Drought conditions and management strategies in Thailand
Background

Thailand Bordered:

- the Lao PDR and the Union of Myanmar to the North,
- the Kingdom of Cambodia and the Gulf of Thailand to the East,
- the Union of Myanmar and the Indian Ocean to the West,
- and Malaysia to the south
Background

Thailand Climate and Geography

- **Total area:** 512,107 km²
- **Population:** 63 million (high concentration in the capital (BKK) approx. 12 M. people)
- **Capital city:** Bangkok
- **Provinces:** 76 Provinces

Map showing: Burma, Laos, Cambodia, Gulf of Thailand, Andaman, Malaysia
Climate and Rainfall

- Temperature: 23.2 - 32.4° C.
- Relative humidity: 67 - 82 %
- Annual rainfall: 1,426 mm.

Sources: Department of Water Resources
Background

Meteorological Condition

sources: Department of Water Resources
Background

sources: Department of Water Resources
Average annual rainfall 1,426 mm./yr

Average Monthly Rainfall in Thailand (mm.)

January: 15.00
March: 15.50
May: 32.10
June: 67.10
July: 166.80
August: 165.50
September: 175.20
October: 209.40
November: 264.40
December: 163.30

Meteorological Condition

Sources: Department of Water Resources
Background

Water Resources and Water Requirement

River Basin Area 1-25

1. Salaween
2. Khong
3. Kok
4. Chi
5. Mun
6. Ping
7. Wang
8. Yom
9. Nan
10. Chao Phraya
11. Sakae Krang
12. Pasak
13. Tha Chin
14. Mae Klong
15. Prachinburi
16. Bang Pakong
17. Tonele Sap
18. Eastern Coast
19. Phetchaburi
20. Western Coast
21. South-East Coast
22. Tapi
23. Songkhla Lake
24. Pattani
25. South-West Coast

Sources: Department of Water Resources
Background

LARGE DAM (%)

Water Resources and Water Requirement

sources: Department of Water Resources
Background

Water Demand

- Ecological Maintenance: 12,359 MCM/year (18%)
- Domestic: 2,459 MCM/year (4%)
- Industry: 2,369 MCM/year (3%)
- Agriculture & Hydropower: 53,034 MCM/year (75%)

Sources: Department of Water Resources
Background

Water Resources and Water Requirement
### Statistic of drought between 2007-2013

<table>
<thead>
<tr>
<th>Year</th>
<th>Area of drought (Province)</th>
<th>People</th>
<th>Agricultural area (acre)</th>
<th>Value (US.$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2007</td>
<td>66</td>
<td>16,754,980</td>
<td>540,047.2</td>
<td>6,109,203.1</td>
</tr>
<tr>
<td>2008</td>
<td>61</td>
<td>13,298,895</td>
<td>209,999.6</td>
<td>3,200,888.5</td>
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<tr>
<td>2009</td>
<td>62</td>
<td>17,353,358</td>
<td>237,773.6</td>
<td>3,337,853.2</td>
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<tr>
<td>2010</td>
<td>64</td>
<td>15,740,824</td>
<td>686,741.2</td>
<td>43,598,997.7</td>
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<td>2011</td>
<td>55</td>
<td>16,560,561</td>
<td>324,672.0</td>
<td>4,062,376.2</td>
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<tr>
<td>2012</td>
<td>52</td>
<td>15,234,597</td>
<td>594,604.8</td>
<td>12,297,552.2</td>
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<tr>
<td>2013</td>
<td>58</td>
<td>9,066,185</td>
<td>1,708,918.8</td>
<td>89,802,429.3</td>
</tr>
</tbody>
</table>

Sources: DDPM
Drought monitoring and early warning systems

- Drought problem and affected areas
- Definition of Drought
- Affected Factors to drought severity
- Criteria and Analysis System
- Drought affected areas
- Drought Mitigation and Preparedness
Drought monitoring and early warning systems

- Drought problem and affected areas

**Repetitive droughts area**

*3 years (2011 – 2013)*

- **3 time in 3 years (31 province)**
- **2 time in 3 years (24 province)**
- **1 time in 3 years (12 province)**
- **None (10 province)**

.sources: DDPM
Drought monitoring and early warning systems

- Drought problem and affected areas

MAP OF DROUGHT RISK IN THAILAND

sources: Department of Water Resources
Drought monitoring and early warning systems

• Definition of Drought

➢ The lacking of drinking water, water for consumption, water for plantation in some areas for long period causing losses and large affects to communities.

➢ Derived from natural phenomenal or man-made disaster.
Drought monitoring and early warning systems

• Affected Factors to drought severity

1. Average annual precipitation rate
2. Irrigated areas and water sources
3. Cover cropping
4. Drainage Soil
5. Land Using
6. Density of river basin and branches
7. Drought Statistics
Drought monitoring and early warning systems

• Criteria and Analysis System

• Most High Risk : more than 80
• Moderate : 56-80
• Risky : 30-55
• Least risk : less than 30
Drought monitoring and early warning systems

- Drought affected areas

October 2012 - May 2013

- 56 provinces (77)
- 588 districts (878)
- 3,958 sub-districts (7,255)
- 37,820 villages (74,964)

affected by drought
Drought monitoring and early warning systems

• Drought Mitigation and Preparedness

➢ Conduct Drought Risk Assessment
➢ Update Drought Database and Hazard Mapping
➢ Mobilize human Resource and equipment for drought
➢ Develop Drought Database and GIS System
➢ Develop Drought Monitoring and forecasting System
➢ Promote and Raise Public Awareness
➢ Arrange Lesson Learned
Drought monitoring and early warning systems

The main agencies for mitigation and preparedness

- Thai Meteorological Department
- Department of Royal Irrigation
- Department of Water Resources
- Department of Land Development and Department of Agricultural Extension
- National Disaster Warning Centre
- Department of Groundwater Resources
- Department of Disaster prevention and Mitigation
- Provincial Office
- District Office
- Local Administration
- Geo-Informatics and Space Technology Development Agency (Public Organization)
- hydro and agro informatics institute (Public Organization)
# The Equipment for drought 2013

<table>
<thead>
<tr>
<th>Department</th>
<th>List</th>
<th>water truck</th>
<th>feed pump</th>
<th>water supply machine</th>
<th>underground water digging truck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Department of Water Resources</td>
<td></td>
<td>48</td>
<td>411</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>Provincial Electricity Authority</td>
<td></td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Department of Groundwater Resources</td>
<td></td>
<td>129</td>
<td>612</td>
<td>18</td>
<td>88</td>
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<tr>
<td>Department of Disaster Prevention and Mitigation</td>
<td></td>
<td>218</td>
<td>123</td>
<td>17</td>
<td>-</td>
</tr>
<tr>
<td>Department of Royal Irrigation</td>
<td></td>
<td>286</td>
<td>1877</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>total</strong></td>
<td>706</td>
<td>3023</td>
<td>43</td>
<td>88</td>
<td></td>
</tr>
</tbody>
</table>
Drought monitoring and early warning systems

After Drought

1. Survey and Prepare List of Victim
2. Conduct Livelihood and Occupation Rehabilitation
3. Conduct Initial Rehabilitation
## Emergency advance payment for disaster victim relief

<table>
<thead>
<tr>
<th>Department</th>
<th>Financial Amount (US. $)</th>
<th>Authority</th>
</tr>
</thead>
<tbody>
<tr>
<td>Secretariat of the Prime Minister.</td>
<td>3,080,714.7</td>
<td>Prime Minister</td>
</tr>
<tr>
<td>Office of the Permanent Secretary, Ministry of Defense.</td>
<td>1,540,357.4</td>
<td>Permanent Secretary</td>
</tr>
<tr>
<td>Office of the Permanent Secretary, Ministry of Social Development and Human Security.</td>
<td>308,071.5</td>
<td>Permanent Secretary</td>
</tr>
<tr>
<td>Office of the Permanent Secretary, Ministry of Agriculture and Cooperatives.</td>
<td>1,540,357.4</td>
<td>Permanent Secretary</td>
</tr>
<tr>
<td>Office of the Permanent Secretary, Ministry of Interior</td>
<td>1,540,357.4</td>
<td>Permanent Secretary</td>
</tr>
<tr>
<td>Office of the Permanent Secretary, Ministry of Public Health</td>
<td>308,071.5</td>
<td>Permanent Secretary</td>
</tr>
<tr>
<td>Department of Disaster Prevention and Mitigation</td>
<td>1,540,357.4</td>
<td>General Director</td>
</tr>
<tr>
<td>Department of Disaster Prevention and Mitigation, Provincial Office</td>
<td>616,142.9</td>
<td>Governor</td>
</tr>
<tr>
<td>District</td>
<td>15,403.6</td>
<td>Chief of District</td>
</tr>
</tbody>
</table>
Vulnerability assessment

The main cause of drought is low level of water source in the reservoirs

- **Agricultural Sector**
  - The paddy filed in Thailand is considered main land using as 70%, farm crops 20% and other 10%.
  - Always happens in the northeast especially outside irrigated area

- **Water for Consumption**
  - problem in the rural areas such as mountainous or island areas
  - The affected group is farmer family in remote areas.
## Level of Disaster Intensity, Vulnerability Managing Competency and Risk Levels

<table>
<thead>
<tr>
<th>Type of Disaster</th>
<th>Intensity Level</th>
<th>Vulnerability Level</th>
<th>Risk Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flood</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Tropical Cyclone</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Earthquake</td>
<td>Low</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Land slide</td>
<td>Moderate</td>
<td>Low</td>
<td>Moderate</td>
</tr>
<tr>
<td>Drought</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Fire</td>
<td>High</td>
<td>Moderate</td>
<td>Moderate</td>
</tr>
<tr>
<td>Explosives</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
<tr>
<td>Accident</td>
<td>High</td>
<td>Moderate</td>
<td>High</td>
</tr>
</tbody>
</table>
1. Provide Public Relations and update drought situation of water saving measures for agricultural sector and consumption.
2. Mobilize Emergency Response Team for providing assistance and surveying initial damage assessment
3. Support and mobilize Tools & Equipment such as water pumps, water trucks and food for cattle.
4. Request assistance from the other government sectors such as artificial rain for farmer, water container.
5. Survey initial damages and provide victim compensation budget, in case it is beyond the capacity of the provincial level it will provide support under Ministry of Finance’s Regulation
Emergency relief and drought response

Provincial Level

Emergency Operations Center

Consultant Committee
- Specialists, Scholars
- Representative of Local Educational Institutions

On Site EOC

Admin & Information Management Section
- General Affairs Sub-Section
- Intelligence and Information Analysis
- Logistics
- Command Center Sub-Section
- Field Inspection Sub-Section
- Communication Section
- IT Establishment

Warning Section
- Monitoring and Situation Assessment
- Vigilance and Warning Sub-Section

Prevention and Operations Section
- Search and Rescue Operations Sub-Section
- Evacuation Sub-Section
- Emergency Medical Service Sub-Section
- Dead body Management Sub-Bureau, etc.

Peace Order Keeping Section
- Theft Prevention Sub-Section
- Security Affairs Sub-Section
- Traffic Management Sub-Section

Relief Rehabilitation Section
- Damage and Need Assessment Sub-Section
- Victim Assistant Sub-Section
- Basic Necessities Procurement Sub-Section

Other Section
(As Appropriate and Needed)

Other Agencies
- Nearly Provinces
- Foundation and Private Enterprises
- DPMRC 1-18

Supporting Agencies

Emergency relief and drought response
Emergency relief and drought response

National Command Center (NCC)

Planning Section
- Level 4: Minister
- Level 3: Permanent Secretary
- Analyze, monitor, assess disaster situation and propose options
- Supervise, follow up and evaluate incidents
- Resources Mobilization and tracking
- Integrate Operations Plan
- Support Technical Assistant and experts

Admin and Operations Section
- Level 4: Minister
- Level 3: Permanent Secretary
- Command and Order
- Integrate Operations with Military Relief Center
- Integrate Operations with EMS Team of Ministry of Public Health
- Provide Security during Emergency Situation
- Provide peace keeping order for the public
- Collaborate with National Royal Thai Police
- Coordinate with relevant agencies
- Set up Communication System during Emergency Crisis
- Conduct Search and Rescue

Logistics Section
- Level 4: Minister
- Level 3: Permanent Secretary
- Facilitate Transportation and Logistics
- Collaborate with Foreign Countries and International Organization
- Support IT and Communication System
- Receive Complaints
- Coordinate and Collaborate with Charity Foundation and Volunteers
- Repair and Rehabilitate infrastructure
- Provide assistant and compensate to the victims
- Coordinate media and press release etc.

National Level
**Emergency relief and drought response**

**On Site Emergency Operations Center**

**Admin & Information Management Section**
- Command during Emergency Incident
- Integrate and Coordinate with relevant agencies to jointly provide assistance
- Designate policy and SOP during Emergency situation
- Disseminate Warning Messages
- Announce Emergency Crisis Situation
- Coordinate and monitor task performance of all sectors

**Planning/Analysis/Disaster Situation Assessment Section**
- Disaster Situation Analysis and Assessment
- Formulate and integrate Emergency Operation Plan for all relevant agencies
- Coordinate and integrate of information networking and disaster data warehouse
- Allocate and Mobilize resources
- Monitor and follow up disaster situation
- Conduct Search and Rescue Situation
- Conduct Search and rescue operations
- Report feedback
- Provide EMS Team
- Verify and monitor affected people
- Identify Disaster Victims
- Victim Registration
- Evacuees’ Registration etc.

**Operation Section**
- Monitor and follow up disaster situation
- Conduct Search and Rescue Situation
- Conduct Search and rescue operations
- Report feedback
- Provide EMS Team
- Verify and monitor affected people
- Identify Disaster Victims
- Victim Registration
- Evacuees’ Registration etc.

**Logistics Section**
- Arrange and provide consumption food and items
- Support resources for land, vessel and air operation
- Support tools, equipment, heavy machines together with man power, volunteers, food, drinking water, gasoline and lubricants, etc.
- Facilitate traffic & Road Management
- Support Medical Team
- Coordinate with international Organization

**Financial Section**
- Inquire Disaster Emergency budget
- Compensate victim assistance according to Ministry of Finance Regulation
- Prepare Financial and Accounting Statement
- Receive and manage donation both in cash and in kind including H.M the King and the Royal Family’s Donation
- Provide officer in charge compensation

**Public Relations/Coordination/Security Section**
- Update and Disseminate press release regarding of disaster situation and victim assistance
- Ensure and create a common understanding with the media for release the updating disaster situation in the same direction
- