

WORLD METEOROLOGICAL ORGANIZATION

Severe Weather Forecasting Demonstration Project (SWFDP)

Regional Sub-project for Bay of Bengal

Report of the Public Weather Services (PWS) Workshop: Delivery of Warning Services

(Colombo, Sri Lanka 6-8 December 2018)



FINAL REPORT

Introduction

At the invitation of the Government of Sri Lanka, WMO convened the Severe Weather Forecasting Demonstration Project (SWFDP) Regional Sub-project for the Bay of Bengal Workshop in Colombo, Sri Lanka (3-8 December 2018). The first 3 days of the Workshop were on Severe Weather Forecasting and was conducted by the WMO Data Processing and Forecasting System (DPFS) from 3 to 5 December 2018. The second part of the Workshop was on Public Weather Services (PWS) addressing the Delivery of Warning Services and was conducted by the Service Delivery Division (SDD) from 6 to 8 December 2018. This report covers the second week of the Workshop.

Workshop Scope

The PWS Workshop on Delivery of Warning Services covered the areas of Service Delivery with an emphasis on Impact-based Forecast and Warning Services (IBFWS). It also addressed: determination of gaps in service delivery in the participating countries; the Common Alerting Protocol (CAP); Working with media; Working with disaster management; and the participation of NMHSs in the WMO World Weather Information Service (WWIS) Website. The programme of the workshop is provided in **Annex 1** of this report.

Participants

Participants were drawn from participating countries of SWFDP, Bay of Bengal Project and was attended by representatives from Bhutan, India, Maldives, Myanmar, Nepal, Sri Lanka and Thailand. Bangladesh and Pakistan, which are Members of the project, did not send participants. The participants comprised one PWS officer and one forecaster from each country. The host, Sri-Lanka provided several participants. **Annex 2** is the List of Participants.

Workshop presentations and other resources

Workshop presentations by the lecturers and participants as well as tables developed during the training session are provided on the PWSD website and may be accessed by clicking [here](#)¹.

Item 1: Opening Session

The Workshop was opened by Ms Anusha Warnasoorya who represented the Director General of the Department of Meteorology of Sri Lanka. In her address she thanked WMO for organizing the Workshop in Sri Lanka. She emphasized on the importance of the Severe Weather Forecast Demonstration Project in strengthening the capacity of participating countries deliver improved forecasts and warnings of severe weather to Disaster Management authorities and the media in order to save lives and livelihoods and for the protection of property. She gave an example of how the Meteorological Service of Sri Lanka together with stakeholder agencies, were able to manage "severe cyclone GAJA" without any casualties along with the backing of this project and RSMC-India.

Mr Samuel Muchemi representing WMO thanked the Government of Sri Lanka for hosting the Workshop. He summarized the workshop content and requested the participants to take advantage of the opportunity offered by the event to gain as much knowledge as they could from the experts who would be leading the training, Chris Tubbs from UK Met Office, Paul Kucera from COMET, UCAR, USA and N. Prakash from UK Met Office.

Item 2: Session on weather warning dissemination, challenges and gaps

¹ http://www.wmo.int/pages/prog/amp/pwsp/eventsworkshops_en.htm

Session objective

The objective of this session was to determine the current levels of service delivery to users in terms of communication channels, communication skills and other related service delivery aspects in the individual National Meteorological and Hydrological Services (NMHSs) of countries of Bay of Bengal participating in the SWFDP. The reason was to develop a baseline of readiness of the participating countries to deliver services to users. This knowledge is essential in determining the most effective capacity building interventions that WMO could employ for optimum utilization of resources in improving service delivery in the sub-region.

Session procedure

The participants presented on the service delivery status of their countries including the products, channels of communication used, collaboration with users etc. They then sat in groups by country to summarize their statuses, and completed a table provided on Google Docs platform which they completed simultaneously summarizing the communication channels each of the NMS had at its disposal and an indication of how well the channels were performing using a scale of 0 to 5 as follows: **Scale: 0- Not Applicable; 1- Poor; 2-Fair; 3-Good; 4-Very Good; 5-Excellent.** The channels considered were: Websites, Met Service Studio TV studio, National TV Studio, National radio Community radios, Commercial radios, Facebook, Tweeter, YouTube, Press (e.g. newspapers), Internet connection, the languages used, Mobile App and WhatsApp Group. They also provided a General Comments. The table below summarizes the outcome. (A clearer and editable version of the table is provided as **Annex 3**).

STATUS OF SERVICE DELIVERY CHANNELS OF COMMUNICATION IN SWFDP-BAY OF BENGAL PARTICIPATING COUNTRIES

Scale: 0- Not Applicable; 1- Poor; 2-Fair; 3-Good; 4-Very Good; 5-Excellent															
Country	Website	TV-Met Service Studio	National TV Studio	National radio	Community radios	Commercial radios	Facebook	Tweeter	YouTube	Press (e.g. newspapers)	Internet connection	Languages (comment)	Mobile App	WhatsApp Group	General Comments
Bhutan	4	0	3	3	3	3	5	0	0	5	5	English and Dzongkha	2	0	Mobile app Govt. working on
India	5	1	5	5	1	5	5	5	3	5	5	English, Hindi and regional Languages of States	1	5	
Maldives	5	5	4	5	5	4	5	5	0	3	5	English & Dhivehi	0	5	Mobile app on progress
Myanmar	3	5	3	4	0	2	5	0	0	4	3	English, Burmese	0	0	SMS and Mobile App are essential
Nepal	3	0	0	1	2	2	1	4	0	2	3	English, Nepali	0	0	0
Sri Lanka	2	1	3	3	0	3	3	0	0	3	4	English, Sinhala & Tamil	0	0	SMS & Mobile App required
Thailand	4	4	4	5	5	4	5	0	5	5	5	Thai,English	4	0	

Figure 1: Service Delivery Gaps Table for Bay of Bengal

Conclusions for the session

The table shows that:

- a) **Website:** Most NMHSs are happy with their websites. Sri Lanka indicated need for improvement
- b) **Met Service Studio TV studio:** Nepal and Bhutan do not have TV studios at their Met Services. India and Sri Lanka indicated need for improvement. Thailand and Myanmar are happy with their studios as they are. Maldives have a new studio and need TV weather presenter training to be conducted.
- c) **National TV Studio:** Nepal needs to develop working arrangements with the national television. All other countries indicated that they were working with their respective national TV broadcaster at varying levels of satisfaction
- d) **National radio:** All countries have their products disseminated through national radio. Nepal indicated an unsatisfactory level of collaboration
- e) **Community radios:** Myanmar and Sri Lanka are not working with community radios. Thailand, India and Maldives indicated an excellent level of collaboration.
- f) **Commercial radios:** All countries are collaborating with commercial radios but Myanmar and Nepal indicated low levels of satisfaction
- g) **Facebook:** All countries except Nepal are happy with their Facebook usage
- h) **Tweeter:** Nepal, India and Maldives are very happy with their usage of Tweeter. Bhutan, Myanmar, Nepal and Thailand do not use Tweeter
- i) **YouTube:** Only India and Thailand are using the YouTube platform
- j) **Press (e.g. newspapers):** All countries use it.
- k) **Internet connection:** All countries are connected and are fairly happy with the quality of connection.
- l) **Mobile App:** Only Thailand is really happy with their Mobile App. India and Bhutan has apps but they indicated the need for improvement. Other countries do not had Apps.
- m) **WhatsApp Group:** India nd Maldives were satisfied with their Whatsapp groups. Other countries do not use them.

Item 2: Session on Gathering Stakeholder requirements

Session Objective



Figure 2: Chris Tubbs (UK Met Office) conducting the Stakeholder session

The objective of this session was to get participants to experience practically the process of interviewing a stakeholder with the intention of getting the stakeholder's requirements, for improvement of service delivery.

The Exercise

Participants sat in groups and one of them pretended to be a stakeholder. To facilitate this, the expert (Chris Tubbs) provided each of the "stakeholder" with a set of questions and corresponding answers describing their area of business and how extreme weather could impact their operations including likely losses. The stakeholder was not supposed to reveal

the answers to the NMHS staff that trying to engage them.

The session was exciting to participants and it gave them a good feel of the process of engaging users and how to prepare for an interview with stakeholders in order to get useful information for improvement in future service delivery.

Introduction to Impact-based Forecasting (IBF) – (Chris Tubbs-Met Office)

Example of UK:

Chris narrated of the genesis of the IBF approach to warning. He told of the storm which caused 18 deaths, 15 million trees lost, hundreds of thousands of homes went without power. It was after this event that The government decided to fund a warning service: the threshold-based warning was born. Chris presented steps in the evolution of warning approaches in the UK which culminated in IBF in 2011 in which a matrix presenting the combination of the likelihood and impact is used to assign colour to a warning.

The Matrix

Colour determined by the combination of the **likelihood** and **impacts**

Likelihood	High				
	Medium				
	Low				
	Very low				
		Very low	Low	Medium	High
Impact					

Figure 3: Te Impact Matrix

Generic Impact tables:

The participants learnt about Generic Impact Table as well as specific impact tables for different weather types (Heavy rain, heat wave etc)



Impact tables

	Very low	Low	Medium	High
Generic impact levels of ALL SEVERE WEATHER for emergency responder organisations	Nil	Incidents dealt with under 'business as usual response' by emergency services e.g. limited number of road traffic collisions (RTCs).	Short-term strain on emergency responder organisations. Risk of injuries with potential danger to life. Potential for short-term loss of some utilities. Some disruption to travel with potential for commuters to be stranded for short periods.	Prolonged strain on resources of emergency responders. Potential danger to life. Potential for loss of utilities for lengthy periods (perhaps days). Severe disruption to travel with prolonged delays. Commuters may be stranded for long periods. Mutual aid arrangements may require activation.

There are also individual impact tables for the 5 weather types

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Figure 4: The Generic Impact Table

Demonstration of Practical use of IBF in the UK Met Office

Two case studies of hazardous weather in the UK, their impacts and how the IBF warnings were issued using the Impact Tables was shown. Case study 1 was on the devastating floods in Coverack, Cornwall 18th July 2017. You can more information [here](#). Participants were taken through the use of feedback to continuously improve Impact Tables. In this case, as a good practice, Met Office conducted a study on the effectiveness of the warning and recorded lessons learnt for application in future warning.

There was also an interesting explanation of how the quality of warning platform matters in that it takes time to send warnings to all clients before the system becomes available for preparing an updated warning. Met office have new software now that does not lock up when "working" but stays available for update.

Introduction to the Weather Ready Nations (Paul Kucera – UCAR)

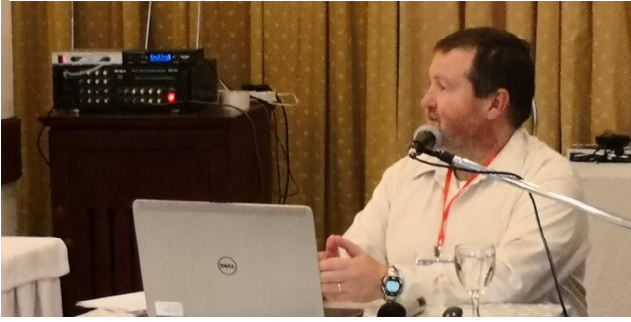


Figure 5: Paul Kucera, COMET, USA

Paul explained that WRN follows the WMO Guidelines (WMO No. 1150). It addresses IBFWS for improved decision-making. A survey carried out resulted in Disaster Managers asking for information that could enable them make decisions about **what** is going to happen, **when**, **where**, and **how** serious it will be. Transitioning to IBFWS involves moving from providing information on what the weather will **be** to what it will **do**. Stakeholders make decisions based on impact on lives, livelihood, property, and the economy. They need information on disaster risk

and forecasting impact beyond the traditional forecast.

He presented how an Impact-based Forecast System Works and explained the following steps:

- Assessing Risks
- Monitoring and Early Warning
- Dissemination and Communication
- Response Capability

Participants were also introduced to the different Risk Matrix and also to the Response Matrix and were taken through exercises to give them a feel of how they are developed and used.

Impact Matrix for emergency management: Winds			
Minimal Impact	Minor Impacts	Significant Impacts	Severe Impacts
<u>Debris</u> Localized loose debris blown around	Localized tumbling of unsecured objects (e.g.: inflatable structures, tents, garbage cans)	Tumbling and rolling of unsecured objects (e.g.: inflatable structures, tents, garbage cans) Injury and danger to life from flying debris	Lifting/airborne of unsecured objects (e.g.: inflatable structures, tents, garbage cans) Widespread danger to life from flying debris
<u>Transportation</u> Isolated transport routes affected	Regional transport routes affected by wind or falling tree limbs Some delays in journey times	Significant transport routes affected by wind and falling trees Significant impacts to first responder operations Significant delays, road closures and traffic congestion	Widespread transport routes and travel services affected for a prolonged periods Severe impacts to first responder operations Delays or cancellation of public transportation Major traffic congestion and stranded residents

Figure 6: Barbados Example - Impact Matrix

Participants were taken through the process of developing and using a risk matrix. Paul explained the steps that WRN has adopted for developing and implementing an impact based system which includes:

Phase One: Collect Data and Develop Hazard, Risk, and Response Matrices

Phase Two: Expand Stakeholder Participation

Phase Three: Forecaster and Disaster Management Interface (Develop display system to share information between forecasters and disaster managers)

Phase Four: Develop Standard Operating Procedures (SOP)

Phase Five: Impact-based Forecasting Demonstration

Phase Six: Public Awareness and Outreach

He cited the main challenges that the WRN has noticed is for NMHSs to commit to the IBF paradigm shift.

Exercise: Impact-based Approach – Using the terminologies (Chris Tubbs)

Aim: To reach a level of understanding of risk and to have effective dialogue with stakeholders.

Risk = The hazard x (Vulnerability and Exposure)

To Identify Hazards

Participants were given a heavy rain scenario and a map depicting features on the affected area including the physical features (mountains, river, plain) and land use (bridge, hospital, road, nuclear plant, sports stadium, reservoir/dam, business area, airport and beach area) they were given the task of identifying likely hazards as the first task.

Participants identified the weather hazards including for example strong wind, flooding, snow blizzard. The hospital is close to the river therefore flooding is a possible hazard. For mountain areas, landslides, avalanche onto the road, strong winds; for the airport: heavy rains, strong winds, waterlogging, flooding near the river etc.

Vulnerability

Participants assessed the vulnerability of each location and ranked the vulnerability by location, from 1 to 10, with the most vulnerable as no. 1. The participants advanced reasons why they ranked different sites in their respective position of vulnerability. This provided a lively discussion and proved quite effective in getting participants to understand and assign risk given a specific weather type hazard.

To update the vulnerability list given updated information.



Figure 7: Participants working on a practical exercise

The next task was to update the vulnerability ranking given new information. E.g. the level of vulnerability for the stadium should be raised higher if there would be an event in the stadium hence more people.

Last part of the exercise

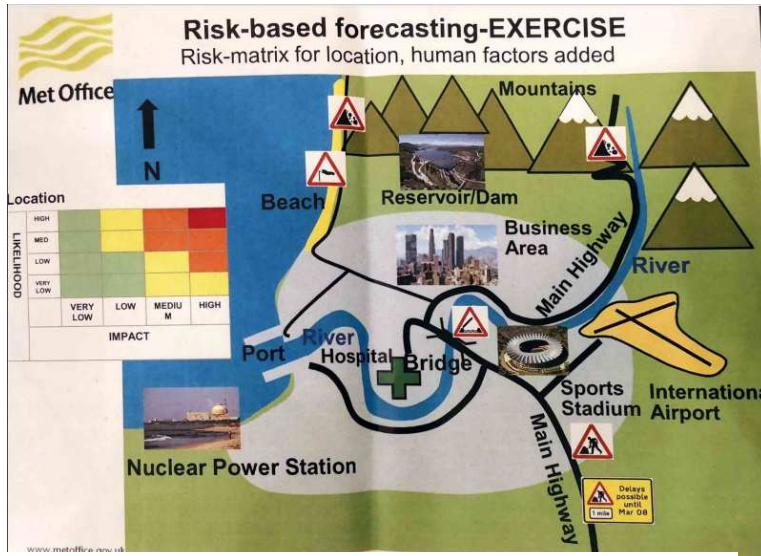


Figure 8: The Risk-based Forecasting Exercise Map

Participants were given the same map but this time with an Impact/Likelihood table included.

The exercise was for them to discuss amongst themselves and to tick the most appropriate box of the Impact/Likelihood table. Participants provided arguments for issuing an amber or red warning categories which was a lively discussion. The lecturer advised that the initial scenario would have been "Medium" and after the updated scenario, the impact would be "High".

Session on the Perspectives of a Disaster Manager (Pradeep Kodippili, Director, Disaster Management Centre)



Figure 9: Mr Pradeep Kodippili, Director, Disaster Management Centre

Mr Kodippili indicated that the Indian Ocean Tsunami of 26 December 2004 happened and people died. After this event, the National Council of Disaster Management of Sri Lanka was created to respond to various disasters.

He started by showing the number of people affected by disaster from 1974 to 2018, showing the seriousness of strong winds, drought, heavy rains and floods.

