzerland	W. Kirchhofer	Principal delegate
Morocco	M. L. Selassi A. Mokssit	Principal delegate Delegate	Syrian Arab Republic	N. Al-Shalabi	Principal delegate
Netherlands	A. F. V. van Engelen A. M. G. Klein Tank	Principal delegate Delegate	The former Yugoslav Republic of Macedonia	I. Cvetkovski P. Ristevski N. Aleksovska (Ms)	Principal delegate Delegate Observer
New Zealand	D. Wratt J. Salinger R. Basher	Principal delegate Delegate Delegate	Tunisia	B. Bchir	Principal delegate
Niger	I. Also	Principal delegate	Turkey	S. Soylu	Principal delegate
Nigeria	S. A. Ettu J. E. Ukeje (Ms)	Principal delegate Delegate	Turkmenistan	M. Ezgeshov	Principal delegate
Norway	B. Aune E. Førland	Principal delegate Delegate	Uganda	A. Asalu	Principal delegate
Oman	A. H. M. Al-Harthy T. A. A. Al-Farsi	Principal delegate Delegate	United Arab Emirates	H. Rafat Sayed	Principal delegate
Peru	G. Lourie Escondon H. G. Castillo	Principal delegate Delegate	United Kingdom of Great Britain and Northern Ireland	D. Griggs M. Nicholls D. Parker M. S. J. Harrison	Principal delegate Alternate Delegate Delegate
Poland	J. Zielinski J. Pruchnicki	Principal delegate Alternate	United Republic of Tanzania	M. S. Mhita	Principal delegate
Portugal	M. Espirito Santo Coelho (Ms)	Principal delegate	United States of America	M. Crowe W. C. Bolhofer T. Karl D. M. Lecomte P. J. Lamb	Principal delegate Delegate Delegate Delegate Adviser
Republic of Korea	Kyung-Sup Shin Seong-Kyoun Kim Sung-Rae Chung	Principal delegate Delegate Delegate	Uzbekistan	S. Nikulina (Ms)	Principal delegate
Republic of Yemen	A. Al-Mikhlaflay	Principal delegate	Zimbabwe	A. Makarau	Principal delegate
Romania	A. Geicu	Principal delegate			
Russian Federation	Yu. S. Tsaturov A. A. Maximov M. Z. Shaimardanov G. V. Gruza N. V. Kobysheva (Ms) N. Sikachev	Principal delegate Delegate Delegate Delegate Delegate Delegate			
				C. INVITED EXPERT	
			P. Mason	Chairperson of the GCOS Steering Committee	

D. REPRESENTATIVES OF INTERNATIONAL ORGANIZATIONS

<i>Organization</i>	<i>Name</i>
United Nations Environment Programme (UNEP)	R. Christ (Ms)
World Health Organization (WHO)	C. Corvalan M. Anker (Ms)
European Space Agency (ESA)	E. Oriol-Pibernat (Ms)
International Association for Urban Climate (IAUC)	G. Jendritzky P. Bessemoulin

<i>Organization</i>	<i>Name</i>
International Astronautical Federation (IAF)	L. Adame
International Society of Biometeorology (ISB)	G. Jendritzky
League of Arab States (LAS)	M. H. Elsayed
E. OBSERVER	
Palestine	I. Musa

