

experience gained by the previous bodies – ICTT-QMF and TT-QMS, and requested the Executive Council to consider establishment of such a body in its future work structure.

3.1.171 In this respect, Congress approved [Resolution 7 \(Cg-17\) – WMO Quality Management Framework](#).

Amendment of Competency and Qualifications Provisions in the WMO Technical Regulations, Volume I (WMO-No. 49)

3.1.172 Congress recalled that the current edition of the WMO Technical Regulations Volume I (WMO-No. 49), contained provisions related to competencies and qualifications of aeronautical meteorological personnel. Congress welcomed advice that during this intersessional period a number of the technical commissions had acted upon the request of Cg-XVI to develop competency provisions in service domains. Congress recognized that in order to accommodate these and future competency provisions, typically as recommended practices within the Technical Regulations, it was necessary to restructure Chapter 5 of Volume I.

3.1.173 Congress agreed that in the restructuring of Chapter 5 it was necessary to define the terms “qualification”, “competency” and “operational personnel”. Congress noted the definition of operational personnel was adapted from that used within ICAO and this provided further consistency in this area between the two organizations. Congress further appreciated that in reviewing the general provisions for this chapter it was necessary to incorporate QMS principles related to Members record keeping and competency assessment programmes, and that these general provisions were introduced with due account to the local conditions, requirements and procedures in WMO Member States. Congress requested all Technical Commissions, particularly the Commission for Aeronautical Meteorology, to keep their qualification and competency requirements under review due to changes in science, technology and service requirements and to incorporate lessons learnt from the implementation of these practises. Congress adopted [Resolution 8 \(Cg-17\) – Amendment of competency and qualification provisions in the Technical Regulations \(WMO-No. 49\), Volume I](#).

3.2 WMO disaster risk reduction services – Priority (agenda item 3.2)

Disaster Risk Reduction Programme

3.2.1 Congress reemphasized that reducing disaster risks from hydrometeorological hazards, such as strong winds and severe storms, tropical cyclones, flash floods, storm surges, droughts, wild fires, heat waves, landslides, sand and dust storms, marine and aviation hazards etc., is one of the strategic priority areas of WMO. Congress stressed that the protection of lives, livelihoods and property in society should be promoted through strengthening the capacities of the National Meteorological and Hydrological Services (NMHSs) in disaster risk reduction (DRR) at local, national, regional, and international levels. In this context, Congress recalled its decision to establish the cross-cutting DRR Programme through Resolution 29 (Cg-XIV), the vision and strategic priorities of which were underpinned by the Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and Communities to Disasters (HFA) adopted by 168 countries at the Second World Conference on Disaster Reduction held in Kobe, Japan, in 2005.

3.2.2 Congress stressed that NMHSs need to provide products and services to a diverse group of DRR stakeholders, including government authorities, public and private sectors, non-governmental organizations (NGOs), the general public, the media, etc. Hence, the DRR Programme adopts a user-driven approach in the development of DRR products and services to provide support in thematic areas such as hazard and risk analysis, multi-hazard early warning systems (MHEWS), sectoral risk management, humanitarian planning and response, and disaster risk financing and financial risk transfer mechanisms (ref.: Resolution 8 (EC-64)).

3.2.3 Congress reiterated that the DRR Programme is cross-cutting and is inextricably linked to other WMO technical programmes, technical commissions (TCs), and regional associations (RAs). Hence, the activities of WMO constituent bodies, global operational and research networks,

as well as strategic partners, should be aligned with the DRR Programme when assisting NMHSs to implement an integrated approach to the development and delivery of weather, water, and climate services to DRR stakeholders and user communities. Therefore it is important for the DRR Programme to ensure careful coordination across the full range of WMO constituent bodies.

3.2.4 Congress noted that the Sendai Framework for DRR 2015–2030 was adopted at the Third United Nations World Conference on Disaster Risk Reduction (WCDRR) held in Sendai, Japan, from 14 to 18 March 2015. The new Framework addresses four priorities for action:

- (a) Understanding disaster risk;
- (b) Strengthening disaster risk governance to manage disaster risk;
- (c) Investing in DRR for resilience; and,
- (d) Enhancing disaster preparedness for effective response, and to “Build Back Better” in recovery, rehabilitation and reconstruction;

and defines the role of stakeholders and of international cooperation and global partnership.

3.2.5 Congress further noted that WMO Members contribute with a number of activities to each priority for action of the Framework, especially for priority for action 4, referring to the Global Framework for Climate Services (GFCS) and hydrometeorological issues, and highlighted that its global target number 7, which reads “substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030”, is particularly relevant to WMO (ref.: paragraphs 3.2.42–3.2.73).

Achievements and progress regarding disaster risk reduction service delivery

3.2.6 Congress acknowledged that nearly all RAs, TCs, and technical programmes contribute to the DRR priority and the DRR Programme’s fundamental objective of assisting Members with the delivery of DRR products and services in a cost-effective and sustainable manner in support of the safety of life, livelihoods, and property. Congress noted in particular the outcomes and achievements of activities of different programmes in support of this objective as follows:

Progress in the implementation of multi-hazard early warning systems

- (a) The publication Institutional Partnerships in Multi-Hazard Early Warning Systems containing seven good practices in MHEWS from Bangladesh, the megacity of Shanghai in China, Cuba, France, Germany, Japan, and the USA, with a sound foundation in risk assessment across multiple hazards being a fundamental part of each of the MHEWS in the seven countries;
- (b) Better observation and monitoring of hazards, improved forecasting and warning services, and the rapid advances in technical capabilities to improve dissemination leading to advances in MHEWS;
- (c) Emphasis on institutional commitment and effective coordination as the key to developing end-to-end user-oriented, impact-based warning systems for multiple hazards and the requirement for a strong political recognition of the importance of MHEWS;
- (d) Improvement of MHEWS by incorporating impact and risk information related to extreme weather and climate change to forewarn and guide individuals, groups and communities at risk, as well as decision-makers, in taking appropriate action on preventing and reducing disaster losses (ref.: paragraphs 3.1.34–3.1.62);
- (e) Implementation of standardized dissemination technologies such as the Common Alerting Protocol (CAP) in NMHSs as an effective tool for the dissemination of public warnings, and to register their alerting authorities in the WMO Register of Alerting Authorities (ref.: paragraphs 3.1.34–3.1.62);

Advances in forecasting hydrometeorological hazards and delivery of warning services

- (f) Improving the ability of NMHSs to forecast severe weather events e.g. through the “Cascading Forecasting Process” (global to regional to national) which is being implemented through the WMO Severe Weather Forecasting Demonstration Project (SWFDP) (ref.: paragraphs 4.1.7–4.1.35) and through the Flash Flood Guidance Systems (FFGS); and enhancing the lead-time and reliability for warnings (ref.: paragraphs 3.1.34–3.1.62);
- (g) Reducing vulnerability by improving operational forecasts and warning capability on the risks and probable impacts from coastal inundation, caused by storm surge, astronomical tides, waves, and sea surface elevation anomalies, through the WMO Coastal Inundation Forecasting Demonstration Project (CIFDP) (ref.: paragraphs 3.1.100–3.1.137);

Improving in flood and risk management

- (h) Improved flood and flood risk management through the Associated Programme on Flood Management (APFM) (ref.: paragraphs 4.1.93–4.1.136), in collaboration with the Global Water Partnership (GWP), by compiling and producing guidance documents and tools in support of integrated flood and flood risk management;

Improving drought management

- (i) Strengthened drought policy, monitoring, early warning and risk management, through the Integrated Drought Management Programme (IDMP) (ref.: paragraphs 4.1.49–4.1.92);

Storm surge watch scheme

- (j) Increased utilization of Regional Specialized Meteorological Centres (RSMC) advisories through inclusion of storm surge information in the advisories by a number of RSMCs working on tropical cyclones (ref.: paragraphs 3.1.63–3.1.99);

Emergency Response Activities (ERA)

- (k) Effective response to environmental emergencies associated with airborne hazards, for example, caused by nuclear accidents or events, volcanic eruptions, chemical accidents, smoke from large fires, and other events, which require emergency atmospheric transport and dispersion modelling (ATM) support (ref.: paragraphs 4.1.36–4.1.48).

DRR User-Interface Expert Advisory Groups (UI-EAGs)

3.2.7 Congress recalled the endorsement by EC-64 of four DRR User-Interface Expert Advisory Groups (UI-EAGs) in four DRR priority thematic areas, including:

- (a) Hazard and risk analysis and assessment;
- (b) MHEWS;
- (c) Climate services for disaster risk financing;
- (d) Hydrometeorological services for improved humanitarian planning and response.

These UI-EAGs were established to:

- (a) Guide the documentation of good practices and the development of user needs and requirements for products and services to support thematic areas in DRR decision-making;

- (b) Support the development of and provide feedback on the WMO DRR knowledge products;
- (c) Support the implementation of the DRR Work Plan 2012–2015;

and the membership of these thematic UI-EAGs includes leading experts from the DRR user community (public and private sectors), United Nations and other international partner agencies from humanitarian and development communities, academia, as well as from the NMHSs and the DRR Focal Points of TCs and technical programmes (DRR FP TC-TP).

3.2.8 Recognizing the work of these UI-EAGs and their contribution to DRR-related activities of WMO, Congress encouraged the continuation of such user-driven approaches in the development of DRR knowledge products, science-based and risk-informed services, and in the implementation of demonstration projects. Congress requested the Secretary-General to develop a set of clear deliverables to allow progress to be tracked.

National DRR capacity development projects with regional cooperation frameworks

3.2.9 Congress noted the successful completion of the Costa Rica Early Warning Systems for Hydrometeorological Hazards Project in 2013 funded by the Global Facility for Disaster Reduction and Recovery (GFDRR). The purpose of the project was to develop an effective framework for an operational EWS, with the Sarapiquí River basin serving as a pilot area, and to strengthen coordination and cooperation among the National Meteorological Institute (IMN), the National Commission of Risk Prevention and Emergency Response (CNE), and the Instituto Costarricense de Electricidad (ICE). This collaboration among national government agencies and NGOs at the local level aimed at strengthening emergency preparedness and response, and included community participation in the implementation and development of this Project. Congress expressed its appreciation to IMN for its active collaboration in the implementation of this Project. Congress stressed the need to build on the lessons learnt from this Project and encouraged further expansion of such national DRR capacity development projects with regional cooperation frameworks.

3.2.10 Congress noted that a binational project between Ecuador and Peru in the Zarumilla River Basin for a flash flood system is being developed and will be implemented by WMO. Congress further noted that in RA III, Brazil (INMET) has developed, with initial financial support from the Ibero-American Cooperation Programme, the EWS called ALERT-AS for the Southern Part of South America. The system is operational in Brazil and will be extended to the NMHSs of Argentina, Paraguay, and Uruguay. The system uses as input different sources of meteorological information as well as information from civil protection on past extreme weather-related events and impacts. The dissemination of warnings is done through the Common Alert Protocol (CAP).

3.2.11 Congress noted that a Workshop on MHEWS for Urban Areas was held in December 2013 in Costa Rica in which a number of representatives from Central and South American as well as Caribbean countries participated. The focus of the workshop was on the development of MHEWS for weather-, climate-, and water-related hazards for medium to large cities. Within this context, the workshop highlighted the importance of a strong partnership between national disaster risk management (DRM) agencies, NMHSs, local governments, and civil society.

3.2.12 Congress noted with satisfaction that the second phase of the South-east European project Building Resilience to Disasters in the Western Balkans and Turkey, funded by the European Commission (Directorate-General for Enlargement), in cooperation with the United Nations Office for Disaster Risk Reduction (UNISDR), was completed in 2014. The Project considered seven beneficiary countries in the Western Balkans and Turkey which are exposed to a range of similar natural hazards. The project strengthened cooperation among national agencies and promoted regional cooperation. Congress supported the multi-national approach taken in this Project, including the project recommendations which include further actions in building a multi-

hazard early warning platform which will contribute to better collaboration and harmonization of warnings and advisories in the region.

3.2.13 Congress noted that during 2010–2011, WMO with support from regional and international partners, conducted an assessment of the institutional and technical capacities and needs of the Caribbean region to support MHEWS and risk assessment. The project included a number of MHEWS training workshops and meetings. Congress highlighted that these activities provide the foundation for future capacity development projects in the region.

