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**REPORT OF THE FORTY-FOURTH SESSION
OF TYPHOON COMMITTEE**

**Hangzhou, China
06-11 February 2012**

PART I – DECISIONS OF THE COMMITTEE

1. The Committee at its Forty-Fourth Session decided to:
 - a. Accept the recommendations submitted by Working Group on Meteorology (WGM) as expressed in **paragraph 69**.
 - b. Accept the recommendations submitted by Working Group on Hydrology (WGH) as expressed in **paragraph 101**.
 - c. Accept the recommendations submitted by Working Group on Disaster Risk Reduction (WGDRR) as expressed in **paragraph 115**.
 - d. Accept the recommendation submitted by Training and Research Coordination Group (TRCG) as expressed in **paragraph 124**.
 - e. Accept the replacement tropical cyclone name for FANAPI by RAI with the effective date of this Report.
 - f. Request Japan submit in the next Session the replacement tropical cyclone name for WASHI in accordance with the Committee's procedure.
 - g. Accept the recommendations of the AWG as expressed in **paragraph 138**.
 - h. Approve the Strategic Plan 2012-2016 and request the AWG to continue to refine the plan as situation warrants.
 - i. Accept the offer of Nanjing University of Information Science and Technology (WMO Regional Training Centre – Nanjing) to serve as a training center for the Committee and to request AWG and TCS to work on the formal arrangement as needed.
 - j. Accept the offer of China to host the 7th Integrated Workshop (IWS) at Nanjing University of Information Science and Technology.
 - k. Request TCS and WMO work with ESCAP to ensure that letters with important information reach Members
 - l. Request ESCAP ensure that its invitation letter for TC sessions requests Members to designate head of delegation and delegates.
 - m. Request Members to officially respond to ESCAP letter with the copy to TCS indicating the head of delegation and delegates.
 - n. Request AWG and TCS explore more effective ways to publish the TC Newsletter as an outreach document
 - o. Request AWG and TCS examine the usefulness and application of In-kind Contributions in consultation with WMO
 - p. Request TCS present In-kind contributions as an information paper at the next session
 - q. Request TCS provide the final account of income and expenditures of the previous two years at the next Session.

- r. Request the AWG to perform assessment of the carry-over from the budget and recommend a process for handling carry-over funds at the next Session.
- s. Request AWG, with the assistance of TCS as well as ESCAP and WMO, to review its overall legal documents and report back to the next session.
- t. Request Members and WGs to submit documents as requested by the TCS and for TCS to upload all the working documents to TC Website one month prior the TC Session
- u. Request AWG and TCS to examine ways to improve the governance, efficiency and effectiveness of the TC as discussed in paragraph 187 and 188 and report their results in the next session.
- v. Approve the TC Annual Operating Plan 2012 submitted by Advisory Working Group (AWG) with modifications and details in **Appendix XVIII**.
- w. Approve the 2012 Budget as presented below, which includes US \$15,000 from carry-over funds: **(Appendix XIX)**

By Group	2011	2011	2012		2012 Total
	Allotment	Spent	Proposed	2011 Carry Over	Including 2011 Carry Overs
TCS	26,000	25,188.57	28,000		28,000
TRCG	25,500	17,196.12	18,000		18,000
WGM	27,500	28,905.64	30,000	2,800	32,800
WGH	26,000	21,866.26	28,000	3,200	31,200
WGDRR	23,000	13,892.75	22,000	6,000	28,000
AWG	6,000	3,000.00	6,000	3,000	9,000
TOTAL	134,000	110,049.34	132,000	15,000	147,000

PART II – PROCEEDINGS OF THE COMMITTEE

I. ORGANIZATION OF THE SESSION

2. The Forty-fourth Session of the ESCAP/WMO Typhoon Committee (TC) was held at the DAHUA Hotel, Hangzhou, China, from 6 to 11 February 2012.
3. The Session was attended by 120 participants from 11 of 14 Members of the Typhoon Committee, namely: China; Hong Kong, China; Japan; Macao, China; Malaysia; Philippines; Republic of Korea; Singapore; Thailand; the Socialist Republic of Viet Nam; and the United States of America (USA).
4. The Session was attended by seven observers from: Joint Typhoon Warning Center (JTWC), International Civil Aviation Organization (ICAO), United Nations Environment Programme (UNEP), Commission for Atmospheric Sciences of World Meteorological Organization (WMO), International Association for Wind Engineering, WMO Regional Training Centre – Nanjing (WMO RTC Nanjing) and the Global Green Growth Institute (GGGI). Three representatives of the Philippines Typhoon Committee Foundation Incorporated attended the Opening Ceremony. Representatives of the Economic and Social Commission for Asia and the Pacific (ESCAP), WMO and Typhoon Committee Secretariat (TCS) also attended the session. The list of participants is given in Appendix I.

Opening of the Session (agenda item 1)

5. The Session was declared open by Dr. ZHENG Guoguang, Administrator of the China Meteorological Administration, at 09:50 am on Monday, 06 February 2012 in Hangzhou, China in the presence of the Members' representatives.
6. The following statements were delivered at the opening ceremony:
 - a. The welcome address of Mrs. GE Huijun, Vice Governor of Zhejiang Province.
 - b. The address of Dr. CHO Seok Joon, Chairperson of the Typhoon Committee.
 - c. The message of Mr. Yuichi ONO, representative of ESCAP secretariat.
 - d. The address of Mr. Koji KUROIWA, representative of the WMO Secretariat.
 - e. The inauguration address of Dr. ZHENG Guoguang, Administrator of the China Meteorological Administration (CMA)
7. The above-mentioned statements are provided in Appendices II.a, II.b, II.c, II.d and II.e, respectively.
8. Dr. Roman L. KINTANAR Award for Typhoon related Disaster Mitigation was presented to the National Meteorological Center of CMA and Korea Meteorological Administration (KMA) by the Typhoon Committee Foundation Incorporated of the Philippines.

II. ELECTION OF OFFICERS (agenda item 2)

9. Dr. JIAO Meiyuan, Deputy Administrator of CMA was elected Chairperson and Mr. SHUN Chi-Ming, Director, Hong Kong Observatory (HKO), China was elected Vice-Chairperson of the Committee. Mr. Jeff LaDouce, Regional Director National Oceanic and Atmospheric Administration (NOAA), National Weather Service, Pacific Region was elected Chairperson of the Drafting Committee.

III. ADOPTION OF THE AGENDA (agenda item 3)

10. The Committee adopted the agenda as shown in Appendix III.

IV. TECHNICAL CONFERENCE (TECO) (agenda item 4)

4.1 Review of the activities of the Regional Specialized Meteorological Center (RSMC) Tokyo 2011 and Typhoon Season by the RSMC Tokyo

(a) Activities of RSMC Tokyo (Appendix IV)

11. The Committee was informed that RSMC Tokyo has started service of Data Collection or Production Centre (DCPC) of WMO Information System (WIS). The Committee was also informed that the RSMC Data Serving System (RSMC DSS) was to be terminated by the end of March 2012, and data provided by RSMC DSS has been provided as WIS DAR since August 2011. In accordance with this update. The Committee was informed that the Global Spectrum Model (GSM) product at 0.5 degree resolution and 0.25 degree resolution (surface layer) and Japan Meteorological Agency (JMA) Satellite Animation and Interactive Diagnosis (SATAID) Service were newly provided to Members and the GSM product within 20°S - 60°N, 60°E - 160°W at 2.5 degree resolution was planned to be terminated.
12. The Committee was pleased that RSMC Tokyo started to provide storm surge distribution maps to Members at the numerical typhoon prediction website in June 2011 and plans to provide storm surge time series charts at one point for each Member upon its request from 2012 typhoon season. Members were requested to provide extended tidal data to RSMC Tokyo for verification and further improvement of its storm surge model. The Committee expressed its gratitude to RSMC Tokyo for sharing information on storm surges through the annual TC attachment training at the Center, 7th Tropical Cyclone Programme/ Joint Technical Commission for Oceanography and Marine Meteorology (TCP/JCOMM) Regional Workshop on Storm Surge and Wave Forecasting in 2011 and the Technical Review to be published in 2012.
13. The Committee was pleased that RSMC Tokyo supported sharing of Quantitative Precipitation Estimation / Quantitative Precipitation Forecast (QPE/QPF) technique through QPE/QPF workshop in conjunction with the IWS, QPE/QPF training conducted during the annual TC attachment training at the Center and the RSMC Technical Review published in March 2011.
14. The Committee was announced that RSMC Tokyo plans to introduce objective tropical cyclone satellite analysis using Multifunctional Transport Satellites (MTSAT) called "Cloud grid information objective Dvorak analysis (CLOUD)" and complementary intensity estimation using Objective microwave analyses with SATAID software to its operation in a few years.
15. The Committee was informed that RSMC Tokyo plans to start tropical cyclone satellite re-analysis in 2012 for the period since 1981.
16. The Committee was informed that RSMC Tokyo participated in a sub-regional project in the Severe Weather Forecasting Demonstration Project in Southeast Asia (SWFDP-SeA) as the Regional Centre for Tropical Cyclone / Typhoon Forecasting Support, and inputs the information to the Regional Subproject Management Team (RSMT) meeting in 2011 to contribute the development of Regional Subproject Implementation Plan (RSIP).
17. The Committee was pleased that RSMC Tokyo improved the WMO North Western Pacific Tropical Cyclone Ensemble Forecast (NWP-TCEFP) Home page and started to provide a new version in the 2011 typhoon season. The results of the questionnaire about effectiveness of Ensemble Prediction System (EPS) sent to Members from WMO in 2011 and feedback through the SWFDP-SeA will be used for further improvement of the NWP-TCEFP Home page.
18. The Committee noted the increase in accuracy of tropical cyclone forecasts by introducing a stochastic physical scheme into the JMA Typhoon Ensemble Prediction System (TEPS) which makes the ensemble spread more appropriate. Also, the Committee was informed that the resolution of the inner model for four-dimensional variational (4D-Var) data assimilation was upgraded, which represented atmospheric structures around typhoons better.

