THE THIRD NATIONAL MONSOON FORUM

29-30 June, 2011
Dhaka, Bangladesh

THE THIRD NATIONAL MONSOON FORUM

June 29-30, 2011

BMD, Dhaka, Bangladesh

Supported by:

Bangladesh Meteorological Department

Regional Integrated Multi-Hazard Early Warning System

Contents

Background

The Bangladesh Meteorological Department (BMD) convened the 3rd National Monsoon Forum on 29-30 June 2011, in Dhaka. The Forum brought together 49 participants from government, UN and non-governmental organizations. BMD has held two Monsoon Forums during the course of 2010 to evaluate the early warning system and enhance coordination among stakeholders. The National Monsoon Forum provides a platform for the broad range generation and integration of hazard risk information of all timescales between early warning information provider and users. It strengthens the multi-hazard early warning system through a regular and sustained multi-stakeholder dialogue process with the participation of mass-based organizations.

Workshop Objectives

The specific objectives of the meeting were to:

- Provide a platform for the broad range generation and integration of hazard risk information of all timescales between early warning information provider and users
- Strengthen the multi-hazard early warning system through a regular and sustained multi-stakeholder dialogue process with the participation of mass-based organizations.
- Ensure that early warning information products, including their uncertainties and limitations, are understood by and communicated to users;
- Encourage climate and hydrological forecast applications for mitigating risks in various climate-sensitive sectors, including, but not limited to agriculture, irrigation, and health ;
- Evaluate potential impacts and develop a plan of action in response to the climate and hydrological outlooks
- Provide a platform for inter-agency coordination of policies, sectoral plans, and programs for dealing with potential impacts of hydro-meteorological and geological hazards.
- Provide a platform for long-term processes of understanding risks posed/opportunities brought about by past, current, and future climate.

- Acknowledge User feedback for improving the early warning system for extreme natural hazard events.
- Early warning system performance is evaluated, and recommendations are taken and acted upon for improving system performance.
- Identify remaining gaps in the climate risk management for each sector.

Early Warning Providers Discussions Summary

The 3rd National Monsoon Forum Introductory Presentation By Arjumand Habib, Director, BMD presented the objectives and expected outcomes of the 3rd Monsoon Forum. She also presented last two monsoon forum recommendations.

The First Monsoon Forum held in Dhaka, 5-6 January 2010 recommended-

- BMD should issue weather forecast and warnings with more lead time.
- More frequent, quick and timely dissemination of products with an accessible media (i.e. print and electronic media, SMS, Voice mail, Toll free telephone etc.).
- Simple rather than technical language should be used so that the forecasts can be easily understood by the common person (Text and Graphics).

The Second Monsoon Forum held in Dhaka, 30-31 May 2010 recommended-

- Identify focal points in respective agencies to be responsible for receiving and providing feedback.
- From BMD to NGOs and others sector specific (Agriculture, fishing, social related) awareness program
- Broadcast a weekly program on TV about meteorology and various meteorological hazards.
- Establishment the effective monitoring cell.

She also discussed on the progress of implementations of recommendations.

Progress and Achievement on Weather Forecasts and Applications By Shamsuddin Ahmed, Assistant Director, and Bangladesh Meteorological Department presented BMD's achievements so far on enhancement of weather forecasts and applications. He mentioned, due to awareness among stake holders now engaged in getting daily and weekly weather information to use their own community and business plan. He requested all stakeholders to visit BMD website (www.bmd.gov.bd) to receive latest and other experimental weather and climate information. The website also provides information on tropical cyclone forecasts, Doppler radar echo, satellite imagery, weather map analysis, climate data etc. He introduced participants to the Weather Research and Forecasting (WRF) model and GSM (JMA) Data Analysis and Visualization modeling outputs.

WRF Model at BMD

- WRF model is being run in BMD since July 2010 with assistance from RIMES.
- The model run for 72 hours and district boundary was added.
- The model is being run automatically:
  - Time : 72 hours, at 00 UTC
  - Resolution : 27 Kms
  - Start at : 10:00 AM
  - Time required: About 1 hour 20 min.
  - Products Generating: Rainfall forecast for 24, 48 & 72 hours district wise.

GSM (JMA) Model at BMD

- JMA providing GSM output data to BMD four times in a day (00,06,12 &18 UTC).
- At surface data resolution is 25 km but in upper air they are 50 km resolution.
- The data of 00 UTC downloading and processing start at 10:20 in the morning and takes about ten min. to process, visualize and upload to BMD website.
- Data are being processed for same domain as WRF model.

Monsoon 2010 Perspective of Flood Forecasting and Warning by Md. Amirul Hossain, Executive Engineer, FFWC, BWDB presented the brief on flood forecast activities, forecast evaluation monsoon 2010. He mentioned 2010 flood was a normal flood. Flood duration was shorter along the Brahmaputra-Jamuna and Ganges rivers (north & north-west part); moderate along the Padma River (Central part), prolong along Surma and Kushiyara Rivers (north-east part) and early flash floods in the North-Eastern part which damaged crops. For the deterministic forecasts the 1 day forecasts was good, 2 days forecasts was average and third day forecasts was poor (figure 1).

Performance of FF 2010 monsoon

Sl. No.	Scale	Value
1	*Good*	*MAE* <= 0.15 meter & r^2 >= 0.9
2	*Average*	*MAE* <= 0.2 meter & >0.15 meter and r^2 >= 0.7 & <0.9
3	*Poor*	*MAE* <= 0.4 meter& >0.3 meter and r^2 >= 0.3 & <0.4

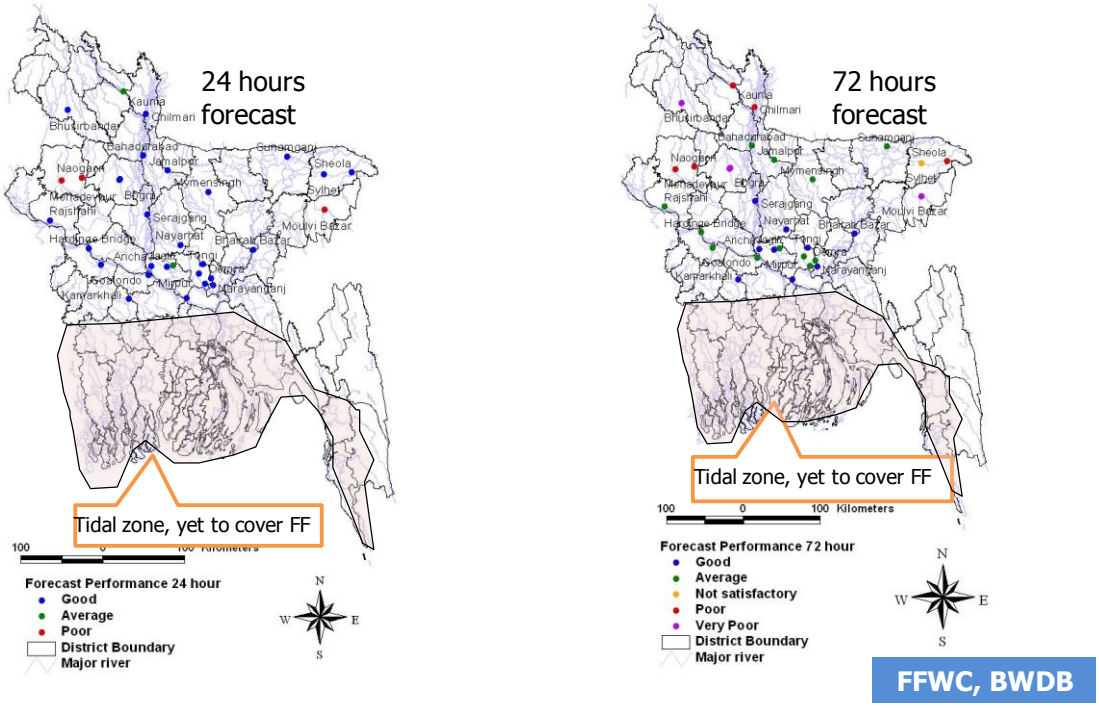


Figure 1: Performance of Deterministic Forecasts

The evaluation of Medium Range Forecasts (1-10 days) was conducted based on statistical analysis (coefficient of determination) and was found that up to 5 days for mean value the

deviation from observed is less than 25 %. Up to 10 days the mean deviation from observed is about 35%. According to WMO standard 33% deviation is acceptable. In this cases the forecasts trend was good though the amount does not match in many cases. Based on the rising and falling trends; 3 days, well match with observed; 5 days and 7 days, satisfactory match with few minor miss-match and 10 days, deviation is much higher and needs improvement (Fig 2-3).

