

# **WORLD METEOROLOGICAL ORGANIZATION**

## **MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME AREA GROUP ON PUBLIC WEATHER SERVICES (PWS) EXPERT TEAM ON PWS IN SUPPORT OF DISASTER PREVENTION AND MITIGATION (CBS/OPAG-PWS ET/DPM)**

BEIJING, CHINA, 17-21 OCTOBER 2011



***FINAL REPORT***

## EXECUTIVE SUMMARY

A meeting of the Commission for Basic Systems (CBS) Open Programme Area Group (OPAG) on Public Weather Services (PWS) Expert Team on PWS in Support of Disaster Prevention and Mitigation (CBS/OPAG-PWS ET/DPM) was held in Beijing, China, from 17 to 21 October 2011. The meeting was chaired by Mr Jim Davidson (Bureau of Meteorology (BoM), Australia).

### **The key outcomes from the discussion and work of the Expert Team are summarized below:**

The Meeting first reviewed the deliverables which were agreed to at the Kuala Lumpur meeting in 2009 and was pleased to note that nearly all of the major deliverables had been completed.

The Meeting was informed that the structure of the OPAG on PWS had been revised by CBS. The Commission had determined that in order to reflect the emphasis on service delivery within the PWS OPAG structure, the work of the three existing Expert Teams should be re-focused to reflect the urgent need for mainstreaming service delivery in the work of the OPAG. As an outcome of this change in strategic direction, it was suggested by the PWS Implementation Coordination Team (ICT/PWS) that the existing ET/DPM should focus on user needs and share responsibility for monitoring and evaluation with other PWS ETs.

Consideration was then given to the existing set of Terms of Reference (ToRs) for the ET/DPM and the merits discussed of retaining, modifying or omitting each of these ToRs in creating the new draft set. When this was satisfactorily resolved, several additional ToRs were developed. A decision was also reached on the most appropriate title for the new ET in consideration of both WMO guidance and the new draft set of ToRs. The draft title chosen was "PWS Expert Team on Meeting User Needs in Reducing the Impacts of Weather, Climate, and Water Hazards".

Dominating the business of the Meeting was the subject of "Memoranda of Understanding" (MoUs) between National Meteorological and Hydrological Services (NMHSs) and Disaster Management Agencies (DMAs). The value, content and structure of MoUs were considered in some detail. Accordingly, one of the key deliverables of the Expert Team would be a MoU template for fostering collaboration and partnerships between NMHSs and DMAs.

Another key deliverable arising from the Meeting would be the provision of guidance material to NMHSs on developing impact-based information, forecast and warning services on various time scales for weather, climate and water hazards. This initiative is in recognition of a growing demand on NMHSs to provide impact-based services where appropriate.

A deliverable of the last ET/DPM meeting was an inventory of expertise needed for capacity-building in PWS aspects of DPM. Expanding on that work, a list of experts in those fields who are willing to contribute to PWS training and development activities will be developed and maintained.

The Meeting agreed to assist NMHSs with the definition and development of work force competencies needed to effectively interact with the user community, especially DMAs.

The Meeting further agreed to keep under review the development of cross-border exchange of warnings with reference to the published WMO guidelines.

The Meeting was enhanced by several participants having a disaster management background. It also considered how it could effectively collaborate with the WMO DRR Programme. Furthermore, ET members agreed to engage other WMO constituent bodies to explore common areas of interest and possible collaboration.

The Meeting was delighted with the increasing global usage and popularity of the World Weather Information Service (WWIS) and the Severe Weather Information Centre (SWIC) initiatives, but it was agreed that the ET/DPM had completed its part in the development of these websites and that the responsibility for further developing the application of these resources could be transferred to the PWS Expert Team on Services and Products Improvement (ET/SPI). The Meeting also agreed that it had completed its task as regards the World Expo 2010 Nowcasting Services (WENS) Demonstration Project which had been designed to coincide with the Shanghai Expo (2010).

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## **1. INTRODUCTION**

1.1 The China Meteorological Administration (CMA) kindly hosted a meeting of the Commission for Basic Systems Open Programme Area Group on Public Weather Services (PWS) Expert Team on PWS in Support of Disaster Prevention and Mitigation (CBS/OPAG-PWS ET/DPM) in Beijing, China, from 17 to 21 October 2011. The meeting was chaired by Mr Jim Davidson (Bureau of Meteorology (BOM), Australia), who welcomed the participants to the meeting. The meeting was opened by Dr Zhou Heng, Counsel of the Department of International Cooperation of CMA, who delivered the official welcome of CMA to the participants. Ms Haleh Kootval, Chief, Public Weather Services Programme (WMO), welcomed the participants on behalf of the Secretary-General and briefed them on the expected outcomes of meeting of the Expert Team. The Chair 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 ICT/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 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;
- (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 who are willing to contribute to PWS training activities; and,
- (i) Report and advise on the 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.

## **2. REVIEW OF RELEVANT DECISIONS OF CBS AND CONGRESS**

2.1 The Meeting was informed by Ms Kootval that the Extraordinary Session of the Commission for Basic Systems (CBS-Ext.(10), Windhoek, Namibia, November 2010) had revised the structure of the PWS OPAG. The Commission had agreed that in order to reflect the emphasis on service delivery within the PWS OPAG structure, the work of the three existing Expert Teams

should be re-focused to reflect the urgent need for mainstreaming service delivery in the work of the OPAG. Accordingly, it had strongly endorsed a structure proposed by the ICT/PWS along the following lines:

- (a) Expert Team on PWS User Needs;
- (b) Expert Team on PWS Services and Products;
- (c) Expert Team on PWS Delivery; and,
- (d) Expert Team on PWS Monitoring and Evaluation.

The Commission had stressed the need for proper coordination to ensure that the new structure would work efficiently and without duplication of effort. It further requested that Members with experience in service delivery should be actively engaged in the new structure to ensure the sharing of knowledge and experience that has been underlined as an important element of the Strategy.

2.2 Recalling that the draft CBS Operating Plan for 2012-2015 had already proposed the formation of one extra Expert Team to focus on Service Delivery, the Commission agreed that the proposed structure could map the work of the existing Expert Teams directly to the “WMO Strategy for Service Delivery” and requested that the PWS OPAG and the Secretariat work on defining the relationship between the responsibilities and ToRs of the proposed new structure and the existing one.

### **3. REVIEW OF THE DELIVERABLES FROM THE 2009 MEETING OF THE ET IN KUALA LUMPUR, MALAYSIA**

The Meeting reviewed the deliverables which had been agreed to at the Kuala Lumpur meeting in 2009 and was pleased to note that nearly all of the major deliverables had been completed. It took note of a few actions that were still outstanding and agreed to follow these up as indicated in the Action Sheets related to the Kuala Lumpur meeting (see Annex III).

### **4. JOINT PRESENTATION OF THE WORKING ARRANGEMENTS BETWEEN THE U.S. NATIONAL WEATHER SERVICE (NWS) AND DISASTER MANAGEMENT AUTHORITIES**

The U.S. National Weather Service (NWS) within the National Oceanic and Atmospheric Administration (NOAA) has embarked upon a new “Weather Ready Nation” initiative which increases focus on improved decision support services, especially for environmental hazards that threaten safety, health, the environment, economic productivity and homeland security.

Being a “Weather Ready Nation” means being prepared for weather- and water-related natural disasters. This preparation helps disaster management agencies take the appropriate actions prior to, during, and after a disaster.