19. The Committee was pleased that JMA will do its best to issue climate information which will be helpful for climate risk management for Members, such as devastating damages over the Indochina Peninsula, especially Thailand, through Tokyo Climate Center. Also, the Committee noted JMA is pleased to assist with capacity building of National Met Services in the region, particularly in flood warning/advisory based on radar data.

(b) Review of the 2011 Typhoon season

20. The Committee noted that in the western North Pacific, 21 named tropical cyclones formed in 2011, eight of which reached typhoon intensity. The total is the fourth least since 1951. Only two named tropical cyclones formed from October to December, which is the record-tying least number since 1951.
21. The mean formation latitude and longitude was 16.2°N and 134.7°E, showing small deviation to the west from the 30-year average (16.2°N and 137.4°E).
22. In May, two named tropical cyclones formed near and east of the Philippines and Aere (1101) caused damage in the Philippines.
23. Ten named tropical cyclones formed from June to August. Nock-ten (1108) which formed near the Luzon Island in July moved westward and caused damage in the Philippines, China and the Indochina Peninsula. Nanmadol (1111) formed over the sea east of the Philippines in August and moved northwestward, which caused damage in the Philippines and China. Talas (1112) formed over the sea west of the Mariana Islands in August and moved northward and caused damage in Japan.
24. Seven named tropical cyclones formed in September. The first four from Noru (1113) to Sonca (1116) formed north of latitude 20 degrees north and moved northward. Roke (1115) formed over the sea west of the Mariana Islands and moved northward and caused damage in Japan. Nesat (1117) and Nalgae (1119) formed over the sea east of the Philippines in late September and hit the Philippines in a row and caused damage.
25. Two named tropical cyclones formed from October to December. Washi (1121) formed over the sea west of Palau Islands in December and moved westward, which caused extensive damage to Mindanao Island of the Philippines.
26. The Committee took note with appreciation the review of the 2011 typhoon season provided by the RSMC Tokyo as provided in Appendix V.

4.2. Member Reports (activities of the Members during 2011)

27. The Committee took note of the presentation of the Members' Reports and requested that the Members' Reports must be submitted to the TCS prior to the established deadline in order to be posted on the TC Website in lieu of providing hardcopies. The Committee also requested ESCAP ensure the requirement for hardcopies is deleted from the annual invitation letter.

4.3. Presentations and Scientific Lectures on Pertinent Technical Issues

28. The scientific lectures were presented as shown in Appendix VI. The Committee expressed its appreciation to all the lecturers and requested the TCS to post all the lecture papers/PowerPoint presentations on the TC website.

4.4. Assessment Report on the Impact of Climate Change on Tropical Cyclone Track and Impact Areas in TC Region

29. The Committee noted with pleasure the completion and presentation of the draft 2nd Assessment Report on the Impact of Climate Change on Tropical Cyclone Track and Impact Areas in TC Region. The report is expected to be published prior to the 45th Session..
30. The Committee expressed appreciation to the Expert Team for preparation of the draft 2nd Assessment Report.

4.5. Urban Flood Risk Management (UFRM) Project

31. The Committee noted with appreciation the presentation of the Urban Flood Risk Management (UFRM) Project. The Final version of UFRM Guidelines is expected to be published as TC Publication up to next TC Annual Session.

4.6. Typhoon Committee Operational Manual (TOM)

32. The Committee noted that the Typhoon Committee Operational Manual (TOM) rapporteur requests WMO to publish and upload the 2012 edition of TOM on the Tropical Cyclone Programme (TCP) Website as submitted by the Rapporteur, with the amendments given in Appendix VII.
33. The Committee expressed its appreciation to the rapporteur for update of TOM.

V. PARALLEL SESSIONS OF METEOROLOGICAL, HYDROLOGICAL AND DISASTER RISK REDUCTION WORKING GROUPS (agenda item 5)

34. Prior to the plenary session for the Committee, parallel sessions of the Working Groups on Meteorology, Hydrology and Disaster Risk Reduction were convened on the afternoon of 08 February 2012 to review progress of work during the past year, identify priorities for cooperation and make recommendations to the Committee.
35. The outcomes of the parallel sessions of the three Working Groups were reported to the plenary session as given in the following sections.

VI. Reports of the WGM, WGH and WGD RR (agenda item 6)

(a) Meteorological Component (agenda item 6.1)

36. The Committee took note of the outcomes of the parallel session of the WGM which met on Wednesday, 8 February 2012 (Appendix VIII)
37. The Committee reviewed the activities of Members' for implementing the TC Strategic Plan and its annual operating plan in relation to Meteorological Component during the past year, details of which are presented in Appendix IX.
38. The Committee accepted the suggested amendments on the Typhoon Committee Operation Manual (TOM) – Meteorological Component as proposed by the rapporteur from the Japan Meteorological Agency (JMA).
39. The Committee was pleased that a number of workshops and training courses were held successfully during 2011.
40. The Committee was pleased to note that the 2nd assessment report on impacts of climate change on tropical cyclones in the Typhoon Committee region was completed and is planned to be published under the name of the TC in 2012.
41. The Committee noted that RSMC Tokyo started service of Data Collection or Production Centres (DCPC) of WMO Information system (WIS) with a Global Information System Center (GISC) and the other seven DCPCs in JMA.
42. The Committee was pleased to learn that RSMC Tokyo started to provide storm surge distribution maps through its NTP website on 1 June 2011.
43. The Committee expressed its gratitude to RSMC Tokyo, for its continued tropical cyclone advisory services, as well as maintenance of the Numerical Typhoon Prediction Website, and implementation of the annual on-the-job training for typhoon forecasters. The activities of RSMC Tokyo in 2011 and implementation plan for the period of 2011 to 2015 are presented in Appendix IV.

44. The Committee was pleased to learn that China has launched a new polar-orbiting satellite (FY-3B), which operates together with FY-3A since 1 July 2011 in a network that covers both morning and afternoon orbits.
45. The Committee was informed that CMA completed its new-generation data-broadcasting system – CMACast in 2011, which is a component of WMO Integrated Global Data Dissemination Service (IGDDS) and GEONETCast systems. The Committee expressed its gratitude to CMA, for its donation of CMACast and Meteorological Information Comprehensive Analysis and Process System (MICAPS) 3.1 System to 19 developing countries in Asia on 11 April 2011.
46. The Committee noted that the WMO Global Information System Center (GISC) Beijing started its operation on 15 August 2011.
47. The Committee expressed its gratitude to CMA for its significant contribution to the publication of the Typhoon Committee journal “Tropical Cyclone Research and Review” and for its continuous efforts in maintaining the web-based typhoon forum and setting up the WMO-TLFDP project website.
48. The Committee expressed its gratitude to Hong Kong, China for its continuous efforts in operating the WMO Severe Weather Information Centre (SWIC) website, which continues to serve as a major channel for dissemination of TC information worldwide.
49. The Committee was pleased to note that Hong Kong, China carried out its first reconnaissance flight specifically around the tropical cyclones over the South China Sea.
50. The Committee noted that the "Aviation Weather Disaster Risk Reduction" (ADRR) website (adrr.caem.wmo.int) was put into operation in April 2011, under the lead of the Hong Kong Observatory as a regional Pilot Project in Regional Association II (RA II) and RA V under CAeM.
51. The Committee was informed that JMA’s super computer system will be upgraded in 2012.
52. The Committee expressed its gratitude to JMA for maintaining the NW Pacific Tropical Cyclone Ensemble Forecast Project (NWP-TCEFP) Website. A survey was carried out in December 2011 on the website and NWP-TCEFP will be updated based on the comments in the questionnaire from TC Members as early as possible.
53. The Committee was informed that a new X-band dual polarization radar has been put into operation in Macao, China and its product is now available to the public.
54. The Committee was informed that Macao Meteorological and Geophysical Bureau (SMG) of Macao, China upgraded its warning dissemination system by migrating to the usage of XML and some Artificial Intelligence (AI) concepts, i.e. dictionaries for holding the various versions of warning contents in different languages.
55. The Committee noted that the Subang radar was integrated into the radar system network of Malaysia and became fully operational in October 2011.
56. The Committee was informed that KMA will start to issue official 5-Day typhoon forecast in May 2012.
57. The Committee was informed the COMS (Communication, Ocean, Meteorological Satellite) of KMA began its official operation providing satellite images and meteorological products on April 1st 2011.
58. The Committee noted that KMA has developed an English version of Typhoon Analysis and Prediction System (TAPS) for transfer of technology to Members’. KMA and Viet Nam has a plan to deliver and install the system in Viet Nam by the 1st quarter of 2012. In 2012, KMA will improve this system for adjusting to the environment in Viet Nam.

