Republic of the Union of Myanmar
Ministry of Transport and Communications
Department of Meteorology and Hydrology

Joint Workshop on Strengthening Multi-Hazard Early Warning Systems and Early Actions in Southeast Asia

Myanmar

Ms. Myo Myo Aye

18th October to 20th February, 2020, Thailand
Outline

1. Background

2. Hazard /Riskmap and Assessment

3. Observation & monitoring network

4. ICT (data transmission, hub and processors)

5. Models and Forecasts

6. Requirements & Future Plans
<table>
<thead>
<tr>
<th>Hazards</th>
<th>Jan</th>
<th>Feb</th>
<th>Mar</th>
<th>Apr</th>
<th>May</th>
<th>Jun</th>
<th>Jul</th>
<th>Aug</th>
<th>Sep</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
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<td>Cyclone</td>
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<td>High Temperature</td>
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<td>Low Temperature</td>
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<td>Drought</td>
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<td>Squalls &amp; Thunderstorm</td>
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<td>Monsoon Depression</td>
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<td>Hail</td>
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**Meteorological Hazards Calendar**
Vulnerability map or risk map of the disaster in Myanmar
Hydrological Hazard/Risk Maps and Assessments

- We develop the flood hazard maps with different return periods for some city using different models such as HEC RAS 1D, 2D Model and RRI.
- The flood hazard maps have already developed with different return periods for about more than 10 cities.
- We shared those maps to the water related disaster management Departments and organizations.
Skill Manpower of Daily Weather Forecasting and Long Range forecasting Division (Nay Pyi Taw)

- **DIRECTOR**
- **Deputy Director**
- **Assistant Director (Weather Section)**

**Climate Group**
- (2) Forecasters
- (1) Assistant Forecaster
- (5) SO and JO

**Daily Duty**
- (1) Forecaster
- (4) SO and JO

**(3) Shift Duty (24/7)**
- For each group
  - (1) Forecaster
  - (1) Assistant Forecaster
  - (2-3) SO and JO

**Management**
- Climate Modeling
- Seasonal Forecast
- Monthly Forecast
- 10 Days Forecast
- Research
- Meeting / Workshop Training
- Data collection
- Administration
- Plotting
- Analysis of Weather chart
- Weather forecasting
- Sending Fax (dissemination)
- To issue Warning/News
AWOS Meteorological Observation Network

(51) WMO Register Stations
Hydrological Observation and Monitoring Network

DMH only issue the daily water level forecasts for 45 hydrological forecasting stations along 14 major rivers in Myanmar.
Daily Weather Forecast Issuing Step

- Synoptic Data (Myanmar/Other Country) → Synoptic Chart
- Upper Air Data (Myanmar/Other) → Upper Air Chart
- Satellite Data (Grid point Data and Satellite Picture) → Satellite Picture (Past 24 hours & Present)
- Radar Data
- Result from JMA Model
- Result from PC Version Model
- RIME WRF Model Output
- Compare and Analysis by using this Chart/Draft Forecast
- Discuss with DG and Other Meteorologist
- Final Forecast

Various Satellite Picture and Chart from other international Met. Dep.
WRF Output

30km and 9 km
Installation of MTSAT and SATAID started from 2010 December, donated by JICA.

- Upgrade - Every 10 minutes observations (Himawari-8, 14th December, 2015)
<table>
<thead>
<tr>
<th>Type of Forecast</th>
<th>Time of Issuance</th>
<th>Forecast Validity</th>
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</thead>
<tbody>
<tr>
<td>Daily Weather Forecast</td>
<td>7:00Am/12:00noon/2:00pm/4:00pm/7:00pm</td>
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<tr>
<td>Sea Route Forecast/Compound</td>
<td>10:30 Am/1:30Pm</td>
<td>24 hours</td>
</tr>
<tr>
<td>Special weather forecast</td>
<td>As per request and weather conditions</td>
<td>Depend on duration</td>
</tr>
<tr>
<td>Cyclone/surge</td>
<td>24-36 Hr before</td>
<td>-</td>
</tr>
<tr>
<td>Untimely Rainfall</td>
<td>Weather disturbance....</td>
<td>-</td>
</tr>
<tr>
<td>Strong Wind Warning</td>
<td>March (15)(31)/April(1)</td>
<td>Pre Monsoon Period</td>
</tr>
<tr>
<td>significant day &amp; night temperature</td>
<td>If necessary(2 days ahead)</td>
<td>-</td>
</tr>
<tr>
<td>Heavy Rainfall/Scarcity Rainfall Warning</td>
<td>If necessary(2 days ahead)</td>
<td>-</td>
</tr>
<tr>
<td>New Records (Rainfall/Max/Min)</td>
<td>when new record occur..</td>
<td>-</td>
</tr>
</tbody>
</table>
Stage 1:
- Whatever the storm is TC or CS, which is not expected to move towards Myanmar coast by the present.

