Disaster Risk Management In Cambodia

22-26 June 2014, Bangkok, Thailand

National Committee for Disaster Management
Kingdom of Cambodia

- Country Name: Kingdom of Cambodia
- Population: 14.68 Million (UN, 2012)
  - Urban: 20%
  - Rural: 80%
- Growth Rate: 1.46% (UN, 2012)
- Density: 83 Per. Sq. Km
- Capital: Phnom Penh
- Area: 181,035 Sq Km
- Province/Capital: 25
- Major Language: Khmer
- Major Religion: Buddhism
- Currency: Cambodian Riel (៛)
- Bordered By:
  - Thailand to the West
  - Lao PDR to the North
  - Viet Nam to the East
  - Gulf of Thailand to the South
Disaster Management System in Cambodia

President

1st Vice President

2nd Vice President

MOINT

Vice President

MOND

Members

- COM
- MOEF
- MOFAIC
- MOE
- MOWRAM
- MOAFF
- MOC
- MOH
- MORD

- MOIME
- MOSWVV
- MOPW
- MOEYS
- MOWA
- RCAF HQs
- CRC
- SSOCA

National Committee for Disaster Management
Commune Coordination Mechanism

Commune Committee for Disaster Management (CCDM)
- Commune Chief: CCDM Chairman
- First Deputy of Commune: Vice of CCDM Chairman
- Commune Clerk: Secretary of CCDM

Commune Council

Security and Rescue Team
- Commune Police: Chief
- School Principal: Vice Chief
- Commune Police: Member
- Volunteers: Member

Health and Hygiene Team
- Health Center: Chief
- Animal Health Agent: Vice Chief
- Focal Person in Charge of Child and Women Affairs: Member
- Volunteers: Member

Information and Response Team
- CRC Volunteers: Chief
- Senior People in Village: Member
- Volunteers: Member

Village Disaster Management Group (VDMG)
- Village Headman: Chief
- Village Assistant (Female): Deputy Chief
- Village Health Support Team: Member
- Village Animal Health Agent: Member
- Village Cambodian Red Cross Volunteer: Member
- Other two more members base upon the village deemed necessary
Cambodia is considered one of the most hazard-prone countries in South-East Asia;

Cambodia is also vulnerable to climate change due to the increase of rising temperatures and shifts in the timing and duration of seasons;

Cambodia has been experienced of several type of hazards such as: Flood, Lightning, Fire, Tropical Storm/Typhoon, Epidemic, Drought, Riverbank Collapse and Traffic Accident [*];

Over decades, Floods, Drought, epidemics and storms had threatened the well-being of Cambodian people as well as economic of the country.
### Cambodia Disaster Loss and Damage Database (CamDi)

**Sources:** (CamDi), http://camdi.ncdm.gov.kh
## Generated Report

<table>
<thead>
<tr>
<th>Serial</th>
<th>Event</th>
<th>Province</th>
<th>District</th>
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<th>Deaths</th>
<th>Affected</th>
<th>Education centers</th>
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<th>Damages in crops Ha.</th>
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Results: 15 hits. 1 Pages:

Sources: (CamDi), http://camdi.ncdm.gov.kh
2013 Map of Flood Victims (CamDi)

Sources: (CamDi), http://camdi.ncdm.gov.kh
Deaths From Multi-Hazards By Year (2000 – 2013)

Sources: (CamDi), http://camdi.ncdm.gov.kh
## Deaths and Victims From Multi-Hazards By Year (2000 - 2013)

<table>
<thead>
<tr>
<th>Event</th>
<th>Flood</th>
<th>Lightning</th>
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<td>94</td>
<td>21,989</td>
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**Sources:** (CamDi), http://camdi.ncdm.gov.kh
Percentage of Deaths Caused by Multi-Hazards (2000 - 2013)

Sources: (CamDi), http://camdi.ncdm.gov.kh
Percentage of Victims Caused by Multi-Hazards (2000 - 2013)

Sources: (CamDi), http://camdi.ncdm.gov.kh
Deaths Caused by Floods (2000 – 2013)

<table>
<thead>
<tr>
<th>Year</th>
<th>Deaths</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>347</td>
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<tr>
<td>2001</td>
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<td>2002</td>
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<td>250</td>
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<td>2012</td>
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</tr>
<tr>
<td>2013</td>
<td>184</td>
</tr>
</tbody>
</table>

Sources: (CamDi), http://camdi.ncdm.gov.kh
Victims Caused by Floods (2000 – 2013)

