



TROPICAL CYCLONE PROGRAMME

Report to Plenary on item 4.3

REFERENCE:

Cg-XVI/Doc. 4.3

APPENDICES:

- A. Draft text for inclusion in the general summary on item 4.3
- B. Draft Resolution 4.3/1 (Cg-XVI) – Tropical Cyclone Programme

ACTION PROPOSED:

It is recommended that the draft text given in Appendix A be included in the general summary of the work of the session and that the draft resolution in Appendix B be adopted.

DRAFT TEXT FOR INCLUSION IN THE GENERAL SUMMARY OF Cg-XIV

4.3 TROPICAL CYCLONE PROGRAMME (*agenda item 4.3*)

4.3.1 Congress was pleased to note the achievements of the Tropical Cyclone Programme during the fifteenth financial period. A description of the Tropical Cyclone Programme is given in the Annex to this paragraph.

Training and Capacity Development

4.3.2 Congress was pleased to note that a number of training programmes were successfully implemented by the Tropical Cyclone Programme (TCP) to upgrade the warning capabilities of developing countries subject to tropical cyclones. Congress noted with appreciation that the TCP/PWS joint training workshops hosted by Météo-France, NOAA and the Bureau of Meteorology in RAs I, IV and V, respectively, made a significant contribution in that regard, covering a wider range of operational forecasting, including service delivery. It welcomed the recent development in the training workshops in RAs I and V in which the TCP collaborated with the DPFS to create a link with the Severe Weather Forecast Demonstration Project (SWFDP) being implemented in these Regions. Congress encouraged the TCP to continue its collaboration with the CBS Severe Weather Forecast Demonstration Project (SWFDP), towards the efficient and effective propagation of Tropical Cyclone forecasts and warnings in developing countries.

4.3.3 Congress noted and supported the request of EC-LXII to the technical commissions to work with the EC Panel of Experts on Education and Training to develop competence standards in their areas of expertise. In light of this, Congress recognized the need for TCP to work closely with these groups and the Commission for Basic Systems to establish top level Tropical Cyclone forecasting competence standards.

4.3.4 Congress also took note of the effectiveness of the attachment training at TC RSMCs which allowed forecasters to acquire practical techniques and expertise through on-the-job experience. Congress was of the view that developing countries, especially SIDSs and the LDCs, continue to be in urgent need of improving the tropical cyclone forecasting skills and competencies required for effective operational capacity. To that effect, Congress recommended that the WMO Secretariat should continue to give high priority to capacity building in tropical cyclone forecasting.

Support to Operational Forecasting

4.3.5 Congress recognized that the field of tropical cyclone forecasting had been rapidly changing due to increased availability of observational data and advances in NWP models and products, evolving new technologies, and the growing demand of users for greater accuracy and longer lead times of forecasts. These developments have brought new challenges to the forecasters to keep pace with the scientific and technological advances and, in particular, upgrade their forecasting capacities and ability to manipulate and integrate into the forecasting process large quantities of information. In this regard, Congress endorsed the measures undertaken through the TCP to support tropical cyclone forecasters, which was targeted particularly at those of developing countries.

4.3.6 Congress noted that the *Global Guide to Tropical Cyclone Forecasting* (WMO/TD-No. 560) was being updated to provide comprehensive guidance on tropical cyclone forecasting from a multi-hazard point of view. The updated Guide will be web-based with a view to timely updating and easier access. In addition, the WMO Tropical Cyclone Forecaster Website has been developed to provide a readily accessible source of forecast tools and analytical data necessary for operational forecasting. These two information sources would be linked with the TCP page of the WMO Website to serve as a comprehensive source of information/material/data that

was expected to be of great value to operational forecasters. In view of the consolidation and usefulness of the overall system, it urged the Secretariat to complete the update of the Global Guide as early as possible and to carry out the enhancement of the Tropical Cyclone Forecaster Website in full consultation with the NMHSs.

Application of Research and Development (R&D)

4.3.7 Congress noted that TCP and the World Weather Research Programme jointly organized various fora where operational forecasters and researchers exchanged their views and shared knowledge and identified the direction of their collaborations for the future. Those included the Workshop on Tropical Cyclone Research in RA I (May 2008 in La Réunion), the 2nd International Workshop on Tropical Cyclone Landfalling Processes (IWTCLP-II; October 2009 in China), the 3rd International Conference on Quantitative Precipitation Estimation and Quantitative Precipitation Forecast (October 2010 in Nanjing, China) and the 7th International Workshop on Tropical Cyclones (IWTTC-VII; November 2010 in La Réunion).