Stage 2:
- Whatever the storm is TC or CS, which is leading to Myanmar coast by the present.

Stage 3:
- Whatever the storm is TS or CS, which may cross to Myanmar coast within next (12)hrs.

Stage 4:
- Whatever the storm is TS or CS, which is crossing to Myanmar coast by the present.

Stage 5:
- Whatever the storm is TS or CS, which has crossed to Myanmar coast & free from storm risk.

COLOUR CODING FOR THE STORM

Doesn’t depend on storm ‘s intensity (ie, whatever it is TD, TC or CS), it means only for RISK of the storm.
DMH have already developed the different hydrological models such as (HBV Model, HEC HMS model and so on.

However, DMH cannot apply this model to our flood forecasting system directly, because of accuracy. Currently, we use this model for reference only, especially for our forecaster.

All models are still needed to improve the accuracy of model output.
Early Warning Dissemination System

President office
Myanmar Disaster Preparedness Agency
Chief Ministries States & Regions
MSWRR
Related Ministries
Media
EOC
Call Center
Local DMH offices

Television
Radio/FM
Website/newspaper
NGO

Phone
SSB
Fax

www.dmh.gov.mm
Hydrological Projects

1. Development and Implementation

Lack of hydro-met information
Need to establish Hydro-met stations
Recent Activities

• The installation of Meteorological (3) Radar System and (30) AWOS with Japan Gov.
• UNESCAP- RIMES Project on reducing risks of tsunami, Drought, Capacity Building for NWP
• Establishment of End to End Early Warning System for Natural Disaster (Connection between MRTV & DMH HQ with cable link )
• Modernization of Meteorological Observation System in Myanmar (KMA/KMI Grant Aid) (40 ASOS)
• Immediate Response Mechanism (World Bank) (88-AWOS)
• Project for Enhancing Capacity of Weather Observation, Forecasting and Warning in Myanmar (JICA) (Grant Aid) Three radar and (30 AWOS)
Current Activities and Ongoing Projects

• (Met.no) Norway Norwegian Meteorological Institute (Met.no)
  Capacity Building
• Ayeyarwady Integrate River Basin Management (AIRBM) Component-2
  Hydromet Observation and Information System

• Modernization (World Bank Loan) (AWOS 66) stations

• Wisdom project with JICA  (training for 3 days and five days forecast using guidance by using GPV data and GRADs, Radar Forecasting and Satellite Forecasting)

• Staff gauge installation already finished at 41 stations according to the Ayeyarwady Integrate River Basin Management (AIRBM) Component-2

• Flood hazard mapping for Ayeyarwady division using SOBEK 1D2D model by collaborated with ADB and Climate Hazard Project Team
• Development and Implementation of Flash Flood Guidance System (FFGS) and Trying to issue the Warning / Forecasts and develop the flood prone area using FFFGS and outputs (Ongoing project)
Future plans

1. To promote of Numerical weather Prediction System
2. To Substitute conventional instruments to advanced instruments.
3. To install modernize weather radars to cover the coastal regions.
4. To upgrade DMH’s Data collection and processing system with automation.
5. To enhance Climate Services, Application and Modeling Dense Meteorological observational networks
6. To extend Automatic Weather Station (AWS),Upper air observation facilities (Pilot balloon, wind, moisture, etc)
7. More instruments to observed radiation, evaporation, sun shine, ozone, upper air, wind and temperature
8. High gust anemometer for coastal station.
Thank you very much