As part of this effort, NOAA/NWS has developed a number of partnerships with government agencies responsible for disaster management and response. One example is the reimbursable agreements with land management agencies (including the U.S. Departments of Interior and Agriculture), which are responsible for fire fighting and mitigation. This agreement specifies the support that NWS provides to land management agencies and details reimbursement procedures to NWS for travel and overtime incurred as a result of this support. Specifically, NWS weather forecasters provide support at the scenes of large forest fires and provide detailed forecasts to fire fighters on the ground. They also provide forecast support to non-fire incidents such as recovery from hurricanes and oil spills. Another example of an existing Agreement with

NWS is the National Tsunami Hazard Mitigation Program (NTHMP). The NTHMP is a consortium of federal, state, and local agencies working together to provide educational outreach, training, research and other services to areas that are vulnerable to tsunamis.

The NWS has specific full-time employees dedicated to providing customer service and direct outreach to users. At each of NWS's 122 NWS Weather Forecast Offices, the Warning Coordination Meteorologist (WCM) is the position dedicated to outreach and manages the work with emergency management agencies at the state and local level. Each WCM is also responsible for communicating with the public, other government agencies and the media.

In 2010, the NWS created a full-time position at the U.S. Federal Emergency Management Agency (FEMA). The NOAA/NWS Liaison sits at FEMA Headquarters in Washington D.C., providing a direct link between the highest levels of disaster management and the NWS. Every day, the NWS Liaison provides a weather briefing to FEMA senior leadership, focusing on weather in geographical areas that are important to FEMA. During an active disaster, the Liaison supports the National Response Coordination Center (NRCC) where all federal activities are coordinated during a large scale disaster. The Liaison also provides a link to other parts of NOAA such as the National Ocean Service (NOS), National Environmental Satellite Data and Information Service (NESDIS) and Office of Atmospheric Research (OAR), to name a few.

Areas of expanded partnerships with other governmental DMAs include outreach and education on tsunamis, space weather, severe flooding and tornadoes. NWS has also established liaison positions at other federal agencies such as the U.S. Department of Homeland Security (DHS) and the U.S. Federal Aviation Administration (FAA) to ensure enhanced collaboration within as many areas of the federal government as possible.

Finally, new partnerships are under development with agencies responsible for public safety and health, including the Environmental Protection Agency (EPA), the Occupational Safety and Health Administration (OSHA), and the Centers for Disease Control (CDC).

## **5. JOINT PRESENTATION OF THE WORKING ARRANGEMENTS BETWEEN METEO-FRANCE AND DISASTER MANAGEMENT AUTHORITIES**

The presentation was introduced with some key elements of institutional context. Vigilance is a system in which Météo-France contributes as the NMHS, but is not alone in this task. Partnerships commenced with the system design, whose original feature was to prepare sets of possible consequences and behaviour advice from Civil Protection to be included in messages and charts produced and disseminated directly by Météo-France.

Working arrangements derive directly from the design stage and ensure:

- The presence of a liaison meteorologist at Civil Security Headquarters;
- Daily contacts directly between forecasters and Civil Security Officers;
- Seasonal positions at civil security operations sites for forest fires risk prediction and assistance to fire fighting; and,
- Meteorologists at local and regional crisis management centres as support to the authorities, physically or by audio/video conferencing.

Great attention is paid to information sharing in real time but also a posteriori to evaluate significant events. Indicators are built upon these assessments and are followed up within the Quality Management System (QMS).

Written agreements are established with Civil Security (regarding all levels from national to local), Ministries of Health, Foreign Affairs, Defence, Civil Aviation, various agencies such as Nuclear Safety Agency, Radio Protection Agency, and large network operators (road management, railways, energy transports and distribution).

## **6. WORKING ARRANGEMENTS BETWEEN SHANGHAI METEOROLOGICAL SERVICE AND DISASTER MANAGEMENT AUTHORITIES**

Weather-related incidents are often the first collapsed plate in the domino effect. Meteorological Services therefore, are the first link in the chain of DPM and have a critical role in hazard detection and warning as well as a supporting role in prevention, mitigation and rescue.

Multi-hazards integration, multi-agency coordination, and multi-phase response are one chain of integrated service. The NMHS has a role to play from the first collapsed domino through the end of the chain, both in terms of management level support and technical information support infrastructure.

### **Standard Operating Procedures (SOPs) to define interactions**

In Shanghai, a number of SOPs define the interaction between the Shanghai Meteorological Service (SMS) and other agencies. These SOPs are defined in 'Special Emergency Plans' including SOPs for different categories, levels, and events; SOPs for coordination; SOPs at community level; SOPs for better dissemination, etc. Different interaction mechanisms have been established for different user categories, sectors, and levels, including city-level, government agencies, and grass-roots community levels.

### **“Category by Category, Level by Level, Event by Event”**

The Multi-Hazard Early Warning System (MHEWS) continues to be a key driver in the Development of SOPs. Users are first identified and categorized by sensitivity to weather events in order to provide tailored and effective service.

The nature of the emergency also requires different response strategies. For weather-related emergencies, the SMS can provide information that may trigger the chain of DPM. For other categories of public emergencies (accidents, public health emergencies and public security) the SMS provides supporting services, information and warning dissemination.

Risk assessments, and risk mapping inform impact forecasts which are proving to be critical tools in the development of SOPs.

### **From MHEWS to Early Warning Centre (EWC)**

Interaction mechanisms used in the MHEWS include the PWS Platform, which is anchored by the Chief Service Officer (CSO) and staffed by Councillors for multi-agency coordination. The PWS Platform is due to be replaced by a comprehensive Early Warning Centre (EWC).

The EWC will have representatives from all major responder agencies. The location of a major city-level emergency management facility within the offices of a Met Service represents a growing appreciation for the role of NHMSs in DPM and Emergency Response Management (ERM).

### **Partnership with Emergency Response Management**

Both the CMA and the Shanghai Municipal Government (SMG) have paid much attention to DPM issues in Shanghai. Their partnership and institutional and policy support has been

instrumental not only in the implementation of the MHEWS, but also social-DPM capacity-building at the community level.

The Shanghai Emergency Response Management Office has cooperated with the SMS not only in weather-related emergencies but in the process of handling other disasters as well. Moving forward, it seeks to build on these experiences to develop the EWC based on the facilities and resources of SMS.

### **Moving Forward: Observations and Key Recommendations**

The CSO has proven to be a vital link in the chain of ERM. This new position shares many of the functions assigned to Weather Preparedness Meteorologists (WPMs) in Canada and Warning Coordination Meteorologists (WCMs) in the United States. Training standards and experience sharing mechanisms for this new class of weather service delivery professionals should be developed.

Methodology and systems governing interaction between the Met Service and DMAs need to be built, *similar* to capacity-building in basic observation and forecasting.

Capacity-building at the user and grass-roots levels is critical and should employ an *End-to-End-to-End* Strategy. Different interaction mechanisms must be established for different user categories and sectors.

Benefits assessments are critical to better service delivery for DPM and ERM. Evaluation of service and interaction with DPM community should be made routine. If possible, an index to verify the efficiency of interaction with other agencies should be created.

## **7. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN AUSTRALIA AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

The presentation first provided an overview of disaster management arrangements in Australia, and then outlined key aspects of the activities related to extreme rainfall, flooding and tropical cyclone in Queensland during the recent wet season, and lastly provided several relevant examples of SOPs that had been developed between the Bureau of Meteorology (BoM) and DMA and government agencies.

Prime responsibility for the protection of life, property and the environment rests with the States and Territories. However, the Australian Government is committed to supporting States and Territories in developing their capacity for dealing with emergencies and disasters, and provides physical assistance to requesting States and Territories when they cannot reasonably cope during an emergency. The Australian Government, through the Attorney-General's Department (AGD), supports a comprehensive approach to disaster management. In doing so, AGD seeks to encourage an "all agencies" and "all hazards" approach to the prevention and mitigation of disasters, preparedness for their impact, response to that impact and recovery from the consequences.

In February 2011 the Council of Australian Governments (COAG) adopted the National Strategy for Disaster Resilience. This strategy recognises that a national, coordinated and cooperative effort is required to enhance Australia's capacity to withstand and recover from disasters. The Australian Government is working in conjunction with State, Territory and Local Governments to implement this strategy and ensure communities are ready, willing and able to deal with natural disasters. In the 2009-2010 Federal Budget, \$110 million was allocated over four (4) years to the Natural Disaster Resilience Program (NDRP) for natural disaster mitigation.



The operational hub of disaster management is the Australian Government Crisis Coordination Centre (CCC), which is located in Canberra, the nation's capital. Responsibility for the CCC rests with the AGD. The CCC is a 24/7 dedicated facility that provides all-hazards, whole-of-government situational awareness, coordination of physical assistance, and briefing and support to executive decision makers from across the Australian Government, non-government and State and Territory agencies. On a number of occasions, during the extreme floods and cyclones impacting Queensland earlier this year, the Bureau of Meteorology provided high-level briefings to the CCC. Occasionally, the Prime Minister and other Federal Ministers participated in the briefings.

The Bureau of Meteorology is Australia's national weather, climate and water agency. The Bureau operates under the authority of the Meteorology Act 1955 (Commonwealth) and the Water Act 2007 (Commonwealth), the former providing the legal basis for its activities in disaster management. The Bureau contributes to all aspects of disaster management, including planning, preparation, response and recovery. The Bureau (as a Commonwealth agency) works with senior disaster managers and state and local governments in order to routinely provide the best possible meteorological and hydrological advice and warning service.

Rainfall and flooding in Queensland during the 2010-2011 wet season was widespread, sustained and exceeded all previous meteorological and hydrological records in many parts of Queensland. Furthermore, a very severe tropical cyclone named YASI impacted north Queensland communities. During this intense period, the Bureau enjoyed a close working relationship with disaster managers.

Over the years, the Bureau, at the national level, has established MoUs with a number of other NMHSs and several Federal agencies. At the regional level, another suite of MoUs exist, mainly with State and Local government agencies. Some examples were presented.

## **8. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN CANADA AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

An overview of the weather warning program of the Meteorological Service of Canada (MSC) was presented as well as some of the relationships between MSC and emergency management authorities in Canada.

MSC's involvement with emergency management authorities is in support to its first and foremost mandate in providing quality meteorological and environmental information and services, and in particular, warnings that will enable Canadians to make effective decisions regarding their health, safety and economic activity, while ensuring ecosystem sustainability and community resiliency.

The Federal Emergency Response Plan, developed by Public Safety Canada in response to the Emergency Management Act, adopts an all hazards- risk assessment approach and harmonizes federal emergency prevention, mitigation and response efforts with those of the provinces/territorial governments, Non-Governmental Organizations (NGOs), and the private sector. This is accomplished through the activities of the Government Operations Centres (GOCs) which includes Subject Matter Experts and Federal Liaison Officers from federal government institutions, NGOs, and the private sector. The MSC and other groups of Environment Canada are key players.

By adopting an all encompassing framework for disaster risk reduction, public safety and other relevant departments of the Government of Canada are instilling a strategy of disaster mitigation.

The MSC has been increasingly involved in identifying a risk based approach in the development of its warning program. Ongoing initiatives and recent prototypes have been adopting an early warning systems approach in the provision of meteorological information in potentially high impact weather events. Some of these include:

- 1.) The warning re-engineering project: MSC's warning program is being reviewed to enable the integration of impact-based warning information to support decision making for Canadians and relevant authorities, in both official languages of the country. This will be accomplished through increased engagement with stakeholders.
- 2.) Warning dissemination such as the Common Alerting Protocol Canadian Profile, and Weatheradio dissemination of weather warnings, in both official languages, across Canada.
- 3.) Weather Preparedness Activities: One of the most visible aspects of the early warning system and the delivery of the impact-based information resides in the role and function of MSC's Weather Preparedness Meteorologists (WPM) located in various parts of Canada. These WPMs serve as key liaison with Emergency Management Officers (EMOs) and other stakeholders, participate within the COG when necessary, by bringing weather related information, in preparation for and during high-impact weather events, as well as in recovery phases when necessary. They perform analysis of events in order to assess the quality of information provided to users and for training purposes. WPMs also participate in hazards-related exercises grouping other departments and NGOs.
- 4.) Weather vigilance enabling tools: In coordination with la Sécurité Civile du Québec, other provincial departments, the COG and NGOs, MSC- Quebec region has developed prototypes based on Météo-France's *carte de vigilance*. These prototypes have demonstrated that the sharing of expertise (before and during an event) between stakeholders enables the dissemination of timely, reliable and relevant warning messages used for planning and decision making. As needs are better understood, the communication process established through the vigilance approach increases the effectiveness of response of these groups when facing high impact weather events.

## **9. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN CROATIA AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

In Croatia, the roles and responsibilities of agencies involved in different aspects of the Early Warning System (EWS) and disaster management are defined in national plans and supported by legislation, with collaboration and coordination mechanisms that are defined through standard operational procedures.

The leading partners in the EWS program are the Meteorological and Hydrological Service (DHMZ) and the National Protection and Rescue Directorate (DUZS). The cooperation between DHMZ and DUZS is based on a considerable history of joint work and previous mutual contacts in both routine and extraordinary situations.

As a result, the SOP for the Use of Weather Forecasts of the Meteorological and Hydrological Service (DHMZ) has been formulated, regulating the content of forecasts and warnings, times of delivery, transmission methods and receiving of specific warnings as well as additional data, interpretations and explanations.

In routine situations, the DUZS is supplied all observational data and daily weather forecasts by DHMZ. The DUZS then disseminates the weather information through its communication network to its County Centres.

When weather hazards and potential or actual disasters occur, the SOP for the Use of Weather Forecasts of the DHMZ regulates the content of forecasts and warnings, the time of delivery, and dissemination of specific warnings, additional data, interpretations and explanations.

The required activities depend on the type of hazard as outlined below.

For **Type I**, or meteorological, hazards, the DHMZ has sole mandate for the development of public warnings (e.g., strong winds, severe thunderstorms, heavy snow, etc.). Generally, there are two types of warnings - public warnings and user-defined special forecasts and warnings.

Public warnings are specially prepared for media (radio, TV, Internet). Usually, forecasters on duty are involved in TV and radio broadcasting of warnings. In Croatia, that form of communicating DHMZ forecasts and warnings to the public is a long tradition (for radio since 1950 and for TV since 1956) and all forecasters in the DHMZ are specially-trained for effective warning communication. The DHMZ is also continuously involved in research on severe weather and in developing nowcasting methods and forecasting tools through different domestic and international projects.

User-defined special forecasts and warnings are tailored for specific needs and directed by specific criteria suggested by users (e.g., DUZS). Furthermore, the Meteoalarm information for Croatia has been found beneficial for DUZS activities and as a valuable supplement to regular coordination. As a result, Croatia has been operationally contributing to the Meteoalarm warning system since 2009.

For **Type II**, or non-meteorological, hazards, the DUZS has the sole mandate for the development of the warning for the specific hazard. The DHMZ plays a support role to responding agencies by providing special weather forecasts and warnings along with interpretations as necessary, before, during, and after the event.