3.2.14 Congress noted the progress made in rehabilitating the NMHS in Haiti following its destruction by the earthquake in 2010 (ref.: agenda item 5.3). The rehabilitation, funded by Environment Canada, has resulted in better working conditions for the staff; construction of a new hurricane-proof and earthquake-resistant building has commenced; and access to basic information and data has been secured. Collaboration with the World Bank Pilot Program on Climate Resilience (PPCR, to commence in June 2015) has been strong from the onset. Congress noted that challenges such as establishing the appropriate mechanisms for the access to data, timely payment of salaries, and ownership of equipment continue to exist, and requested the Secretary-General to continue to support the Haiti NMHS.

3.2.15 Congress urged the RAs, with support from the Secretariat, to document lessons learnt from the approach of the DRR Programme and the engagement of the RAs in the implementation of the DRR capacity development projects and to submit recommendations to EC on how the RAs can be effectively engaged in promoting this approach in other WMO Regions.

Knowledge products

3.2.16 Congress noted the efforts undertaken and underway to develop guidelines, standards, assessment reports, and training modules in the main areas of work of the DRR Programme that are consistent with Quality Management System (QMS) principles and that are to be demonstrated and further developed in the afore-mentioned capacity development projects. Effective service delivery to local, regional, and national stakeholders remains the principle focus of the NMHSs. Supporting knowledge of MHEWS, disaster risk financing, DRR and climate adaptation policies, institutional and financial planning, sectoral risk management and operations can also help inform NMHSs in respect of prioritized service delivery. Congress therefore requested the Secretary-General to provide further guidance to Members in this area.

3.2.17 Congress noted with appreciation the publication of several DRR knowledge products including:

- (a) *Strengthening of Risk Assessment and Multi-hazard Early Warning Systems for Meteorological, Hydrological, and Climate Hazards in the Caribbean* (WMO-No. 1082, 2011);
- (b) *Institutional Partnerships in Multi-Hazard Early Warning Systems: A compilation of seven national good practices and guiding principles* (WMO, 2012);
- (c) *Strengthening Multi-Hazard Early Warning Systems and Risk Assessment in the Western Balkans and Turkey: assessment of capacities, gaps and needs* (DRR-SEE-1, 2012);
- (d) *Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2012)* (WMO-No. 1123).

3.2.18 Congress stressed the importance of DRR training materials, which can also help strengthen national institutional arrangements. Congress noted that a significant amount of training modules have been developed by Members and Regional Training Centres (RTCs) that could be extended and elaborated through the introduction of additional materials from partners such as the World Bank and other partner United Nations agencies. Congress requested the Secretary-

General to arrange for a review and regular updating of these training modules and programmes and to facilitate access to these materials as a contribution to WMO's Capacity Development Strategy. Congress requested the Secretary-General to include a review of DRR-related training materials as part of the WMO DRR Roadmap implementation.

Contribution of DRR-related programmes to the Global Framework for Climate Services

3.2.19 Noting that DRR is one of the priority areas of the GFCS and that the implementation of the DRR activities can demonstrate the value of climate services to risk-based DRR decision-making, Congress agreed that the UI-EAGs can contribute to the GFCS User Interface Platform (UIP), and that the deliverables of the WMO DRR Roadmap are relevant to strengthening of the UIP.

Coordination with technical commissions and technical programmes

3.2.20 Congress noted the establishment of the DRR FP TC-TP through nominations by the presidents of TCs (PTC) and relevant coordinating mechanisms of other technical programmes in 2013, and the progress underway to map the roles and relevant activities of TCs and RAs and to develop processes for their coordination in the implementation of the DRR Programme activities. Congress requested the DRR FP TC-TP to include DRR focal points of the regional associations.

3.2.21 Noting the recommendation of DRR FP TC-TP and subsequent recommendations of the meeting of the PTC in January 2014 to initiate a DRR demonstration project in South-East Asia that focuses on capacity development for risk analysis and MHEWS, Congress requested the Secretary-General, together with the PTC and with support from the DRR FP TC-TP, RA II, Members and partners, to facilitate the scoping of the proposal to complement existing relevant projects and activities in order to avoid duplication. Congress requested the Secretary-General to provide relevant information including the scoping of the proposal for consideration by EC.

3.2.22 Congress noted the work of the Commission for Basic Systems (CBS) Task Team on the Provision of Operational Meteorological Assistance to Humanitarian Agencies, through the Global Data-Processing and Forecasting System (GDPFS) and Public Weather Services (PWS) Programme, as a direct contribution from CBS to the DRR priority as an UI-EAG. Congress acknowledged the continued collaboration with the United Nations Office for the Coordination of Humanitarian Affairs (UNOCHA) in the comprehensive review of the requirements for operational meteorological and hydrological products and services by humanitarian agencies, which would lead to the development of procedural arrangements for the provision of meteorological and hydrological assistance to humanitarian contingency planning, preparedness and early warning, and response and recovery activities. Congress therefore requested CBS, in collaboration with the Commission for Climatology (CCI) and the Commission for Hydrology (CHy), and in coordination with UNOCHA, to continue to work on the revision, with appropriate testing, of the Arrangements for the Provision of Meteorological Assistance to United Nations Humanitarian Missions, which are described in the *Manual on the Global Data-processing and Forecasting System* (GDPFS) (WMO-No. 485, Vol. I, Appendix 1-5).

Coordination with regional associations, national and regional Platforms for DRR and forums

3.2.23 Congress stressed the critical role of the RAs in the implementation of WMO DRR projects at national and regional levels by providing input on the needs and priorities of the Members and the Regions and encouraged the presidents of the RAs to facilitate collaboration with the regional inter-governmental DRM organizations. Congress urged the participation of NMHSs and RAs in the national, regional, and global DRR platforms as this will lead to strengthened partnerships and cooperation for the identification and implementation of DRR capacity development projects. Cooperation with civil protection and planning agencies in national and regional Platforms for DRR and forums are particularly important as long and short-term decisions are taken on that level. Congress stressed the importance of engaging the RAs, through their various DRR task teams or working groups, in DRR capacity development projects to provide

advice and expertise on implementation, review, and evaluation of the outcomes, and recommendations for improvements, sustainability, and scaling up of the projects.