APPENDIX B

AGENDA

<i>Agenda item</i>	<i>Document Nos.</i>	<i>PINK Nos. and person submitting</i>	<i>Resolutions and recommendations adopted</i>
1. OPENING OF THE SESSION		1, president of CCI	
2. ORGANIZATION OF THE SESSION		2, president of CCI	
2.1 Consideration of the report on credentials			
2.2 Adoption of the agenda	2.2(1); 2.2(1), REV. 1; 2.2(2) 2.2(2), REV. 1		
2.3 Establishment of committees			
2.4 Other organizational matters			
3. REPORT OF THE PRESIDENT OF THE COMMISSION	3	3, president of CCI	
4. REPORTS OF THE CCI WORKING GROUPS AND RAPPORTEURS	4	4, president of CCI	
5. CLIMATE SYSTEM MONITORING	5	6, chairperson, Committee A	
5.1 Climate change detection			
5.2 Requirements for, and development of, observing networks for climate monitoring			
5.3 Future WMO climate information system			
5.4 Requirements for climate data exchange			
5.5 Interactions with other WMO and United Nations commissions and programmes			
6. CLIMATE DATA MANAGEMENT	6	6, chairperson, Committee A	
6.1 General requirements			
6.2 Data processing, including climate computing			
6.3 Data rescue activities			
6.4 Interactions with other WMO and United Nations commissions and programmes			
7. CLIMATE APPLICATIONS, IMPACTS AND RESPONSE STRATEGIES			
7.1 Human health	7.1	7.1, chairperson, Committee B	
7.2 Urban climatology	7.2	7.2, chairperson, Committee B	
7.3 Food and agriculture	7.3	7.3, chairperson, Committee B	
7.4 Water resources	7.4	7.4, chairperson, Committee B	
7.5 Energy and other applications	7.5	7.5, chairperson, Committee B	
7.6 Interactions with the United Nations Environment Programme and other bodies	7.6	7.6, chairperson, Committee B	
8. CLIMATE INFORMATION AND PREDICTION SERVICES	8	8, chairperson, Committee B	
8.0 Report of the chairperson of the Working Group on Climate Information and Prediction Services			
8.1 Implementation of climate information and prediction services			
8.2 Requirements for integrated data and products			
8.3 Developments in operational seasonal to interannual climate prediction			

<i>Agenda item</i>	<i>Document Nos.</i>	<i>PINK Nos. and person submitting</i>	<i>Resolutions and recommendations adopted</i>
8.4			
8.5			
8.6			
8.7			
9. ELECTION OF OFFICERS		9, chairperson, Nomination Committee 9(2), vice-president of CCI	
10. OTHER ACTIVITIES OF THE COMMISSION	10	10, president of CCI	
10.1			
10.2			
10.3			
10.4			
10.5			
10.6			
10.7			
10.8			
11. STRUCTURE OF THE COMMISSION FOR CLIMATOLOGY, WMO STRUCTURAL ISSUES AND LONG-TERM PLANNING	11(1); 11(2)	11(1), chairperson, Committee of the Whole 11(2), chairperson, Committee of the Whole	Res. 1; 2; 3
12. SCIENTIFIC LECTURES	12	12, president of CCI	
13. NOMINATION OF MEMBERS OF WORKING GROUPS, INCLUDING THE ADVISORY WORKING GROUP, AND OF RAPPORTEURS			
14. REVIEW OF PREVIOUS RESOLUTIONS AND RECOMMENDATIONS OF THE COMMISSION AND OF RELEVANT EXECUTIVE COUNCIL RESOLUTIONS	14	14, chairperson, Committee A	Res. 4 Rec. 1
15. ANY OTHER MATTERS			
16. DATE AND PLACE OF THE FOURTEENTH SESSION		16 and 17, president of CCI	
17. CLOSURE OF THE SESSION		16 and 17, president of CCI	