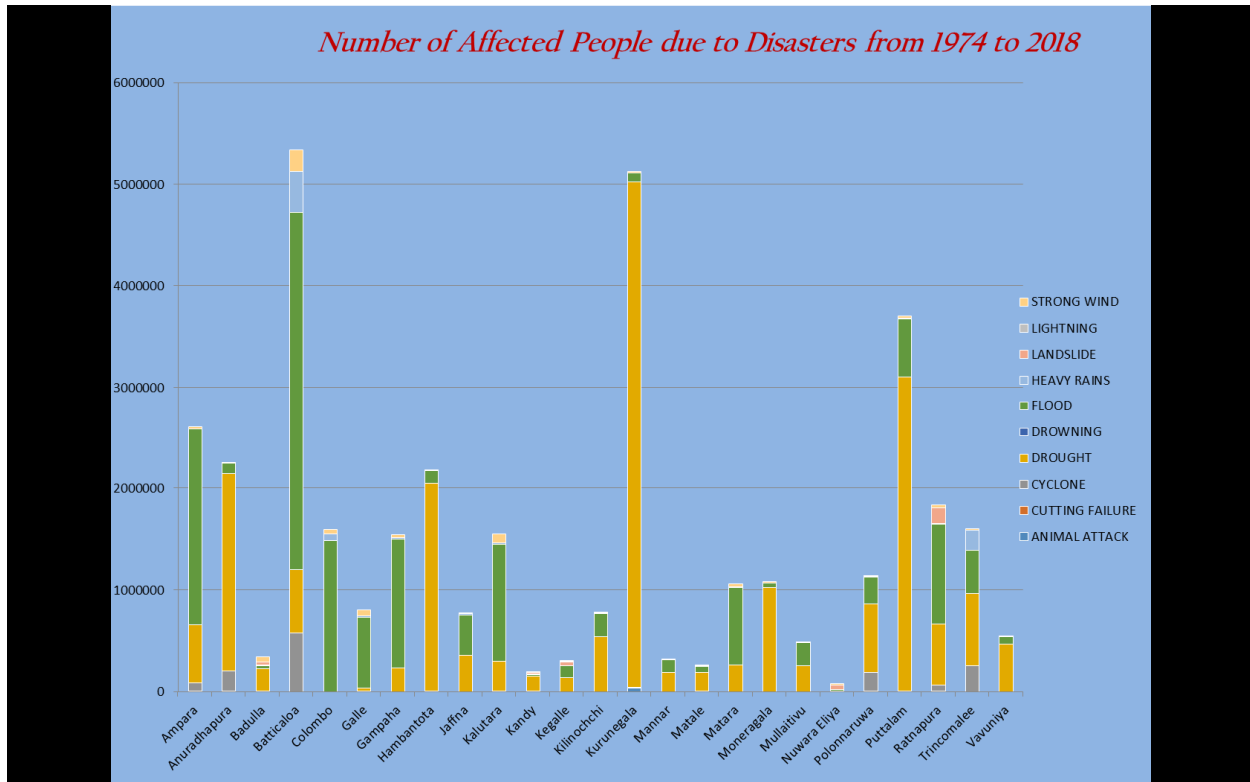


Figure 10: Number of people affected by disasters in Sri Lanka (1974-2018)

He pointed out the Disaster Management Authority conducts mitigation initiatives and research in the country. They also engage in public awareness programme educating the public and schools.

They have also developed standard Operating Procedures (SOPs) for use when hazards occur. They receive information from many varied international centres especially for Tsunami monitoring.

Dissemination

They have 77 early warning towers; Virtual Privet Network (VPN); a mobile application called Disaster Early Warning Network (DEWN) (services are free of charge); a call centre; social media to be updated with warnings automatically; legacy media. They have developed a simplified communication system for rural communities. They are using police and military for response.

Working with the Meteorological Department

He indicated that there is very close collaboration with the Meteorological Service of Sri Lanka and that they were receiving a lot of products from the Service.

Impact-based Forecasting Simulation - Paul Kucero (UCAR)

Goal of the exercise

To better understand the impact-based forecasting process.

Procedure

Participants sat in groups to discuss a simulated tropical storm that was to affect an island described in the simulation study and responded to some case study multiple choice questions. The exercise took the participants through the process of identifying hazards, assigning risk levels, comparing likely impacts from different hazards associated with the storm (i.e. heavy rain and wind) and used the Impact Matrix Table to assign colour to the IBF warning. Participants discussed and agreed on the best answer and made a presentation justifying their decisions.