59. The Committee was informed that KMA provided TC research fellowships on the Training for TAPS for two experts from Thai Meteorological Department (TMD) and **Philippine Atmospheric, Geophysical and Astronomical Services Administration (PAGASA)**.
60. The Committee expressed its gratitude to KMA for implementing the Korea International Cooperation Agency (KOICA) project “Establishment of an Early Warning and Monitoring System for Disaster Mitigation in Metro Manila of Philippine”.
61. The Committee was informed that the Philippines improved the surface monitoring system and upgraded FY satellite receiving facilities in 2011.
62. The Committee noted that Singapore launched the Integrated Heavy Rain and Rising Water Levels Alert system in August 2011 through collaboration between the Meteorological Service Singapore (MSS) and the National Water Agency.
63. The Committee was informed that Singapore commissioned a new 2.4m X/L-band satellite reception system to receive data from the NOAA and EOS Terra and Aqua satellites as well as the new FY3 and NPP (NASA-NOAA) in May 2011.
64. The Committee was pleased to learn the progress that has been made by Hat Yai, Songkhla Province in Thailand as one of pilot cities in the cross-cutting project of Urban Flood Risk Management (UFRM).
65. The Committee noted that a radar expert mission to Thailand was carried out by the radar experts from JMA and Kyoto University and TCS to investigate the capacity of TMD in the area of establishing the radar composite map with the coverage of Thailand in September 2011. TMD will follow up of the recommendation of the radar mission report in the area of UFRM pilot city of Hat Yai in the first step.
66. The Committee was informed that RSMC Honolulu prepared and distributed a text and graphical Tropical Weather Outlook during 2011 tropical cyclone season, which describes the probability of tropical cyclone development in the next 48 hours.
67. The Committee noted that the National Weather Service of USA completed its Radiosonde Replacement System (RRS) Program in 2011 with the installation of the new system throughout the NWS Pacific Region. The new system replaced 1980 technology and employs 1680MHz global positioning satellite radiosondes.

Conclusions of WGM:

68. On the basis of the information provided by Members and findings of the Integrated Workshop(IWS) in Nha Trang, Viet Nam in November 2011 as well as Parallel Session of WGM, the following conclusions were reached:
 - a. Important progress was made by Members in the implementation of the TC Strategic Plan and annual operating plan under Meteorology Component during the past year.
 - b. Significant progress was made by Members during the past year in tropical cyclone monitoring and communication systems, data assimilation and numerical weather prediction systems, tropical cyclone forecast-aiding systems, and scientific understanding of tropical cyclone activities.
 - c. Significant progress was made in the project entitled ‘2nd Assessment Report on the Impact of Climate Change on Tropical Cyclone Track and Impact Areas in TC region’.
 - d. The development of the storm surge watch scheme for UFRM will contribute effectively to the early warning of storm surge in TC region.
 - e. There is a need to continue Typhoon Information Processing Systems (TIPS) technology and knowledge transfer among TC Members.

- f. The web-based typhoon forum is helpful in terms of providing a communication platform for both forecasters and researchers.
- g. The ensemble prediction products are playing a more and more important role in improving tropical cyclone forecast and the effectiveness of warning.
- h. Exchange of radar data among TC Members is important in terms of improving QPE and QPF capability.
- i. The launch of the Typhoon Committee journal *Tropical Cyclone Research and Review* is important in providing an effective way to exchange the knowledge and latest progresses in tropical cyclone sciences, forecast techniques and warning systems.

Recommendations of WGM:

69. On the basis of the information provided by Members and findings of the integrated workshop in Nha Trang, Viet Nam in November 2011 as well as Parallel Session of WGM, the following recommendations were made:
- a. To publish the 2nd Assessment Report prior to the 45th Session.
 - b. To postpone the 3rd Assessment Report on Tropical Cyclones and Climate Change considering that the existing expert team had made a thorough study on relevant documents which are currently available and it is preferable to wait for the outcomes of further research and IPCC review cycle.
 - c. To urge Members to provide comments on the draft 2nd Assessment Report by the end of February 2012.
 - d. To exchange and compare the historical tropical cyclone best-track datasets, including Current Intensity (CI) numbers if available, among the centers.
 - e. To request RSMC Tokyo provide storm surge time series charts in 2012 typhoon season, to conduct training on storm surges for UFRM. During the annual TC attachment training and to share the storm surge information in the RSMC Tokyo Technical Review, and request Members provide extended tidal data archive to RSMC Tokyo for verification and further improvement of the storm surge model.
 - f. To request KMA further develop the project "TIPS" considering its importance in promoting the exchange of experiences among Members and improving TC forecast tools of all the Members.
 - g. To request RSMC Tokyo improve the WMO North Western Pacific Tropical Cyclone Ensemble Forecast (NWP-TCTEF) home page upon feedback from Members through the WMO questionnaire.
 - h. To promote Members' understanding of EPS through SWFDP and its training workshop.
 - i. To request CMA improve the web-based typhoon forum based on the outcomes of the moderator meeting held in Shanghai on 22 November 2011.
 - j. To request TMD make a progress report on radar composite map based on results of the Expert Mission on Composite Map Project in Thailand conducted in September 2011, and RSMC Tokyo to conduct training for TMD staff on receipt of the report from TMD.
 - k. To further improve QPE/QPF techniques of Members and request RSMC Tokyo to conduct QPE/QPF training during the annual TC attachment training.
 - l. To enhance the interaction among WGM, WGH and WGDRR by promoting the project on Urban Flood Risk Management (UFRM).

- m. To further develop the tropical cyclone forecast verification techniques and assess the performance of operational objective guidance and the official forecasts.
- n. To encourage Members to carry out joint field experiment on offshore and landfall tropical cyclones so as to facilitate the research on 'difficult' (hard to forecast) changes of offshore and landfall tropical cyclone.
- o. To reinforce the research on techniques for medium and long range forecasting of tropical cyclone, evaluate the short term climate prediction techniques of tropical cyclone.
- p. To strengthen the cooperation with WGH and WGDRR towards evaluation of tropical cyclone impact and disaster risk management.
- q. To enhance the collaboration with TRCG towards the exchange of latest developments and techniques related to tropical cyclone research and operational forecast, as well as the effectiveness of typhoon early warning system.
- r. To request CMA work together with TCS to edit and publish the Typhoon Committee science and technology journal "*Tropical Cyclone Research and Review*" quarterly from February 2012, in order to enhance the Typhoon Committee's contributions and influence in the area of tropical cyclone research and related issues among the research community of the world.
- s. To establish a Taskforce on Tropical Cyclone Intensity Analysis for Upgrading Tropical Depressions (TD), to be led by Hong Kong, China as the coordinator, *with members from China, Japan (RSMC), the Philippines, the Republic of Korea and other interested TC Members'*, with support provided by the TCS. The primary objective is to eliminate or reduce the discrepancies experienced in the timing of upgrade through a scientific and objective approach. The Terms of Reference for the Taskforce are: (a) to study and identify the reasons behind any systematic biases in the timing of upgrading of TD in operational warnings issued by various warning centres; (b) to explore practical communication channels for sharing of data, observations or information to reduce discrepancies associated with data availability constraints; and (c) to report findings to WGM, including recommendations for follow-up actions.
- t. To further improve the numerical prediction systems for tropical cyclones in the South China Sea.
- u. To request KMA develop a web portal for typhoon seasonal prediction.
- v. To develop a collaborative relationship with WMO Severe Weather Forecasting Demonstration Project (SWFDP)
- w. To retire of the name "Washi" from the list of tropical cyclone names.
- x. To re-appoint Mr. Masashi Kunitsugu (Japan) as the TOM Rapporteur.
- y. To request JMA consolidate the information on operational procedures of tropical cyclone analysis from CMA, JMA, HKO and JTWC for inclusion in the TOM.
- z. To request WMO publish, as early as possible, the 2012 edition of TOM as submitted by the Rapporteur, with the amendments given in Appendix VII.
- aa. To request WMO upload the updated TOM on the Tropical Cyclone Programme (TCP) Website and distribute the 2012 edition in CD ROM format to Members by March 2012.
- bb. To request WMO and ESCAP to promote the Tropical Cyclone Journal as well as to encourage Members' to submit articles for the Journal.

cc. To re-appoint Dr. LEI Xiaotu (China) as Chairperson of WGM, Dr. Nathaniel Servando (the Philippines) and Ms. Che Gayah ISMAIL (Malaysia) as Vice-Chairpersons of WGM.

