

WORLD METEOROLOGICAL ORGANIZATION

EXPERT TEAM ON PUBLIC WEATHER SERVICES IN SUPPORT OF DISASTER PREVENTION AND MITIGATION (ET/DPM)

Kuala Lumpur, Malaysia

25-29 May 2009



EXECUTIVE SUMMARY

A meeting of the Expert Team on Public Weather Services in Support of Disaster Prevention and Mitigation (ET/DPM) was held in Kuala Lumpur, Malaysia, from 25 to 29 May 2009. The meeting was chaired by Mr H.G. Wai (Hong Kong, China).

The key conclusions from the work of the Expert Team are summarized below.

- (i) Future guidance material should be presented in short succinct format in a problem solving approach using Internet and multi-media technologies where appropriate.
- (ii) Noting the results of the Second Coordination Meeting of the World Weather Information Service (WWIS) Website Hosts held in Toulouse, France, 12-14 May 2009, the Meeting supported the new development initiatives identified except for the addition of weather observation reports on the web pages of city forecast in WWIS.
- (iii) The Meeting, recommended that a professional consultant be hired to do the face-lift of the WWIS using the trust fund set up with the reward money of the Stockholm Challenge.
- (iv) The Meeting noting the different purposes served by WWIS and Severe Weather Information Centre (SWIC), agreed not to merge the two websites.
- (v) The Meeting agreed to making the WWIS forecast data freely available to the media with proper acknowledgement of the originating Members, subject to agreement by participating Members.
- (vi) The Meeting agreed that a register of WMO Members alerting authorities be drawn up with the following information:
 - Country name;
 - Organizational name of the alerting authority;
 - Geographic scope for which the organization has authority;
 - Types of messages for which the organization has authority; and,
 - Internet URL where the alerting authority serves its alert messages.
- (vii) The Meeting agreed to develop a dialogue with the Tropical Cyclone Programme (TCP) community with a view towards future collaboration in the area of warning service delivery.
- (viii) The Meeting agreed to continue the collaboration with World Weather Research Programme (WWRP) in the area of application of nowcasting to public warnings.
- (ix) The Meeting reviewed the progress of WMO demonstration projects on the Shanghai Multi-Hazard Early Warning Services (MHEWS) and Shanghai World EXPO 2010 Nowcasting Service Demonstration Project (WENS). The Meeting recognized the importance of the above projects in support of a successful World Exposition 2010 in Shanghai. WMO will participate in EXPO 2010 with a MeteoWorld pavilion in cooperation with the China Meteorological Administration

(CMA). The Meeting noted, plans for a workshop on DPM in connection with the opening of MeteoWorld Pavilion on 9 May 2010 subject to further discussions between CMA and WMO and offered its support, as appropriate.

- (x) The Meeting agreed that guidance should be provided to developing countries on how to connect with users, develop partnerships with them, design warning products that will meet their needs, and develop public education on responding to weather warnings.
- (xi) The Meeting agreed to enhance the Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management (PWS-13) to cater for the rapidly changing user requirements and technological capabilities in the improvements of PWS. These enhancements include: (a) improving partner collaboration, (b) improving communication of particularly urgent warnings and clarifying their impacts, (c) utilising new communication technologies to improve partner decision support, (d) increasing training and mentoring opportunities for developing countries, and (e) infusing the expertise of social scientists to clarify specific requirements among the growing and diverse array of users of PWS.
- (xii) The Meeting agreed to update and enhance the existing Guidelines on Cross-Border Exchange of Warnings (PWS-9).

1. INTRODUCTION

1.1 The Malaysian Meteorological Department (MMD) kindly hosted a meeting of the Expert Team on PWS in Support of DPM (ET/DPM) in Kuala Lumpur, Malaysia, from 25 to 29 May 2009. The meeting was chaired by Mr H.G. Wai (Hong Kong, China). The meeting was opened by Dr Yap, Director-General of MMD. Ms Haleh Kootval (Chief, Public Weather Services Programme, WMO Secretariat) welcomed the participants on behalf of the Secretary-General and briefed them on the expected outcomes of meeting of the Expert Team. Ms Kootval drew attention to the Team's Terms of Reference (ToRs) as approved by the Commission on Basic Systems (CBS). The ToRs are as follows:

- (a) Monitor and report on the progress of earlier initiatives of ET-DPM and make recommendations as appropriate to OPAG/PWS;
- (b) Monitor and report on aspects of disaster prevention and mitigation that relate to support of major WMO activities, including the Shanghai 2010 World Expo Multi-Hazard Early Warning Systems project;
- (c) Identify ways to assist developing countries in their efforts to improve disaster prevention and mitigation in the context of their national PWS programme;
- (d) Continue to provide guidelines on the development of the WWIS and the SWIC to promote improved international availability and access to National Meteorological and Hydrological Services' (NMHSs) official forecasts and severe weather information via the Internet;
- (e) Provide guidance on the role of PWS in the early warning process, including the development of appropriate reference material based on current practices in early warning, highlighting communication and technology aspects;
- (f) Keep under review the development of cross-border exchange of warnings with reference to the published WMO guidelines;
- (g) Develop reference material on the application of nowcasting to the provision of public warnings associated with mesoscale weather phenomena;
- (h) Develop and maintain a list of experts in PWS aspects of Disaster Prevention and Mitigation (DPM) who are willing to contribute to PWS training activities; and,
- (i) Report and advise on collaborative activities with other CBS OPAGs and Technical Commissions.

1.2 The list of participants is given in Annex I. The programme of the meeting is contained in Annex II.

1.3 The Meeting began its work with considering each Term of Reference (ToR). Leaders for each ToR assisted by another member of the team introduced their respective ToRs and prepared a separate report on the details of its work for inclusion in the final report of the meeting.

2. BACKGROUND

2.1 The Meeting was informed by Ms Kootval that the Fourteenth Session of the Commission for Basic Systems (CBS-XIV, Dubrovnik, Croatia, 2009) had approved the proposed structure of the OPAG on PWS. The work of the PWS Programme continues to be coordinated through three expert teams and an implementation and coordination team. These are: the Expert Team on

Services and Products Improvement (ET/SPI); the Expert Team on the Communication Outreach and Public Education Aspects of PWS (ET/COPE); the Expert Team on PWS in Support of Disaster Prevention and Mitigation (ET/DPM); and the Implementation/Coordination (IC) Team on PWS. In addition, CBS also established two task teams under the OPAG on PWS namely, the Task Team on Meteorological Services for Improved Humanitarian Planning and Response and the Task Team on the preparation of prototype Guidelines on Meteorological Hazards.