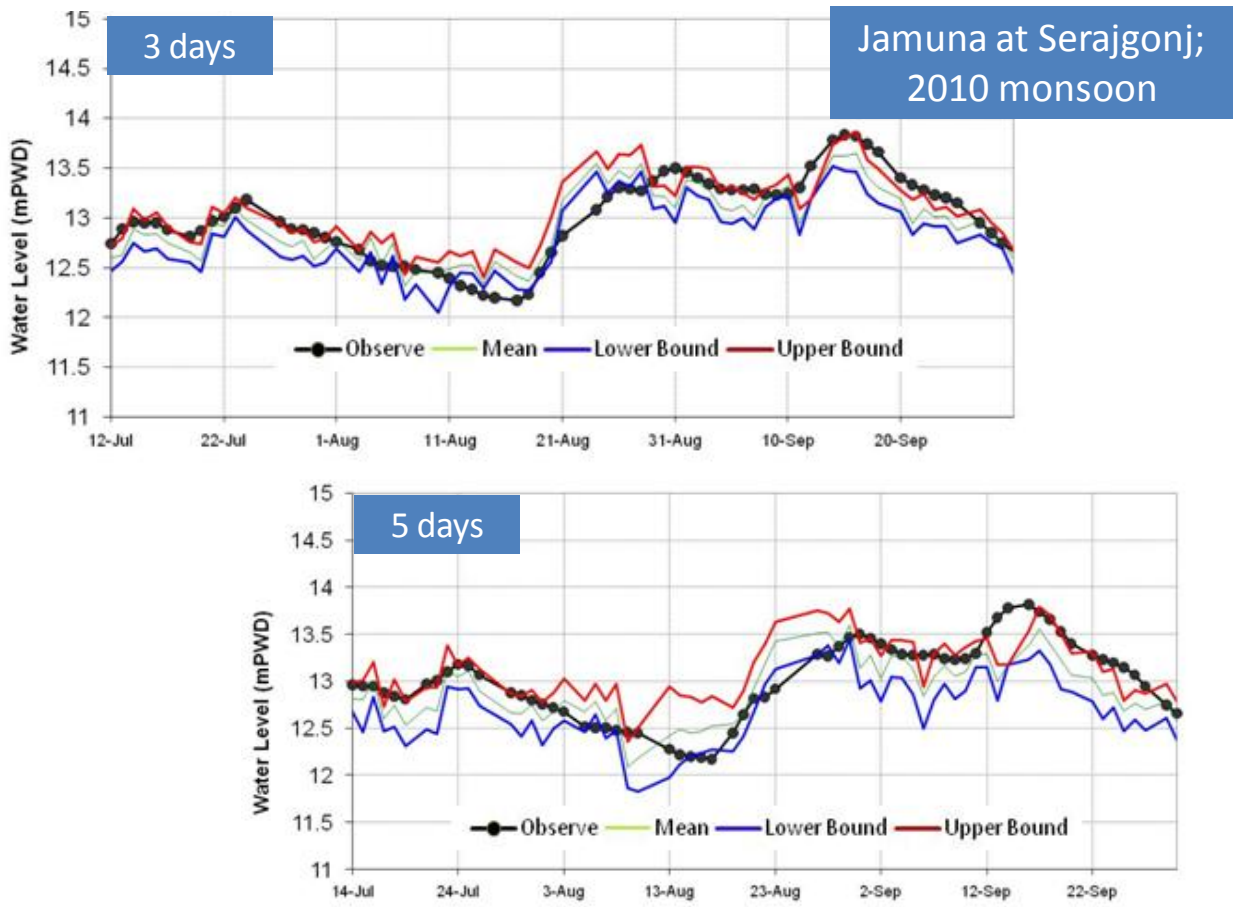


Figure 2: Performance of Medium Range Forecasts

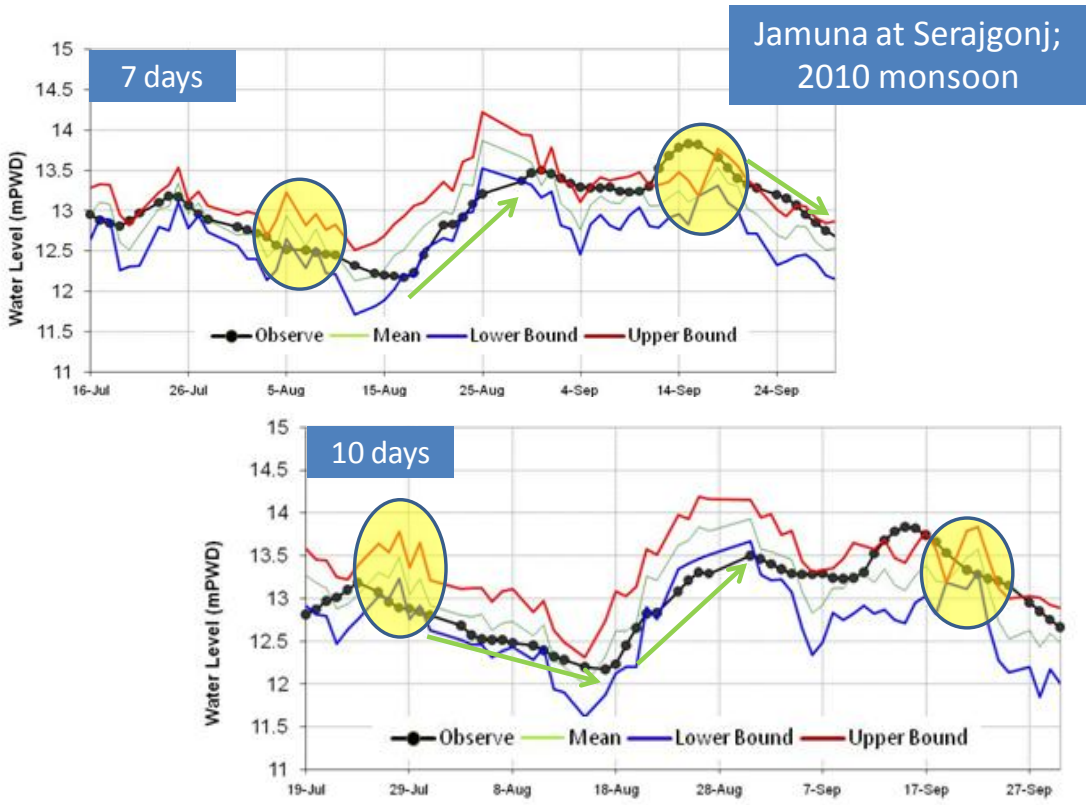
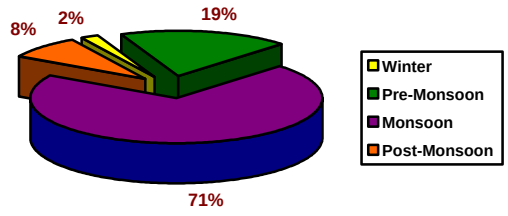