## **10. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN HONG KONG, CHINA AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

The Meeting was briefed on the different kinds of high-impact weather in Hong Kong, China and how the Hong Kong Observatory (HKO) collaborated with DMAs in Hong Kong, China which include the Security Bureau and other key government departments, on severe weather. Highlighted was the importance of close collaboration before, during and after the event or the season of high-impact weather. This includes maintaining close contact, understanding requirements and constraints of each other, ensuring the effectiveness of facilities, conducting exercises, exchanging information through multiple communication means and reviewing the operational procedures regularly.

Coordination with bureaux/departments of the Hong Kong Government is enhanced through the use of dedicated web-based weather information servers. Some tailor-made products are made available to government users to facilitate their decision making in weather-related hazards. More specialized and tailor-made information is transmitted through this channel for the interpretation and consideration by the professionals and administrators. Unlisted telephone hotlines are reserved for key decision-makers to have direct consultations with HKO weather forecasters. Regular communication exercises are held to evaluate the effectiveness of the alerting mechanism and the communication links among key bureaux/departments. Annual liaison meetings with government bureaux/departments and key sectors are arranged before the onset of the rainy season to review the services provided by HKO. The feedback from users contributes towards the continual improvement of the warning services.

The Meeting was also showed the contents of the contingency plan for severe weather used by the Hong Kong Government. The plan provides a proven framework for emergency

responses in weather-related disasters. It summarizes the government's alerting system and organizational framework for responding to natural disasters. It stipulates the triggering mechanisms of the alerting system, spells out the responsibilities of various bureaux/departments as well as NGOs in responding to specific types of severe weather warnings relating to tropical cyclones, rainstorms, flooding, landslip and thunderstorms. To ensure a smooth and effective flow of disaster-related information, the plan also clearly states the controlling authorities in the rescue, recovery and restoration phases, with an emphasis on direct liaison and coordination among relevant working parties.

The HKO, one of the key players in the contingency plan, issues weather warnings, together with advice on precautions, to the media and key government bureaux/departments through a robust network. The weather information is transmitted by the Information Services Department to other government departments and parties according to an alerting system in the plan so as to ensure effective dissemination. The HKO is also proactive in keeping the government's Emergency Monitoring and Support Centre and other relevant departments fully informed about imminent severe weather in a timely manner, to enable them to make good advance preparations for the public's reactions to HKO warnings broadcast by the media.

#### **11. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN INDONESIA AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

The Indonesia Meteorological, Climatological, and Geophysical Agency (BMKG) is the governmental agency in Indonesia that provides weather, climate, and earthquake/tsunami information and early warnings to the public. It has two major programs; these are Ina-MEWS (Indonesia Meteorological Early Warning System) and Ina-TEWS (Indonesia Tsunami Early Warning System). Ina-MEWS deals with providing weather-related information, whilst Ina-TEWS deals with providing earthquake-tsunami-related information. Both Programmes have similar outline components: i.e., data collecting system, data processing system, and disseminating system. In disseminating its products, the BMKG collaborates with several interface institutions to pass on its products to end users. Some of these collaborative ventures have been incorporated in formal and/or informal agreement documents (MoUs and SOPs), such as with the national DMA, Search and Rescue Agency, Indonesia Armed Forces, national police, provincial governments, Directorate General of Civil Aviation, mass medias and telecommunication providers.

To strengthen BMKG's position in cooperation among agencies involved in disaster risk reduction management, Parliament and Government of Indonesia have passed Act No. 31 of 2009 on Meteorology, Climatology, and Geophysics. Based on this legislation, the BMKG has a mandate to act as a single voice in providing and issuing weather-related and/or earthquake/tsunami-related advisory and warning. The issuance of the advisory and/or warning includes before, during, and after the disaster events, to support prevention, preparedness, mitigation, and recovery measures.

#### **12. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN UNITED REPUBLIC OF TANZANIA AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

Current practices in disaster risk reduction in the United Republic of Tanzania, including Early Warning Systems (EWSs) for disaster management and prevention, were presented and comprised three main topics.

The first part was an introduction which discussed meteorological systems that influence weather in the United Republic of Tanzania and the neighbouring countries in Eastern and Southern Africa, as well as major hazards in the region. Some social economic impacts emanating from disasters were highlighted.

The second part of the presentation focused on the creation of a disaster unit in the United Republic of Tanzania which was later extended to incorporate more stakeholders and the dissemination of information to the public and affected area.

The third component of the presentation was centered on EWS. Essential elements of early warnings were discussed as well as the understanding and evolution of severe weather events. Constraints and challenges which the United Republic of Tanzania is facing are common to a number of African countries. Several requirements needed to support early warning in the United Republic of Tanzania were suggested. The critical role of product development to support all three phases of a disaster (before, during and after) was discussed.

Means of communicating forecasts and warning information to the public in the United Republic of Tanzania are radio, TV, newspaper, telephone and fax. In regards to SOPs, the Tanzania Meteorological Agency (TMA) has signed a MoU with the Tanzania Red Cross, and the Disaster Management Unit (DMU) it is operating, as part of its obligation mandated by the Government of the United Republic of Tanzania.

Plans are in progress to enhance communication between the TMA and the DMU to increase the capacity of the two institutions so as the DMU is able to operate on a twenty-four hour basis and the TMA can improve its services and products.

### **13. REVIEW OF CURRENT PRACTICES OF COLLABORATION BETWEEN THE NMS AND THE DISASTER MANAGEMENT AUTHORITIES IN CURAÇAO AND ANY EXISTING FORMAL OR INFORMAL STANDARD OPERATING PROCEDURES (SOPs)**

The presentation highlighted the collaboration between the Meteorological Department Curaçao (MDC) and the DMAs in most of the islands of the Dutch Caribbean. The Dutch Caribbean islands are Aruba, Bonaire and Curaçao (ABC Islands) in the southern Caribbean and St. Maarten, St. Eustatius and Saba in the north-eastern Caribbean.

After describing the governmental status of the islands of the Dutch Caribbean, an overview was presented on the mission and vision of the MDC, its key activities and customer group (65% aviation, 24% public weather services and 11% marine services). The main topic discussed was how the MDC manages disaster risk reduction.

Curaçao is the largest and most populous island of the former Netherlands Antilles. It is now an autonomous but not independent country in the Dutch Kingdom and (still) the only island of the Dutch Caribbean with the capability to serve all these islands 24/7, providing daily weather forecasts and warnings. The island/country of Aruba has its own meteorological service and this agency is able to provide forecasts and warnings, despite having very limited forecasting personnel (one meteorologist). The challenge for the forecasters at MDC is to generate forecasts and warnings in more than one language (English, Dutch and Papiamentu, the native language spoken in the ABC Islands in the southern Caribbean). Mention was made of the local development of a "forecasting engine," which should enable forecasters to generate and translate forecast and warning bulletins semi-automatically.

An explanation was also given of the legislation in each of the Dutch Caribbean islands and what services the MDC would deliver, based on agreements with the governments of these territories - Aruba, St. Maarten and the Netherlands (for the islands of Bonaire, St. Eustatius and Saba, which are now Dutch municipalities). A summary was given of the EWS of the MDC and also how the forecasters would monitor the weather in the region. A table with colour codes for the various warning levels, used during the threat of tropical cyclones, was shown and the way the DRM agencies in the territories were structured. For Curaçao, it showed the Prime Minister being at the head of DRM and also the various Emergency Support Function (ESF) Group coordinators, who advise the Prime Minister during a disaster situation.

Finally, the website of the MDC was shown along with its Facebook page in which useful information on current threats can be given. A brief overview was also given on the MDCs current efforts to introduce a QMS and how it cooperates with other external agencies such as the WMO.