Response to major disasters related to hydrometeorological hazards since Cg-XVI

3.2.24 Congress highlighted that there have been a number of disasters during the intersessional period. It particularly noted the devastation caused by the earthquake in Nepal in April 2015, super typhoon *Maysak* in the Federated States of Micronesia in April 2015, severe tropical cyclone *Pam* in Vanuatu on 14 March 2015, severe tropical cyclone Ian in Tonga in January 2014, the severe Balkan floods in 2014, the significant disaster that affected the Southern Africa Development Community (SADAC) countries in 2010, 2014 and 2015 such as the flooding in Zimbabwe in February 2014, typhoon *Haiyan* which devastated the central Philippines in November 2013, the Solomon Islands earthquake and tsunami in February 2013, and cyclone Evan which struck Fiji in 2012.

3.2.25 Congress noted with appreciation the efforts of the Secretariat to facilitate a coordinated response to NMHSs following these disasters. Noting that major disasters such as the earthquake in Nepal and floods in the Balkan peninsula have an international dimension and require coordinated response from a broader range of agencies and organizations and the need for improved and effective communication and the need for sustained public educational efforts to increase the awareness, understanding and preparedness of the public to the risks of the hazards and to take appropriate actions in response to the authoritative warnings, Congress requested the Secretary-General, in coordination with the TCs, RAs, RSMCs, and other operational centres to analyse the issue and develop a draft working arrangement that elaborates the roles and responsibilities for the coordination of WMO's response to Members' requests for assistance, noting that operational responsibility lies with the Members, and to report to EC for consideration.

Identifiers for cataloguing extreme weather and climate events

3.2.26 Regarding extreme weather and climate events and their reporting by Members, Congress noted the emphasis of the Sendai Framework for DRR 2015–2030 on the need for substantial reduction in disaster losses through the implementation of policies and practices for DRM based on an understanding of disaster risk in all its dimensions, including hazard characteristics. In this connection, Congress noted the need for systematic characterization and cataloguing of extreme weather and climate events in a form that allows data on losses and damage to be cross-referenced to these phenomena. In this regard, Congress recognized the Caribbean Climate Impacts Database (CCID) launched in Saint Lucia in May 2015, which archives impact information (including damage and loss information) associated with extreme weather and climate events in the Caribbean as a positive step in this direction.

3.2.27 Congress noted that several TCs including CCI, the Commission for Agricultural Meteorology (CAgM), CHy, CBS, the Joint WMO-IOC Technical Commission for Oceanography and Marine Meteorology (JCOMM), the Commission for Atmospheric Sciences (CAS), as well as RAs and relevant technical programmes are addressing different aspects of extreme events such as sector-specific indices, definitions of extreme weather and climate events, the development of extremes-related climate services, etc., and that this work needed to be consolidated.

3.2.28 Congress adopted [Resolution 9 \(Cg-17\) – Identifiers for cataloguing extreme weather, water and climate events](#).

Partnerships for disaster risk reduction

3.2.29 Congress noted the partnership of WMO with global and regional organizations and international agencies in different regions that influence DRR policies, planning, funding, and institutional development, such as UNISDR, the International Federation of Red Cross and Red Crescent Societies (IFRC), United Nations regional economic groupings (e.g. the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)), development banks (World Bank in particular); and with academia and the private sector. By considering the necessity

and importance of NMHSs in all phases of the disaster risk management process not only for hydrometeorological disasters but also for all other types of disasters, Congress further noted that relations and partnerships with disaster risk management authorities, other national bodies and regional and global stakeholders should be improved for the efficient management of all disasters, including the reduction of risks and the prevention of creating new risks.

3.2.30 Congress noted that the Global Disaster Alert and Coordination System (GDACS), a cooperation framework between the United Nations (UNOCHA, the Operational Satellite Applications Programme of the United Nations Institute for Training and Research (UNITAR/ UNOSAT), the European Commission (through its Joint Research Centre (JRC)), and disaster managers worldwide to improve alerts, information exchange and coordination in the first phase after major sudden-onset disasters, is in the process of registering with the WMO Information System (WIS). Congress recalled the caution of EC-66 that the alerts and warnings from GDACS should not undermine the authoritative meteorological, hydrological and other environmental hazard warnings issued by NMHSs. Congress encouraged GDACS to use the authoritative information available through WIS and noted that information provided by GDACS through WIS could be helpful to Members in managing their preparations for and responses to disasters. Congress reminded all WIS Centres, including GDACS and other similar platforms, to take utmost care and ensure that any guidance they publish through WIS does not detract from warnings issued by registered alerting authorities. Congress therefore requested the Secretary-General to engage in a comprehensive dialogue with GDACS and other third-party service providers to facilitate improved cooperation and coordination of activities, while stressing the need to emphasize the mandated role of the NMHSs.

3.2.31 Congress requested the Secretary-General to further strengthen WMO partnerships with UNISDR and other relevant partners for the implementation of national and regional DRR projects in line with the Sendai Framework for DRR 2015–2030, including the partnerships of RAs, bodies such as the regional typhoon/hurricane committees which in many cases have existing DRR working structures, and WMO Regional Offices with regional bodies of international organizations and other partners.

WMO DRR Roadmap

3.2.32 Congress noted Resolution 8 (EC-66) requesting the Secretary-General to “urgently develop a WMO DRR Roadmap of prioritized and realistically achievable activities and deliverables, that are consistent with the WMO Strategic and Operating Plans, as well as the work plans for relevant WMO Programmes and projects”.

3.2.33 Congress emphasized that WMO DRR activities are based upon, and are in support of, the core work of NMHSs. Hence, the WMO DRR Programme should, in close collaboration with relevant technical programmes, and in particular the PWS Programme and Hydrology and Water Resources Programme (HWRP), facilitate efforts that promote delivery of authoritative forecast and warning information to decision-making authorities at local, national, regional, and global levels as well as provide relevant hazard and risk analysis and assessment to assist DRM.