2.2. The results of work under the various Terms of Reference (ToRs) of the Expert Team are summarized below.

3. ET/DPM WORK PROGRAMME

3.1 ToR (a): Monitor and report on the progress of earlier initiatives of ET-DPM and make recommendations as appropriate to ICT-PWS

3.1.1 The Chair briefed the Meeting on the progress with the earlier initiatives of ET/DPM. It was noted that letters had been sent to Members who had not responded to the PWS survey issued in 2006 on severe weather warning services and that no additional response was obtained. The Meeting was informed of the overall outcome of the International Symposium on PWS that was held in 2007. The Chair also pointed the Meeting to the success of the Learning-Through-Doing concept and resulting projects including the on-going Shanghai 2010 EXPO Multi-Hazard Early Warning System Project.

3.1.2 In respect of improving DPM capacity of developing countries, the Meeting noted the Voluntary Cooperation Programme (VCP) course conducted by Hong Kong, China on "The Use and Interpretation of City-specific Numerical Weather Prediction Products" in 2006.

3.1.3 The Chair went on to brief the meeting on the latest status of the WWIS and SWIC projects and the publication of the User Manual for both websites. He also informed the Meeting of an earlier attempt initiated by the WMO Information System (WIS) team to convert SWIC tropical warning information to Common Alerting Protocol CAP format which had not been successful due to format inconsistencies among those warnings.

3.1.4 Regarding the nowcasting applications in the provision of public warnings, the Meeting was updated about the activities of the Joint (PWS-WWRP) Nowcasting Applications and Services (JONAS) Group which was formed in 2007. These included the successful Beijing Forecast Demonstration (B08FDP) Project in 2008 and the ongoing Shanghai World Expo Nowcasting Services (WENS) Demonstration Project.

3.1.5 In addition, the Meeting was also informed of the collaboration with RA II in the project of City Specific Forecast where Japan, Korea and Hong Kong, China provided model output time series for weather elements at specific cities to assist developing countries in forecast preparation.

3.1.6 The Chair drew the attention of the meeting to the report of the CBS-XIV on PWS, in particular, the result of the International Symposium on PWS, and the request of CBS to the PWS Program (PWSP) in respect of the trends, developments and evolving needs of users, and Members' priority areas.

3.1.7 In reviewing the effectiveness of the guidance materials, the Meeting noted the request of CBS-XIV to the PWS community to pay attention to the emerging trend in e-learning and agreed that future guidance materials should be presented in short, succinct format using Internet and multi-media technologies where appropriate.

3.1.8 The status of progress with the deliverables identified by the ET/DPM at its last meeting was given in Annex VI to the report of the PWS Implementation/Coordination Team (ICT) Meeting in Shanghai in May 2008 (reproduced in Annex III of this report).

3.2 ToR (b): Monitor and report on aspects of disaster prevention and mitigation that relate to support of major WMO activities, including the Shanghai 2010 World Expo Multi-Hazard Early Warning Systems Project

3.2.1 The Meeting discussed the follow-up activities of the WMO demonstration project of WENS in the framework of Shanghai MHEWS. The Meeting was informed of plans for a workshop on disaster prevention and mitigation in connection with the opening of MeteoWorld Pavilion on 9 May 2010 as an integral part of WMO's programme in EXPO subject to further discussions between CMA and WMO. The Meeting considered that such activity would be in line with the objectives of this Expert Team in improving PWS in support of DPM and offered its support as appropriate.

3.2.2 The Meeting considered that the workshop might focus on two themes. The first could be to review the status of nowcasting techniques for the benefit of WMO Members, particularly in the context of WENS Project, in providing warning services on high impact weather and multi-hazard early warning services in support of the World EXPO 2010. The second could be to review the role of NMHSs in providing multi-hazard early warning and emergency response management for stakeholders beyond the EXPO.

3.3 ToR (c): Identify ways to assist developing countries in their efforts to improve disaster prevention and mitigation in the context of their national PWS programme

3.3.1 The Meeting considered service quality improvement through connection to the users and the identification of user requirements as a high priority. The Meeting agreed that guidance should be provided to developing countries on how to connect to users, on developing public education strategies on responding to weather warnings, and on developing partnerships with the relevant stakeholders with respect to the design of warning products.

3.3.2 The Meeting agreed that the following initiatives should be pursued to assist developing countries in their effort to improve disaster prevention and mitigation in the context of their national PWS programmes based on their requirements as reflected in previous surveys.

- Capacity-building activities in developing partnerships with stakeholders and end-users in connection with the development of more effective warning services delivery and usage of new innovative methods for dissemination including graphics;
- Capacity-building activities conducted using a blended Internet / telecommunication technology (e.g., GOTOMEETING). The PWS forthcoming workshops in RA I and RA V (2009) may be used to demonstrate this concept;
- Use of the network of DPM resource centres e.g., Australia Website for RA V Tropical Cyclone (TC) community;
- Recording of PWS workshops to be made available via Webcast;
- Creation of online library of PWS in support of DPM training resources; and,
- Sharing success stories and lessons learned in user friendly formats.

3.4 ToR (d): Continue to provide guidelines on the development of the World Weather Information System (WWIS) and the Severe Weather Information Centre (SWIC) to promote improved international availability and access to NMHSs official forecasts and severe weather information via the Internet

3.4.1 The Chair briefed the Meeting that as of May 2009, the WWIS provided forecasts of 1302 cities in seven different hosts contributed by 121 WMO Members. Over 80% of the participating Members contributing city forecasts provided forecast for three to five days. The Meeting was pleased to note the steady rise in the visit rate of the WWIS, the growth in participating Members and additional language versions set up over the past couple of years. The Meeting was very much encouraged by the winning of the Stockholm Challenge Award in 2008.

3.4.2 The WWIS will become available in Italian and Russian languages in the near future. The Hong Kong Observatory (HKO) has been identified as a potential Data Collection/Production Centre in the WMO Information System and preparation is underway to develop the necessary data management functions.

3.4.3 The Chair also briefed the Meeting that 21 Members joined the SWIC project including all the Tropical Cyclone Warning Centres (TCWCs) and Regional Specialized Meteorological Centres (RSMCs). The site provided access to Tropical Cyclone warnings issued by participating Members. Maps showing reports of heavy rain/snow and thunderstorms were also provided on SWIC.