APPENDIX C

LIST OF ABBREVIATIONS

ACCAD	Advisory Committee on Climate Applications and Data
ACMAD	African Centre of Meteorological Applications for Development
AgMP	Agricultural Meteorology Programme
AOPC	Atmosphere Observation Panel for Climate
ARCHISS	Archival Climate History Survey Project
AREP	Atmospheric Research and Environment Programme
ASC	Area Support Centre
AWG	Advisory Working Group
AWS	Automatic Weather Station
CagM	Commission for Agricultural Meteorology
CARDS	Comprehensive Aerological Reference Dataset
CAS	Commission for Atmospheric Sciences
CBD	Convention on Biological Diversity
CBS	Commission for Basic Systems
CCI	Commission for Climatology
CDMS	Climate Database Management System
CEOS	Committee on Earth Observation Satellites
CHy	Commission for Hydrology
CIMO	Commission for Instruments and Methods of Observation
CLiC	Climate and Cryosphere Programme
CLICOM	Climate Computing
CLIMAG	Climate Prediction for Agriculture
CLIPS	Climate Information and Prediction Services
CLIVAR	Climate Variability and Predictability
CLIWOC	Climate of the World Oceans
COADS	Comprehensive Ocean-Atmosphere Dataset
C-OPAG	Chairperson of the Open Programme Area Group
CSM	Climate System Monitoring
DARE	Data Rescue
DWD	<i>Deutscher Wetterdienst</i>
ECA	ECSN Climate Assessment
ECAC	European Conference on Applied Climatology
EC-AGE	Executive Council Advisory Group on the Exchange of Meteorological and Related Data and Products
ECD	ECSN Climate Dataset
ECMWF	European Centre for Medium-range Weather Forecasts
ECSN	European Climate Support Network
ESA	European Space Agency
ET	Expert Team
EUMETNET	European Meteorological Network
EUMETSAT	European Organization for the Exploitation of Meteorological Satellites
GAW	Global Atmosphere Watch
GCOS	Global Climate Observing System
GEWEX	Global Energy and Water Cycle Experiment
GIS	Geographical Information System
GOOS	Global Ocean Observing System
GOSIC	Global Observing Systems Information Centre
GPCC	Global Precipitation Climatology Centre
GSN	GCOS Surface Network
GTOS	Global Terrestrial Observing System
GUAN	GCOS Upper-air Network
GURME	GAW Urban Research Meteorological Environment Project

IAF	International Astronautical Federation
IAUC	International Association for Urban Climate
ICB	International Congress on Biometeorology
ICSU	International Council for Science
ICT	Implementation/Coordination Team
ICUC	International Conference on Urban Climatology
IGBP	International Geosphere-Biosphere Programme
IGOS	Integrated Global Observing Strategy
IHDP	International Human Dimensions Programme on Global Environmental Change
IHP	International Hydrological Programme
INFOCLIMA	World Climate Data Information Referral Service
IOC	Intergovernmental Oceanographic Commission
IPCC	Intergovernmental Panel on Climate Change
IRI	International Research Institute for Climate Prediction
ISB	International Society of Biometeorology
ISDR	International Strategy for Disaster Reduction
JMA	Japan Meteorological Agency
JCOMM	Joint WMO/IOC Technical Commission for Oceanography and Marine Meteorology
LAS	League of Arab States
NCDC	National Climatic Data Center
NMHS	National Meteorological and Hydrological Service
NMS	National Meteorological or Hydrometeorological Service
OHP	Operational Hydrology Programme
OPAG	Open Programme Area Group
RA	Regional Association
RBCN	Regional Basic Climatological Network
RCC	Regional Climate Centre
6LTP	Sixth WMO Long-term Plan
SBSTA	Subsidiary Body for Scientific and Technological Advice
START	System for Analysis, Research and Training
TRUCE	Tropical Urban Climate Experiment
UKMO	United Kingdom Meteorological Office
UNCCD	United Nations Convention to Combat Desertification
UNCHS	United Nations Centre for Human Settlements
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
UNIDO	United Nations Industrial Development Organization
VCP	Voluntary Cooperation Programme
WCASP	World Climate Applications and Services Programme
WCDMP	World Climate Data and Monitoring Programme
WCIRP	World Climate Impact Assessment and Response Strategies Programme
WCP	World Climate Programme
WCRP	World Climate Research Programme
WHO	World Health Organization
WHYCOS	World Hydrological Cycle Observing System
WMO	World Meteorological Organization
WWW	World Weather Watch