Session outcome

The simulation presented for the exercise was very comprehensive and gave a chance to participants to think through a real life case study involving forecast uncertainty, which enabled a lively discussion which was very useful and fitting to the training.

Participants were informed that more such simulations are available on the COMET MetEdWebsite (<https://www.meted.ucar.edu>) as indicated below:

- Fire Weather Situational Awareness Simulation:
<https://www.meted.ucar.edu/fire/sitrep/navmenu.php?tab=1&page=1-1-0&type=flash>
- Fire Weather Communication Simulation:
<https://www.meted.ucar.edu/fire/s591/comms/navmenu.php?tab=1&page=simulation&type=flash>
- Winter Weather Simulation:
https://www.meted.ucar.edu/winter/sfc_impacts/navmenu.php?tab=1&page=2-0-0&type=flash

Introduction to the Common Alerting Protocol (CAP) - Mr Samuel Muchemi (WMO)

Mr Muchemi made a presentation introducing CAP to the participants. The aim of the session was to provide participants with the understanding of what CAP is, why CAP is needed, the benefits of CAP, the role of the WMO Register of Alerting Authorities and the WMO Alert Hub. The participants also learned the steps they would need to take to implement CAP and how WMO assists NMHSs to implement CAP through the CAP jump-Start training workshops.

Participants were very receptive of the lecture and shared their experiences regarding CAP in their countries. Some decided to take action, upon returning home, toward the implementation of CAP in their respective countries. See **Annex 4**.

WMO global platforms for service delivery: The World Weather Information Service (WWIS) - Mr Samuel Muchemi (WMO)

Mr Muchemi introduced the World Weather Information Service (WWIS) to the participants and pointed out that 169 Members were currently providing weather and climatological information for 2152 cities. The website is available in Eleven Languages: (Arabic, Chinese, English, French, German, Italian, Korean, Polish, Portuguese, Russian and Spanish). It is hosted and coordinated by Hong Kong Observatory (HKO). It is available on mobile phone versions (Android and Apple platforms). A weather widget is available for Members to include on their websites.

Purpose of WWIS

The purpose of WWIS is to be a source of official weather by NMHSs and to enhance visibility of NMHSs, especially those of developing countries. It is also a primary component of the WMO Global Multi-hazard Alerting System (GMAS), which is under development to aggregate warnings and alerts from authorized sources. It is therefore essential that NMHSs participate fully in WWIS.

Future of WWIS

WMO is taking steps to increase participation of NMHSs and to include modern features in WWIS and requests Members to:

- To increase number of cities for which they provide forecast and climate information
- To provide forecasts for at least 5 days
- To provide a link to WWIS from the Website of the NMHSs
- To enable local media, tourist companies, hotels and the public to use WWIS
- To include the WWIS widget on the website of NMHSs

Status of WWIS Implementation by countries participating at the Workshop

The WWIS Monitoring tool which shows the performance of NMHSs was used to display the levels of participation of countries present at the workshop with a view to eliciting action by participants in line with Future WISS above.

The tool is available at:

<https://portal.worldweather.org/statistic.php>

username: wmpws

password: wmo935B

Country Action Plans

Participants sat in country groups and discussed what they had learnt in the workshop and how they could translate what actions they would take with regard to actualizing the necessary actions. They then provided their intended actions on a table provided on Google Docs simultaneously. The Action Plan Table is provided in **Annex 4**.

WORKSHOP ON PUBLIC WEATHER SERVICES

(Colombo, Sri Lanka 6-8 December 2018)

Provisional Programme

(Updated on 16 November 2018)

Bhutan, Bangladesh, India, Maldives, Myanmar, Nepal, Pakistan, Sri Lanka and Thailand