3.4.4 The Meeting noted the results of the Second Coordination Meeting of the WWIS Website Hosts, which was held in Toulouse, France, 12-14 May 2009, as follows:

3.4.4.1 A WWIS Forum will be set up.

3.4.4.2 Statistics on the number of cities and range (day) of forecast provided by each Member will be published in the newsletter together with those provided by CNN and BBC based on Numerical Weather Prediction (NWP).

3.4.4.3 A professional consultant would be hired to do the face-lift of the WWIS using the reward money of the Stockholm Challenge held in a WMO trust fund.

3.4.4.4 The SWIC would be developed into a one-stop-shop for severe weather information as a long-term goal.

3.4.4.5 A common dictionary of weather terms would be set up.

3.4.5 In deliberating the suggestions of the WWIS coordination meeting, the Meeting provided the following advice:

3.4.5.1 The newsletter on WWIS and SWIC to be sent to all ET-DPM Members. The access to WWIS Forum to be provided to all ET-DPM Members.

3.4.5.2 In building the common dictionary of weather terms, the work done by METEOALARM should be referred to in order to avoid duplication of effort. The common dictionary of weather terms set up should be made available to other Members.

3.4.5.3 A "Suggestion Box" should be set up in WWIS to collect user comments/suggestions on the Website.

3.4.5.4 WMO Secretariat was requested to explore the possibility of integrating the WWIS in the 2010 Expo MeteoWorld Pavillion.

3.4.5.5 The Meeting revisited the idea of merging WWIS and SWIC Websites. It was noted that the idea was previously proposed to streamline the management of the two websites and to ensure a more coordinated approach to their development. The purpose has actually been served after putting both websites under the purview of the ET/DPM. The two websites were in fact set up to serve different user groups, for example, the WWIS to serve world travellers planning trips

overseas and SWIC to serve the media seeking news on severe weather. Furthermore, the translation of warnings in different WWIS Website languages would involve huge resources which were not likely to be available. After deliberation, the meeting agreed that there was no longer a need to merge the two websites. Cross-linkage between the websites will suffice. The Meeting also considered that the reproduction of weather observation reports on web page of city forecasts would not provide much added value and advised to drop the development of that product and focus on other improvement initiatives identified by the coordination group.

3.4.5.6 The Meeting noted the increasing demand for distribution of the WWIS forecasts to other media and that technologies such as XML and RSS were available for doing so effectively. It also noted that the original objective of the WWIS project was to promote the visibility of NMHSs by making their official forecasts more accessible to the public. It considered that making the WWIS forecast data freely available to the media with proper acknowledgement to the originating Members would serve to achieve the original objective more effectively. The WMO Secretariat was requested to seek agreement of the participating Members for doing so.

3.4.5.7 The Meeting considered a proposal to publicize a register of WMO Members warning authorities and noted that it was a step towards achieving "Single official voice for dissemination of warnings" which was one of the priority areas identified by Members. It agreed to explore the setting up of a register containing the following information which will replace the existing list of Members' legal basis for issuing weather warnings presently posted on the WMO PWS Website.

- Country name;
- Organizational name of the alerting authority;
- Geographic scope for which the organization has authority;
- Types of messages for which the organization has authority; and,
- Internet URL where the alerting authority serves its alert messages.

3.5 ToR (e): Provide guidance on the role of PWS in the early warning process, including the development of appropriate reference material based on current practices in early warning, highlighting communication and technology aspects and ToR (g): Develop reference material on the application of nowcasting to the provision of public warnings associated with mesoscale weather phenomena

3.5.1 The Meeting noted that there were a number of user requirements and technological capabilities driving improvements in the provision of Public Weather Services (PWS). First, the increasingly complex society and partners of NMHS are expecting more highly specific, customised information and decision support services for an expanding array of user needs. Second, society has become more vulnerable to a variety of natural and man-made hazards, highlighted by the events such as the September eleventh attacks, Hurricane Katrina and the Asian Tsunami. Third, increased dissemination capabilities provided by the internet, high-speed, remote communications and cell phone technology are opening up new avenues within the PWS arena.

3.5.2 The Meeting conducted a preliminary review of existing publication WMO PWS-13 entitled, "Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management". While there was agreement that these Guidelines should still serve as a valuable resource, there was also consensus that some aspects should be enhanced. It was also recommended that the revised Guidelines should be produced in electronic formats accessible via the Internet to allow access to a wider audience and also to facilitate updates on an as-needed basis. There should be hyperlinks pointing to relevant resources on the Internet.

3.5.3 The Meeting recommended re-titling the Guidelines to reflect increased focus on developing partnerships with key stakeholders and strengthening existing communication channels. The reworked Guidelines will include examples from various NMHSs best practices in preparing both textual warnings and graphical products. The following paragraphs reflect areas of specific needs for updating identified by the Meeting.

- a) **Address Improved Communication of Particularly Urgent Warnings:** In recent years, an increasing emphasis has been placed by the meteorological community on nowcasting. A number of international exercises and initiatives are currently addressing the recognised need to improve the capability of NMHSs to provide timely and effective warnings of natural hazards such as severe thunderstorms and heavy rain leading to flash flooding. The Meeting recommended focus particularly on hazardous warnings which are of an immediate nature, and will be associated with significant impact. This issue has been highlighted by emergency managers and the media. Such warnings are often referred to as “short-fused warnings” and carry with them particular urgency. Such “short-fused warnings” may be based on thresholds established for each hazardous phenomenon for each geographical area as needed. These warnings may then be clearly identified in several ways including the use of “extreme” in the title, suitable colour-coding of the threat level, and the media broadcast of the warning to ensure public attention. NMHSs may modify in consultation with partners, their operational practices to include procedures for issuing “short-fused warnings”.
- b) **Improve Clarity and Comprehension of Warning Information:** Hazardous events can always be characterised by their magnitude, location, duration and timing. The most important information (what, where, when, severity, impact) should always be placed at the top of the warning. This supports easy comprehension by users of the most important aspects of the warning.
- c) **Encourage General Use of Multi-Hazard Warnings:** Some weather events such as deep low-pressure systems can produce multiple hazards such as strong winds, flash flooding and high seas. In the report by Chair of the PWS on OPAG at the CBS-XIV session (2009), multi-hazard warnings was listed as a priority area in which guidance should be provided to NMHSs’. Reducing the number of individual warnings in favour of a consolidated Multi-Hazard Warning could avoid possible confusion among partners and other users. As a preliminary step, one or more examples will be provided in the revised Guidelines.
- d) **Transition from Dissemination of Generalised Products to Specific Information Geared Towards Partner Decision Support:** NMHSs and disaster managers need to have a shared understanding of the warning process for the response to be most effective. It is widely accepted that the end-to-end warning system is only as strong as its weakest link and that capacity-building for decision support is an essential requirement. The Team noted that the emphasis was gradually shifting from hazard prediction to risk communication of the likely impacts. The development of a mindset for providing tailored information to support users with critical decision making and the use of Geographical Information System (GIS) were considered integral to a successful transition. NMHSs are encouraged to employ the services of social scientists to facilitate the process of enabling more effective engagement with partners.
- e) **Improve Partner Collaboration:** In the report by the Chair of the PWS on OPAG at the CBS-XIV session (2009), the development and fostering of collaborative partnerships with users was a listed priority. The Team noted that the warning communication process rested on the interconnected dependency of many partners, stakeholders, organisations, communities and individuals. Each of these groups