3.2.34 Congress requested the Secretary-General to leverage existing guideline documents already created by expert teams within the TCs, gather lessons learned from NMHSs and disaster management partners, and identify existing gaps within the DRR Roadmap outline, which need to be filled. This will increase efficiency and minimize duplication of effort as the DRR Roadmap and other planning evolves.

3.2.35 Congress emphasized that all DRR work should proceed in consideration of all relevant guidelines and documents created by the expert teams within TCs, as well as input provided from NMHSs’ own DRR roadmaps, frameworks, and best practices.

3.2.36 Congress noted with appreciation that a draft WMO DRR Roadmap was prepared and sent to all the Members for their review and comments.

3.2.37 Congress noted that specific thematic areas to be addressed by the Roadmap should be closely interlinked with the priorities for action of the Sendai Framework for DRR 2015–2030, including the emphasis on a people-centred, multi-hazard approach to DRR underpinned by science and technology.

3.2.38 Congress noted that the Roadmap emphasizes the role NMHSs need to play across all timescales, including the provision of weather-specific early warnings with improved lead time, slower onset seasonal or climate-related information, and related hazard and risk information for planning and prevention purposes, including reducing existing risks and preventing the creation of new risks. In this context, the Roadmap:

- (a) References developments in capabilities such as multi-hazard and impact-based forecasting; especially in dissemination and communication of early warnings to emergency managers, the general public, and other relevant stakeholders, with emphasis to support NMHSs of most vulnerable Members, specifically LDCs and SIDs;
- (b) Provides a framework for WMO Members to enhance NMHSs' contributions to their national DRR efforts using in particular the possibilities of national and regional Platforms for DRR and forums, including forecasting, warning, service delivery, communication of forecasts and warnings to the public, and public education efforts;
- (c) Provides a mechanism to enhance WMO Members' and programmatic collaboration in respect of DRR;
- (d) Identifies both tactical and strategic opportunities to enhance the role of hydrometeorology and therefore NMHSs in global, regional, national, and sub-national DRR and climate change adaptation strategies;
- (e) Provides mechanisms for engagement with the international DRR stakeholder community, e.g. the United Nations system, regional organizations and economic groupings, the private sector, and humanitarian agencies;
- (f) Provides guidance and tools to NMHSs to strengthen linkages with emergency managers, decision makers in hydrometeorologically sensitive sectors, and the general public on reducing risk of weather, space weather, climate and water hazards.

3.2.39 Noting the enormous significance of the Sendai Framework for DRR 2015–2030 to the DRR priority of WMO and the need for assisting WMO Members in the effective implementation of this Framework through:

- (a) Developing DRR knowledge products (e.g. guidelines, standards, training modules) in thematic areas such as hazard and risk assessment, MHEWS, humanitarian planning and response, and disaster risk financing;
- (b) Assisting with the coordinated national and regional DRR capacity development activities and demonstration projects in these thematic areas;
- (c) Promoting, engaging in, and facilitating multi-stakeholder partnerships in DRR on different levels.

3.2.40 In this regard, Congress requested the Secretary-General, in consultation with Members and collaboration with technical commissions and regional associations, to develop a final draft of the WMO DRR Roadmap for consideration and approval by the 68th Executive Council. It requested Executive Council to guide its further development and implementation, including monitoring and evaluation, and updating, in line with the Sendai Framework for DRR 2015–2030 adopted by 187 countries and other relevant international development frameworks (e.g. on sustainable development, climate change, humanitarian assistance, and urban issues).

3.2.41 Reemphasizing that the DRR Programme is a cross-cutting programme that coordinates the DRR services supported by various WMO Programmes, Congress requested EC to establish an appropriate governance mechanism to guide the implementation of the WMO DRR priorities through the DRR Programme with the aim to strengthen the capacities of Members, especially of their NMHSs, and the role of the WMO operational and research networks and designated entities assisting and cooperating with WMO, to deliver high-quality services for DRR towards building resilience at all levels.

Third United Nations World Conference on Disaster Risk Reduction (WCDRR)

3.2.42 Congress noted that the Third United Nations World Conference on Disaster Risk Reduction (WCDRR), held in Sendai, Japan, from 14 to 18 March 2015 was well attended with the participation of over 6,500 delegates, including 2,800 representatives from 187 governments, in the 150 intergovernmental and multi-stakeholder events and over 143,000 participants in the 350 side events organized in the public forum.

3.2.43 Congress was pleased to note that over 60 representatives of National Meteorological and Hydrological Services (NMHSs) from more than 42 countries (from all regional associations (RAs), and including 24 PRs with WMO) attended the conference, most of them being members of their respective national delegations. The NMHS representatives and staff members of the WMO Secretariat actively participated and contributed to the discussions during the sessions of WCDRR.

Sendai Framework for Disaster Risk Reduction 2015–2030

3.2.44 Congress acknowledged with satisfaction the adoption by 187 countries of the Sendai Framework for Disaster Risk Reduction (SFDRR) 2015–2030 and WMO's extensive engagement in the various related consultations and preparatory processes between 2013 and 2015. SFDRR addresses four priorities for action: (1) understanding disaster risk; (2) strengthening disaster risk governance to manage disaster risk; (3) investing in disaster risk reduction (DRR) for resilience; and (4) enhancing disaster preparedness for effective response, and to "Building Back Better" in recovery, rehabilitation and reconstruction and defines the role of stakeholders and of international cooperation and global partnership.

Consultative process

3.2.45 Congress appreciated the participation and active involvement of Members, RAs, and the WMO Secretariat (including Regional Offices) in the consultative processes for the Post-2015 Framework for DRR facilitated by the United Nations Office for DRR (UNISDR), which included the session of the Global Platform for DRR in 2013, the Regional Platforms and Ministerial Conferences for DRR, and the three sessions of the Preparatory Committee for the WCDRR, as well as the open-ended informal consultative and negotiation meetings, held in 2014 and 2015. Congress appreciated the technical support WMO provided to the Informal Working Group on Targets and Indicators of the Preparatory Committee.

3.2.46 Congress noted the contribution of the WMO Secretariat Task Team for the Post-2015 Framework for DRR and WCDRR to ensure the active participation of WMO in the consultative processes leading to the adoption of the SFDRR and the organization processes leading to the conduct of the WCDRR. Congress further noted the close coordination of the Secretariat with other United Nations agencies through its active participation in the United Nations Inter-Agency Group (IAG) and the High-Level Committee on Programmes Senior Management Group for DRR and Resilience (HLCP-SMG) in the various preparations for the WCDRR.