4.3.8 Recognizing the growing importance of ensemble techniques and probabilistic forecasts, Congress took note of the Typhoon Landfall Forecast Demonstration Project and the NW Pacific Tropical Cyclones Ensemble Forecast Project as outcomes of the IWTCLP-II, which were implemented jointly with WWRP in the Typhoon Committee region. It acknowledged the significance of improving the utility of Ensemble Prediction System (EPS) products by considering the views and feedbacks of tropical cyclone forecasters.

4.3.9 Congress also noted with interest that the TCP, in response to the recommendation of IWTTC-VII, organized the Workshop on Satellite Analysis of Tropical Cyclones in Hawaii, US in April 2011 in conjunction with the 2nd workshop of the International Best Track Archive for Climate Stewardship (IBTrACS) held by the National Climatic Data Center of NOAA. Linking with the effort to produce a globally-unified best track dataset, the workshop set out to promote the sharing of expertise in satellite analysis of tropical cyclones between forecasters and researchers and helped facilitate their discussions on its future improvement to meet the emerging needs for homogenization of the tropical cyclone data base.

4.3.10 Congress recognized that a consensus among different meteorological services in satellite analysis should be reached (e.g. through verification of different methods using the best available observations) so that in future a globally unified best track dataset could be attained. At the same time, operational tropical cyclone intensity estimation based on the Dvorak method should be updated and harmonized among RSMCs, TCWCs and Members taking into account new and emerging techniques such as microwave satellite observation.

4.3.11 Congress also recognized the need of further research on the impact of tropical cyclone, both for direct and remote impacts.

4.3.12 Congress encouraged the WMO Secretariat to take measures to further strengthen the linkages between operational forecasters and researchers through various gatherings on both global and regional levels to ensure transfer of research and development outcomes to forecasters for enhanced forecasting capability.

Storm Surge Watch Scheme

4.3.13 Congress noted with satisfaction the substantial progress made towards the establishment of the Storm Surge Watch Scheme (SSWS) which was recommended by the Executive Council at its sixtieth session (EC-LX, June 2008) after the devastations by storm surges associated with the Tropical Cyclones Sidr and Nargis in the Bay of Bengal. EC-LX requested the TCP to cooperate with the Marine Meteorology and Ocean Affairs Programme for extension of the

SSWS to all regions exposed to tropical cyclones including incorporating the Scheme in the tropical cyclone advisory arrangements and in regional operational plans and manuals.

4.3.14 Congress was encouraged by the response of Regions to the EC request noting that in RA V, the Tropical Cyclone Committee set up an SSWS Action Team and formulated a regional 1st SSWS plan in December 2008. Congress also took note of the storm surge advisory service implemented by the RSMC New Delhi in 2009 in cooperation with Indian Institute of Technology (IIT). RSMC Tokyo started provision of the storm surge forecast map in 2011. RSMC La Réunion implemented a study on the application of Météo-France's storm surge model to RA I SSWS.

4.3.15 Congress noted with pleasure that TCP also actively worked to raise the storm surge warning capabilities on a national level. TCP collaborated with JCOMM to organize the 5th Storm Surge Workshop in Australia for the Members of RA V Tropical Cyclone Committee (TCC) in December 2008 and the 6th Workshop in the Dominican Republic for the RA IV Hurricane Committee Members in February 2011. TCP continued annual attachment training at IIT Delhi for the Members of the WMO/ESCAP Panel on Tropical Cyclones. Congress emphasized that both regional and national approaches were imperative to assure the establishment of SSWS globally. In that respect, it requested the WMO Secretariat to continue the effort of building capacity in storm surge forecasting to cover every Member subject to tropical cyclones.

Global Coordination

4.3.16 Congress noted that the Sixth Tropical Cyclone RSMCs/TCWCs Technical Coordination Meeting (TCM-6) took place in Brisbane, Australia in November 2009. The Meeting is held every three years for promoting the harmonious development of regional warning services and the global standardization of the operational procedures. Congress noted with pleasure that TCM-6 completed the study on suitable conversion factors between the wind speeds of different time ranges and its outcome was distributed as a WMO Technical Document (WMO/TD-No. 1555) to all the members of five regional TC bodies in October 2010. Arrangements were underway to include a summary of the report in the regional tropical cyclone operational plans/manuals. Congress recognized that the incorporation of the conversion factors in the regional TC operational plans/manuals should be an important first step towards an international common standard of wind averaging period for TC maximum sustained winds. This is considered essential to ensure harmonized practices in TC forecasting operations and post analysis.