has distinct requirements, so different approaches to warning communication are often required. NMHSs are encouraged to partner with disaster managers and the media to coordinate an appropriate level of understanding of the warning-response system. Where appropriate, hydrologists should also be included in the partnership arrangement. Feedback mechanisms need to be put in place if NMHSs are to realize continuous warning system improvement.

- f) Use Remote Communications Technologies for Coordinating and Mentoring:** At the CBS-XIV session (2009), attention was directed at the growing use of the internet and wireless communications for service delivery, the use of videoconferencing technology for interoffice communication, and capacity-building through e-learning. The Team discussed emerging communication and technology advances and considered there was significant value in NMHSs taking advantage of these opportunities where appropriate and affordable. For example, with the advent of point-to-multipoint, live communications which allows the viewing of a facilitator's computer screen by any number of users, the possibilities for live partner collaboration, training and mentoring to support improvements in short-fused warning techniques have expanded greatly. These distance communication techniques should be demonstrated at future meetings as appropriate where Internet and phone capabilities exist.

3.6 ToR (f): Keep under review the development of cross-border exchange of warnings with reference to the published WMO guidelines

3.6.1 The Meeting noted that the Severe Weather Information Centre (SWIC) and METEOALARM serve as effective means for displaying warnings (for both) and watches for the latter. These websites can indeed play an efficient role in the exchange of warnings between NMHSs. The SWIC which is maintained by Hong Kong, China on behalf of the WMO Members, was successful in incorporating all the tropical cyclones centres products, as well as observations of thunderstorms and heavy precipitation. The Meeting noted the challenge in extending the information on this website to other types of warnings and to different languages.

3.6.2 A presentation on METEOALARM was provided to the meeting. The Meeting expressed interest with the way the access to detailed warnings is attained at local levels and with the multi-language availability for the international and national levels of access. Also, the Meeting was supportive of the concept of "colour levels" which the directors of European NMHSs had agreed upon. In this last respect, the National Weather Service (NWS) representative explained how his Service was addressing the issues of harmonizing and simplifying some graphical presentations of warnings. The Meeting noted with interest some convergences with the principles (e.g., distinction between watches, warnings and extreme weather warnings) and solutions put forward by METEOALARM. The Meeting was of the opinion that the development of a common scale, perhaps depicted as an international colour code, could be considered for a number of different types of meteorological and hydrological hazards. As previously recommended by the Expert Team, cross-linkage with SWIC is now available.

3.6.3 The Meeting reviewed the existing Guidelines on Cross-Border Exchange of Warnings. The "General principles" and "Considerations in bilateral or regional exchanges" (Chapters 2, 4 and 5 -"summary structure") were found sound and globally still valid. The introduction could possibly dwell more on the driving reasons for cross-border exchange of warnings. It was suggested that at least in some cases, cross-border exchange of warnings could be considered as an intermediate step towards totally harmonized ("seamless") warnings.

3.6.4 Examples in Chapter 3 of the Guidelines were considered to suffer from imbalances. Some examples are still relevant and illustrative (e.g., simple bilateral exchanges, tropical cyclones), while others should be updated. Still others are interesting but deserve more details (e.g., Nordic countries). The European Multi-service Meteorological Awareness (EMMA) is clearly

lengthy and outdated (to be replaced with METEOALARM). SWIC is not mentioned. The Meeting agreed that a thorough updating of these guidelines is required, even if the general structure and conclusions are sound. The emerging "Internet culture" should be taken in due account, both in the content of the document (stress to be put on Internet platforms like SWIC, METEOALARM), and in the presentation of the Guidelines (e-publication, flexible links to sites or new examples).

3.6.5 Ways and means for this upgrade were discussed (see deliverables), noting also that success stories and lessons learned from as great a number of Regional Associations (RAs) as possible were desired. Following discussions, the team proposed a new title as: "International & cross-border collaboration in public warning process", which acknowledges among others the idea that cross-border exchange could be considered a step towards the production of "seamless" cross-border systems of warnings.

3.7 ToR (h): Develop and maintain a list of experts in PWS aspects of Disaster Prevention and Mitigation who are willing to contribute to PWS training activities

3.7.1 The Meeting discussed one of the conclusions of the previous ET/DPM meeting which stated that NHMSs should strengthen their efforts to improve disaster prevention and mitigation activities through building partnership with their national disaster management and civil protection community. Effective partnerships should allow the users to plan jointly with the NMHS the structure and content of the warnings. It is important that all parties involved should have a complete understanding of the end-to-end process and the roles and responsibilities of all parties. Training and liaison visits between NMHS and national disaster management and civil protection personnel are highly recommended.

3.7.2 The Meeting also noted the recommendations of the CBS-XIV meeting (2009). The Commission had noted that timely and effective communication of warnings through collaborative partnerships with users was one of the Members' priority areas. The Commission reiterated that NMHSs should keep abreast of achievements in the science of meteorology and related technologies in order to prepare for emerging trends, and to anticipate evolving needs of users. To respond to Members' needs, the Commission requested the PWSP to continue to pay particular attention to training and capacity-building through e-learning as an efficient and cost-effective tool in training of NMHS staff.

3.7.3 The Meeting considered the training requirements of the WMO Members on the basis of the survey of *Analysis of the 2006 WMO Disaster Risk Reduction Country-level Survey (Capacity Assessment of National Meteorological and Hydrological Services in Support of Disaster Risk Reduction, WMO, 2008)*. The results of the survey pointed out the need for basic training in the new forecast techniques and also the need for complex interdisciplinary capacity-building which will enable meteorologists to understand the needs of partners, stakeholders and users. This will support reaching decision-makers as well as the public and helping them to understand the meaning of warnings and enhance their ability to respond appropriately.

3.7.4 The Meeting agreed to define an inventory of areas of expertise needed for the Members' capacity-building in the PWS aspect of DPM and to identify contact persons in each NMHS for collaboration with the Expert Team to identify the suitable experts when training activities on specific area are planned.

3.7.5 The Meeting identified the following areas of expertise in PWS aspects of DPM:

1. Building partnerships with disaster management and civil protection community;
2. Building a communication strategy including the presentation of forecast uncertainty, to address requirements of disaster management, and to invite the participation of social science experts in such an exercise;

3. Capacity-building (networks, systems, software, new forecasting techniques);
4. International and cross-border collaboration in warning process; and,
5. Weather warnings in big cities (e.g., EXPO 2010)

3.9 ToR (i): Report and advise on collaborative activities with other CBS OPAGs and Technical Commissions

3.9.1 The Meeting noted the RA II project in city specific forecast in assisting developing countries in strengthening their PWS.

3.9.2 The Meeting noted the collaboration with TCP through the active participation of the TCWCs and RSMCs in the SWIC project. The Meeting was pleased to learn that a pilot project using SWIC as a portal to warnings issued by participating Members was underway under the Typhoon Committee where a direct warning delivery service using software (known as "Weather Wizard") installed on user's PC would pull warnings from participating Members' websites.

3.9.3 The Chair informed the meeting of a planned PWS/TCP Seminar on tropical cyclone warning formulation and communication in Nanjing or Hong Kong around end of 2009. The Meeting requested the Chair to continue coordination with Typhoon Committee on this collaboration.

3.9.4 The Meeting noted the increasing awareness of the importance of warning service delivery among the TCP community. It requested Mr Jim Davidson (BOM) to identify areas of future collaboration such as international collaboration on warning process with the TCP community during the RSMC/TCWC Technical Coordination Meeting (Brisbane, November 2009). The Chair agreed to do the same in the aforementioned PWS/TCP Seminar in Nanjing/Hong Kong.

3.9.5 The Chair also brought to the attention of the meeting the collaboration with WWRP through the JONAS Group in the B08FDP project in 2008 and the on-going WENS project. The Meeting agreed to build on the success and requested the Chair to seek opportunities for the contribution of this ET in the capacity-building workshop planned for after the conclusion of EXPO 2010 in the area of nowcasting warning service delivery including partnership development.

3.9.6 The Meeting also noted that Hong Kong, China was working with the CBS OPAG on Information Systems and Services (ISS) to set up a Data Collection or Product Centre (DCPC) for WWIS city forecast collection and product files production.

3.9.7 The Meeting noted the success of the Severe Weather Forecasting Demonstration Project (SWFDP) in RA I and considered that collaboration with the CBS OPAG on Data Processing and Forecasting Systems (DPFS) in this project in area of warning service delivery would add value to that initiative. The Meeting agreed that the Secretariat could help get success stories from SWFDP participants on international collaboration in warning process.

3.9.8 Noting the significant portion of natural disaster damages and loss being caused by flooding, the Meeting agreed that warning information relating to flooding should be the next area of development for SWIC. It requested the Chair to approach the Commission for Hydrology (CHy) in collaboration with PWS to explore the possibility of getting such information from the hydrological authorities and also to explore the possibility of collecting storm surge warnings among Typhoon Committee Members.

3.9.9 Noting the requirement for assistance with the interpretation of seasonal forecast model output for monsoon prediction, the Meeting suggested that advice from the appropriate seasonal forecasting authorities (e.g., NCEP/CPC, ECMWF, CIIFEN, RCC (Tokyo and Beijing)) be sought.

4. DELIVERABLES AND FUTURE FOLLOW-UP

4.1 Based on the discussions of the ToRs and associated deliverables, the Meeting agreed to undertake the following activities to implement the deliverables.

Deliverable 1: Enhancement of WWIS (ToR (d))

The Meeting supported the development initiatives of WWIS identified by the WWIS coordination group during the Toulouse meeting, in particular:

- Enhance the appearance and navigation of WWIS;
- Improve coverage (cities, forecast range);
- GIS-enabled feature;
- Push functionalities for WWIS; and
- Add suggestion box to the website.

The above development initiatives would be taken up by the WWIS language hosts with the Secretariat assisting in acquiring a consultant for designing the enhancement using the Stockholm Challenge reward money. The Meeting noted the above initiatives required substantial IT development resources and agreed that they should be targeted for completion by mid-2010.

Action by: WWIS language hosts and Secretariat, deadline: Mid-2010

Deliverable 2: Register of warning authorities (ToR (d))

The Meeting agreed to set up a register of WMO Member warning authority. The WMO Secretariat was requested to write to Members to seek input for the register after confirming with the WMO WIS team about the structure of the register. The Chair will provide a sample register entry (by end-July 2009).

Action by: WMO Secretariat, Chair (End-June 2009 and End-July 2009, respectively)

Deliverable 3: PWS/TCP Seminar on TC warning formulation and communication

The Meeting requested the Chair to continue coordinate with Typhoon Committee and CMA on the organisation of a PWS/TCP Seminar on TC warning formulation and communication in Nanjing or Hong Kong around end of 2009.

Action by: Chair, deadline: End-November 2009

Deliverable 4: A workshop on PWS in support of disaster prevention and mitigation in connection with the opening of MeteoWorld Pavilion on 9 May 2010.

Action by: Dr Chen Zhenlin and the WMO Secretariat to clarify the role that may be played by the ET/DPM, deadline: June 2009

Deliverable 5: Update “Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management”

The Meeting recommended re-titling the Guidelines to reflect increased focus on developing partnerships with key stakeholders and strengthening existing communication channels. The re-worked Guidelines will include examples from various NMHSs best practices in preparing both textual warnings and graphical products.