Significance of SFDRR to WMO

3.2.47 Congress acknowledged the enormous significance of the SFDRR to the DRR Priority of WMO given the stated goal of SFDRR to "*prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and*

reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience.”

3.2.48 Congress noted that WMO Members and their NMHSs contribute to a number of activities under each of the four priorities for action of the SFDRR and highlighted that global target number 7 of the framework which reads “substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to people by 2030” is quite relevant to WMO.

3.2.49 Congress emphasized that among the provisions of SFDRR called for by and addressed to States, the following are primarily relevant to WMO:

- (a) To enhance and strengthen multi-hazard early warning systems (MHEWS), to develop and invest in regional multi-hazard early warning mechanisms, to facilitate the sharing and exchanging of information across all countries, and to achieve the global target for MHEWS;
- (b) To enhance and strengthen climatological aspects in the development of prevention activities together with other partners and governmental institutions;
- (c) To strengthen and implement global mechanisms on hydrometeorological issues, in order to raise awareness and improve understanding of water-related disaster risks;
- (d) To develop and apply methodologies to assess disaster risks, vulnerabilities and exposure to all hazards;
- (e) To promote international cooperation for DRR and enhanced coordination of DRR strategies of United Nations and international and regional organizations and institutions;
- (f) To maintain and strengthen in situ and remotely sensed Earth and climate observations;
- (g) To promote the collection, analysis, management and use of relevant data and practical information and ensure its dissemination, taking into account the needs of different categories of users, as appropriate;
- (h) To promote real-time access to reliable data, make use of space and in situ information, including geographic information systems (GIS), and use information and communications technology innovations to enhance measurement tools and the collection, analysis and dissemination of data;
- (i) To have a more people-centred approach to DRR in addition to multisectoral-based and inclusive and accessible DRR practices.

WMO at WCDRR

Intergovernmental Segment and high-level events

3.2.50 Congress was pleased to note that the WMO Executive Management conveyed key messages on the role of NMHSs in disaster risk management (DRM) in the Intergovernmental Segment of WCDRR. The Secretary-General participated in the United Nations High Level Special Event “Uniting Nations, People and Action for Resilience”. The Secretary-General also participated in the Ministerial Round Table “Public Investment Strategies for DRR” to discuss the importance of sustained investments in observation systems, scientific research and technology development. Furthermore, WMO provided the outcomes of the WMO Conference on Gender Dimensions of Weather and Climate Services to the organizers of the High-level Multi-Stakeholder Partnership Dialogue “Mobilizing Women's Leadership in DRR”, and contributed to the conceptualization of the

Ministerial Roundtable “Reducing Disaster Risk in Urban Settings” and the High-level Multi-Stakeholder Partnership Dialogue “Inclusive DRM: Governments, Communities and Groups Acting Together”.

3.2.51 Congress appreciated that the WMO statement in the WCDRR Plenary Session articulated achievements, challenges and general commitments of WMO for DRR.

Multi-stakeholder Segment

3.2.52 The Multi-stakeholder Segment was comprised of 34 Working Sessions that addressed the experiences and progress of States in implementing the Hyogo Framework for Action (HFA) 2005–2015, emerging risks, commitments to implementing the post-2015 framework for DRR, and accelerating such implementation.

3.2.53 Congress appreciated the key role played by WMO in organizing the following Working Sessions of the Multi-stakeholder Segment:

- (a) Early Warning (HFA Priority 2);
- (b) Integrated Water Resource Management (IWRM);
- (c) Applying Science and Technology to DRR Decision-making;
- (d) Climate and Disaster Risk: Accelerating National and Local Initiatives;
- (e) Food Security, Disaster-resilient Agriculture and Nutrition.

3.2.54 Congress was pleased to note that WMO also contributed to the preparations of, and the discussions during, other Working Sessions including those on “Underlying Risk Factors”, “Standards for DRR”, “Earth Observations and High Technology to Reduce Risks”, and “Lessons from Mega-Disasters”.

Public Forum

3.2.55 Congress noted with appreciation that WMO organized a symposium as well as showcased good practices in exhibitions during the Public Forum which was a significant part of WCDRR, promoting a shared responsibility of reducing risk and building resilience.

3.2.56 WMO organized the International Symposium on MHEWS and Service Delivery with the participation of 127 delegates including 19 Directors of NMHSs. The Symposium leveraged WCDRR to bring together MHEWS experts to take stock of the latest advancements in observation, seamless prediction of hazards, identification of their impacts and risks and the delivery of information and services, and to debate the future of DRR and the emerging role and challenges to NMHSs. The participants discussed how multi-stakeholder partnerships could make a difference in realizing the vision for MHEWS, and how the achievements NMHSs have made in building a more resilient society could be secured, sustained and strengthened further. The Symposium participants agreed that in order to do this, it would be essential to: (i) ensure access to the best possible science and optimum services for early warnings of hazards; (ii) build resilience in infrastructure systems and services; and (iii) provide for adequate catastrophe insurance.

3.2.57 The Congress welcomed the creation by WMO, the US National Weather Service and the US Agency for International Development (USAID) of the Weather-Ready Nations initiative. This initiative is a new programme to improve the understanding of high-impact weather, water, and climate events. Weather-Ready Nations, relying on best practices developed in many countries, will address this by offering to combine and share countries' experiences in developing initiatives that shift toward an impact-based forecasting and warning system which informs people about what impact the weather will have on users, rather than just expected conditions.

3.2.58 In collaboration with the Japan Meteorological Agency (JMA) and the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO/IOC), WMO organized a special exhibition booth on Building Weather and Climate Resilience. The booth made available to the public filmed messages and documentary videos of good practices in early warning systems, and public educational videos on typhoon hazards (produced by Hong Kong, China on behalf of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP)/Typhoon Committee) shared by Members.

3.2.59 Congress was pleased to note that as part of the WMO communications plan for WCDRR, WMO prepared and distributed a brochure that highlighted the progress of Members in the delivery of weather and climate services, including for MHEWS. In addition, WMO coordinated closely with the UNISDR communications group on media affairs and a press conference.