Figure 3: Performance of Medium Range Forecasts

Review of Seasonal Outlook with focus on Monson 2010 by Mossammat Ayesha Khatun, Assistant Director, Bangladesh Meteorological Department mentioned that Bangladesh is a small deltaic land of area about 1,47,570 sq. km with many rivers on it. The great Himalayan Range is in the north and the vast Bay of Bengal is to the south. This unique geographic location makes the weather system complicated in this region. It is the most disaster prone area in the world. Most of the disasters are meteorological and hydrological such as Cyclone, Flood, Local severe storm, Tornado, Heavy rainfall etc. She mentioned that in 2010 rainfall was below normal by 18% and during the Monsoon season it was 12% below normal due no depression forming over the Bay of Bengal in Monsoon 2010. In addition, 2010 was the warmest year since 1951 for Bangladesh



Seasonal rainfall distribution over Bangladesh

and was above normal by 0.9°C. The evaluation of long rang weather forecast mentioned in the Annex -1.

An initiative to predict SW monsoon rainfall outlook for Bangladesh By Md. Shameem Hassan Bhuiyan, Meteorologist (Agro met Division), Bangladesh Meteorological Department mentioned that now-a-days BMD produce one month outlook at the 1st week of every month and three months extended outlook and update every month. BMD is using LRF for different available regional centre not producing any seasonal forecast internally and not using any specific seasonal climate models. He mentioned that the MR Model Forecast for 2011 for the country as a whole is 81% of normal. SW Monsoon Rainfall Prediction by CPT-Model is also for the country as a whole 90% of normal. Other Monsoon Predictors also indicate that monsoon rainfall over Bangladesh and adjoining area will be below normal or near normal.

An initiative to predict SW monsoon rain forecast at BMD

Review of Storm Surge Modeling by S. M. Quamrul Hassan, Meteorologist, Bangladesh Meteorological Department mentioned that about 5% of the global tropical cyclones form over the Bay of Bengal however, 80% of the world casualties result from these tropical cyclones. Loss of life and property is mainly due to storm surges. The long continental shelf, shallow bathymetry in the North Bay of Bengal, the northward-converging nature of the Bay, complex coastal geometry with many kinks and islands, high astronomical tides and long tidal range between east and west coasts of Bangladesh are the main causes of the highest storm surge and of the longest duration in this region. BMD is operationally running IIT-D storm surge model developed by Dr. S.K. Dube. The model can run in both LINUX and Windows OS. The model is well tested and several experiments have been done by BMD personnel on the model. In December 2010 BMD organized a 5-day training Workshop on MRI (JMA) storm surge model with the help of RIMES, Bangkok. One expert from MRI came from a resource person who developed the model. To increase the confidence level for forecasters the input data for IIT-D model are positioned of cyclone (lat. Lon.), Time, Pressure drop and radius of maximum wind

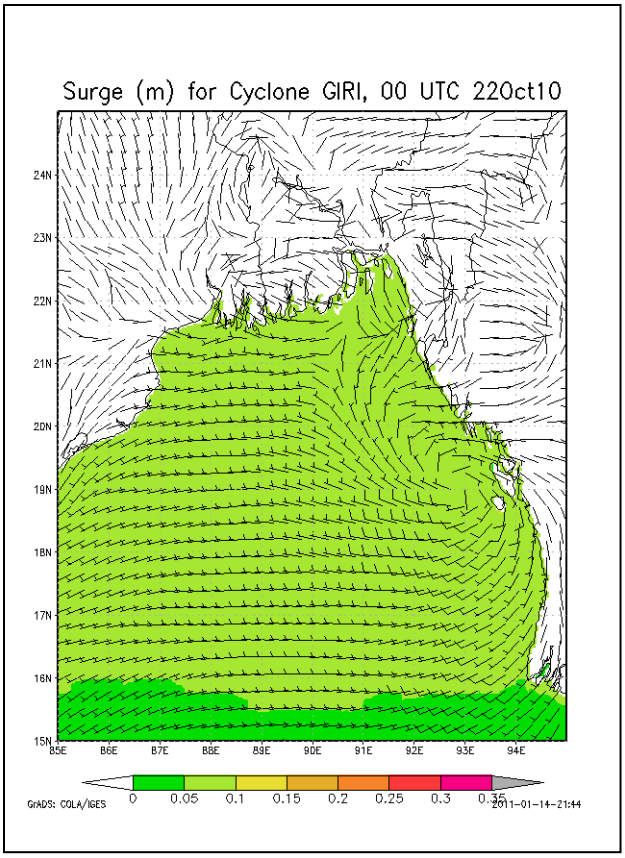
MRI model has been adopted at BMD. Almost all the same data can be used for the MRI model therefore other model outputs can be used as an input.

Simulation of Storm Surge for Cyclone GIRI at BMD using MRI model-

- Input data from GSM from JMA
- Domain: 85°E - 95°E
  15°N - 25°N
- For 24 Hours (00, 22 Oct 2010 – 00,23 Oct 2010)
- Interval: 30 Min.

Outputs from Wave Model:

- Significant Wave Height (m)
- Significant Wave period (sec)
- Wave direction
- Sea Surface Wind (m/s)
- Swell Height (m)
- Sea Surface Pressure (hPa)



RIMES Collaboration with Bangladesh on Weather/Climate and Flood Forecasting by Jayaraman Potty, RIMES, Thailand talked about RIMES, its objectives, purpose and area of collaboration with BMD on WRF Modeling for Short Range Prediction, seasonal outlook, integration of radar data for improved IC, integration of AWS data for 4-D Var, storm Surge model with WRF model, thunderstorm prediction for ferry services and WMO-RIMES Project.

Users Discussions Summary

Disaster Management & Early Warning Dissemination by Probir Kumar Das, Programmer, Disaster Management Bureau presented major responsibilities of DMB during alert and warning stages:

- Ensure receipt of warning signals of imminent disasters by all concerned officials, agencies and mass communication media.
- Activate the Emergency Operations Centre (EOC) and keep touch with other agencies for making their Action Plan effective and also to activate the Control Room.
- Publish daily bulletins during disaster periods for foreign embassies and UN Missions.
- Instruct local authorities for assessment of loss and damage and requirement of relief.

Disaster Management Bureau is implementing a pilot project titled "Early warning dissemination through cell broadcasting" from July 2009 through a Memorandums of Understanding signed between Grameenphone Ltd and Teletalk Bangladesh Ltd. As per MoU Grameenphone Ltd. and Teletalk Bangladesh Ltd will disseminate early warning within 20 characters in the flood prone Sirajganj and Cyclone prone Cox's bazaar district. DMB has already developed a message format on Cyclone warning and Flood warning with the help of BMD and FFWC. DMB has already organized two workshops for Disaster Management Committees in the Sirajganj and Cox's Bazar district on Flood and cyclone CB Message Format. Disaster Management Bureau is now implementing a project on dissemination of Early Warning through IVR. IVR - is a technology that automates interactions with telephone callers. The System is now developing and it will be launch very soon. Peoples could hear weather information and river situation through their mobile phone.