Action by: 1) Messrs Elliott Jacks and Jim Davidson, to review PWS-13 and come up with a Table of Contents with expected topics for a new guideline, deadline: September 2009; 2) ET/DPM to review and work on the content of the updated guidelines, deadline, December 2009; 3) Messrs Elliott Jacks and Jim Davidson to propose the techniques for easy reference using electronic media including examples as applicable, deadline: Mid-2010; and, 4) ET/DPM and Secretariat extract success stories and lessons learned for posting in PWS Website , deadline: Mid-2010

Deliverable 6: Updated Guidelines on cross-border exchange of warnings which will be re-titled Guideline on International and Cross-border Collaboration in the Warning Process

The ET, with Mr Charles Dupuy and Dr Chen Zhenlin taking the lead, to draft a revised version of the said Guidelines, to be enriched with success stories and lessons learnt on cross-border collaboration on the warning process from a greater number of RAs. The draft will be reviewed by the ET Members for publication (preferably e-publication) by the end of 2009. The examples will be included in the document and will also be made available on the PWS Website. Target completion of the document: end of 2009.

Action by: 1) Mr Charles Dupuy and Dr Chen Zhenlin to review PWS-9 and prepare a table of content with expected topics for a new guideline, deadline: September 2009; 2) The ET will review and work on the content of the updated guidelines, deadline: End-2009; 3) Mr Charles Dupuy and Dr Chen Zhenlin to use the same techniques used in updating PWS-13, deadline: Mid-2010; 4) WMO Secretariat to extract success stories and lessons learned for posting in PWS Website

Deliverable 7: List of contact points for sourcing training experts in PWS aspect of DPM

Define an inventory of areas of expertise needed for the Members’ capacity-building in PWS aspects of DPM.

Actions by: Dr Vlasta Tutis and Mr Jim Davidson, deadline: End-2009

Identify a contact person at NMHSs of each WMO Member for collaboration with the ET. Letter to be sent from the Secretariat to Permanent Representatives with the list of expertise needed to identify the suitable experts to assist in training activities.

Action by: WMO Secretariat, deadline: End-March 2010

4. VISIT TO MALAYSIAN METEOROLOGICAL DEPARTMENT (MMD)

On 28 June 2009, the Meeting visited the “forecasting office” and the computing centre of MMD. The Meeting was briefed on the operation of the public weather forecasting and warning services including the “Tsunami warning” which was set up in 2005 after the 2004 Tsunami in south Asia. The Meeting was also briefed on the operation and development of MMD’s work in meteorological data communication and modelling. The Meeting expressed appreciation to the Director and staff of MMD for the arrangements made for the very interesting and informative visit.

5. CLOSING

The ET/DPM meeting closed at 1800 hours on 29 May 2009.

List of Annexes to the Final Report of the
Expert Team on Public Weather Services in Support of
Disaster Prevention and Mitigation (ET/DPM)
Kuala Lumpur, Malaysia 25-29 May 2009

Annex I	List of Meeting Participants
Annex II	Meeting Programme
Annex III	Status of Deliverables

**PARTICIPANTS AT THE MEETING OF THE CBS OPAG/PWS
EXPERT TEAM IN SUPPORT OF DISASTER PREVENTION AND MITIGATION (ET/DPM)**

(Kuala Lumpur, Malaysia, 25-29 May 2009)

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EXPERT TEAM ON PUBLIC WEATHER SERVICES IN SUPPORT OF DISASTER PREVENTION AND MITIGATION (ET/DPM)

(Kuala Lumpur, Malaysia, 25-29 May 2009)

PROGRAMME

	Monday, 25 May 2009	Tuesday, 26 May 2009	Wednesday, 27 May 2009	Thursday, 28 May 2009	Friday, 29 May 2009
A.M. 0900	1. Opening 2. Introductory Remarks (Secretariat) 3. ET/DPM work programme ToR (a) (Lead: Wai, Assist: Che Gayah)	ToR (d) (Lead: Wai, Assist: Che Gayah) ToR (e) (Lead: Jim, Assist: Charles)	ToR (b) (Lead: Chen, Assist: Wai) ToR (i) (Lead: Wai, Assist: Augustine)	5. Conclusions, deliverables and follow-up actions 6. Preparation of report of the Expert Team	8. Preparation of report of the Expert Team Continued)
1200	Lunch	Lunch	Lunch	Lunch	Lunch
P.M. 1330	ToR (h) (Lead: Vlatsa, Assist: Jim) ToR (c): (Lead: Augustine, Assist: Eli)	ToR (f) (Lead: Charles, Assist: Chen) ToR (g): (Lead: Eli, Assist: Vlasta)	4. Discussion of the deliverables of the ET	7. Visit to MMD	9 Adoption of the report 10. Closure of the Meeting
1700					

**REPORT OF THE EXPERT TEAM ON PUBLIC WEATHER SERVICES IN
SUPPORT OF DISASTER PREVENTION AND MITIGATION (ET/DPM)**
(PWS Implementation/Coordination Team (ICT) Meeting in Shanghai in May 2008)

The following is an account of work of the expert team since 2005 in respect of the Terms of Reference (ToR) and deliverables of the ET/DPM:

I. TERMS OF REFERENCE

ToR (a) Monitor and report on the progress of earlier initiatives of ET-DPM and make recommendations as appropriate to OPAG/PWS;

The Commission for Basic Systems (CBS) at its Thirteenth Session, held in St. Petersburg, Russian Federation, February 2005, approved the World Weather Information Service (WWIS) and Severe Weather Information Centre (SWIC) to become operational components of the Public Weather Services Programme (PWSP). These websites were officially launched on 23 March 2005.

ToR (b) Monitor and report on aspects of disaster prevention and mitigation that relate to support of major WMO cross-cutting activities such as Disaster Prevention and Mitigation, the WMO Space Programme and THORPEX;

1. The Team continued to pursue and support WMO cross-cutting activities and initiatives in the implementation of the Hyogo Framework for Action which was adopted by 168 Governments in January 2005. The Team in collaboration with the Expert Team on Service and Product Improvement (ET/SPI) developed and conducted a survey on WMO Members in 2006 with the following objectives:

- (a) To compile information on severe weather warning systems operated by Members with a view to publishing a handy reference on such system;
- (b) To assess the vulnerability of various Members to weather-related disasters with a view to developing workshops to address the gaps and weaknesses identified; and,
- (c) To assess the PWS needs of National Meteorological and Hydrological Services with a focus on identifying opportunities to improve products and services, in particular, on severe weather warning services.