3.2.60 Congress conveyed its sincere thanks to JMA for their active cooperation and support extended to WMO and its Members during WCDRR.

Follow-up actions

3.2.61 Congress emphasized that there are a number of key follow-up actions that need to be taken to ensure the best contribution of WMO to the SFDRR.

3.2.62 Congress encouraged all Members to adopt a shared approach with relevant agencies and organizations at the national level to promote implementation of the SFDRR. In this regard, Congress noted that the United Nations Plan of Action on DRR for resilience was highlighted in the United Nations High Level Event in WCDRR and that it presents a strategy for integrating disaster risk reduction into United Nations country level operations. It is intended to all partners committed to reducing the risks that disasters pose and making our societies more resilient. Congress emphasized the need for a set of core commitments and actions to address the issue of resilience.

3.2.63 In response to the call of States in the SFDRR for advancing MHEWS at various levels, Congress emphasized that additional efforts are needed to institutionalize and strengthen multi-hazard, end-to-end, people-centred early warning systems (EWS) for all communities. Congress noted that international and regional collaboration as well as multi-stakeholder partnership at all levels is critically necessary, given the borderless nature of most hydrometeorological hazards.

3.2.64 Recognizing the increasing impact of disasters and their complexity in many parts of the world, the delegates to WCDRR declared their determination to enhance and strengthen the efforts to reduce disaster losses of lives and assets worldwide. Congress reiterated WMO's commitment to support DRR which is one of the strategic priority areas of WMO. Congress urged Members to proactively engage in their national DRM and take on a leading role in relevant areas such as early warning and/or multi-hazard early warning systems to assist the development of DRR Standard Operating Procedures (SOPs) for appropriate response to these warnings.

3.2.65 Congress noted that a number of partnerships were proposed and/or established during WCDRR such as for MHEWS, Earth observations and data and product sharing and exchange in support of national strategies for DRM, reducing landslide disaster risk, water resources management, coherence with climate change adaptation initiatives, and an international partnership of science and technology to support the implementation of the SFDRR. Congress encouraged WMO Members and the Secretariat to engage in relevant partnerships for effective implementation of SFDRR, and in particular to take on a leading role in the fields of MHEWS and in identifying/cataloguing extreme weather and its impacts, water and climate events in cooperation with all activities of the Global Framework for Climate Services (GFCS).

3.2.66 National and regional Platforms for DRR are mechanisms where NHMSs can take an active and leading role to bring in hydrometeorological perspectives in the timescale of early warnings, but also long-term planning and prevention aspects. The cooperation with other partners from public and the private sector are crucial for the advancement and implementation of SFDRR.

3.2.67 Congress requested the Secretary-General to extend full support to the Members in their efforts to implement SFDRR.

International Network on MHEWS and proposal for an International Conference on Multi-Hazard Early Warning Systems

3.2.68 Congress agreed that partnership and networking among relevant stakeholders and actors concerned are critical to advance and usher the next generation of EWS and service delivery for DRR and resilience building towards a multi-hazard approach that incorporates relevant impact and risk information.

3.2.69 Congress noted that during the Working Session on Early Warning (HFA Priority 2) in the Multi-Stakeholder Segment, a proposal was presented, developed jointly by WMO and other United Nations agencies and international organizations concerned, to establish an International Network on MHEWS (IN-MHEWS) (<https://www.wmo.int/pages/prog/drr/documents/IN-MHEWSConceptPaper16415.pdf>).

3.2.70 Congress was pleased to note that several organizations have expressed their intention to collaborate and to contribute to the initial activities of IN-MHEWS as Network Partners. These include United Nations Agencies and international organizations including WHO, UNDP, UNESCO-IOC, UNESCAP, UNISDR, UNOOSA/UN-SPIDER, ITU, and IFRC and National organizations i.e., GFZ (Helmholtz-Centre Potsdam – GFZ German Research Centre for Geosciences) and GIZ (German Development Corporation). Congress also noted that the establishment of the IN-MHEWS was supported by members of the national delegations of China, Ecuador, France, Germany, India, Indonesia, Italy, and the Philippines.

3.2.71 Congress noted that for more effective and wider implementation of MHEWS among the Members, it is important to document the good practices and other national experiences in implementing MHEWS and prepare guidelines on institutional coordination and cooperation and the role of NMHSs in implementing MHEWS. Congress noted the plans to organize an International Conference to address these issues and encouraged the organization of the International Conference on MHEWS in 2016, in collaboration with appropriate International, Regional and National agencies and institutions that have the mandates for other hazards such as for geophysical, biological, and human-induced hazards (a draft concept note is available at <https://www.wmo.int/drr/ConceptNoteIntConfMHEWS>).

3.2.72 Congress was pleased to note that the German Committee for Disaster Reduction (DKKV) informally conveyed its interest to contribute and co-organize the International Conference.

3.2.73 Congress adopted [Resolution 10 \(Cg-17\) – Sendai Framework for Disaster Risk Reduction 2015–2030 and WMO participation in the International Network for Multi-hazard Early Warning Systems](#).

4. ADVANCING SCIENTIFIC RESEARCH AND APPLICATION, AS WELL AS DEVELOPMENT AND IMPLEMENTATION OF TECHNOLOGY (agenda item 4)

4.1 Data-processing and forecasting: weather, climate and water (agenda item 4.1)

Seamless data-processing and forecasting

Towards a Future Enhanced Integrated and Seamless Data-processing and Forecasting System

4.1.1 Congress recalled the decision by the Sixteenth World Meteorological Congress in 2011 (Cg-XVI) that the *Manual on the Global Data-processing and Forecasting System* (GDPFS) (WMO-No. 485) is the single source of technical regulations for all operational data-processing and forecasting systems of WMO Members. It noted that the Executive Council, in its sixty-fifth session

5.3.2.1 Members should ensure that institutions providing education and training for meteorological, hydrological and climatological services have the personnel and resources to:

- (a) Analyse the organizational context and manage the training processes;
- (b) Identify learning needs and specify learning outcomes;
- (c) Determine a learning solution;
- (d) Design and develop learning activities and resources;
- (e) Deliver training and manage the learning event;
- (f) Assess learning and evaluate the learning process.