Expectation of forecast from BMD for Agriculture Use:

- Forecast of depression
- Forecast of flash flood
- Forecast of flood
- Forecast of cyclone
- Forecast of rainfall
- Forecast of temperature changes
- Forecast of humidity
- Forecast of evapo-transpiration
- Forecast of fog/drizzling
- Forecast of soil moisture
- Forecast of day length
- Forecast of wind speed and direction
- Forecast of upstream tidal information(water level) for better boundary estimation and downstream tidal boundary prediction

Forecast Outlooks & DAE Expectations by Dr. S.K Harun Rashid Ahmed, Department of Agricultural Extension (DAE) mentioned that DAE is working on the future food security. DAE has been receiving forecast from BMD from last year on short range forecast on January to February' 2011: 12 hours forecast and past 12 hours rainfall (mm), maximum & minimum temp. information from 34 stations of

BMD. From March to June'2011: 24 hours forecast and past 24 hours rainfall (mm), maximum & minimum temp. information from 34 stations of BMD. He mentioned that the 24 hours forecast is more useful than 12 hours forecast, observed forecasts have been matched with the reality. Midterm forecast :(1 week to 10 days) mostly matched with the reality, very helpful for disseminating to field level. Long term forecast includes rainfall status of previous month, forecast for the present month/ next month mentioning river condition, depression, flood, rainfall, temperature changes and long term (five years) temperature and rainfall data of previous 10 years. Some long term forecast did not matched with the reality and therefore were unhelpful when planning agricultural practices.

Application of Weather Forecast Concerning Fisheries (DoF) by Md. Mizanur Rahman Siddiquee, Assistant Director, Department of Fisheries mentioned that DOF is working with the people whom are in charge of the production, collection, processing of fisheries of the country. For better fish production, in the last 5 years climate and meteorological information has been essential. Fisheries have played a great role in agricultural production. For fisheries production times of sun rise and sun set, relative humidity, cloud, temperature, storm warning, tsunami warning etc forecasts are essential to the fisherman and the fish farmer for maximum output to be obtained. DoF generally attain weather forecast from TV and radio. They do not receive any weather forecast from BMD or other organizations. DoF is eagerly awaiting weather and meteorological information by SMS, FAX or over phone from BMD. Thus they could deliver the weather information to its local level office. DoF is also expecting weather related workshops and training at their district and local level office in order for them to understand the weather forecast product easily.

Application of Weather Forecast Concerning Bangladesh Power Development Board (BPDB) by Khan Manjur Morshed, Executive Engineer mentioned that BPDP was established in 1972 and is the authority for planning, construction and operation of power generation and transmission facilities throughout Bangladesh and for distribution in urban areas except metropolitan city of Dhaka and its adjoining area. Ashuganj Power Station Company Ltd. (APSCL), Electricity Generation Company of Bangladesh (EGCB), North West Power Generation Company Ltd. (NWPGCL) and West Zone Power Distribution Company Ltd. (WZPDCL) has already started functioning as company under BPDB.

The BPDB is responsible for major portions of energy generation and distribution mainly in urban areas of the country. Their aim is to provide quality and reliable electricity to the people of Bangladesh for desired economic and social development as a result the power system has been expanded to keep pace with the fast growing demand. BPDB has no weather forecasting department and still has no mechanism to take into account weather prediction in power

generation and distribution process. This is required to establish a close contact with BMD for getting the weather forecast. That would help BPDB to take necessary action.

Application of Weather Forecast Concerning Bangladesh Navy (BN) by Lt. Cdr. Arafat Islam, OIC Met Sec, BNHOC, Bangladesh Navy presented role of BM and importance on weather information for their daily works. He mentioned that Bangladesh Navy is working closely with BMD for enhancing the delivery, communication skill of weather forecasting facilities.

- Safeguard/defend the territorial waters of Bangladesh.
- Keep the Sea Lines of Communications (SLOC) open during war & at peace.
- Keep the sea ports of Bangladesh open for shipping during a war.
- Protection of the Bangladesh fishing fleet.
- Patrolling in river waters of Bangladesh.
- Search and Rescue at sea.
- Cyclone warning for Naval Ships and craft.
- Protection of Bangladesh merchant ships in the high seas.
- Assist the civil administration in maintaining internal security and peace, whenever called for such duties.
- Assist the civil administration in the event of natural calamities like flood, cyclone, tidal waves, earthquake etc whenever called for such duties.
- Naval Control of Shipping (Internal and External, Inland or Foreign) Organization.
- Oceanographic survey.
- Any other task for which the government may deem it necessary to deploy the Navy.

Forecast Outlooks & DGHS Expectations by Dr. Md. Abdul Matin Bhuiyan, Assistant Director (Disaster), DGHS presented DGHS responsibilities and roles of weather and flood information in the health facilities. He mentioned that currently they receive warning information by TV (Scrolling, Special weather forecast), radio, newspaper and website. Whenever any emergency they activate Standard Operating Procedure by-

- Activate control room (DGHS CR, respective district/s Hospital as well as upazila health Complexes CR)
- Medical team/ assessment team/Rapid Response Team (RRT) remain stand-by at local and national level
- Communication with relevant personnel regarding preparedness (stock fuel for generator because lack of electricity which is needed to maintain cold chain of vaccine)
- Pre-positioning of emergency drugs (Buffer stock) and medical supplies
- Develop situation report (add warning map that collect from BMD/FFWC webpage) and circulate through email

- Call on special health cluster meeting with all health partners
- Analyze inventory list, update emergency directory, reporting format, assessment tools in terms of upcoming emergency
- Declaration of health Emergency

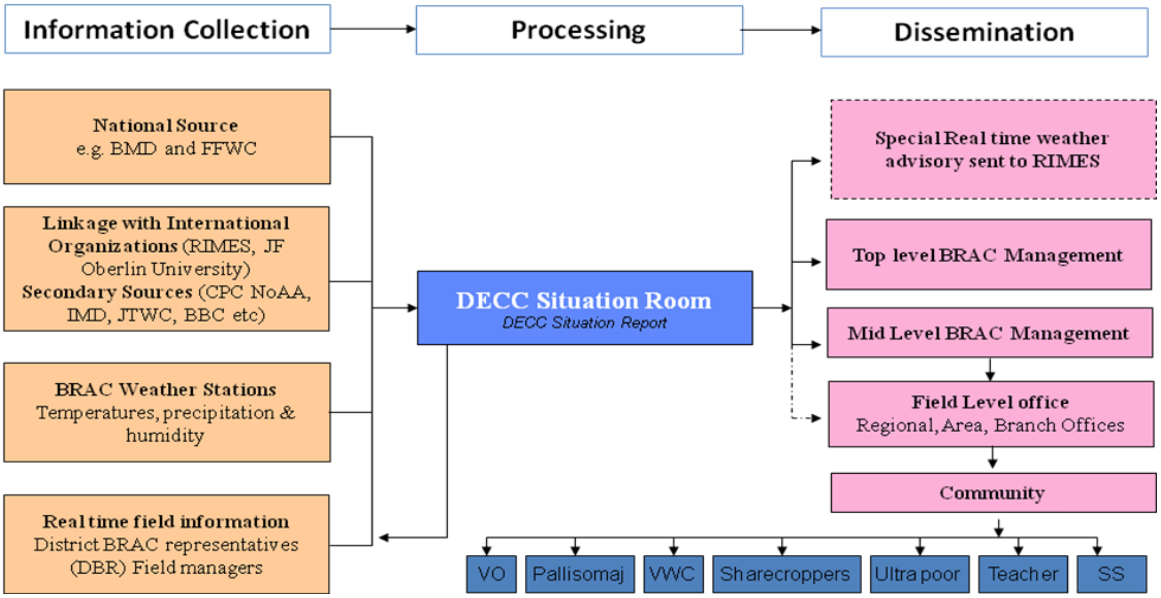
Based on the early warning information the applications they conduct are:

- Floods mortality- Drowning, snakebite – counseling parents who have children, fencing, swimming; stock anti-snake venom
- Floods morbidity- Diarrhea, ARI due to disrupted WATSAN situation- readiness WPT, Bleaching Powder, Water treatment plant, IEHK kits for displaced population
- Cyclone morbidity- injury- ensure availability trained personnel for first aid, CPR, mass casualty management
- Cold wave morbidity- ARI, COPD- distribution warm cloths
- Provide comprehensive health care service (by arranging mobile hospital, establishing makeshift hospital)

They have requested some specific action should be taken by BMD and FFWC such as

- Disaster forecasting by BMD/FFWC should be in time and accurate.
- Aware community people about early warning system (understanding Signal Numbering System and what to do after receiving signal) by using TV, Radio, Newspaper and IEC materials (leaflet, poster).
- Signal should be sent through SMS in case of great danger warning signal 10 and probable time of cyclone arrival.
- What kind of disease outbreak may be triggered due to cyclone, floods, cold wave and their preventive measures should be informed to the common people by using mass media

BRAC & Weather Forecasting System by By Mohammed Zahidur Rahman, Management Professional, BRAC mentioned that BRAC is a development organization dedicated to alleviating poverty by empowering the poor to bring about change in their own lives. They have awareness raising and capacity development at community level (200000 VO members, 64000 School teachers, 80000 Health volunteer, 50000 Community members). The information dissemination process to BRAC stuffs are shown in the diagram below:



Information collection system for Weather Forecast

Application of Weather Forecast Concerning WASA by S.M Ruhul Amin, Executive Engineer, WASA discussed major responsibilities and functions of DWASA and their extended areas. He mentioned that Dhaka WASA didn't get any weather, climate or meteorological forecast from BMD. If Dhaka WASA got the early warning weather forecasts then it would be easier to make effective decisions for drainage systems and water supplies.

UNDP initiatives on Climate Risk Management in Bangladesh by By Aminul Islam, Assistant Country Director, UNDP mentioned that Bangladesh is a country prone to natural disasters, 200 disaster events have occurred causing more than 500,000 deaths since Liberation. Climate change has severe impacts in Bangladesh. Such as

- Increasing frequency and severity of climatic events such as:
- Flooding, cyclones and drought
- Increasing loss of assets and livelihoods (up to 3%)
- Projected impact of sea level rise (<45cm):
- Inundate 10-15% of land by 2050
- Directly impact up to 35 million people
- Projected global temperature increases by 2050 could reduce:
- rice production by 8%
- wheat production by 32%

– Undermine macro-economic growth, reduce food security, and increase migration pressure.

UNDP play catalytic role in mainstreaming sustainable development in Bangladesh by integrating environment, climate change and disaster risk reduction in policies and development intervention. They have 3 programmatic thrusts:

- Climate Change Adaptation with Disaster Risk Reduction
- Climate adaptive Natural Resource Management/ biodiversity
- Stronger focus on Climate Change Mitigation and Green Development

Regarding the Responsive Approaches UNDP involves multi-level Governance and Institutional Change; focus on policy leveraging to facilitate transformational development; facilitate informed and knowledge based decision making thru policy debates, knowledge product development and knowledge networking; programming in the high impact areas (e.g., enhanced ecosystem productivity, sustainable land/water management) addressing the un-served programmatic areas.

Projects and Programmes of UNDP

Project Title	Duration	Budget (USD)
ENVIRONMENT – USD 7.157 million (8%)		
Coastal and Wetland Biodiversity Management at Cox's Bazaar (CWBMP)	2002-2011	5,520,000
Capacity Building and Resource Mobilization for Sustainable Land Management in Bangladesh (SLMP)	2007-2011	637,000
Capacity Building for the Planning Commission: Poverty, Environment and Climate Change Mainstreaming (PECM)	2010-2012	1,000,000
CLIMATE CHANGE MITIGATION AND ENERGY – USD 7.971 million (9%)		
Enabling activities for the Preparation of the Second National Communication of the Bangladesh to the UNFCCC (SNC)	2008-2011	405,000
National Ozone Depleting Substances Phase Out Plan	2008-2012	1,025,000

Institutional Strengthening for the Phase Out of Ozone Depleting Substances ODS Phase V	2008-2011	130,000
Phase-out of CFC Consumption in the Manufacture of Metered Dose Inhalers (MDIs) in Bangladesh	2009-2012	2,776,788
Barrier Removal for Energy Standards & Labeling (BRESL)	2009-2012	635,000
Improving Kiln Efficiency in the Brick Making Industry	2010-2014	3,000,000
CLIMATE CHANGE ADAPTATION AND DISASTER – USD 75.805 million (83%)		
Community based Adaptation to Climate Change through Coastal Afforestation in Bangladesh (Coastal Afforestation)	2009-2013	4,400,000
Community based Adaptation to Climate Change in Bangladesh (CBA)	2009-2010	405,000
Comprehensive Disaster Management Programme Phase II (CDMP II)	2010-2014	68,000,000
Early Recovery Facility (ERF)	2011-2015	3,000,000
TOTAL		90,933,788

Management of Climate Change Risk: Initiatives of CDMP By Sanjib Kumar Saha, Response/Adaptation Management Analyst discussed about CDMP Phase II roles and program areas and CC initiatives in Phase I and ongoing and planned activities in Phase II. He mentioned that in Phase I introducing CCA and its impact with DRR as a key element which facilitated the establishment of the Climate Change Cell in the Department of Environment (Ministry of Environment and Forest), supported the Cell to undertake – adaptation research, building capacity to carry out modeling, and establishing a climate change database etc and implemented Adaptation trial at community levels through Livelihood Adaptation to Climate Change (LACC) approach by Department of Agricultural Extension(DAE)

In the CDMP Phase II Mandates in CCA covers:

- To reduce vulnerability to adverse natural & anthropogenic events.
- To support people-oriented DM/DRR partnership.
- To improve linkages and synergies between DRR and CCA particularly.

- To build CCA capacities in the MoFDM and DMCs.
- To provide technical guidance to local Govt. to implement adaptation strategies, policies, measures.
- To provide technical supports to the govt. agencies (DoE, DAE, DoF etc) and other stakeholders (NGOs).
- To scale up community adaptation through the CRA/RRAP process.

Some of the on-going activities in CDMP Phase II are

- Development of CC scenario and hazard impact: on the rainfall, temperature, flood, drought, upsurge by engaging recognized institutes;
- Development of CCA modules: for training for govt. officers and other stakeholders by recognized national training institute or organization;
- CCA options and technologies: study to identify and validate verify CCA options, technologies, approaches;
- Development of Union Fact Sheet: for 2000 unions incorporating the DRR and CCA.
- CCA elements in Disaster Resilient Habitat: for the vulnerable population living in high risk areas;

Discussion and Working Group Outcomes

During the working group exercise participants worked on three specific topics. Group one discussed identifying information gaps or issues, if any, for better using climate-related information and analysis (issues could be climate data analysis concerns not met/ FFWC/BMD's forecast information is not received/ difficulty in understanding/ difficulty in applying for decision-making/ need for improvement of forecast information as per specific requirement – to be identified) and how can these issues be addressed. The outcomes of group one were as follows:

- Short term/ Midterm/ Long term info given by BMD should be more specific.
- Forecasts/ Weather info. Should be illustrated and well described.
- Every forecast/ Weather information should have a conclusive statement.
- Terms used in forecasting should be simple/ easy to understand.
- Number of observatories should be increased.
- Weather information are being monitored/ submitted to top brasses of individual department.
- All weather reports should contain a record.
- Long term data should be preserved and published.
- Website addresses to be available/ published to government department user department.
- Electronic / Print media/ Electronic bill boards to be utilized.
- BMD should incorporate Met studies in national curriculum.
- Inter Department Training / Workshop/ Forum would be organized.