(b) Hydrological Component (agenda item 6.2)

70. The Committee took note of the outcome of the parallel session of the WGH, which met on Wednesday morning, 08 February 2012 in Appendix X.
71. The Committee reviewed the activities of the Members related to the implementation of the TC Strategic Plan and its annual operating plan for the hydrological component during the past year. Details can be found in the Appendix XI.
72. The Committee was informed on the progresses and future activities of on-going projects:
 - a. Urban Flood Risk Management (UFRM) in TC region, led by China;
 - a. Assessment System of Flood Control Measures on Socio-economic Impacts (ASFCM), led by Republic of Korea;
 - b. Hazard Mapping for Sediment-related Disasters, led by Japan;
 - c. Establishment of Flood Disaster Preparedness Indices (FDPI), led by Japan;
 - d. Satellite-based information utilized on reducing water-related disaster risks, driven by ESCAP;
 - e. Mainstreaming Extreme Climate Events in Flood Forecasting and Warning System for Dam Operation, led by Philippines.
73. The Committee was pleased to note that the AWG and UFRM Task Force (TF), as the coordination body, have been given substantial responsibility of managing the cross cutting project of UFRM in 2011.
74. The Committee noted with pleasure that the cross-cutting project of UFRM has made notable progress in 2011. The related activities implemented in 2011 include:
 - a. UFRM Guidelines working meeting held in Beijing, China;
 - b. study of good practices in Shanghai, China and Ansong City, Republic of Korea;
 - c. training on QPE/QPF, flood inundation mapping and flood disaster assessment for pilot-city members for pilot study, particularly for Thailand;
 - d. proposal for development of real-time Operational System of Urban Flood Forecasting and Inundation Mapping (OSUFFIM);
 - e. half-day discussion on cooperation/coordination with Storm Surge Warning Service (SSWS) at WMO 7th TCP-JCOMM Regional Workshop on Storm Surge and Wave Forecasting which was held in Macao, China.
75. The Committee noted with the greatest appreciation the broad in-kind contribution and cooperation to UFRM project in terms of funding and expertise from:
 - a. Bureau of Hydrology (BOH) of the Ministry of Water Resources (MWR) of China;
 - b. Ministry of Land, Transportation and Maritime Affairs (MLTM) and Korea Institute of Construction Technology (KICT) of Republic of Korea;
 - c. Shanghai Meteorological Service (SMS)/Shanghai Typhoon Institute (STI) of China Meteorological Administration (CMA) of China;
 - d. PAGASA of the Philippines;

- e. Thai Meteorological Department (TMD) of Thailand;
 - f. Meteorological and Geophysical Bureau (SMG) of Macao, China;
 - g. TC Working Group on Meteorology (WGM), Disaster Risk Reduction (WGDRR) and Advisor Working Group (AWG) members;
 - h. WMO Regional Training Centre (RTC) in Nanjing, China;
 - i. Information and Communications Technology and Disaster Risk Reduction (ICT and DRR) Division of ESCAP.
76. The Committee was pleased to note that Department of Irrigation and Drainage (DID) Malaysia and Bureau of Hydrology (BOH) of China identified Kuala Lumpur (KL) and Guangzhou, respectively, to be the pilot cities of the UFRM. There are five pilot cities in all at present.
 77. The Committee noted that the training courses and on-job-training on QPE/QPF, urban flood inundation mapping and disaster assessment were successfully conducted for UFRM pilot study of Thailand.
 78. The Committee noted with appreciation that the project consultant Prof. Xiaotao Cheng from China Institute of Water Resources and Hydropower Research (IWHR), contracted by ESCAP finished the consultancy report for implementation of UFRM.
 79. The Committee noted with pleasure that drafting panel led by China completed the first version of UFRM Guidelines in cooperation with the members.
 80. The Committee noted with pleasure that the efforts of Thailand to explore mobilization the self-funding support for the UFRM pilot studies of Hat Yai in 2011.
 81. The Committee noted with pleasure that TRCG linked the Roving Seminar of QPE/QPF, which was held in Malaysia, with the implementation of TC cross-cutting project of UFRM.
 82. The Committee noted with pleasure the efforts made by TCS to advance the implementation of UFRM. It is also noted that TCS is exploring the funding support, in cooperation with SMG of Macao, from Science and Technology Development Foundation (STDF) of Macao, China to develop Operational System for Urban Flood Forecasting and Inundation Mapping (OSUFFIM) for Members.
 83. The Committee noted with pleasure that the WGH initiated the linkage with its other projects, such as ASFCM led by Korea, FDPI led by Japan, etc; and the linkage with QPE/QPF and storm surge warning service in cooperation with WGM.
 84. The Committee noted with pleasure that the Republic of Korea held an ASFCM Workshop from May 23 to 24 in 2011. Ministry of Land, Transport and Maritime Affairs (MLTM) of Korea funded the participants from UFRM pilot cities.
 85. The Committee noted with pleasure that the flood disaster assessment methodology of ASFCM had case studies in UFRM pilot cities, namely Hat Yai, Thailand, Metro manila, Philippines, Hanoi, Vietnam and Karla Lumpur, Malaysia.
 86. The Committee was pleasure to note that MLTM of Korea will consider the possibility of sending the specialist to Thailand for education of ASFCM and flood disaster assessment, including HEC-RAS, for longer term training, as requested by Thailand, one of UFRM pilot city member.
 87. The Committee noted with pleasure that the National Institute for Land and Infrastructure Management (NILIM) and SABO Technical Center of Japan established the international SABO website <http://www.sabo-int.org/> and perfected the Typhoon Committee technical help desk, and conducted the field-training course on hazard mapping of sediment-related disasters for Members in cooperation with NHMS of Vietnam and TCS in Nha Trang, Vietnam, in conjunction with TC 6th IWS.

88. The Committee noted with pleasure that ICHARM of Japan successfully completed pilot surveys and pretests of FDPI in Thailand (BKK, Ubon) and the Philippines (Manila) on February 2011. It is informed that the project of FDPI will be extended one more year up to the TC annual session of 2013.
89. The Committee was informed that the project of Satellite-based Information Utilized on Reducing Water-related Disaster Risks, driven by ESCAP, will be extended one more year up to 2013. It is noted that ESCAP will host the Sentinel Asia Operational Training Workshop for TC members in Macao, China from 27 February to 2 March 2012 with support by the Japan Aerospace Exploration Agency (JAXA), SMG and TCS.
90. The Committee was informed that the title of the project on “Mainstreaming Extreme Climate Events in Flood Forecasting and Warning System for Dam Operation” will be integrated into the new proposal for 2012 and beyond made by Republic of Korea.
91. The Committee was informed of the plan for two new proposed projects which will be launched in 2012 and 2013 as new Annual Operating Plan (AOP)s of WGH:
 - a. Project on Development of Comprehensive plan for Extra-Ordinary Flood in the TC Members, proposed by Republic of Korea;
 - b. Project on Estimation of Socio-Economic Impact from Sediment-Related Disaster , proposed by Japan;
92. The Committee noted that the project on Development of Comprehensive plan for Extra-Ordinary Flood in the TC Members will be lasted from 2012 to 2016 with the general objective of (a) investigate flood damage types caused by climate change, flash flood, and flood prevention capacity; and (b) cooperate with Typhoon Committee members to reduce the adverse effects from the extreme flood.
93. The Committee noted that the project on Estimation of Socio-Economic Impact from Sediment-Related Disaster will be conducted from 2013 to 2015 with the purpose to establish a common collecting format and methods of investigation for disasters to estimate socio-economic impacts from sediment-related disaster and to share common technical background with TC members.
94. The Committee noted with appreciation that MLTM together with KICT, the Ministry of Land, Infrastructure, Transport and Tourism of Japan (MLIT) together with the Infrastructure Development Institute – Japan (IDI) provided funding to support four WGH members to participate in the 6th TC IWS.
95. The Committee noted with pleasure the progresses of the cooperation on flood forecasting modelling and development of real-time operational system between Sun Yat-Sen University of China and TMD of Thailand.
96. The Committee noted the comments from Dr. Ti Le-Huu, former Chief of Water Security Section of ESCAP, on sharing of experiences of Thailand flood in 2011 which could be organized as a joint project related to the activities of the WGH. The Committee also noted that ESCAP and National Disaster Management Institute (NDMI) of Korea have been conducting some valuable works in this area.
97. The Committee was pleased to note the cooperative efforts of China and Republic of Korea on training of flood forecasting to enhance cooperation between the working groups on hydrology of WMO RA II and the Committee in 2011.
98. The Committee also noted with appreciation the proposed areas of joint TC and WMO interest and the recommendation from Dr. Wolfgang Grabs, Chief of Hydrological Forecasting and Water Resources Division of WMO for enhancement of the linkage between WMO RA II and the Committee.
99. The Committee noted with appreciation that MLTM of Republic of Korea will generously offer the funding support for hosting WGH working group meeting annually starting in

2012 as required by WGH participants. And the Committee recognized that it could be an opportunity for WGH and WGDRR to have joint discussion for cross-cutting issues during their separate working group meeting.

Conclusions of WGH:

100. On the basis of the information provided by Members and findings of the TC 6th IWS held in Nha Trang, Vietnam in November 2011 as well as Parallel Session of WGH, the following conclusions were reached:
 - a. The collaboration of 3 working groups, AWG and TF and close linkage with WMO and ESCAP are vital to the success of the project UFRM.
 - b. Enhancement of training and cooperation on QPE/QPF application, hydrological/hydraulic modelling, inundation mapping and disaster assessment are very important for the UFRM.
 - c. The UFRM should be continued considering that the project is very important and has many different tasks to complete even though substantial progress has been achieved in past years.
 - d. Enhancement of the close collaboration with the WMO RA II Working Group on Hydrological Forecasts and Assessments and RA V Working Group on Hydrological Services in several themes of common interest provides significant benefits to the Committee.

Recommendations of WGH:

101. On the basis of discussion and the outcomes of the WGH Parallel Session and IWS in Nha Trang, VietNam in November 2011, the WGH made the following recommendations :
 - a. To re-appoint Mr. Minoru KAMOTO, Japan as WGH Chairperson, Dr. Yang-Su KIM, Republic of Korea and Dr. LIU Zhiyu, China as Vice Chairpersons of WGH, respectively.
 - b. To allocate US\$28,000 from TCTF in total for supporting overall WGH activities for 2012 calendar year.
 - c. To continue assigning to TF Members the responsibility of providing expertise guidance and advice to UFRM implementation:
 - the Chairperson of WGM Mr. Xiaotu LEI and Director of RSMC Mr. Masashi KUNITSUGU to take care of meteorological aspect;
 - Chairperson and Vice-Chairpersons of WGH Mr. Minoru KAMOTO, Dr. Zhiyu LIU and Dr. Yang-soo KIM to take care of hydrological aspect;
 - Chairperson and representatives of WGDRR, Dr. Tae Sung CHEONG. Mrs. Hilda LAM and Ms. Fong Peng LEONG to take care of DRR aspect.
 - Chairperson of TRCG, Mr. Edwin LAI to take care of the training and education of UFRM.
 - d. To request WGM, WGH and WGDRR continue considering how to combine their activities with and contribute to the TC cross-cutting project of UFRM.
 - e. To request Members continue providing the training and expertise on QPE/QPF, hydrological/hydraulic modelling, inundation mapping and flood disaster assessment for UFRM pilot project as in-kind contribution.
 - f. To request the Members of Pilot Cities continue exploring mobilization the self-funding support for the pilot studies.
 - g. To request strong collaboration of the three working groups, AWG and TF and maintain close linkage with WMO and ESCAP to push forward the project UFRM.

- h. To request WGH conduct case study on real-time QPE/QPF application in UFRM pilot study, in cooperation with WGM;
- i. To request TRCG continue coordinating with WGH when planning related matters training and research.
- j. To endorse the hosting of the WGH working group meeting annually starting in 2012 with funding support from Republic of Korea.
- k. To request WGH, in cooperation with WGM and WGDRR to take into account the recommendation of Dr. Ti Le-Huu on sharing the experience of Thailand flood 2011 in WGH AOP7 'the project on development of comprehensive counterplan for extraordinary flood' led by the Republic of Korea, in conjunction with ESCAP, NDMI of the Republic of Korea and Thailand.
- l. To appoint the hydrologist of TCS Mr. Jinping LIU and the focal point of WGH, Ms. Hwi-Rin KIM, Republic of Korea as the liaison to WMO RA II and RA V WGHs for the Committee.
- m. To request WMO take actions to facilitate involvement of WGH in the activity of WMO water and hydrology issues.
- n. To request WGH take the action on the closest linkages between the two working groups of WMO RAI and the Committee which were indentified at the Committee 43rd Session as:
 - UFRM and flash flood/debris flow/landslide prediction/warning under the RA II theme of Disaster Mitigation – Implementation of the WMO Flood Forecasting Initiative including Flash Flood Forecasting Capabilities; and
 - Assessment of the variability of water resources in a changing climate under the RA II theme of Water Resources Assessment, Availability and Use (surface water and ground water).
- o. To request WGH focus on improving the ability to forecast hydrological phenomena and provide measures for the effectiveness of the improvements

(c) Disaster Risk Reduction Component (agenda item 6.3)

- 102. The Committee took note of the report of the Parallel Session of the WGDRR, details of which are presented in Appendix XII. In the report China; Hong Kong, China; Macao, China; Malaysia; Republic of Korea; Philippines; Thailand; USA presented their efforts on DRR.
- 103. The Committee reviewed the activities of the TC Members, ESCAP, WMO and other collaborating organizations, during the past year, details of which are presented in Appendix XIII. Activities within the DRR component among the Members included the following:
 - a. Progress on WEB-GIS based Typhoon Committee Disaster Information System (WGTCDIS) project.
 - b. The 6th WGDRR Workshop in Incheon, Republic of Korea during 25-26 May 2011.
 - c. IWS during 5-12 November 2011 in Viet Nam.
 - d. Publication of the report on DRR Expert Mission 2011.
- 104. The Committee was informed that twenty-three representatives from Members and international organizations attended the 6th WGDRR Workshop that was held in Incheon during 25-26 May 2011. During the meeting, the group agreed to provide inputs to the WEB-GIS based TCDIS (WGTCDIS) by early March 2012. The participants also discussed vision and future activities of WGTCDIS.

105. The Committee noted the need to have closer interaction among WGM, WGH, and WGDRR Members to collect disaster information needed to extend WGTCDIS and to calibrate and validate WGTCDIS effectively.
106. The Committee was informed of some ongoing initiatives of WMO for the development and implementation of early warning system projects in collaboration with UN and international partners, such as United Nations Development Programme (UNDP), International Federation of Red Cross and Red Crescent Societies (IFRC), International Strategy for Disaster Reduction (ISDR) and World Bank.
107. The Committee noted the information provided by Hong Kong, China in the development of Common Alert Protocol (CAP) and considered it a potentially useful way of dissemination warning to users and the public.
108. The Committee noted that progress was made in the project on warning dissemination. Hong Kong, China implemented the function to disseminate warnings through the Severe Weather Information Center (SWIC) which was named SWidget (<http://severe.worldweather.org/swidget/swidget.html>) and launched in 2010 with warnings from China; Hong Kong, China; Macao, China; Guam, USA; Republic of Korea; Singapore and Malaysia.
109. The Committee was informed that the current WGDRR Chairperson, Dr. Sangman JEONG will retire from his position. The Committee noted with appreciation his great contribution and constructive work to WGDRR activities.
110. The Committee was informed that WGTCDIS can be linked to TC web pages providing additional information sharing among Members .
111. The Committee was informed of the development of the SDDS (Smart Disaster Dissemination System) led by NDMI, Republic of Korea to strengthen regional cooperation of NMHSs with the disaster risk management agencies from national to local levels in multi-hazard warning systems.
112. The Committee was informed that a TC expert team from the three Working Groups will visit the Philippines to assess the impacts of tropical storm Washi. The team will:
 - a. assist Philippine's implementation of the Typhoon Committee Disaster Information System;
 - b. share knowledge on early warning system at the community level;
 - c. provide at least one automatic weather station in the affected community in Mindanao; and
 - d. publish mission report, including the recommendations that provided to the Government of Philippines.
113. The Committee was informed of a new project namely "Benefit Evaluation of Typhoon Disaster Prevention and Preparedness" led by China to evaluate the different disaster prevention and preparedness measures and provide the result as the basis of decision making policy.

Conclusions of WGDRR:

114. On the basis of the information provided by the Members and findings of the parallel session on WGDRR, the following conclusions were reached:
 - a. The WGDRR recognized the importance of the outcomes of the 5th IWS on Urban Flood Risk Management considering climate change, as the basis for future activities on WGTCDIS.
 - b. The future activities of WGDRR should include joint activities with WGM and WGH and economic impacts assessment considering climate change.

- c. Expert missions to three TC Members namely Malaysia, Philippines and USA will be conducted in 2012 to introduce WGTCDIS and provide training on the operation of WGTCDIS.
- d. The 7th WGDRR Workshop will be held in Seoul, Republic of Korea on 25-26 May 2012.
- e. NDMI will establish database for disaster information and hardware to continue the maintenance for WGTCDIS in 2012.
- f. Hong Kong, China has made preparations for the installation of automated weather stations for the Pilot project for Community Weather Stations in 2012. The WGDRR will continue to identify appropriate sites and local recipient organizations in interested Member to take the project forward in 2012.
- g. NDMI has made preparations for developing the SDDS (Smart Disaster Dissemination System) led by NDMI, Republic of Korea to strengthen regional cooperation of NMHSs with the disaster risk management agencies from national to local levels in multi-hazard warning systems.
- h. China proposed a new project namely “Benefit Evaluation of Typhoon Disaster Risk Reduction” to be led by China to evaluate the different disaster prevention and preparedness measures and provide the result as the basis of decision making policy.