4.3.17 The TCM-6 also established a cooperative relationship with IBTrACS and agreed to support this project by providing regional best track data and adequate guidance for integration of the data. For aviation users, the TCM-6 reaffirmed that it would cooperate with ICAO to change the format of tropical cyclone advisories from the text to the graphic in response to the request of the users. Congress also noted the continued need to work in close collaboration with ICAO to optimize tropical cyclone services in the TCAC areas of responsibility to ensure the most efficient and effective delivery of these services.

4.3.18 Congress recognized that, with the advance of globalization, it is increasingly important to promote the sharing of technologies and expertise and the standardization of procedures and products between the Regions. In this regard, Congress recalled its discussions on the Disaster Risk Reduction Programme during this session (agenda item 11.5) and stressed that there is an urgent need to develop a standardized format for exchange of tropical cyclone advisories issued by RSMCs and TCWCs, so as to improve the accessibility and understanding of the information by members of the public and international media. In that context, Congress underlined the significant role of TCM for securing the coordination among the RSMCs and TCWCs as an essential mechanism to meet the users' requirement from the global point of view.

Regional TC Bodies

4.3.19 Congress recognized that regional TC bodies played an important role in the various regional projects of relevant WMO Programmes such as DRR, DPFS, MMOP, WWRP and HWR in addition to SSWS development. The RA IV Hurricane Committee supported the development and implementation of the DRR Central American Pilot Project on Early Warning Systems and DRR Initiative to Strengthen MHEWS Capacity in the Caribbean. RA V Tropical Cyclone Committee (TCC) developed the basic framework of the Severe Weather Forecast and Disaster Risk Reduction Demonstration Project (SWFDDP). The ESCAP/WMO Typhoon Committee established linkages with the RA II Working Group on Hydrology through joint activities, including for the management of urban floods and flash floods in their region. Pilot projects of Coastal Inundation Forecasting Demonstration Projects (CIFDP) in the Caribbean and the North Indian Ocean would be linked with the activities of the Hurricane Committee and the WMO/ESCAP Panel on Tropical Cyclones, respectively.

4.3.20 Congress noted with pleasure that the regional TC bodies were also active in forming a partnership with international agencies. It is represented by the mutual cooperation between the Hurricane Committee and the Intergovernmental Coordination Group for the Tsunami and Other Coastal Hazards Warning System for the Caribbean and Adjacent Regions (ICG/CARIBE EWS) and between the WMO/ESCAP Panel on Tropical Cyclones and the Pacific and Indian Ocean Tsunami Warning and Mitigation Systems (ICG/PTWS and ICG/IOTWS).

4.3.21 Congress recognized the growing role played by the regional TC bodies as the platforms for the development of multi-hazard early warning systems in the respective Regions. To carry out such new assignment, Congress emphasized the need for strengthening the link between the three key areas of regional activities – meteorology, hydrology and disaster risk reduction. From that perspective, Congress encouraged the Secretariat to take further actions to promote the involvement of hydrologists and DRR experts in the activities of regional TC bodies, in particular their annual and biennial sessions, to maximize the synergies between the three areas and thus fully meet the varied regional requirements.

4.3.22 Congress adopted Resolution 4.3/1 (Cg-XVI) – Tropical Cyclone Programme.

Annex to paragraph 4.3.1 of the general summary

PROGRAMME DESCRIPTION

TROPICAL CYCLONE PROGRAMME

MAIN LONG-TERM OBJECTIVES

The main long-term objectives of the Tropical Cyclone Programme are:

- (1) To strengthen the capabilities of WMO Members to provide reliable and timely forecasts of tropical cyclone tracks and intensities, and related forecasts of strong winds, heavy rainfall, and storm surges, covering all tropical cyclone-prone areas; and,
- (2) To promote the establishment of national disaster risk management and reduction mechanism of the Members with regard to tropical cyclones with multi-hazard configuration.

PURPOSE AND SCOPE

The purpose of the Programme is to assist the Members to establish national and regionally coordinated institutional systems to ensure that the loss of life and damage caused by tropical cyclones are reduced to a minimum. This includes facilitating WMO's role in the implementation of follow-on activities to the International Strategy for Disaster Reduction and helping Members to obtain the humanitarian, social and economic benefits of effective tropical cyclone disaster mitigation and to achieve sustainable development. The Programme therefore makes its main contribution to the implementation of the WMO Strategic Plan by enhancing the forecasts of tropical cyclones and associated hazards and strengthening the NMHSs capacity to deliver the services in full compliance with the users' demand. To this end, the Programme places its emphasis on building capacity of the Members especially SIDSs and LDCs, developing assistance tools for forecasters, facilitating application of Research and Development outcomes, promoting cooperative activities of regional TC bodies, enhancing coordination among the regional services, and taking a multi-hazard approach inclusive of flooding and storm surge. It also makes a closer link with relevant WMO Programmes and international agencies which are concerned with tropical cyclone disaster mitigation.