## **OVERVIEW OF THE WMO DISASTER RISK REDUCTION PROGRAMME**

A presentation was made on WMO's disaster risk reduction programme and its goals which are derived from Hyogo Framework for Action, pertaining to those high priority areas that fall under the mandate of WMO and NMHSs. The adoption of Hyogo Framework for Action in 2005-2015 by 168 countries (Kobe, Japan) pointed out a new paradigm in disaster risk management. Whereas disaster risk management has traditionally been focused on post disaster response in most countries, investments in preparedness and prevention, through risk assessment, risk reduction and risk transfer, are nowadays considered essential.

The new multi-sectoral, multi-hazards and risk-based approaches in DRR offer new opportunities to NMHSs in supporting preparation and preparedness as well as disseminating warnings to the public.

The associated challenges are the capacity to deliver quality services to large groups of stakeholders, an increased liability and accountability and the engagement within the official multi-sectoral and multi-institutions coordination process in DRM.

The Sixteenth World Meteorological Congress (Cg-XVI, Geneva, May-June 2011) approved that DRR activities should adopt an approach leveraging expertise, resources and capacities of WMO Members, Regional Associations, WMO technical and operational Programmes and Commissions, and other United Nation (UN), international and regional partners to support end-to-end service delivery for DRR applications.

Subsequently, DRR expected outcomes and deliverables for the 2012-2015 period consist of knowledge and capacity development activities such as identification of good practices in service provision for sectoral hazard/risk assessment, insurance and financial risk transfer markets, and the implementation of regional/national capacity development projects, as well as developing services for humanitarian preparedness.

Given that the ET is tasked by CBS to provide guidance, assistance and advice to NMHSs in the development and improvement of the delivery of warning services in support of disaster preparedness and mitigation, the Meeting considered that there might be areas of collaboration between its work and that of DRR programme, which could result in mutual benefit and agreed to explore these possibilities.

### **14. DEVELOPMENT OF GENERIC SOPs, TAKING INTO CONSIDERATION DIFFERENT NATIONAL STRUCTURES AND FRAMEWORKS**

During the meeting, and per a major agenda item, the ET held discussions on how to develop guidance on the establishment of "Standard Operating Procedures" (SOPs) to specify the nature of interactions between NMHSs and DMAs. However, during the course of these discussions, the Team quickly agreed that what was really needed was a template that NMHSs could use to create "Memoranda of Understanding" (MoUs) with DMAs rather than a universal set of SOPs.

The Team made this decision because it agreed that MoUs are more appropriate than SOPs for the intended purpose of the agenda item. That is, MoUs are designed to set high-level frameworks that govern the nature of relationships between cooperating agencies which, in turn, are based on their individual mandates and capabilities. In contrast, SOPs are generally limited to specific situations or needs, and would not provide the needed high-level construct to support all

aspects of NMHS-DMA relationships. That said, the Team did agree that specific SOPs could be included as addenda to individual MoUs created by NMHS as desired or needed.

Based on this decision, the Team devoted considerable time to establishing an outline (or template) to guide NMHSs on how to develop effective MoUs with DMAs. Key suggested elements for inclusion within the template included: (a) a listing of all participating agencies; (b) the reason for developing the MoU (in terms of how it will benefit society); (c) articulation of the individual agency mandate(s) that support their participation in the MoU; (d) the aim and scope of the MoU; and, (e) specific activities to be accomplished as a result of the MoU's establishment.

Actions agreed to at the conclusion of the discussion were as follows:

- (a) Collaborate within the Team to determine a final version of the template, which should include a summary preface for context;
- (b) Within the finalized version of the template, provide "best practice" text excerpts from existing MoUs that exemplify how the suggested template elements can be (and are) actually articulated; and,
- (c) Create an appendix of existing MoUs provided by members of the Team for reference by all NMHSs.

#### **15. DISCUSSIONS ON THE DECISIONS OF CBS-Ext.(10) AS REGARDS OPAG-PWS: RESTRUCTURING, PWS EXPERT TEAMS, TITLES AND TORS, RELATIONSHIPS BETWEEN EXPERT TEAMS IN THE FRAMEWORK OF SERVICE DELIVERY**

The Meeting was briefed by Ms Haleh Kootval on the changing landscape within WMO as the effects of the Strategic Planning Process worked their way through the organisational structures. Of particular importance to the ET/DPM was the positioning of Service Delivery as one of the key Strategic Thrusts of WMO. As an outcome of this change in strategic direction, CBS approved a number of changes to the structure and mandate of the OPAG/PWS to align it with the new WMO Strategy for Service Delivery, and requested that the ToRs of the Teams be modified to reflect these changes. As a result, the existing ET/DPM should focus on user needs for services in support of disaster preparedness and mitigation, and share responsibility for monitoring and evaluation with the other PWS ETs.

#### **16. DISCUSSION OF THE TITLE OF THE ET AND ITS NEW TORS**

The Meeting first considered the existing set of ToRs for the ET/DPM and discussed the merits of retaining, modifying or omitting each of these ToRs in creating the new draft set. When this was satisfactorily resolved, several additional ToRs were developed in close accord with WMO guidance. Discussion then turned to the new title of the ET and a decision reached on the most appropriate title in consideration of both WMO guidance and the new draft set of ToRs. The title chosen was the "PWS Expert Team on Meeting User Needs in Reducing the Impacts of Weather, Climate, and Water Hazards". The new ToRs appear as Annex IV to this report.

#### **17. VISIT TO CMA HEADQUARTERS (FORECASTING AND SERVICE DELIVERY)**

On 20 October 2011, the Team visited the headquarters of the China Meteorological Administration (CMA). Briefings were conducted at the Public Meteorological Service Centre, the CMA demonstration observation site, the Beijing Huafeng Group of Video and Media Information, the National Meteorological Centre, the National Satellite Meteorological Centre, the National Space Weather Centre, and the CMA Public Exhibition Hall. The Team expressed its appreciation to the Administrator and staff of CMA for hosting the very interesting and informative visit.

## **18. DELIVERABLES AND FUTURE FOLLOW-UP**

Based on the discussions of the ToRs, the Meeting agreed to the following deliverables and the accompanying activities for their implementation. The Action Sheet related to the deliverables and the agreed timeline is attached as Annex V.

### **Deliverable 1: (ToR (b))**

#### **Guidance on impact-based forecasts and warnings**

The Meeting agreed to provide a common definition of impact-based information, forecast and warning services to ET members for comments and additions. Also, requested, are examples from ET members of existing impact-based information, forecast and warning services. The gathered examples from ET members will then be presented in an integrated format to WMO for final ratification. The Secretariat is to provide this material together with a cover note explaining the context and intent to NMHSs.

**Action by: Elliott (Eli) Jacks, Sally Pavlow Johnson and Secretariat; Deadline: 1 June 2012**

### **Deliverable 2: (ToRs (c and f))**

#### **List of areas of expertise and competencies to deliver effective impact-based services and list of experts**

The first step in the process is for the Secretariat to consult with the WMO Education and Training (ETR) Office on the areas of competency for delivering impact-based services. Then, follow the revision and amendment as necessary of expertise developed by ET/DPM (as part of its work in 2009) for the provision of impact-based services. Examples of existing workforce competencies related to impact-based services will be requested from ET members. A generic set of competencies will then be developed based on the areas of expertise and the examples provided and these will be circulated to ET members for comments. The generic set will be presented to WMO for consideration by the ETR Programme as an initial step for formal introduction of competencies for the provision of impact-based services. The Secretariat is to circulate the generic set to NMHSs with a covering note from WMO, and invite them to identify experts in these areas to assist with PWS training and development activities.

**Action by: Vlasta Tutis, Jennifer Milton and Secretariat; Deadline: 1 November 2012**

### **Deliverable 3: (ToR (d))**

#### **Feedback from NMHSs on the usefulness of ET deliverables**

When deliverables are completed, the Secretariat is to send them to NMHSs with a covering letter and request comments and feedback on their usefulness.

**Action by: Secretariat; Deadline: 1 November 2012**

### **Deliverable 4: (ToR (h))**

#### **Proposal for collaboration with relevant Programmes and ETs**

Separate focal points among the ET members are to be identified who will contact the relevant WMO Programmes (primarily Tropical Cyclone Programme (TCP) and DRR). The focal points are then to make contacts with the WMO Programmes to exchange information on common and relevant Programme activities including production of guidance and other documentations (including provision of the report of the work of the ET). Other focal points within the ET are to



make contact with the other PWS ETs and OPAGs to exchange information and establish agreed areas of common interest for collaboration, including production of guidance and other documentation (including provision of the report of the work of the ET).

**Action by: Jennifer Milton, and Cyrille Honoré for DRR; Jim Davidson for TCP; Lap Shun Lee, Augustine Kanemba and Chen Zhenlin for other PWS Expert Teams and OPAGs; Deadline: Ongoing**

**Deliverable 5: (related to ToR (i))**

**A template agreement document containing guiding principles for fostering effective partnerships**

The existing outline of an agreement document developed during the meeting is to be expanded into a full guidance agreement document (MoU). This draft will then be sent to all ET members for them to suggest inclusion of relevant MoU excerpts to support the agreement document. Following this phase, the draft will be updated and circulated to ET members for comments and feedback. Based on this information, a further update will then be undertaken and the resulting agreement document forwarded to the Secretariat. Existing MoUs will also be sought from ET members as “current practice” examples. The latest version of the agreement document and the MoU examples will form the template to be sent to NMHSs. The final steps are to convert the package into a PWS guide series and for WMO to forward to NMHSs with an explanatory covering letter.

**Action by: Elliott (Eli) Jacks, Lap Shun Lee, Chen Zhenlin and Secretariat; Deadline: 1 November 2012**

## **19. CLOSING**

The Meeting of the CBS/OPAG-PWS ET/DPM closed at 1500 hours on Friday, 21 October 2011.

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List of Annexes to the Final Report of the Commission for Basic Systems  
Open Programme Area Group on Public Weather Services (PWS) Expert Team on  
Public Weather Services in Support of Disaster Prevention and Mitigation  
(CBS/OPAG-PWS ET/DPM)

(Beijing, China, 17-21 October 2011)

- Annex I: List of Meeting Participants
  - Annex II: Meeting Programme
  - Annex III: Action Sheets of the Kuala Lumpur Meeting
  - Annex IV: New Terms of References (ToRs) of the ET
  - Annex V: Action Sheet related to the deliverables (and the agreed timelines)
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**PARTICIPANTS AT THE MEETING OF THE COMMISSION FOR BASIC  
SYSTEMS OPEN PROGRAMME AREA GROUP ON PUBLIC WEATHER  
SERVICES (PWS) EXPERT TEAM ON PWS IN SUPPORT OF DISASTER  
PREVENTION AND MITIGATION (CBS/OPAG-PWS ET/DPM)  
(BEIJING, CHINA, 17-21 OCTOBER 2011)**

\* Indicates Nominated Expert Team (ET) Core Members

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**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME  
AREA GROUP ON PUBLIC WEATHER SERVICES (PWS) EXPERT TEAM ON  
PWS IN SUPPORT OF DISASTER PREVENTION AND MITIGATION  
(CBS/OPAG-PWS ET/DPM)**

*(BEIJING, CHINA, 17-21 OCTOBER 2011)*

**MEETING PROGRAMME**

*Monday, 17 October 2011*

<b>DAY 1</b>			
0900-0930	Opening	<ul style="list-style-type: none"> <li>• Host</li> <li>• Mr Jim Davidson (Australian Bureau of Meteorology, Chairperson of the ET/DPM)</li> <li>• Ms Haleh Kootval (WMO Secretariat)</li> </ul>	30 minutes
0930-1000	Objectives and Expected Outcomes: Review of relevant decisions of CBS-Ext.(10) and Sixteenth World Meteorological Congress (Cg-XVI)	<ul style="list-style-type: none"> <li>• Chairperson</li> <li>• Ms Haleh Kootval</li> </ul>	30 minutes
1000-1030	<b>REVIEW OF THE CURRENT TERMS OF REFERENCE (TORS) OF THE ET</b>	<ul style="list-style-type: none"> <li>• Chairperson</li> </ul>	30 minutes
<b>1030-1100</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1100-1200	Review of the Deliverables from the 2009 meeting of the ET in Kuala Lumpur	<ul style="list-style-type: none"> <li>• Chairperson</li> </ul>	30 minutes
<b>1200-1330</b>	<b>LUNCH BREAK</b>		<b>90 minutes</b>
1330-1430	Joint presentation of the working arrangements between the US National Weather Service (NWS) and disaster management authorities	<ul style="list-style-type: none"> <li>• Mr Elliott (Eli) Jacks (NOAA/NWS)</li> <li>• Ms Sally Pavlow Johnson</li> </ul>	30 minutes
1430-1530	Joint presentation of the working arrangements between Météo-France and disaster management authorities	<ul style="list-style-type: none"> <li>• Mr Cyrille Honoré (Météo-France)</li> <li>• (Name to be provided)</li> </ul>	30 minutes
<b>1530-1600</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1600-1700	Presentation of the working arrangements between Shanghai Meteorological Service and disaster management authorities	<ul style="list-style-type: none"> <li>• Dr Tang-Xu (SMB)</li> <li>• Mr Zhang Haitao (Emergency Response Management, Shanghai)</li> </ul>	30 minutes
1700-1730	Presentation by WMO Disaster Risk Reduction (DRR) Programme	<ul style="list-style-type: none"> <li>• TBD</li> </ul>	30 minutes

<b>Tuesday, 18 October 2011</b>			
<b>DAY 2</b>			
0900-0930	Review of current practices of collaboration between the NMS and the diaster management authorities in Australia and any existing formal or informal Standard Operating Procedures (SOPs)	<ul style="list-style-type: none"> <li>• Mr Jim Davidson</li> </ul>	30 minutes
0930-1000	Review of current practices of collaboration between the NMS and the diaster management authorities in Canada and any existing formal or informal SOPs	<ul style="list-style-type: none"> <li>• Ms Jennifer Milton (Enviornment Canada)</li> </ul>	30 minutes
1000-1030	Review of current practices of collaboration between the NMS and the diaster management authorities in Croatia and any existing formal or informal SOPs	<ul style="list-style-type: none"> <li>• Dr Vlasta Tutiš (Meteorological and Hydrological Service of Croatia)</li> </ul>	30 minutes
<b>1030-1100</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1100-1130	Review of current practices of collaboration between the NMS and the diaster management authorities in Hong Kong, China and any existing formal or informal SOPs	<ul style="list-style-type: none"> <li>• Mr Lap Shun Lee (Hong Kong Observatory)</li> </ul>	30 minutes
1130-1200	Review of current practices of collaboration between the NMS and the diaster management authorities in Indonesia and any existing formal or informal SOPs	<ul style="list-style-type: none"> <li>• Mr Mulyono Rahadi Prabowo</li> </ul> <p style="text-align: center;"><b>or</b></p> <ul style="list-style-type: none"> <li>• Mr Riris Adriyanto (BMKG Indonesia)</li> </ul>	30 minutes
1200-1230	Review of current practices of collaboration between the NMS and the diaster management authorities in the United Republic of Tanzania and any existing formal or informal SOPs	<ul style="list-style-type: none"> <li>• Mr Augustine Kanemba</li> </ul>	30 minutes
<b>1230-1330</b>	<b>LUNCH BREAK</b>		<b>90 minutes</b>
1330-1400	Review of current practices of collaboration between the NMS and the diaster management authorities in Curaçao and any existing formal or informal SOPs	<ul style="list-style-type: none"> <li>• Mr Alfredo Capello (Meteorological Department, Ministry of Traffic, Transport and Urban Planning, Curaçao)</li> </ul>	30 minutes