Recommendations of WGDRR:

115. On the basis of the information provided by the Members and deliberations, the WGDRR made the following recommendations:
- a. To appoint Dr. Woon-Kwang YEO from the National Disaster Management Institute of the Republic of Korea as Chairperson and Mrs. Hilda LAM from Hong Kong Observatory, Hong Kong, China and Ms. Fong Peng LEONG from Macao Security Forces Coordination Office, Macao, China as Vice Chairpersons of the WGDRR .
 - b. To allocate US\$22,000 budget of TCTF in 2012 for supporting WGDRR activities, including support for the community based weather station pilot project, three TC Members to collect typhoon disaster information to extend the WGTCDIS and participation in next TC IWS and Expert Mission.
 - c. To enhance the ongoing project on WGTCDIS to serve as a portal site for sharing disaster risk reduction technologies and information among TC Members.
 - d. To extend WGTCDIS for Multi-Hazard Early Warning Systems in conjunction with other WGs and to promote its linkage with systems in other WGs.
 - e. To send expert missions on the WGTCDIS to 3 TC Members namely Malaysia, Philippines and USA in 2012.
 - f. To support the publications of typhoon brochure of TC Members and the organization of public education events to raise public awareness on DRR jointly with WMO DRR and PWS Programs and UN/ISDR, as well as WGM and WGH, and consider if these would need to be added during the expert mission.
 - g. To organize the 7th WGDRR Workshop in Republic of Korea during 25-26 May 2012 and invite members of Panel on Tropical Cyclone in the Workshop to share disaster related information and technologies.
 - h. To extend the project on the real-time transmission of severe weather warnings using SWidget in SWIC to other interested Members in 2012.
 - i. To set up automatic weather stations for the community based weather station projects in the 4 interested Members : DPR Korea , Philippines, USA and Viet Nam.

- j. To request the Committee endorse further collaboration with WMO through participation of the Chair of WGDRR in activities of WMO RA II and RA V working groups related to DRR.
- k. To develop the Smart Disaster Dissemination System (SDDS) led by NDMI, Republic of Korea to strengthen regional cooperation of NMHSs with the disaster risk management agencies from national to local levels in multi-hazard warning systems.
- l. To dispatch an TC expert team from the three Working Groups to visit the Philippines to assess the impacts of tropical storm Washi. The team will:
 - a. assist Philippine's implementation of the Typhoon Committee Disaster Information System;
 - b. share knowledge on early warning system at the community level;
 - c. provide at least one automatic weather station in the affected community in Mindanao; and
 - d. publish mission report, including the recommendations that provided to the Government of Philippines.
- m. To implement the project namely "Benefit Evaluation of Typhoon Disaster Risk Reduction" proposed by China to evaluate the different disaster prevention and preparedness measures and provide the result as the basis of decision making policy.

VII. Reports of the TRCG, TCS and AWG (agenda item 7)

(a) Training and Research Coordination Group (agenda item 7.1.)

- 116. The Committee took note of the report given in Appendix XIV prepared by the Chair of Training and Research Coordination Group (TRCG).
- 117. The Committee expressed its appreciation to MMD for hosting the Roving Seminar in Petaling Jaya, Malaysia in September 2011. The Committee also appreciated the support provided by the three resource persons from Hong Kong, China; Singapore; and Thailand.
- 118. The Committee thanked China, Hong Kong, China and Republic of Korea for hosting research fellowship programmes in 2011.
- 119. The Committee took note of the successful training attachment of forecasters from Lao PDR and Macao, China in July 2011, and thanked JMA and WMO TCP for continuously supporting this capacity-building initiative.
- 120. Mr. WANG Caifang, Executive Director of WMO Regional Training Centre in Nanjing (WMO RTC-Nanjing) that is hosted by the Nanjing University of Information and Science Technology, gave a comprehensive introduction to WMO RTC-Nanjing. The Committee took note with appreciation the kind offer of WMO Nanjing Regional Training Center to host the next IWS and to become a training centre for the Committee.

CONCLUSIONS of TRCG:

- 121. The 4-year work plan formulated in the 1st TRCG Planning Meeting in 2009 continued to provide a sound basis for implementing training and research activities of the Committee, and the AOP 2012 was drafted in accordance with the plan for implementation.
- 122. There is a need to start preparing for the drafting of the next 4-year work plan (2014 – 2017), including the sourcing of effective options for organizing the 2nd TRCG Planning Meeting in 2013.

123. TRCG will continue to link up or provide support to cross-cutting training and research activities, e.g. UFRM, and would also provide input to relevant TC initiatives, e.g. the publication of Tropical Cyclone Research and Review.

RECOMMENDATIONS of TRCG:

124. On the basis of the conclusions reached by the deliberation of Members, the TRCG made the following recommendations:
- a. To re-establish TRCG with the re-appointment of Mr. Edwin S.T. LAI (Hong Kong, China) and Mr. Roger EDSON (USA) as Chairperson and Vice Chairperson of TRCG, respectively.
 - b. To request Members confirm their respective focal points as members of TRCG, and to update the list of resource persons as appropriate.
 - c. To encourage Members to support the participation of TRCG members in TRCG-related meetings/activities as far as possible so that good continuity in TRCG work can be maintained.
 - d. To request Members offer or take part in research fellowship programmes on themes including TIPS and QPE/QPF.
 - e. To endorse the priority training and research areas as given in para. 5 of Appendix XIV.
 - f. To endorse the proposed TRCG AOP for 2012 (Annex XIII of Appendix XIV), including the organization of a roving seminar (venue to be confirmed) under the support of Typhoon Committee Trust Fund.
 - g. To make available the opportunity for Members from the Panel on Tropical Cyclones to take part in some of the training and research activities being organized.
 - h. To keep in view of future training and research needs in relation to lessons learnt from the devastating impact caused by a relatively weak tropical cyclone Washi in the Philippines.
 - i. To accept the offer of WMO Nanjing Regional Training Center to serve as a training center for the Committee and to request AWG and TCS to work on the formal arrangement as needed..

(b) Activities of Typhoon Committee Secretariat (agenda item 7.2)

125. The Committee took note of the activities report given in Appendix XV prepared by the Secretary of the Typhoon Committee and appreciated the efforts of the TCS for executing the decisions of the TC and supporting its activities.
126. The Committee thanked the Government of Macao, China for continuing to provide headquarters and endowment fund for TCS operation.

(c) Activities of AWG (agenda item 7.3)

127. The Committee was informed of the activities of the AWG in 2011. (Appendix XVI).
128. The Committee was informed of the status of the 2011 Typhoon Committee Annual Operating Plan (AOP), the proposed AOP for 2012, and the budget for 2012 (Appendices XVII-XIX). AWG, TCS and Working Group Chairpersons provided additional clarification on the 2012 AOP and the 2012 Budget for the Committee's consideration, upon requests by Members.

129. The Committee noted with satisfaction the status of the 2011 Typhoon Committee Annual Operating Plan (AOP). The final results for WGM; WGM 10 Objectives, 46 Success Indicators, 12 Success Indicators met (meeting and workshop to be held later in 2012); WGH 6 Objectives, 12 Success Indicators, 12 Success Indicators met (9 in 3 areas started); WGDRR 8 Objectives, 8 Success Indicators, 8 Success Indicators met; TRCG 3 Objectives, 3 Success Indicators, 3 Success Indicators met.
130. The Committee noted the draft of the 2012-2016 Strategic Plan and considered it to be a working document. The Committee requested the AWG to continue to develop the 2012-2016 Strategic Plan to include standardized performance based metrics in the KRAs and strategic goals and proposed further collaboration with ESCAP.
131. The Committee requested the AWG to review the governance of the Committee, with the assistance of TCS, and submit a report to the 45th session with a view to achieving the Committee's objectives in a more efficient and effective manner.
132. The Committee requested the AWG to continue to coordinate with Members, TRCG, Working Groups and Secretariats to review, investigate, and implement methods and procedures to evaluate the effectiveness of training and workshops and present findings and recommendations at 45th Session.
133. Adopt "Effective Warning" as the main theme of the 2012 Integrated Workshop. Further enhancement of the theme may be considered in the ensuing months.
134. Consider holding the TECO or scientific lectures in conjunction with the IWS and thereby avoiding duplication.
135. Review the organization and reduce the length of the 45th Session Meeting to maximize effectiveness.
136. The Committee requests that the AWG look into formally disbanding the Resource Mobilization Group and incorporate the RMG activities into other groups within the scope of the AWG with collaboration from ESCAP and WMO.
137. The Committee expressed its sincere appreciation to the AWG members for their work in formulating and coordinating the 2012 annual operating plan and the 2012 budget.

Recommendations of the AWG

138. The AWG proposed the following recommendations to the Committee:
 - a. To approve the objectives and success indicators contained in the 2012 AOP.
 - b. To approve the proposed 2012 budget of US\$132,000 with \$15,000 USD carry over funds from 2011 in Appendix XIX.
 - c. To arrange a small meeting of the AWG in order to discuss proposals on the improvement of the governance and efficiency and effectiveness of the Typhoon Committee. Consider the timing of this meeting in conjunction with other TC meetings to minimize expenses.
 - d. To continue collaboration with ESCAP on inserting wording on the Hyogo Framework of Action and a climate change cross cutting theme to the Strategic Plan.
 - e. To discontinue the Tropical Cyclone Annual Review (Appendix XX) and to issue the TC newsletter twice a year (Appendix XXI).
 - f. To formally disband the Resource Mobilization Group and to request TCS to collaborate with WMO and ESCAP for Resource Mobilization activities and amend the documents referring to RMG accordingly.
 - g. To approve modifications of Rule 6 of the Rules of Procedures of the TC as submitted by the AWG in Appendix XXII.