Group two discussed if additional information is made available (eg: longer lead time forecasts, more regional or location specific information), what would be the requirements to make use of it (requirements can be- need for policy or institutional framework, need for capacity to understand and apply- if so, what capacity?). The outcomes of the group were:

- Modernization of the existing observatories.
- Capacity building of the existing manpower.
- Motivation and awareness building of the stake holders
- Involvement of the related communities.

- Feedback and evaluation from the end users.
- Inclusion of the meteorological and seismological subject in national curriculum.

Group three discussed identifying a pilot project (location, key activities and key agencies to be involved) for practically addressing above issues. Identification of pilot locations could consider a severe climate risk experienced in specific locations/ communities, receptivity of local institutions to assist communities with new interventions, connectivity and communication facilities for launching pilot demonstration project, commitment of communities to sustain new innovative practices etc. The project was identified on "Remedy **of Water Logging ".** Key activities suggested were

a) Activate Coordination Cell &Open Control Room

1. Volume Assessment
2. Collecting information from BMD and FFWC.
3. Present drainage capacity of WASA/ DCC/ BWDB.
4. Identifying vulnerable areas.
5. Keeping operational assets like equipment and manpower in standby mode.
6. Running cleaning operation
7. Area basis information dissemination and preparedness.
8. Established fast communication with Power Development Board for electricity regulation and standby generator for WASA.
9. Ensure pump and generator for various points.
10. KPI should be give highest priority of attention.
11. Allocating available resources.
12. Maintain law and order
13. Involve DPHE and Health Services.
14. Monitoring trough coordination cell.

b) Update & review information of key agencies

1. BMD
2. WASA
3. BWDB, FFWC
4. Electric Supply, BPDB
5. Fire Service & Civil Defense
6. DMB
7. DPHE & DGHS

8. DMP
9. Media & Mobile Operator
10. Armed Forces

Recommendation

During the Forum participants shared information and evaluated processes towards the following actions:

- Developing a preparedness plan for the 2011 monsoon season based on the forecast given by BMD & Flood Forecasting & Warning Center (FFWC) and other inputs and considerations.
- Provided specific recommendations on improving inter-agency coordination and collaboration towards strengthening the multi-hazard early warning system.
- Long-term policy recommendations on ways to better manage climate risks.
- Prioritize climate risk management program and specify actions for specific locations.
- Developing a platform for inter-agency coordination of policies, sectoral plans, and programs for dealing with potential impacts of hydro-meteorological and geological hazards.
- Developing a platform for long-term process of understanding risks posed/opportunities brought about by past, current, and future climate.
- Gathered user feedback for improving the early warning system for extreme natural hazard events.
- Identified other gaps in the climate risk management for each sectors.
- Focal Points in respective agencies can be formed for communication of climate and forecast info.
- BMD should enhance number of weather observatory. Every district should have a weather observatory.
- Weather forecast should be objective oriented and more frequent, quick and timely dissemination of products with an accessible media (i.e. print and electronic media, SMS, Voice mail, Toll free telephone etc.).

- BMD should discover new mechanism like SMS, IVR for dissemination of the forecast.
- BMD's weather forecast should be easy to understand for the stake holder.
- BMD should issue weather forecast and warnings with more lead time.
- More media coverage should be ensured.
- BMD should introduce interactive system for any query/ clarifications for the users.
- Training and capacity building for enhancing effective end to end EWS.
- Stakeholders should take appropriate measures in time.
- Weather information display systems should be at railway stations, air ports, river ports, sea ports and important public place.
- Easy communicating language should be used instead of more technical one so that common people can understand the forecast easily (Text and Graphics).
- Reduce the technical presentation but give more socio-economic impact related to climate change.
- From BMD. NGOs (Agriculture, fishing, social related) would stand awareness program among people.
- The regional, local may invited to share lesson learn.

Implementation Strategies of Recommendations

Some implementation strategies of recommendation came from the 3rd National Monsoon Forum. Those are given below:

- Stand a sustainable inter departmental synergies to minimize the gap of communication and find out new stakeholders who are affected by disaster and climate issues.
- Help BMD to issue weather forecast and warnings with more lead time.
- Review of the seasonal forecast performance in the previous season.
- Report of the actions taken by user agencies.
- Delivery of the seasonal climate/hydrological outlook, and discussion of potential impacts and preparedness measures to be undertaken.
- Identification of areas for improvement and actions to address gaps in preparation for the coming season.
- Current issues on early warning systems and special topics on other hazards of interest may be also identified.
- Facilitate the integration of weather and climate information applications into the agency operations and practice, development policies, plans, and laws.
- Evaluate early warning system performance and develop recommendations to take appropriate action for improving system performance.
- Activities that would strengthen the end-to-end multi-hazard early warning system from national down to the local level.
- Support the integration of weather, climate and hydrology information applications into broader national development platform.
- BMD and stakeholders would organize training and capacity building for enhancing effective end to end EWS in the stake holder.
- Help the stakeholders to realize for taking appropriate measures in time.
- Try to establish a weather information display systems at railway stations, air ports, river ports, sea ports and important public place.

- Take long-term policy recommendations on how to better manage climate risks.
- Organizing the BMD Web site more users friendly and arrange some system that would allow stakeholders to put question and message.
- Establishment the effective monitoring cell.
- Broadcast a weekly program on TV about met and various meteorological term in weather forecast
- Use the friendly language to explain the technical term which other people could use.
- Ensure every stakeholder's regional, local level would share lesson learnt among them.
- Bi-Monthly meeting among the stakeholder lead by BMD.

Conclusion:

The main strategies of the national monsoon forum is to provide a platform for the seamless generation and integration of hazard risk information of all timescales and strengthen the multi-hazard early warning system through a regular and sustained multi-stakeholder dialogue process between early warning information provider and users at the national level and local level with the participation of mass-based organizations. The 3rd National Forum has evaluated Early warning system performance, and recommendations have been made for improving system performance. This time every stakeholder placed their relevant presentation which ensures the first two national monsoon forum objectives in past year. If BMD and the stakeholders could able to disseminate the weather forecast and climate information successfully then the common person would be aware of any future climatic hazard and will be able to make suitable decisions to deal with the climate. Thus helping people achieve the socio-economic goal.

Annex 1: Evaluation of Long Range Weather Forecasts

Long Range Forecast for January 2010

- Normal Rainfall may occur over the country.
- Two to three spell of moderate(06-08°C) to severe (04-06°C) cold wave may sweep over Northern and Central part of the country and three to four spells of mild (08-10°C) to moderate (06-08°C) cold wave may sweep elsewhere over the country.
- Moderate to thick fog may occur over the river basins, Northern and Central part and light to moderate fog elsewhere over the country.
- Agro-met forecast: Average evaporation 2.0-2.5 mm/day and average sunshine 6.2-6.7 hrs./day.
- River situation: Normal.

Evaluation of forecast January 2010:

- In January 2010 below normal rainfall recorded over the country.
- Thick fog occurred over the river basins and Northern, Eastern and Central part and light to moderate fog elsewhere over the country and the fog persists till noon.
- Severe cold wave swept in the northern and northwestern Central parts and the lowest minimum temperature of 5°C was recorded at Srimongal (12 Jan).