The survey questionnaire was prepared in four different languages namely, English, French, Spanish and Russian. An electronic version of the questionnaire and a webform were also available on the WWIS Website for downloading and submission of return respectively by Members. A total of 170 questionnaires were successfully sent out. After analysing the initial returns from 76 Members, the Team published a report on the survey and proposed the following recommendations:

- (a) Using the contact information provided on each completed survey, it is proposed that an inventory of EWSs operated by Members be developed;
- (b) Based on the survey results identifying rain as the hazard of most concern and some 40% of the responses cited "forecasting accuracy" as the primary challenge, the Team recommended enhancing the predictability of rain (as defined in this survey) as the most effective area to focus on to reduce the vulnerability of Members' countries;

- (c) To improve on the warning of short-term severe weather phenomena, especially rainstorms, nowcasting as a decision-support tool, is called for. Workshops and capacity-building on nowcasting should be considered; and,
- (d) The success of a warning is to change people's behaviour and education is the key issue. Workshops and capacity building on reaching out to decision-makers as well as the public to help them understand the meaning of warnings and enhance their ability to translate these into action should be considered.

2. The Implementation Coordination Team (ICT) of the OPAG met in Muscat, Sultanate of Oman, from June 4 to 9 2007, to discuss the new and emerging issues of special importance to the work of the PWSP; these included the WMO Strategic Plan; the Madrid Conference, the work of the Task Force on the Socio-economic Applications of Meteorological and Hydrological Services, and the decision to hold an International Symposium on PWS. The major decisions of the ICT were:

- (a) The OPAG would initiate a PWS Pilot Project, focusing on "Learning-Through-Doing", aimed at a small number of countries and a defined range of sectors;
- (b) Extra responsibilities for Outreach and Public Education are devolved onto ET/COM, to be re-named ET/COPE;
- (c) The bringing together of all responsibilities relating to the WWIS and SWIC Websites which would henceforth lie with ET/DPM;
- (d) ICT Members would act as the Programme Committee for the Symposium on PWS to be held in Geneva, Switzerland, in December 2007;
- (e) ICT would support the constitution of the Task Force on Social and Economic Applications of PWS as an Expert Team within the OPAG;
- (f) A network of national PWS Focal Points would be established, to encourage the use of PWS resources and report on the effectiveness of PWS Programme activities; and,
- (g) The ICT of the OPAG on PWS were happy with the current name and with the current structural arrangements of the OPAG within CBS, reflecting the place of Public Weather Services as a fundamental part of NMHSs.

The ICT considered that, as the PWS Pilot Project in (a) above would absorb a considerable degree of time and effort on behalf of experts active within the OPAG, the individual Expert Team deliverables to be agreed at the next CBS session might be streamlined, in order to maintain an acceptable workload for ET Members.

3. The PWS OPAG Implementation Coordination Team (ICT) meeting was held on 6 December 2007 in Geneva, Switzerland, to discuss the future work programmes. The ICT deliberated that one of the main thrusts of future work would be on nowcasting applications, in particular, in relation to the cross-cutting Shanghai 2010 EXPO Multi-Hazard Early Warning System (MHEWS) Project. (See also discussion in ToR (h)).

4. The ET/DPM Chair attended and lectured in the Asia Conference on Disaster Reduction (ACDR) 2006 held in Seoul, Korea as well as the ACDR2007 held in Astana, Kazakhstan.

ToR (c) Identify ways to assist developing countries in their efforts to improve disaster prevention and mitigation in the context of their national PWS programme;

1. Hong Kong, China organized a “Training Course on Design and Operation of Meteorological Warning Systems” for WMO under the VCP Programme in December 2005. The objective was to provide participants with a better understanding of the key factors underlying the design and operation of meteorological warning systems. Ten participants from various Members attended the course.

2. In 2006, eight meteorologists from Members attended the VCP Training Course on “The Use and Interpretation of City-specific Numerical Weather Prediction Products” also organized by Hong Kong, China.

ToR (d) Continue to provide guidelines on the development of Severe Weather Information Centre (SWIC) for improved international availability and access to NMHSs’ official severe weather information via the Internet;

The user guides for WWIS and SWIC have been completed and made available on the Website of WMO.

ToR (e) Define and clarify the role of PWS in early warning process and develop appropriate reference material based on current practices on early warning highlighting communication and technology aspects. Create general guidelines from reference materials for use by NMHSs;

The “Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management” has been published as PWS-13.

TOR (f) Promote awareness of, and provide guidance to, Members on the exchange of public weather forecasts and warnings on the Internet;

1. In September 2006, the National Institute of Meteorology of Spain (INM) launched the WWIS Spanish language version. The French language version was launched in January 2007 by Météo-France. The WWIS Website now operates in six different languages namely English, Arabic, Chinese, Portuguese, Spanish and French. Also, the Deutscher Wetterdienst has expressed a keen interest to prepare a German language version.

As of 31 March 2008, 161 out of a total of 188 WMO Members participated in WWIS, the latest two being Republic of Moldova and Papua New Guinea. A total of 118 Members provide forecasts for 1263 cities, while 161 Members provide climatological data for 1265 cities.

The access statistics of WWIS since 2003 is shown in Annex I. The figure shows that the popularity of WWIS remains very high.

2. To enhance communication between host countries, a coordination meeting of the WWIS Website hosts was held in January 2007 at Hong Kong, China in which host countries took part to discuss and prepare a roadmap for future activities. The Meeting agreed on the eventual merging of the WWIS and SWIC Websites.

3. Efforts are continuing to enhance the city forecast webpages by adding city maps and scenic photographs when available from participating Members.

4. The WWIS Website was one of the 10 finalists in the “Environment” category of Stockholm Challenge 2008. The result will be announced on 22 May. The Stockholm Challenge is an international competition held once every two years to award the best ICT applications for people and society.

5. Twenty WMO Members are presently participating in SWIC. The number of monthly page views reached a record high of 2,937,823 in August 2006. The access statistics of SWIC since 2003 is shown in Annex II. The figures show an increasing popularity of the SWIC.

6. After a period of testing, the SWIC webpage showing “global distribution of thunderstorms”, decoded from SYNOP reports, was declared operational in March 2007. This additional feature augmented the display of existing severe weather phenomena such as tropical cyclones, heavy rain and snow.

7. The possibility of displaying “gales” information on WWIS instead of SWIC was being considered. However, the plan for a multiple-language version of SWIC is making little progress as there is currently no reliable software in the market that can be used to translate warning messages into different languages.

8. The WMO Secretariat invited Hong Kong, China to participate in a demonstration project to incorporate the Common Alerting Protocol (CAP) in SWIC. This will enable the SWIC to promulgate weather warnings as CAP messages which can then be made available to the public with technologies like RSS over the web. This is one way to increase the visibility and image of NMHSs in the eyes of the public.

