South Asia Flash Flood Guidance System Operational Workshop (Step-4) (5th to 7th June 2018)

Operational Flash Flood Forecasting and Early Warnings Capabilities in Bhutan

(Sonam Tashi)
Weather Forecaster
Weather & Climate Services Division, NCHM
Phone: 00975-02-335578/77634940(M)
sonamtashi@nchm.gov.bt
1) Operation Flash Forecasting - Bhutan
2) Early Warning Capabilities - Bhutan
3) Warnings on Flash floods/Flood by NCHM
4) Collaboration between Meteorological and Hydrological services
5) Mechanisms of Flash Warning dissemination
Flash Flood Forecasting in Bhutan

• Generally, issue warnings as flood related: Heavy rain, cloud out burst and etc..

• Gauge readers: Water level rises issue warnings to public nearby

• There is no clear definition between Floods and Flash Floods.

• Currently term flood and flash flood are used same term by media and others.

• NCHM: Issue weather related to heavy rain advisory to General public
Flood/Flash Flood risk

1. Pre-monsoon season
2. Monsoon season
3. Post monsoon season
4. Glacier
5. Others...
1. The **Flood Warning Section** under the Hydrology Division, NCHM, is responsible to provide flood warning services in Bhutan.

2. Flood warning activity is undertaken by the Royal Government of Bhutan in collaboration between the **Central Water Commission** (CWC) of India mainly to provide early warning for people down streams from floods.

3. River water level and rainfall data from these stations are continuously transmitted to designated stations in **Cooch Bihar, Jalpaiguri, Nalbari and Berbeta in the Indian States of West Bengal and Assam**.

4. The Flood warning stations are monitored for 24 hrs during the **monsoon season** and data are transmitted using wireless sets on hourly basis to stations in India.
Glacial Lakes such as these are sources of water for the rivers flowing in Bhutan
Flooding/Flash Flood: Bhutan
Main Components of Early Warning

**RISK KNOWLEDGE**
- Systematically collect data and undertake risk assessments
- Are the hazards and the vulnerabilities well known?
- What are the patterns and trends in these factors?
- Are risk maps and data widely available?

**MONITORING & WARNING SERVICE**
- Develop hazard monitoring and early warning services
- Are the right parameters being monitored?
- Is there a sound scientific basis for making forecasts?
- Can accurate and timely warnings be generated?

**DISSEMINATION & COMMUNICATION**
- Communicate risk information and early warnings
- Do warnings reach all of those at risk?
- Are the risks and the warnings understood?
- Is the warning information clear and useable?

**RESPONSE CAPABILITY**
- Build national and community response capabilities
- Are response plans up to date and tested?
- Are local capacities and knowledge made use of?
- Are people prepared and ready to react to warnings?
Components of GLOF EWS

Remote Monitoring Stations

Communication

Sirens

Control Room
Remote Monitoring Stations

Automatic Monitoring Stations in lakes in Lunana:

- 6 Automatic Water Level Station (AWLS) installed in all the four lakes in upper region

Automatic Monitoring Stations in upstream Punakha on Phochhu:

- 2 AWLS and
- 2 AWS
Siren Towers

- 18 Sirens

- All Siren stations are placed high above the population centers for maximum sound projection.

- Whelen OA-1 siren produces a sound pressure of 60 dB at a distance of 2800 feet (0.85 km).

- Siren stations placed high above the population centers for maximum sound projection.

- Sirens can be activated from Control Room automatically and manually
Control Center is located at **Wangdi**, Flood Warning Office and is equipped with the State-of-Art-Technology hardware and software for monitoring GLOF/flood.

- Manned by staff for 24/7
- Functions:
  - Retrieving Environmental Data for all Flood Warning and Siren Sites,
  - Remote Monitoring of Flood Warning and Siren Sites,
  - Remote Control of Flood Warning and Siren Sites,
  - Displaying Health System of System
  - Displaying warnings to the operator.
Hydropower Plants

Department of Disaster Management (DDM), MoHCA

Ministry of Economic Affairs

Control Room, GLOF EWS, Flood Warning Office, Wangdi

Department of Disaster Management (DDM), MoHCA

Line Agencies

Department of Hydro-met Services (DHMS), MOEA

Media

Public

Vulnerable Communities

Report on Flood/Lakes Status

Report on Flood Status

Dz. Emergency Operation Centre

Gewogs

Thanza FWS Office, Lunana

Report on Flood Status

Request for Dissemination of Information

Dissemination/Siren status

Report on Flood/Lakes Status

Report on Flood/Siren Status & Other

Dissemination/ Feed back

Request for Dissemination of Information

Report on Flood/Siren Status

Warning Sirens

Hydropower Plants(PHPA-I/ PHPA-II/Basochhu)
Luanan Area

Punakha-Wangdi Valley

6 Water level Station
3 Sirens

4 Water Level/Weather Stations
15 Sirens Stations
Hydropower contributes over 27% of government revenue and 14 percent of Bhutan’s GDP.
1. Brief and made presentation to HRC members (Director, Chief, Hydrologists, Meteorologists and Forecasters).

   • Explain case studies of Bhur/Gelephu and findings
   • Benefits from FFG system to Forecasters/NCHM
   • Plans and program related to FFG: Regional (IMD)
   • How users can operate the FFG system other then Regional Center (IMD)
Do Bhutan need Flash Flood warning?
Collaboration: Meteorological and Hydrological

- One Director: National Center for Hydrology and Meteorology
- Weather monitored by Weather and Climate Services Division
- Early Warning/Flash flood monitored by Hydrology Division

Extreme weather warning:
- Warnings are issued through press release (Media/television)
- Disaster Management office for planning and action with Dzongkhags
- PMO office
- HM office and ministers
We issue extreme weather warning through different mode of communication such as Facebook, website, mobile and press release to different media houses (Print media, radio and television).
Services

1. HM office
2. PMO, Ministers, Government Secretary
3. Disaster Management office
4. National television (BBSC)
5. Print media- (Kuensel and others)
6. Agriculture office- farmers information
7. Tourism-in tourist seasons/off season
8. Helicopter services and to individual who request us
9. We also provide 72 hours/3 days weather forecast on our website
10. We also update weather information in Mobile apps (Druk Namshey)
Thank you for your attention