- h. To appoint Dr. CHO Seok Joon (KMA) as the AWG Chairperson and re-appoint Ms. Genevieve Miller as the AWG Vice-Chairperson.

VIII. PROGRAMME FOR 2012 AND BEYOND (agenda item 8)

(a) Strategic Plan 2012-2016

139. The Committee is requested to discuss the Strategic Plan 2012-2016. (Appendix XXIII)
140. ESCAP requested the Committee to provide guidance to the global agenda related to disaster risk reduction and sustainable development, including the post Hyogo Framework for Action and Post UN Millennium Development Goals to emphasize the importance of implementation of tropical cyclone disaster risk reduction.
141. The Committee is requested to approve the Strategic Plan 2012-2016.
142. The Committee noted the need for sound indicators to monitor the progress on KRA1 and KRA2. In addition to existing disaster data from EM-DAT and other sources.
143. The Committee noted that the WEBGIS –based TCDIS could provide more accurate disaster data.

(b) AOP-2011-status and Proposal for AOP-2012

144. The Committee noted the presentation of the Chairs of WGs on the AOPs 2011 and new proposals for the AOP2012.

(c) Rule No 6 of Rules of Procedure in what concerns the substitution of the Chairperson of TC in case of impediment

145. The AWG presented the modifications of the Rule 6 of Rules of Procedure to the Committee for its approval.

(d) Theme and dates for the seventh IWS. Members may wish to make an offer to host this workshop

146. The Committee discussed the offer by China to host the next IWS at Nanjing University of Information Science and Technology
147. The Committee discussed possible themes for IWS. Discussions included “Effective Warnings”, “Saving lives through Effective Warnings” and “ Effective Warnings to save lives”.
148. WMO proposed ‘CAP’ as a possible sub-theme.

(e) New names of the tropical cyclones as replacement of names removed from the list

149. The Committee noted the request from the Philippines to retire the name of the tropical cyclone Washi.
150. The Committee noted the suggestion of USA to replace the name FANAPI with RAI.

(f) Feasibility of holding a future joint session of the Panel on Tropical Cyclones (PTC) and Typhoon Committee.

151. The Committee took note of the information from WMO related to the PTC joint Session. WMO expressed that it's premature to conduct a Joint Session because the WG's are not well established in the PTC. The committee noted the importance of mutual understanding of the Regions and will discuss this issue when time is appropriated.
152. The Committee requested TCS to:

- Coordinate the update the Focal Points and Directorship lists with Members’.

IX. PUBLICATIONS (agenda item 9)

153. The Committee noted with appreciation that the RSMC Tokyo published the “Technical Review No.13” in March 2011 and the “Annual Report on the Activities of the RSMC Tokyo – Typhoon Center in 2010” in December 2011. These are available on the Web page of JMA/RSMC Tokyo at <http://www.jma.go.jp/jma/jma-eng/jma-center/rsmc-hp-pub-eg/annualreport.html>.

(a) Launching of the first issue of the Tropical Cyclone Research & Review

154. The Committee noted with appreciation the publication of the first issue of the Tropical Cyclone Research and Review presented in TC 44th Session. The Committee expressed that the publication should cover related subjects and consider including results/summary of the TC Workshops.

(b) Report of the Expert Mission on the WEB GIS-based Typhoon Committee Disaster Information System (WGTCDIS)

155. The Committee took note on the coordination by TCS of the publication under the series of technical publications of TC, “DRR Expert Mission 2011” (TC/TD 0003).

156. The Committee expressed its appreciation on National Emergency Management Agency (NEMA) and National Disaster Management Institute (NDMI) of Republic of Korea for supporting establishment of the system and providing training and education.

(c) Typhoon Committee Annual Review (TCAR)

157. The Committee took note that the TCS published the 2010 Typhoon Committee Annual Review (TCAR) in January 2011 and disseminated them to the Members, ESCAP and WMO in electronic (CD-ROM) format.

(d) Typhoon Committee Newsletter 2011

158. The Committee took note that the TCS published the Typhoon Committee Newsletter in January 2011 and disseminated them to the Members, ESCAP and WMO in electronic (CD-ROM) format.

159. The Committee expressed that the electronic version could be more concise compared to printing version. For the improvement of the Newsletter and to enhance the TC visibility and efficient results, the newsletter should better focus on promoting TC activities to partners and potential donors. Chairs of all WGs committed to providing input to help accomplish this goal.

160. The Committee discussed that AWG and TCS could explore more effective ways to publish the TC Newsletter as an outreach document.

X. COORDINATION WITH OTHER ACTIVITIES OF THE WMO TROPICAL CYCLONE PROGRAMME (agenda item 10)

161. The Committee was informed by the WMO Secretariat that, at its 16th Congress (Cg-XVI) of WMO gave priority on the following:

- a. Global Framework for Climate Services (GFCS)
- b. Capacity Building
- c. WMO Integrated Global Observing System (WIGOS) & WMO Information System (WIS)
- d. Disaster Risk Reduction
- e. Aeronautical meteorology

162. The Committee was also informed that Cg-XVI gave following guidance to the Tropical Cyclone Programme (TCP):

- a. 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;
- b. To continue to support the capacity building programmes for developing countries, especially for Least Developed Countries and Small Island Developing States;
- c. 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;
- d. 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.

163. TCP activities during the inter-sessional period were highlighted as follows.

a) Training and Capacity Development

- Workshops on TC Forecasting and Public Weather Service in Miami, Florida, USA from 21 March to 1 April 2011 and in Melbourne, Australia from 5 to 23 September 2011
- RSMC attachment training in New Delhi, India from 28 February to 11 March 2011 and in Tokyo, Japan from 20 to 29 July 2011

b) Support to Operational Forecasting

The Global Guide to Tropical Cyclone Forecasting has been updated and now in the stage of expert review. It will be mainly web-based for widespread access by forecasters and researchers around the globe and a limited number of hard copies will be also distributed to the WMO Members. Collation of chapters will be completed by June 2012 and the final version of the updated Global Guide will become available by the end of 2012. The new Guide will achieve synergetic effect with the TC Forecaster Website which is also under construction and will provide useful tools and data for operational forecasters. In this respect, the Committee noted with pleasure that Hong Kong, China agreed to host the TC Forecaster Website in response to the request of WMO. The Website will be established later in 2012.

c) Storm Surge Watch Scheme

TCP collaborated with WMO/IOC Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) to organize the 6th Storm Surge Workshop in the Dominican Republic for the RA IV Hurricane Committee Members in February 2011. It also held the 7th Storm Surge Workshop in Macao, China for the Typhoon Committee Members in October 2011 in cooperation with Meteorological and Geophysical Bureau of Macao and the Committee and with support of Macao Foundation. A panel discussion was conducted on the storm surge warning service and its collaboration with the Urban Flood Risk Management (UFRM) project.

d) Application of Research and Development (R&D)

The first WMO International Workshop on the Satellite Analysis of Tropical Cyclones (IWSATC) was organized in Honolulu, Hawaii, USA from 13 to 16 April 2011 in collaboration with the WMO World Weather Research Programme (WWRP) and the National Climatic Data Center of NOAA. The workshop was held in conjunction with the 2nd workshop of the International Best Track Archive for Climate Stewardship (IBTrACS) which

is run by the National Climatic Data Center of NOAA. Linking with the effort to produce a globally-unified best track dataset, IWSATC 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.