Sources: (CamDi), http://camdi.ncdm.gov.kh
## Summary of Damage and Losses (DaLA)

<table>
<thead>
<tr>
<th>Sectors and Sub-Sectors</th>
<th>2009 Ketsana Typhoon</th>
<th>2011 Flood</th>
<th>2013 Flood</th>
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<tr>
<td></td>
<td>Effects (US$ Million)</td>
<td>Effects (US$ Million)</td>
<td>Effects (US$ Million)</td>
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<tr>
<td></td>
<td>Damage</td>
<td>Loss</td>
<td>Total</td>
</tr>
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<td>Infrastructure</td>
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<td>11.49</td>
<td>28.75</td>
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<td>Social Sector</td>
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<td>3.33</td>
<td>42.89</td>
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<td>Productive Sector</td>
<td>1.05</td>
<td>59.01</td>
<td>60.06</td>
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<td>Cross-Cutting Sector</td>
<td>0.21</td>
<td>0.10</td>
<td>0.31</td>
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<td>TOTAL</td>
<td>58.07</td>
<td>73.93</td>
<td>132.01</td>
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</table>

**Sources:** Ketsana Comprehensive Post-Disaster Needs Assessment (March 2010), ADB Flood Damage Emergency Reconstruction Project (Preliminary Assessment, March 2012), and Post-Flood Early Recovery Needs Assessment (April 8, 2014)

**Note:** Damage and Loss Assessment (DaLA)
Map of the 2013 Flood Extent in Cambodia

Overview of Flood Extent in Cambodia, October 2013

Legend
- National capital
- Provincial town
- International boundary
- Province boundary
- National primary road
- National secondary road
- Provincial main road
- Main river (dry season)
- Water body (dry season)

- Flood extent, Oct 2013
- Flood extent, Sep 2011

Map produced by WFP Cambodia, 11 October 2013

Map information:
This map shows the potential flood water over the affected area along the Tonle Sap Lake and the Mekong River in Cambodia in 2011 and 2013. The 2013 flood extents were detected with COSMO-SkyMed acquired on 08 and 09 Oct 2013 and RADARSAT-2 acquired on 09 Oct 2013. The analysis of 2011 flood extents were based on satellite data recorded on 27 and 30 September 2011. The flood analysis has not been validated in the field.

Data Sources:

Disclaimer:
The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.
Structural DRR Measures

- Engineered buildings;
- Non-engineered buildings;
- Retrofit of existing buildings;
- Strengthening and protecting infrastructure;
- Protection of lifelines and critical facilities (high ground/structure);
- Flood protection measures;
- Structural warning systems.
Non-Structural DRR Measures

- DRR & CCA action plan/ contingency plan;
- Warning systems;
- Business continuity plan;
- Strengthening building codes/ regulations;
- Land-use managements;
- Public awareness campaigns;
- Education/training/ exercises.
Concerned Ministries - Institutions

Ministry of Water Resources and Meteorology (MOWRAM) is mandated to produce and disseminate the forecasting and early warning information to the entire country;

NCDM in partnership with other stakeholders (Ministries-Institutions, PCDM/DCDM, humanitarian agencies etc.) assume the coordination role;

Regional Flood Management and Mitigation Center (RFMMC) of the Mekong River Commission (MRC) based in Vientiane (Lao PDR) is responsible for producing and disseminating flood forecasting and early warning information for its member states in the Lower Mekong Basin, including Cambodia.
Domestic Data and Information

A. Surface Observation

- Synoptic Station Consists of: 21-Synoptic Stations including 9-Automatic Stations;

- 21-Synoptic are operating with manned observational equipment;

- Data and information receiving by SMS, E-mail, Fax, and Phone.

Sources: MOWRAM
Weather Forecasting System (2)

Global Data and Information

B. Surface and Upper Air Data and Information

- **GTS**
  - NWP
  - SATAID
  - Digital atmosphere
  - GPV Data

- **MTSAT**

- **Online**
  - NWP
  - Weather Map
  - Satellite Imagery

(Sources: JMA, Hong Kong Observatory, BOM, NOAA etc.)
GPV VIEWER SOFTWARE TO SEE GPV DATA

GPV Time 2011/10/08 00:00

'Wind Spd Dir Vec' 6-hour forecast values (10/08 06:00)

Clear

Close
SATAID TO SEE GPV AND SATELLITE DATA
Digital Atmosphere Software for Analysis
Domestic Data and Information

River Flood Forecasting System in Cambodia is carried out by Department of Hydrology and River Works (DHRW) of the Ministry of Water Resources and Meteorology (MOWRAM);

So far, the system could forecast 3-days flood levels at **7-stations** located at the mainstream of rivers: **Mekong River, Bassac River and Tonle Sap Lake**;

**4-stations** were installed along **Mekong River**: Stung Treng, Kratie, Kampong Cham and Neak Loeung;

**2-stations** were installed along **Bassac River**: Phnom Penh and Koh Khel;

**1-station** was installed at **Tonle Sap Lake**: Prek Kdam;

The multi-regression model has been applied as a tool to simulate the flood level forecasts.