1400-1530	Discussion on the development of generic SOPs based on the reviewed examples and practices presented at the meeting, taking into consideration different national structures and frameworks	<ul style="list-style-type: none"> <li>All participants</li> </ul>	60 minutes
<b>1530-1600</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1600-1700	Discussion on the development of generic SOPs based on the reviewed examples and practices presented at the meeting, taking into consideration different national structures and frameworks (continued)	<ul style="list-style-type: none"> <li>All participants</li> </ul>	60 minutes
<b>Wednesday, 19 October 2011</b>			
<b>DAY 3</b>			
0900-1030	Work in groups on the drafting of generic SOPs	<ul style="list-style-type: none"> <li>All participants</li> </ul>	90 minutes
<b>1030-1100</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1100-1200	Work in groups on the drafting of generic SOPs (continued)	<ul style="list-style-type: none"> <li>All participants</li> </ul>	90 minutes
<b>1200-1330</b>	<b>LUNCH BREAK</b>		<b>90 minutes</b>
1330-1530	Work in groups on the drafting of generic SOPs (continued)	<ul style="list-style-type: none"> <li>All participants</li> </ul>	30 minutes
<b>1530-1600</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1600-1700	Discussion on the work of groups	<ul style="list-style-type: none"> <li>All participants</li> </ul>	60 minutes
<b>Thursday, 20 October 2011</b>			
<b>DAY 4</b>			
0900-1030	Discussions on the decisions of CBS-Ext.(10) as regards OPAG-PWS: restructuring, PWS Expert Teams, titles and ToRs, relationships between expert teams in the framework of Service Delivery	<ul style="list-style-type: none"> <li>Chair to lead, all participants</li> </ul>	90 minutes
<b>1030-1100</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1100-1200	Discussion of the title of the ET to be proposed for consideration to ICT-PWS and drafting of the ToRs	<ul style="list-style-type: none"> <li>Chair to lead, all participants</li> </ul>	30 minutes
<b>1200-1330</b>	<b>LUNCH BREAK</b>		<b>90 minutes</b>
1330-1700	Visit to the China Meteorological Administration (Forecasting and Service Delivery)	<ul style="list-style-type: none"> <li>All participants</li> </ul>	210 minutes

<b>Friday, 21 October 2011</b>			
<b>DAY 5</b>			
0900-930	Finalization of ToRs	<ul style="list-style-type: none"> <li>All participants</li> </ul>	30 minutes
0930-1030	Preparation of the report of the meeting and the Executive Summary	<ul style="list-style-type: none"> <li>All participants</li> </ul>	60 minutes
<b>1030-1100</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1100-1200	Preparation of the report of the meeting and the Executive Summary (continued)	<ul style="list-style-type: none"> <li>All participants</li> </ul>	60 minutes
<b>1200-1330</b>	<b>LUNCH BREAK</b>		<b>90 minutes</b>
1330-1530	Review of the report	<ul style="list-style-type: none"> <li>All participants</li> </ul>	120 minutes
<b>1530-1600</b>	<b>COFFEE / TEA BREAK</b>		<b>30 minutes</b>
1600-1700	Adoption of the report	<ul style="list-style-type: none"> <li>All participants</li> <li>Chair</li> </ul>	60 minutes
1700	<b>Closure of the Meeting</b>		

**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME  
AREA GROUP ON PUBLIC WEATHER SERVICES (PWS) EXPERT TEAM ON  
PWS IN SUPPORT OF DISASTER PREVENTION AND MITIGATION  
(CBS/OPAG-PWS ET/DPM)**

*(KUALA LUMPUR, MALAYSIA, 25-29 MAY 2009)*

**TEAM DELIVERABLES (STATUS: AS OF 27 JANUARY 2011)**

<b><i>Deliverable 1: Enhancement of WWIS</i></b>				
	<b>Actions:</b>	<b>Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Enhance the appearance and navigation of WWIS	Language hosts and Secretariat		Done
2.	Improve coverage			Done
3.	GIS-enabled feature			Done
4.	Push functionality for WWIS			Done
5.	Add suggestion box	<b>NOTE: all work kindly completed by HKO</b>		Done <b>Deliverable completed</b>
<b><i>Deliverable 2: Register of warning authorities</i></b>				
	<b>Actions:</b>	<b>Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Write to Members, seeking input	Secretariat	End June 2009	Done
2.	Provide a sample register entry	Chair	End July 2009	Done
3.				
4.				

5.				<b>Deliverable completed</b>
<b><i>Deliverable 3: PWS/TCP seminar on TC warning formulation and communication</i></b>				
	<b>Actions:</b>	<b>Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Coordinate with Typhoon Committee and CMA on the organization of a PWS/TC seminar in Nanjing or Hong Kong	Chair	End 2009	Not done, keep under review
2.				
3.				
4.				
5.				
<b><i>Deliverable 4: Workshop on PWS in support of DPM in connection with the opening of Meteoworld Pavilion</i></b>				
	<b>Actions:</b>	<b>Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Clarify the role of the ET in this event	Chen Zhenlin and Secretariat	June 2009	A workshop on DPM and Service Delivery was organized in May 2010 in Shanghai by SMB/CMA and Secretariat was requested to identify lecturers but this was done at the very last minute before the event and lecturers were from amongst those invited by CMA to the opening of the Pavilion <b>Deliverable completed</b>
<b><i>Deliverable 5: Update "Guidelines on Integrating Severe Weather Warnings into Disaster Risk Management (PWS-13)"</i></b>				
	<b>Actions:</b>	<b>Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Review PWS-13 and prepare Table of Contents for the new guidelines	Elliott Jacks and Jim Davidson	September 2009	Done
2.	ET to review and work on the content	All	December 2009	Done

3.	Propose techniques for easy reference using electronic media	Elliott Jack and Jim Davidson	Mid-2010	Can the summary extracts and links be put on WMO blog?(If it exists)
4.	Extract success stories and lessons learnt for posting on PWS website	ET and Secretariat	Mid-2010	Not done
5.	Publish the new guidelines entitled “ <b>Guidelines on Early Warning Systems and Application of Nowcasting in Warning Operations</b> ”	Secretariat	End August 2010	Guidelines were published in January 2011 and distributed to all NMHSs and PWS teams in hard copy and also posted on PWS website as of 28 January 2011 <b>Deliverable completed</b>
<b>Deliverable 6: Update “Guidelines on cross-border exchange of warnings” re-titled “Guidelines on International and Cross-border Collaboration in the Warning Process”</b>				
	<b>Actions:</b>	<b>Responsible Member(s):</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Review PWS-9 and prepare Table of Content	Charles Dupuy and Chen Zhenlin	September 2009	Done
2.	ET review and work on the content	All	End-2009	Done
3.	Use same technique as for PWS-13	Charles Dupuy and Chen Zhenlin	Mid-2010	Can the summary extracts and links be put on WMO blog?(If it exists)
4.	Extract success stories and lessons learnt for posting on the PWS Website	Secretariat		
5.	Publish the guidelines	Secretariat	Mid-June 2011	Guidelines published mid-June 2011 and distributed to all NMHSs and PWS ETs in hard copy and will also be posted on the PWS website <b>Deliverable completed</b>
<b>Deliverable 7: List of contact points for sourcing training experts in PWS</b>				
	<b>Actions:</b>	<b>Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Define an inventory of expertise needed	Vlasta Tutis and Jim Davidson	End 2009	Done. The list was reviewed by Chair and a more compact version produced