164. The Committee was informed that the Severe Weather Forecast Demonstration Project (SWFDP) for the Southeast Asia is being implemented by WMO with participation of Cambodia, Lao PDR, Thailand, and Viet Nam. The project will benefit from advanced numerical weather prediction guidance products from CMA, JMA, KMA, and from a SWFDP regional centre planned to be established at the National Centre for Hydro-Meteorological Forecasting of Viet Nam. RSMCs Tokyo and New Delhi will support the project, tracking and predicting the development of the main source of severe weather conditions such as tropical cyclones. The Hong Kong Observatory will provide regional support on training, technical aspects, and also act as a focal point for Public Weather Services aspects of the SWFDP.
165. The Committee was informed of the activities of the WMO World Weather Research Programme (WWRP) in 2011 and its plan for the future. The Committee noted with pleasure that the International Workshop on Rapid Change of Tropical Cyclone Intensity and Movement was successfully held in Xiamen, China from 18 to 20 October 2011. The workshop was attended by 53 tropical cyclone researchers and forecasters. The workshop highlighted recent advances in the theory and practice of forecasting rapid changes in tropical cyclone intensity and track.
166. The 3-day training session on Tropical Cyclone Ensemble Forecast was conducted from 14 to 16 December 2011 at the WMO Regional Training Centre in Nanjing, China. The session was held in conjunction with the 2-week International Training Course on Tropical Cyclones organized by CMA (5-16 December 2011). The training session was co-sponsored by CMA, Typhoon Committee, WWRP (including THORPEX) and TCP and was targeted mainly at forecasters of the Typhoon Committee Member countries. The session focused on the use of up-to-date ensemble forecast of tropical cyclones such as on maximum wind speeds, rainfall, and landfall timing and location.
167. The Committee noted that WWRP and TCP are jointly organizing the Second International Conference on Indian Ocean Tropical Cyclones and Climate Change (New Delhi, India, 14-17 February 2012). Major objectives of the Conference are to i) review and discuss current status of the operational tropical cyclone forecasting and warning system, ii) progress on the understanding of tropical cyclone genesis, iii) climate change and tropical cyclone activity, tropical cyclone risk and iv) vulnerability assessment and tropical cyclone disaster preparedness, management and reduction.
168. To be held in succession by WWRP in India is International Conference on "Opportunities and Challenges in Monsoon Prediction in a Changing Climate" (OCHAMP-2012) to be held from 21 to 25 February 2012 in Pune. The Conference will be dedicated to Monsoon prediction in a changing climate. Its aim is to give impetus to basic research and development and also to spread the salient features of the research pursuits in force throughout the world. It would bring together a panel of highly-accomplished and leading experts in the field of monsoon prediction coming from different research and operational meteorological environments. Noting that the monsoon activities are closely related to flooding in the Asia region, the Committee requested WMO to ensure that outcomes of the Conference be duly shared by the tropical cyclone communities in other regions including Typhoon Committee.
169. WWRP and TCP also plan to organize the International Workshop on Unusual Tropical Cyclone Behaviour tentatively in Guangzhou, China in November 2012. The workshop will focus on unusual behavior of tropical cyclones, especially on motion, evolution, intensity, precipitation patterns and structure. A better understanding of such tropical cyclone behavior will lead to more accurate forecast and better guidance for disaster risk managers and thus contribute to mitigation of impacts of storms.

XI. SUPPORT REQUIRED FOR THE COMMITTEE'S PROGRAMME (agenda item 11)

(a) Technical Cooperation

170. The Committee was informed of the technical cooperation activities of WMO and ESCAP in support of the programmes of the Typhoon Committee carried out in 2011, including the WMO Voluntary Cooperation Programme (VCP), Emergency Assistance Fund scheme and South-South Cooperation activities, and expressed its appreciation to WMO, ESCAP and collaborating partners for providing assistance to Members of the Typhoon Committee.
171. The Committee noted that, in 2011, China, Japan and the Republic of Korea made cash contributions to the Voluntary Cooperation Fund (VCP(F)). China; Hong Kong, China; Japan; Republic of Korea; and USA provided equipment, expert services, training and fellowships within the framework of the VCP Equipment and Services (VCP(ES)) Programme. The VCP(F) support was provided to support the requests for expert services for Cambodia and DPR Korea. As of 31 December 2011, three projects for two countries (Cambodia and DPR Korea) have not received VCP support.
172. The Committee noted that WMO provided an expert mission to the DPR Korea from 18 to 25 March 2011, with representatives and experts from the WMO Secretariat and the China Meteorological Administration. In collaboration with SHMA and relevant concerned departments and institutes in DPR Korea, including the user organizations such as the Ministry of Land Environment Protection (MoLEP) and the Academy of Agricultural Sciences (AAS), the mission assessed the current capability of SHMA with regard to weather, agrometeorological, hydrological, oceanographic and climate information services, the status of natural hazards, the capability of the observation network and telecommunication system, and assisted SHMA in the development of proposals and recommendations for the enhancement of its meteorological and hydrological services.
173. The Committee further noted that, following the exceptional severe floods in Pakistan in July-August 2010 and a WMO fact-finding and needs-assessment mission carried out in November 2010 in collaboration with ESCAP and in coordination with UNESCO, several donor Members of WMO, including China; Hong Kong, China; Japan; and USA, indicated their possible support to restore essential hydrometeorological infrastructure (AWSs, conventional synoptic meteorological stations, etc.) in Pakistan, in addition to the WMO support under the Emergency Assistance Fund.
174. Following the floods caused by Typhoon Ketsana from 28 September to 2 October 2009, Lao PDR requested WMO for emergency assistance for the restoration of damaged meteorological instruments and equipment at synoptic meteorological stations. China supported Lao PDR by providing surface measurement instruments. Affected Members who need emergency assistance are advised to utilize this scheme, and all Members are requested to consider possible support to the affected NMHSs.
175. Within the framework of the south-south cooperation (or Technical Cooperation among Developing Countries (TCDC)), China organized the 40th China Study Tour and the Regional Training Seminar on WMO Information System (WIS) in April 2011. China, Lao PDR, Malaysia, Thailand, Philippines and Viet Nam of the Committee participated in the event, which witnessed the donation of communication and information systems (CMACAST and MICAPS) to all the participating countries aimed at enhancing the capabilities of NMHSs in the implementation of WIS in Asia.
176. Significant importance should be attached to assistance from developed countries to Committee's activities on a bilateral basis. Members concerned are invited to inform the Committee at this session of typhoon-related activities, which have been implemented and/or will be undertaken on bilateral arrangements.

(b) In-kind Contributions

177. The Committee expressed appreciation for the in-kind contributions from some Members, namely China; Hong Kong, China; Japan; Macao, China; Malaysia, Republic of Korea and Thailand. The Committee also invited the other Members to report their in-kind

contributions, quantifying the corresponding values assigned that have expended in actions related to TCTF projects (Appendix XXIV).

178. The Committee discussed how information on In-kind contribution presented to the Committee and AWG and TCS could examine the usefulness and application of In-kind Contributions

(c) Typhoon Committee Trust Fund (TCTF) by WMO

179. The Committee reviewed the statement of account of TCTF for the period of 1 January to 31 December 2010 and the provisional statement for 1 January to 31 December 2011 submitted by the representative of the WMO Secretariat as shown in Appendix XXV.
180. The Committee encouraged Members to submit contributions in as timely a manner as possible.

(d) Typhoon Committee Trust Fund (TCTF) by TCS

181. The Committee was informed by TCS, the summary of income and expenditure from 1 January to 31 December 2011 related to the execution of the Work Plan 2011 (Appendix XXVI)
182. The Committee discussed that TCS should provide the final account of income and expenditures of the previous two years at the next Session.
183. The Committee discussed harmonizing the documents of income and expenditures presented by WMO and TCS.

XII. APPROVAL OF TCTF-2012 (agenda item 12)

184. The Committee discussed the budget proposal for 2012 (paragraph 138 b) and expressed concern about the carry-over identified from the execution of 2011 programme.
185. The Committee expressed that there is a need to review budget and programme planning process to minimize carry-over and to apply carry-over in a systematic way.

XIII. OTHER BUSINESS (agenda item 13)

(a) Improvement of the governance and efficiency and effectiveness of TC

186. The Committee noted that, while it successfully implemented the Strategic Plan, there is an increasing need for a comprehensive review of its governance with a view to achieving the Committee's objectives in a more efficient and effective manner. It therefore requested the AWG to review the governance of the Committee, with the assistance of TCS, and submit a report to the next session. In this regard, the Committee underlined the following as priorities in the revision:
 - a. Terms of Reference (TORs) of the AWG, Working Groups on Meteorology, Hydrology and DRR, TRCG and TCS;
 - b. Minimizing the duration of the annual session;
 - c. Involvement of high-level officials in the session by separating the technical matters from the session;
 - d. Enhanced coordination between the IWS and the technical meetings to avoid any duplication;
 - e. Use of decision- and action-based documents in the session;
 - f. Consistent follow-up of the decisions and recommendations made at the session;

- g. Development of synergies with ESCAP and WMO through strategic objectives and policies and operating plans;
- h. Standardization and harmonization of Members' practices to promote effective warning, in particular communication of advisory and warning messages to the users.

187. The Committee noted there was a need to further review the existing legal documents of the Typhoon Committee.

188. The Committee noted that not all documents were available for Members' review at the 44th Session.

(b) ESCAP Tsunami Trust Fund

189. The Committee took note of the submission of the project "Synergized Standard Operation Procedure for Coastal Multi-Hazards Early Warning System" for grant funds from ESCAP Trust Fund for Tsunami Disaster and Climate Preparedness. The Committee would proceed with the project should funds become available.

XIV. DATE AND PLACE OF THE FORTY-FIFTH SESSION (agenda item 14)

190. The Committee noted and appreciated the offer of Hong Kong, China to host the Forty Fifth Session, provisionally on the week of 28 January, 2013. The final dates will be confirmed in due course by TCS.

XV. ADOPTION OF THE REPORT (agenda item 15)

191. The Committee adopted the report of the session at 9:30 am 11 February 2012.

XVI. CLOSURE OF THE SESSION

192. The delegates from the Members of the Typhoon Committee, representatives of ESCAP, WMO and TCS and observers expressed their thanks and appreciation to the CMA for the successful hosting and the Zhejiang Meteorological Service for organizing the Forty Fourth session of the Typhoon Committee. They also expressed gratitude to Dr. Jiao Meiyuan, Deputy Administrator of CMA and her staff for the warm hospitality and excellent arrangements made and also for organizing a tour through the beautiful sites of Hangzhou, China.

193. The Session was closed by the Chairperson at 10:10 am, 11 February 2012.