GOVERNANCE

The technical guidance for the Programme is provided by WMO Regional Associations concerned, regional tropical cyclone bodies and the Commission for Basic Systems, with regard to RSMC with activity specialization in tropical cyclones. In addition, the Executive Council Working Group on DRR and Service Delivery also provides overall guidance in matters related to tropical cyclone disaster risk reduction and service delivery.

PROGRAMME STRUCTURE

The activities of the Programme are implemented mainly through the two major components of the Programme:

- (1) The general component which is focused on capacity building and transfer of technology, information and expertise to the Members towards meeting the objectives of the Programme. It also encompasses the broader training requirements of the Members;
- (2) The regional component which comprises the planning and implementation of the programmes of the regional TC bodies. Each of the five regional bodies has an operational plan or manual which aims to provide the best possible forecasting and warning services through regional agreements and cooperation. These plans are regularly updated to incorporate new facilities, advances and developments.

DRAFT RESOLUTION

Res. 4.3/1 (Cg-XVI) – TROPICAL CYCLONE PROGRAMME

THE CONGRESS,

Noting:

- (1) Resolution 6 (Cg-XV) -Tropical Cyclone Programme,
- (2) The thirty-fourth, thirty-fifth and thirty-sixth annual status reports on the implementation of the Tropical Cyclone Programme issued in 2008, 2009, and 2010,
- (3) The WMO Strategic Plan,

Expresses its satisfaction with the progress achieved in the development of the Tropical Cyclone Programme to improve the operational tropical cyclone forecasting and for the invaluable assistance provided to developing countries to build their capacities through the WMO Voluntary Cooperation Programme, donor Members and bilateral arrangements;

Considering:

- (1) That the fundamental role of the Tropical Cyclone Programme is to assist Members to establish national and regionally coordinated warning systems to ensure that the loss of life and damage caused by tropical cyclones are reduced to a minimum,
- (2) That the Members especially Least Developed Countries and Small Island Developing States are under the stress of strengthening their capacities to meet the users' demand to deliver enhanced services with more accurate and timely warnings of tropical cyclone and associated flooding and storm surge, especially to end users, disaster managers and other decision makers,
- (3) That a high priority requirement for reducing the social-economic impacts of tropical cyclones is to establish an effective warning system through multidisciplinary approach,

Decides:

- (1) That the WMO Tropical Cyclone Programme shall be further strengthened to enable the Members to fulfil the increasing role and to address the new challenges;
- (2) That the substance of the Tropical Cyclone Programme shall comply with the WMO Strategic Plan;
- (3) That the WMO Strategy for Service Delivery should guide the implementation of the Tropical Cyclone Programme;

Urges Members to ensure that their Meteorological and Hydrological and Disaster Risk Reduction Services take whatever steps which are within their competence and coordinate with the appropriate authorities:

- (1) To promote awareness of the risks associated with tropical cyclones and related hazards;

- (2) To continue to strengthen their forecasting and warning capabilities and ensure wide dissemination, understanding and utilization of their products, particularly at the community and local levels;
- (3) To ensure that the measures necessary to save human lives and reduce damage are carried out at all levels, including the community level, as a consequence of tropical cyclone forecasts and warnings;
- (4) To strengthen the partnership with other Members and relevant national agencies such as disaster and emergency management through sharing of knowledge, skills, experience and resources to save human lives and reduce damaging impacts; for tropical cyclone and other multi-hazard inundation events, such as those from tsunamis;
- (5) To utilize the WMO Strategy for Service Delivery to further Improve their early warning services and products and their dissemination;

Requests the Secretary-General:

- (1) To keep Members concerned fully informed of progress and of developments in the planning and implementation of the Programme;
- (2) To assist Members in their efforts to implement Tropical Cyclone Programme activities for the safeguard of life and property from tropical cyclones and related hazards to the maximum extent possible within the available budgetary resources;
- (3) To continue to support the capacity building programmes for developing countries, especially for Least Developed Countries and Small Island Developing States;
- (4) To maintain and further enhance the collaboration between the Tropical Cyclone Programme and relevant WMO Programmes and technical commissions, particularly in relation to the development of tropical cyclone forecasting competencies;
- (5) To continue close cooperation with other international as well as relevant national organizations at the global and regional levels to promote a multidisciplinary and multi-hazard approach towards the attainment of the humanitarian goals of the Programme.

Note: This resolution replaces Resolution 6 (Cg-XV) which is no longer in force.