Date	Time	Agenda Items	Who
6 December 2018 (Thursday)	09:00 – 12:30	Item 1: Opening/welcome Item 2.1: Working Arrangements Item 2.2: Workshop objectives and outline Item 3: Presentations by participants: - weather warning dissemination, challenges and gaps	Host/WMO Host S. Muchemi, WMO All PWS Participants representing countries Moderator (S. Muchemi)
	14:00-14:30	- Service Delivery: The case of a lead NMHS – Met Office	Chris Tubbs (Met Office)
	1430-1530:	Item 4: Impact-Based Forecasting & warning - Introduction to IBF with examples from UK and South Africa (Presentation and video)	Chris Tubbs (Met Office)
		- Introduction to the Weather Ready Nation (WRN) initiative	P. Kucera (UCAR)
	1600-1700:	- Interactive IBF Exercise introducing exploring the concept of vulnerability/exposure and how this relates to risk	N. Prakash
7 December 2018 (Friday)	09:00-10:30	- IBF exercise continued, culminating in creating impact tables for participants countries	N. Prakash
	11:00-12:30	- Session on gathering customer/stakeholder requirements (interactive)	Chris Tubbs
	14:00-15:30	- Impact and advice matrices	N. Prakash
	16:00-17:00	- User perspective: Disaster Manager	TBD (Sri Lanka)
8 December 2018 (Saturday)	09:00-10:30	- IBF Exercise	P. Kucera (UCAR)
	11:00-11:30	- Common Alerting Protocol	S. Muchemi (WMO)
	11:30-12:30	- Item 5: WMO global platforms for service	S. Muchemi
	14:00-17:00	- Item 6: Country Action Plan Participants present their understanding of IBF and how they could implement it in their Met services	All participants Coordinator: Chris Tubbs N. Prakash

		<ul style="list-style-type: none">- Presentations by participants (continue)- delivery- Workshop evaluation- Closure	
Daily Breaks	10:30-11:00	Morning Coffee	
	12:30-14:00	Lunch Break	
	15:30-16:00	Evening Coffee	

List of Participants

Name	Country	E-mail address
<i>PARTICIPANTS</i>		
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Participants from Stake Holder agencies	Designation	Organization
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Mr. H.D.P.Tissera	Assistant Director	Department of Fisheries & Aquatic Resources
Mr. J.M.A.R.Jayarathne	Deputy Director	Disaster Management Centre
Mr. Pradeep Kodippili	Deputy Director	Disaster Management Centre
Mr. R.M.S.A.K. Rathnayake	Scientist	National Building Research Organization
Trainees from Met Service of Sri Lanka	Designation	Organization
Ms. A.R.Warnasooriya	Director	Department of Meteorology
Ms. P.M.Jayakody	Meteorologist	Department of Meteorology
Mr. L.A.D.B. Bandurathna	Meteorologist	Department of Meteorology
Mr. S.Wickramasuriya	Meteorologist	Department of Meteorology
Mr. Malinda Millangoda	Meteorologist	Department of Meteorology
Ms. K.R.K.D.N.Ranaweera	Meteorologist	Department of Meteorology

Mr. K.L.Pasqual	Meteorologist	Department of Meteorology
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**STATUS OF SERVICE DELIVERY CHANNELS OF COMMUNICATION IN SWFDP-BAY OF BENGAL
PARTICIPATING COUNTRIES**

	Scale: 0- Not Applicable; 1- Poor; 2-Fair; 3-Good; 4-Very Good; 5-Excellent														
Country	Website	TV-Met Service Studio	National TV Studio	National radio	Community radios	Commercial radios	Facebook	Tweeter	YouTube	Press (e.g. newspapers)	Internet connection	Languages (comment)	Mobile App	WhatsApp Group	General Comments
Bhutan	4	0	3	3	3	3	5	0	0	5	5	English and Dzongkha	2	0	Mobile app Govt. working on
India	5	1	5	5	1	5	5	5	3	5	5	English, Hindi and regional Languages of States	1	5	
Maldives	5	5	4	5	5	4	5	5	0	3	5	English & Dhivehi	0	5	Mobile app on progress
Myanmar	3	5	3	4	3	2	5	0	0	4	3	English, Burmese	0	0	SMS and Mobile App are essential
Nepal	3	0	0	1	2	2	1	4	0	2	3	English, Nepali	0	0	0
Sri Lanka	2	1	3	3	0	3	3	0	0	3	4	English, Sinhala & Tamil	0	0	SMS & Mobile App required
Thailand	4	4	4	5	5	4	5	0	5	5	5	Thai,English	4	0	

COUNTRY ACTION PLANS

1. BHUTAN

Please discuss as country groups on specific actions to take when you return home covering:		
	The Gaps	Comment: Immediate action
Service delivery gaps	1. Mobile App, 2. SOP between NCHM and DDM, 3. Wechat-Stakeholders, 4. Education of general public (Weather and Climate terms).	Form mass communication such as Wechat, currently we are lacking good M-app and using social media (FB) only (Some format of warning will be adopted/format).
Impact-based forecast and Warning Services (IBFWS)	1. Need to initiate impact based forecast (Start), 2. Warning colour/number based on severity, 3. Re-look/modify into format of warnings.	3. Currently, we are not doing IBF in Bhutan-benefits for public and DDM plan implantations. Look for some project for IBF and start in Bhutan with Expert.
Common Alerting Protocol (CAP)	Inform about Common Alerting Protocol (CAP) to Head forecasting and take matters with Chief and Director, to take action/process.	SOP and initiate on CAP process-NCHM
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	Inform to Head forecasting, Chief and PR of Bhutan to WMO (Director). Explain	Take action and inform on status with WMO regarding WWIS, what are the process with WMO.