ToR (g) Keep under review the development of cross-border exchange of warnings with reference to the published WMO guidelines;

1. The SWIC continues to issue information on heavy rain and snow and thunderstorms in addition to the tropical cyclone information, which has been issued since inception in 2001.

2. Under the coordination of the WMO Secretariat and in support of cross-border exchange of warnings between NHMSs, SWIC was cross-linked with EUMETNET’s METEOALARM Website (formerly known as the European Multi-service Meteorological Awareness (EMMA) webpages) which was launched in March 2007. The public can easily obtain information on severe weather warnings in Europe as well as around the world.

ToR (h) Develop reference material on the application of nowcasting to the provision of public warnings associated with mesoscale weather phenomena;

1. The PWS Workshop on Warnings of Real-time Hazards by Using Nowcasting Technology was held in Sydney in October 2006 in collaboration with the WWRP Nowcasting Working Group. The workshop drafted a business plan for a PWS Nowcasting Applications framework and recommended the formation of a Joint (PWS-WWRP) Nowcasting Applications and Services (JONAS) Steering Committee to further develop the draft framework. Subsequently, the JONAS Steering Committee met in Geneva in March 2007 to consider the development of the Joint PWSP-WWRP Nowcasting Applications Implementation Plan. The Committee will formulate and implement a strategy to promulgate the PWS application of nowcasting technology in developing countries, in particular, the establishment of a pilot open testbed on nowcasting applications and services.

2. The first and second trial run of the WMO Forecast Demonstration Project (FDP) in association with the 2008 Olympic Games to be held in Beijing, China (B08FDP) was conducted successfully in 2006 and 2007, respectively. The FDP will enter into full swing this August.

3. As discussed under ToR (b), item 3, the ICT deliberated that one of the main thrusts of future work programmes of the OPAG would be on nowcasting applications. In this respect, a Forecast Demonstration Project on Nowcasting Applications and Services (S2010-FDP) in relation to the cross-cutting Shanghai 2010 EXPO Multi-Hazard Early Warning System Project has been planned. ET-DPM will take lead in the planning and implementation of the S2010-FDP.

ToR (i) Report and advice on collaborative activities with other CBS OPAGs and Technical Commissions.

1. As discussed under ToR (b), item 1, the Team has conducted the PWS survey on severe weather warning services in collaboration with ET/SPI. A report on the survey has been published and is available on the PWSP Website.

2. As reported under ToR (h), item 1, the Team will collaborate with WWRP in formulating and implementing a strategy to promulgate the PWS application of nowcasting technology in developing countries.

3. The RA II pilot project, with the participation of Hong Kong-China, Japan, and the Republic of Korea, currently provides via the internet site specific forecasts in the medium-range to 12 developing countries within the Region similar to those provided by ECMWF to some Members in RA I. Forecasts for 145 cities are provided twice daily.

II. CURRENT STATUS OF IMPLEMENTATION OF DELIVERABLES

Deliverable 1: *Regional roving seminars on natural disaster management in the context of the PWS Programme*

As regional roving seminars require a large investment of resources, the ICT, at the 2007 meeting in Muscat (as reported in ToR (b) item 2 above), recommended that this be provided within the context of the proposed PWS Pilot Project.

Deliverable 2: *Resource kits (booklets, CDs, etc.) for the public, esp. for school children, on DPM, preferably, using cartoon figures to help them understand the threats of natural hazards and protective actions to be taken*

The ICT, at the 2007 meeting in Muscat (as reported in ToR (b) item 2 above), recommended that this item be dropped as it is not strictly within the competency of ET/DPM.

Deliverable 3: *Publish "Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management"*

The Guideline has been published as PWS-13.

Deliverable 4: *PWS survey on severe weather warning services in various countries*

The survey was conducted jointly with ET/SPI in 2006. The survey report has been posted onto the PWSP Website.

Deliverable 5: *Enhanced SWIC Website to include multi-hazard warning pages, multiple-language versions and more participation by Members. The ultimate objective is to develop the SWIC into a multi-hazard information and resource centre*

Under the coordination of the WMO Secretariat and in support of cross-border exchange of warnings between NHMSs, SWIC has been cross-linked with EUMETNET's METEOALARM Website (formerly known as the European Multi-service Meteorological Awareness (EMMA) webpages) which was launched in March 2007.

The Team recognizes the challenges in implementing multiple language versions and recommends to explore the technical feasibility of automatic translation of the warning messages into different languages as well as study the associated resource implications.

Deliverable 6: *Workshop on advances in nowcasting and applications in early warnings of meteorological and hydrological hazards, involving system developers, forecasters as well as disaster management experts*

A nowcasting workshop was conducted in Sydney, Australia in October 2006 in collaboration with the WWRP Nowcasting Working Group bringing together meteorological experts and representatives of disaster management agencies. A Joint (PWS-WWRP) Nowcasting Applications and Services Steering Committee has been formed to oversee formulation and implementation of a strategy to promulgate the PWS application of nowcasting technology in developing countries, in particular, the establishment of a pilot open testbed on nowcasting applications and services.

Deliverable 7: *Survey to assess the vulnerability of developing countries, including LDCs, to natural disasters and their needs, followed by a workshop to identify and address the areas where vulnerabilities can be reduced in the context of national PWS programmes*

This survey activity has been folded into Deliverable 4 to minimize duplication of effort. Please refer to **Deliverable 4** for status of the survey.

Deliverables 8 and 9: *Publication of success stories showing how disaster prevention and preparedness, in particular, effective warning systems, reduce vulnerability and prepare examples of best practice in early warning systems*

A template to facilitate collection of examples of best practices and success stories has been designed and will be posted on the PWSP Website. Collected best practices and relevant cases of stories on successful application of effective warnings systems will be published on the PWSP Website for reference by WMO Members initially. After a sufficient number of cases have been accumulated, the relevant webpages will be made available to the public.

Deliverable 10: *An international conference on PWS in support of DPM to provide a forum for professionals of various disciplines (meteorologists, media and communications experts, social scientists, engineers, etc.) to discuss early warning systems in support of DPM, effective warning dissemination and disaster communication. This will also serve to facilitate building up of a coherent disaster reduction "community"*

The International Symposium on PWS was held in Geneva, Switzerland, from 3 to 5 December 2007, with the participation of over 100 meteorologists, media and communication experts, disaster risk managers, etc.

M.C. Wong
Chair, ET/DPM
30 April 2008