2.	Send letter to PRs with the list of expertise to identify suitable experts	Secretariat	End-March 2010	<p>This action will be done after all PWS ETs have prepared the list of expertise and will be compiled by ICT/PWS into a single list. CBS requested that PWS OPAG produce a list of competencies required for delivering PWS tasks. This list will be sent in one single letter to PRs with the request for identification of experts for all areas of PWS.</p> <p><b>Deliverable ready for ET/DPM but pending for other ETs</b></p>
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**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME  
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PWS IN SUPPORT OF DISASTER PREVENTION AND MITIGATION  
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*(BEIJING, CHINA, 17-21 OCTOBER 2011)*

**TERMS OF REFERENCE (TORS) FOR THE PWS “EXPERT TEAM ON MEETING USER  
NEEDS FOR REDUCING IMPACTS OF WEATHER, CLIMATE, AND WATER HAZARDS”**

- (a) Monitor and report on the progress of recent initiatives of the Expert Team;
- (b) Develop a template for an agreement document for fostering collaboration and partnership between National Meteorological and Hydrological Services (NMHSs) and Disaster Management Authority (DMA) organizations;
- (c) Provide guidance to NMHSs on how to develop impact-based information, forecast, and warning services on various time scales for Weather, Climate and Water (WCW) hazards;
- (d) Keep under review the development of cross-border exchange of warnings with reference to the published WMO Guidelines;
- (e) Monitor and survey the usefulness of the work of the Expert Team in assisting NMHSs to deliver improved products and services in reducing impact of WCW hazards;
- (f) Engage other WMO Programmes, PWS Expert Teams, CBS OPAGs and Technical Commissions (TCs) to determine common areas of interest and possible collaboration;
- (g) Assist NMHSs with the definition and development of work force competencies needed to effectively interact with the user community in the context of reducing impact of WCW hazards;
- (h) Develop and maintain a list of experts in PWS aspects of reducing impact of WCW hazards who are willing to contribute to PWS training and development activities; and,
- (i) Report to and make recommendations, as appropriate, to the ICT/PWS.

**MEETING OF THE COMMISSION FOR BASIC SYSTEMS OPEN PROGRAMME AREA GROUP ON  
PUBLIC WEATHER SERVICES (PWS) EXPERT TEAM ON PWS IN SUPPORT OF DISASTER PREVENTION AND MITIGATION  
(CBS/OPAG-PWS ET/DPM)**

**(BEIJING, CHINA, 17-21 OCTOBER 2011)**

PWS Expert Team on Meeting User Needs in Reducing Impact of Weather, Climate, and Water Hazards

**TEAM DELIVERABLES**

<b><i>Deliverable 1: Related to ToR (b)</i></b> <b><i>Guidance on impact based forecasts and warnings</i></b>				
	<b>Action(s):</b>	<b>Lead(s) Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Provide common definition of impact-based information, forecast and warning services to the ET for comments and additions	Elliott Jacks and Sally Pavlow Johnson	1 February 2012	
2.	Request contribution of examples from ET members of existing impact based information, forecast and warning services	Elliott Jacks and Sally Pavlow Johnson	1 February 2012	
3.	Provide a common definition and gathered examples from ET members in an integrated format to WMO for final ratification	Elliott Jacks and Sally Pavlow Johnson	1 May 2012	
4.	Provide this material together with a cover note explaining the context and intent from WMO to NMHSs	Secretariat	1 June 2012	
5.				
<b><i>Deliverable 2: Related to ToRs (c and f)</i></b> <b><i>List of areas of expertise and competencies to deliver effective impact-based services and list of experts</i></b>				
	<b>Action(s):</b>	<b>Lead(s) Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Consult with the WMO ETR Office on the areas of competency for delivering impact based services	Secretariat	1 December 2011	
	Revise and amend as necessary the list of areas of expertise developed by ET/DPM for the provision of impact-based services	Vlasta Tutis and Jennifer Milton	1 February 2012	



2.	Request contribution of examples from ET members of existing work force competencies related to impact-based services	Vlasta Tutis and Jennifer Milton	1 April 2012	
3.	Develop a generic set of competencies based on the areas of expertise and the examples provided and circulate to ET members for comments	Vlasta Tutis and Jennifer Milton	15 September 2012	
4.	Provide the generic set to WMO for consideration by the ETR Programme as a starting step for formal introduction of competencies for the provision of impact-based services	Secretariat	30 September 2012	
5.	Circulate the generic set to NMHSs with a covering note from WMO, and invite them to identify existing experts in these areas to assist with PWS training and development activities	Secretariat	1 November 2012	
<b>Deliverable 3: Related to ToR (d)</b> <b>Feedback from NMHSs on the usefulness of deliverables</b>				
	<b>Action(s):</b>	<b>Lead(s) Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	When deliverables are ready, send them to NMHSs with a letter from the Secretariat and request for comments and feedbacks on their usefulness	Secretariat	Following completion of key deliverables	
<b>Deliverable 4: Related to ToR (h)</b> <b>Proposal for collaboration with relevant programmes and ETs</b>				
	<b>Action(s):</b>	<b>Lead(s) Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1.	Identify separate focal points in the ET who will contact the relevant WMO Programmes (primarily TCP and DRR)	Jim Davidson, Cyrille Honoré and Jennifer Milton	Done	
2.	Focal points to make contacts with the WMO programmes to exchange information on common and relevant programme activities including production of guidance and other documentations (providing the programmes with the report of the work of ET)	Jim Davidson, Cyrille Honoré and Jennifer Milton	Ongoing	

3.	Focal points to make contacts with other PWS ET and OPAGS to exchange information and establish agreed areas of common interest for collaboration, including production of guidance and other documentations (providing the programmes with the report of the work of ET)	Lap Shun Lee, Augustine Kanemba and Chen Zhenlin	Ongoing	
<b>Deliverable 5: Related to ToR (i)</b> <b>A template agreement document containing guiding principles for fostering effective partnership</b>				
	<b>Action(s):</b>	<b>Lead(s) Responsible:</b>	<b>Due Date:</b>	<b>Status:</b>
1	Expand existing outline into a full guidance document for agreement document. Send draft to ET members for them to suggest inclusion of relevant MoU excerpts to support the MoU  Circulate to ET members for comments and feedback, incorporate and send the resulting document to the Secretariat	<b>Elliott Jacks</b> , Lap Shun Lee and Chen Zhenlin	1 February 2012  1 April 2012	
2	Collect existing MoUs from ET members as examples on how to develop new MoUs	Elliott Jacks, <b>Lap Shun Lee</b> and Chen Zhenlin	1 December 2011	
4	The expanded outline and the examples will form the template to be sent to NMHSs	<b>Elliott Jacks</b> , Lap Shun Lee and Chen Zhenlin	1 June 2012	
5.	Convert the package into a PWS guide series for WMO to forward to NMHSs with a covering letter explaining purpose, etc.	Secretariat	1 November 2012	