2. INDIA

Please discuss as country groups on specific actions to take when you return home covering:	
	Immediate action
Service delivery gaps	Risk based forecast, dedicated weather TV channel and mobile app
Impact-based forecast and Warning Services (IBFWS)	proper implementation of impact and risk based forecast
CAP	We issue weather forecasts and warnings as per the terminology laid down in our SOP (Standard Operating Procedure). Although, we would try accommodating CAP in Forecast & Warning issuance.
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	addition of more cities in WWIS

3. MALDIVES

	Immediate action	Comment
Please discuss as country groups on specific actions to take when you return home covering:	Will discuss with our focal point and MMS management.	To start IBF and forecast verification.
Service delivery gaps	1-Need training in presenter skills.2- Refreshing training for forecasters and Observers.3-Need 2 more weather radar to cover whole country. 4- Lightning detector also needed.	Mobile App comes with CAP function and will be ready by Feb 2019.
Impact-based forecast and Warning Services (IBFWS)	We will discuss other stake holders to get hazards and risk maps and will try to start IBF.	Not started yet
Common Alerting Protocol (CAP)	We are implementing CAP	On going
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	We will add more cities on WWIS	On going

4. MYANMAR

	Immediate action	Comment
Please discuss as country groups on specific actions to take when you return home covering:		
Service delivery gaps	Mobile App, Upgrade to Weather Studio, Change to Text message to Graphical Message	
Impact-based forecast and Warning Services (IBFWS)	Proper work to implement the IBFWS	(1) Need to create risk map in the whole country. (2) DMH need to discuss with decision makers, NDMC, media and community.
Common Alerting Protocol (CAP)	DMH continue to utilize CAP for warning.	Due to lightning strike, CAP computer severe damaged. Therefore, DMH need to support from WMO to repair the computer severe.
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	action to add more cities	

5. NEPAL

	Immediate action	Comment
Please discuss as country groups on specific actions to take when you return home covering:		
Service delivery gaps	1. development of Mobile App 2. Prepare SOP for severe weather events warning and dissemination 3. issuing regionwise forecast in their local languages.	
Impact-based forecast and Warning Services (IBFWS)	1. Initiation	Not started yet
Common Alerting Protocol (CAP)	(1) discussion regarding Trainings and system set-up	Not started yet
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	(1) increase the number of cities; (2) forecast up to 3 days.	currently 5 cities for 1 day only

6. SRI LANKA

	Immediate action	Comment
Please discuss as country groups on specific actions to take when you return home covering:		
Service delivery gaps	Make a comprehensive survey of current service delivery gaps	With the relevant permission and guidance of the superiors, update relevant stakeholders and media personnel of the current means of service delivery and get their feedback on how they would like to receive the service
Impact-based forecast and Warning Services (IBFWS)	Further stress on the importance of moving towards IBF and seek guidance	DoM has currently started issuing warnings including some impacts for Severe weather events such as cyclones, thunderstorms and heat weather. It should be noted that the risk matrix table is a good way to convey the likelihood and the impact of Severe weather.
Common Alerting Protocol (CAP)	Inform the superiors about CAP and seek guidance regarding way forward	CAP is new to the DoM, therefore introduction to the system and further guidance would be required on CAP
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	Increase the number of days for the outlook for at least 5 days and address the communication issue of the current forecast	Explore the possibility to further increase the number of cities to 15

7. THAILAND

	Immediate action	Comment
Please discuss as country groups on specific actions to take when you return home covering:		
Service delivery gaps	develop mobile apps more accuracy and easy to use. improve announcement to easy to understand for stakeholder.	
Impact-based forecast and Warning Services (IBFWS)	Set up seminar with mass media and share knowledge to our stakeholder	
Common Alerting Protocol (CAP)	Need more training and workshop.	
Provision of forecasts for display on the WMO World Weather Information Service (WWIS)	add more cities.	