Note: The performance criteria and knowledge requirements that support the competencies should be customized based on the particular context of an organization.

5.4 Personnel supporting the WMO Information System (WIS) (in preparation)

5.5 Personnel providing marine meteorological services (in preparation)

5.6 Personnel involved in the provision of public weather services (in preparation)

5.7 Personnel involved in the provision of climate services (in preparation)

Resolution 9 (Cg-17)

IDENTIFIERS FOR CATALOGUING EXTREME WEATHER, WATER AND CLIMATE EVENTS

THE WORLD METEOROLOGICAL CONGRESS,

Noting:

- (1) The increasing frequency and magnitude of extreme weather, water and climate events and their impacts on different socioeconomic sectors, lives and livelihoods,
- (2) The calls for reducing the losses associated with extreme events in the Sendai Framework for Disaster Risk Reduction 2015–2030, the United Nations Framework Convention on Climate Change Warsaw international mechanism for loss and damage associated with climate change impacts, and the United Nations draft sustainable development goals,

Noting further:

- (1) That developing identifiers for cataloguing weather, water and climate extreme events in cooperation with institutions having competences about possible impact of those weather events can provide an unambiguous reference for associated losses and damages and can promote consistency in the characterization of extreme events,
- (2) That more consistent event characterization in terms of type of event, location, duration, magnitude and timing would allow for better evaluation of the types of losses and damages associated with different types of events, and the most damaging events and thresholds, and trends,

Considering:

- (1) That many National Meteorological and Hydrological Services have developed and are maintaining historical catalogues of extreme events,

- (2) That many countries have established disaster loss and damage accounting systems that could help in monitoring the implementation of the Sendai Framework and other international policies,
- (3) That technical commissions, regional associations and technical programmes are at different stages in addressing the different aspects of extreme weather, water, climate and space weather events such as methodologies and standards for defining the events, indices, and creating web portals for event databases, and that there is a need for better understanding their roles in addressing this issue,
- (4) That an identifier and cataloguing system is an important prerequisite for the Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes and the United Nations Office for Disaster Risk Reduction Global Assessment Reports on Disaster Risk Reduction, and that it could greatly assist the Global Framework for Climate Services by bringing a standardized approach of National Meteorological and Hydrological Services to the analysis and recording of extreme hydrometeorological events in national databases, and by supporting the international exchange and validation of these data,

Decides to standardize weather, water, climate, space weather and other related environmental hazard and risk information and develop identifiers for cataloguing weather, water and climate extreme events;

Requests the Executive Council to provide oversight on the standardization of hazard information for loss and damage assessment;

Requests the Commission for Basic Systems to develop, in collaboration with all technical commissions and regional associations, a proposal on standardized identifiers for cataloguing hazardous events for consideration by the Executive Council;

Requests the Secretary-General to take the necessary actions, within the available budgetary resources, to facilitate the work on this important issue.

Resolution 10 (Cg-17)

SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION 2015–2030 AND WMO PARTICIPATION IN THE INTERNATIONAL NETWORK FOR MULTI-HAZARD EARLY WARNING SYSTEMS

THE WORLD METEOROLOGICAL CONGRESS,

Noting:

- (1) The need to assist Members in implementing the Sendai Framework for Disaster Risk Reduction 2015–2030 through provision of guidance, capacity-building and facilitating implementation of projects at the national level,
- (2) The need for a holistic and integrated multi-hazard approach to early warning systems as a strategy to streamline such systems, to apply lessons learned from their operations, and to contribute effectively to disaster risk reduction,

Noting further:

- (1) That the Sendai Framework calls for the necessity of enhancing multi-hazard early warning systems (MHEWS) and that the Member States of the United Nations called for

strengthened regional and international cooperation to develop science-based methodologies and tools to support MHEWS,

- (2) The emphasis placed by the United Nations Plan of Action on Disaster Risk Reduction for Resilience on the need for cooperation and coordination between various United Nations agencies and other international organizations,
- (3) The need for a multi-stakeholder partnership at various levels forged through voluntary commitment to foster and enhance cooperation, collaboration and networking on improving early warning systems with a multi-hazard approach,
- (4) The concept for the establishment of the International Network for Multi-hazard Early Warning Systems (IN-MHEWS), developed by the organizing team of the United Nations World Conference on Disaster Risk Reduction Working Session on Early Warning, presented during the Conference, and the support this received from the Working Session and a number of key stakeholders,
- (5) That IN-MHEWS would involve a number of appropriate international, regional and national partner agencies and institutions that have the mandates for the monitoring, forecasting and warning of natural and human-induced hazards,
- (6) That WMO is planning to conduct an International Conference on MHEWS in 2016 in collaboration with Members, technical commissions, regional associations, and partners that have expressed commitment to IN-MHEWS and other international bodies and stakeholders,

Requests the Executive Council, working with regional associations and relevant technical commissions, to guide the WMO contribution to the development of the hydrometeorological elements of IN-MHEWS, including possible governance mechanisms, operating modalities and appropriate monitoring and evaluation procedures;

Requests the Secretary-General:

- (1) To proactively and continuously assist Members in their efforts to implement the Sendai Framework;
- (2) To ensure relevant stakeholders in hydrometeorological aspects are actively engaged in the planning meetings of IN-MHEWS in 2015 to develop its collaborative arrangements and integrated plan of action;
- (3) To keep Members informed about the progress in the establishment of IN-MHEWS and its activities;

Requests the regional associations to assist with the development of IN-MHEWS and to cooperate with the regional organizations and regional bodies to strengthen partnerships and support WMO Regional Centres to promote the implementation of the Sendai Framework, in particular MHEWS;

Requests the technical commissions:

- (1) To assist with the development of IN-MHEWS, in particular the development of science-based methodologies and tools to support MHEWS;
- (2) To develop appropriate training modules to enhance the capacity of National Meteorological and Hydrological Services in implementing the Sendai Framework, in particular MHEWS, and climatological aspects of extreme weather impacts for planning and prevention;

Requests Members to adopt a shared approach with relevant agencies and organizations at the national level to promote implementation of the Sendai Framework.