Sources: MOWRAM
Flood Forecasting in the Flood Plain

- The multi-regression model has been applied as a tool to simulate the flood level forecasts;
- Understandable, applicable tools and methods available at communities (staff gauge, flood markers and flood emergency response boards);
- Flood forecasts carried out by the DHRW.

Sources: MOWRAM
Regional Data and Information

- Basin-wide Real time Data Collection Network;
- Data Transmission every 15mn;
- Mekong-HYCOS: 12-stations in Cambodia among 32-stations of MRC Network;
- Real time data above are very important for flood forecasting and warning.

Sources: MOWRAM
# 4-Classifications of Flood Level in Cambodia

**Based on Annual Maximum Water Level at Bassac-Chaktomuk Station**

<table>
<thead>
<tr>
<th>Classification</th>
<th>Little Flood</th>
<th>Moderate Flood</th>
<th>Heavy Flood</th>
<th>Severe Flood</th>
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<td></td>
<td>Lower</td>
<td>Between</td>
<td>Between</td>
<td>Higher</td>
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<tr>
<td></td>
<td>&lt; 9.00m</td>
<td>&gt; 9.00m to &lt;10.00m</td>
<td>10 &gt; 00m to &lt;11.00m</td>
<td>&gt; 11.00 m</td>
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## Flood Travel Time

<table>
<thead>
<tr>
<th>Station</th>
<th>Flow Duration Arrives at Phnom Penh-Chaktomuk</th>
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<tbody>
<tr>
<td>Vientiane</td>
<td>9 days</td>
</tr>
<tr>
<td>Parkse</td>
<td>5 days</td>
</tr>
<tr>
<td>Stung Treng</td>
<td>3 days</td>
</tr>
<tr>
<td>Kratie</td>
<td>2 days</td>
</tr>
<tr>
<td>Kg Cham</td>
<td>1 day</td>
</tr>
</tbody>
</table>

Sources: MOWRAM
DEPARTMENT OF HYDROLOGICAL AND RIVER WORKS

HYDROLOGICAL STATIONS IN CAMBODIA

Legend
- National Road
- Small River or Stream
- Provincial Center
- Province Boundary

Type of Station
- HYCOS
- Exiting Hydrological Station

Sources: MOWRAM

National Committee for Disaster Management
Ministries-Institutions
Sub-National Level
Relevant Stakeholders
Media

MOWRAM
DOM & DHRW

Satellite-Radar Observation Station
Rainfall Observation Station

Ministries-Institutions
Sub-National Level
Relevant Stakeholders
Media
Dissemination of Forecasting and Early Warning Information

MOWRAM

3-Days and Now-Casting Weather Forecast

DOM

DHRW

10-Near Real Time Hydrological Stations

Endorsed and/or Official Announcement

Means of Dissemination

- Upload to the Ministry’s website
- Email, Fax, Phone, etc.

Ministries-Institutions:
- Cabinet of the Royal Palace
- Cabinet of the Prime Minister
- National Committee for Disaster Management (NCDM)
- Ministry of Information
- Cambodian Red Cross (CRC)
- Ministry of Interior
- Ministry of National Defense

Sub-National Level:
- Provincial Administrations, Departments and PCDM

Relevant Stakeholders:
- National and International Organizations, MRC, UN Agencies

Media:
- TVs, Radios, Newspapers, Online-News

Relevant Stakeholders:
- National and International Organizations, MRC, UN Agencies

Means of Dissemination

- Upload to the Ministry’s website
- Email, Fax, Phone, etc.
<table>
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</table>

National Committee for Disaster Management
NCDM’s capacity is limited in dissemination of disaster information across all levels, due to:

- Insufficient funding;
- Dated communication systems;
- Lack of equipment and high technology applications;

The Early Warning System project has been supported by UNDP and implemented by MoWRAM;

Strengthening capacity of DMIS technologies and management;

The CamDi online Disaster Loss and Damage Database will be launched on **15 July 2014**.