Long Range Forecast for June 2010

- Within 2nd week of June Southwest monsoon (Rainy season) may set in over the country.
- Above Normal Rainfall may occur over the country.
- 01- 02 Monsoon Depressions may form in the Bay of Bengal.
- Agro-met forecast: Average evaporation 3.5-4.5 mm/day and average sunshine 4.0-5.0 hrs./day.
- River situation: In the month of June the main rivers (the Brahmaputra and the Padma) may flow below the danger level, so there is less possibility of flood. But due

to heavy rain and run off from hilly area, there is a chance of flood in the northeastern region.

Evaluation of forecast June 2010:

- Southwest monsoon has advanced up to Teknaf coast on 3rd June and set on over Bangladesh on 6 June.
- In June 2010 above normal rainfall recorded over the country (+14.3%).
- In the 1st, 3rd and 4th week of June SW monsoon was active over Bangladesh (heavy to very rainfall occurred).
- On 7th June a low developed in the WC-Bay and adjoining area but on 14th June it became unimportant in the sea.

Evaluation of forecast July to September 2010:

- In July 2010 below normal rainfall recorded over the country (-36.0%).
- SW monsoon was less active over the country.
- No low pressure system or depression crossed Bangladesh coast.
- A low developed in the NW Bay on 27 July, it intensified into a well marked low on 29 July but on the next day it weakened and crossed Orissa coast of India.
- In August 2010 below normal rainfall recorded over the country (-29.0%).
- In August 2010 three low pressure systems developed in the NW Bay and adj. area. On 5th August one low intensified into a well marked low but on 7th August it weakened and crossed Orissa coast of India.
- In September 2010 below normal rainfall recorded over the country (-26.0%).
- SW monsoon was less active over the country.
- No low pressure system or depression crossed Bangladesh coast.
- A low developed in the North Bay on 12 September and it crossed Orissa coast of India on 17 September.

Long Range Forecast for October 2010

- Normal Rainfall may occur over the country.
- 02 Monsoon Depressions may form in the Bay of Bengal.
- Within 1st half of October Southwest monsoon (Rainy season) may withdraw from the country.
- In the month of October Day and Night temperature may decrease gradually.

- Agro-met forecast: Average evaporation 3.25-3.75 mm/day and average sunshine 6.25- 7.25 hrs./day.
- River situation: Normal.

Evaluation of forecast October 2010:

- In October 2010 above normal rainfall recorded over the country (+62%).
- In the month of Oct. due to the effect of cycle-genesis three low pressures developed in the Bay of Bengal.
- 1st low developed in the WC Bay and adj. area on 5th Oct. and intensified into a depression on 7th Oct. and crossed Bangladesh –West Bengal coast on 8th Oct 2010.
- The second depression formed on 13th Oct. in the EC Bay and adj. area, on 14th Oct. it intensified into a deep depression and crossed Orissa coast on 16th Oct 2010.
- The 3rd depression formed on 21st Oct. in the EC Bay and adj. area and intensified into a cyclonic storm "Giri" on the same day. It further intensified into a severe cyclonic storm with a core of Hurricane wind and crossed Myanmar coast on the night of 22nd Oct.
- SW monsoon withdraw from Bangladesh on 18th October 2010.

Evaluation of forecast November 2010:

- In November 2010 below normal rainfall recorded over the country (+78%).
- In the month of November two low pressure system formed in the Bay of Bengal.
- 1st low formed in the Andaman Sea and adj. area on 2nd Nov. and intensified into a depression on 4th Nov. It further intensified into a cyclonic storm "Jal" and then severe cyclonic storm and crossed Tamilnadu coast on 7th Nov. 2010.
- The second low formed on 15th Nov. in the SE Bay and adj. area and intensified into a well marked low and on 16th Nov it weakened and crossed Tamilnadu coast on 16th November 2010.

Annex 2: Agenda

Day 1: Wednesday, 29 June 2011	
8:30- 9:00	**Registration**
Inaugural Program	
9:00-10:00	Recitation from Holy Quran **Welcome Address by: Ms. Arjumand Habib** Director, Bangladesh Meteorological Department **Remarks by :** Engr. Habibur Rahman Director General, BWDB **Opening Remarks by:** Secretary, Ministry of Defense Government of the People's Republic of Bangladesh **Group photo & Tea Break**

10:00- 10:30	
SESSION 1: INTRODUCITION AND FORECAST BRIEFING	
10:30-10:45	**The 3rd Monsoon Forum** (objectives, outputs, milestones, and expected support) ***Mrs. Arjumand Habib*** Director, BMD
10:45 – 11:30	**Progress and Achievement on Weather Forecasts and Applications** BMD
11:30-12:00	**Review Seasonal outlook with focus on Monson 2010** BMD
11:30-12:00	**Review of long range Flood Forecasts Application** **Mr. Aminur Rahman,** FFWC
12:00-12:30	**Review of Storm Surge Modeling, Seasonal Outlook Capacity of BMD** BMD
12:30-13: 00	**RIMES contribution to Bangladesh on Weather and Flood Forecast Applications** **Dr. J Potty, Chief Climatologist, RIMES**
13:00-14: 00	**LUNCH BREAK**
	SESSION 2: FORECAST OUTLOOKS & USERS (STAKEHOLDERS)

	EXPECTATIONS
14:00- 15:30	Each Stakeholder will present on the forecasts outlook for last season according to expectations, receiving mechanism, usefulness, application and expectations. Stakeholders will describe on what were the lessons learned from using/not using weather/climate/ flood information. They will also identify actions that should undertake be undertaken by BMD and FFWC for this season. • Presentation by Disaster Management Bureau (DMB) • Presentation by Department of Agriculture Extension (DAE) • Presentation by Bangladesh Power Development Board (BPDB) • Presentation by Department of Fisheries (DoF) • Presentation by Bangladesh Water Development Board (BWDB) • Presentation by Directorate General of Health Services (DGHS) • Presentation by Dhaka WASA • Presentation by Roads and Highway Department (RHD) • Presentation by Bangladesh Armed Force (BAF) • Presentation by a NGO (BRAC) on community level actions
15:30-16:00	**Tea break**
16:00- 17:00	**Panel Discussions** 1 Representative from BMD 1 Representative from FFWC 2 representative from Forecasts Users Group (i.e. DAE, DMB, DoF, etc) Facilitate by S.H.M. Fakhruddin
Day 2: Thursday, 30 June 2011	
9:00-9:45	**SESSION 3: Climate Risk Management** **Presentation: Climate Risk Management Technical Assistance Support Project**

	S.H.M. Fakhruddin, Hydrologist, RIMES
9:45-10:30	**UNDP initiatives on Climate Risk Management in Bangladesh** **UNDP**
10:30-11:00	**Tea Break**
11.00-12.00	**Working group discussions** The working group will discuss on the - Past, on-going and planned climate-related initiatives (emphasis on adaptation) in the sector / Current status of application of weather and climate information for managing risks - Climate-related future initiatives requirement - What are the actions or priority initiatives necessary for climate risk management
12:00-13:00	**Working Group Presentation:** Each working group will have 15 minutes to present a summary of their discussions and their recommendations.
13.00-14.00	**LUNCH**
14.00-15.30	**PART 5: PRESENTATION OF RECOMMENDATIONS** **Discussion on the Recommendations** (by rapporteur) **Md. Shadekul Alam** Meteorologist, BMD
15:30-16.00	**Closing & Break**

Annex 3: List of Participants

SL No.	Name	Organization	Contact address
1	Syed Nazmul Ahsan , Deputy Director	Department of Environment(DoE)	01819427358, nazmul@doe-bd.org
2.	Md. Shahidul Islam	Comprehensive Disaster Management Program, CDMP	01191002105, shahidul.islam@cdmp.org.bd
3.	Md. Amirul Hossain, Executive Engineer	Flood Forecasting and Warning Center (FFWC), BWDB	01552360340, amirulbd63@yahoo.com
4.	Lt. Col. MD. Shameem Ahsan Jaglul, PSC, Director	Survey of Bangladesh, (SoB)	01730332350, shameem_shimul@yahoo.com
5.	Bhabesh Chandra Dey, Livestock Economist	Department of Livestock (DoL)	01711396638, bcdeyle@gmail.com
6	Lt. Cdr. Arafat Islam, OIC Met Sec, BNHOC, Bangladesh Navy	Bangladesh Navy	01712651948, arafat1191@yahoo.com
7.	Lt. Cdr. A F M Ahsan Uddin, Assistant, Director(Operation)(C)BN , Bangladesh Coast Guard HQ	Bangladesh Coast Guard HQ	01715015479, ahsanbn@yahoo.com
8.	Dr. Sk Harunur Rashid Ahmed, UAO, DAE	Department of Agriculture Extension(DAE)	01552446711, harunrashid61@gmail.com
9.	Mahmud Akhter Hossain, Sr. Aerodrome Officer, Civil Aviation Authority of Bangladesh	Civil Aviation Authority of Bangladesh	01712181013, akhtermahmud_07@yahoo.com
10.	S.M. Ataur Rahman, Executive Engineer	Bangladesh Water Development Board(BWDB)	01729788425, smar170367@gmail.com
SL No.	**Name**	**Organization**	**Contact address**

11.	Mihir Kanti Sarkar, Assistant Programmer, DEO, Bangladesh Agricultural Research Council	Bangladesh Agricultural Research Council(BARC)	017188693200, mk.sarkar@barc.gov.bd
12.	Kamrul Ahsan, Deputy Director	Geological Survey of Bangladesh(GSB)	01711152845, kamrulgsb@yahoo.com
13.	S.M Habibur Rahman, Deputy General Manager, DESCO	Dhaka Electric Supply Company Ltd.(DESCO)	01713090468, hrahman@desco.org.bd
14.	S.M Ruhul Amin, Executive Engineer, Drainage Division, WASA	WASA	01747902860, ruhul1419@yahoo.com
15.	Probir Kumar Das, Programmer, DMB	Disaster Management Bureau(DMB)	01199000068, kumarprobir@yahoo.com
16.	Dr. Muhammad Zahidur Rahim, WHO	WHO	01730032311, rahimm@searo.who.int
17.	Dr. Md. Abdul Matin Bhuiyan, Assistant Director(Disaster), DGHS	DGHS	01819064870, amatinpm@gmail.com
18.	Md. Mizanur Rahman Siddiquee , Assistant Director, DoF	Department of Fisheries(DoF)	01717537821, mizansiddiquee@yahoo.com
19.	Mohammed Zahidur Rahman, Management Professional, BRAC	BRAC	01715029095, zahidur.r@brac.net
20.	Ferdous Ara Begum, Dhaka Residential Model, College	Dhaka Residential Model, College	01817007968,

SL No.	Name	Organization	Contact address
21.	Nasima Begum, Deputy Director, Bangladesh Betar	Bangladesh Betar	01554355904, nasima_info24@yahoo.com
22.	Momtaz Begum, Statistical Officer, BBS	Bangladesh Bureau of Statistics	01818813572, momtazbbs@yahoo.com
23.	Dr. Rumena Yasmeen, BRRI, Gazipur	BRRI, Gazipur	01819487292, r_yasmeen67@yahoo.com
24.	A.K.M Mizanur Rahman, Assistant Teacher, School, Dhaka	Dhanmondi Govt. Boys High	01914438663, rahmanefti@yahoo.com
25.	Malik Kabir, Program Officer, WFP	WFP	01714044018, malik.kabir@wfp.org
26.	Tanzeba Ambereen Hqq, BRAC	BRAC	01713063258, tanzeba.ah@brac.net
27.	Khan Manjur Morshed, Executive Engineer	Bangladesh Power Development Board(BPDB)	01819219738, director.training@yahoo.com
28.	Ahmed Jahir Khan, BPDB	Bangladesh Power Development Board(BPDB)	01712164904, jahir2440@yahoo.com
29.	Md. Abdul Haque, Deputy Director	Directorate of Relief and Rehabilitation	01712850616,

SL No.	Name	Organization	Contact address
30.	Md. Amin Helaly, FBCCI	FBCCI	01711532801, holobdltd69@yahoo.com
31.	Shahriar Al Mamun, AC-PMO Security, Bangladesh Police	Bangladesh Police	01713398421, sohanbpa@yahoo.com
32.	M. Aminul Islam, UNDP	UNDP	01818260741, aminul.islam@undp.org
33.	Sanjib Kumar Saha, CDMP	CDMP	01711152344, sanjib.saha@cdmp.org.bd
34.	Md. Alauddin Biswas, Deputy Director ,BMD	Bangladesh Meteorological Department(BMD)	01556552530, biswas.alauddin@gmail.com
35.	Md. Saiful Islam Khan, Assistant Director, BMD	Bangladesh Meteorological Department(BMD)	01720397684, saiful_ik@yahoo.com
36.	Mahnaz Khan, AD, BMD	Bangladesh Meteorological Department(BMD)	9116918, anjank2007@yahoo.com
37.	Md. Mozidul Islam, Meteorologist, BMD	Bangladesh Meteorological Department(BMD)	9114035, mozidul_islam@yahoo.com
38.	Begum Jinnatun Nessa, BMD	Bangladesh Meteorological Department(BMD)	01732945025,

SL No.	Name	Organization	Contact address
39.	Mossammat Ayesha Khatun, BMD	Bangladesh Meteorological Department(BMD)	9135742
40.	Md. Azizur Rahman, Assistant Director, BMD	Bangladesh Meteorological Department(BMD)	9143703, 01552317752, sifat_ar@yahoo.com
41.	S.M Quamrul Hassan, Meteorologist, BMD	Bangladesh Meteorological Department(BMD)	smquamrul77@yahoo.com
42.	Md. Shameem Hassan Bhuiyan, Meteorologist, BMD	Bangladesh Meteorological Department(BMD)	shameem_dd@yahoo.com
43.	Md. Abdul Mannan, Meteorologist, SMRC, BMD	Bangladesh Meteorological Department(BMD)	01191177004, mannan_u2003@yahoo.co.in
44.	Md. Abdur Rahim, BMD	Bangladesh Meteorological Department(BMD)	01552332052, abdur_rr@yahoo.com
45.	Ahmed Arif Rashid, Sr. Mechanical Engineer, BMD	Bangladesh Meteorological Department(BMD)	arifrashid2004@yahoo.com
46.	Shamsuddin Ahmed, Assistant Director, BMD	Bangladesh Meteorological Department(BMD)	01713434488, shamsbmd@yahoo.com
47.	Dr. J Potty, RIMES	Regional Integrated Multi-Hazard Early Warning System	potty@rimes.int

SL No.	Name	Organization	Contact address
48.	S.H.M Fakhruddin, Hydrologist, RIMES	Regional Integrated Multi-Hazard Early Warning System	0066879929694, fakhruddin@rimes.int
49.	Md. Jabed Hossain, Research Associate, RIMES	Regional Integrated Multi-Hazard Early Warning System	01912775881, jabed@rimes.int, rony333047@yahoo.com

Regional Facility, Regional integrated Multi-Hazard
Early Warning System for Africa & Asia,
Asian Institute of Technology Campus, PO Box 4
Klong Luang, Pathumthani 12120, Thailand
(t) +662 516 5900 – 01 **(f)** +662 516 5902 **(e)** rimes@rimes.int
(w) www.rimes.int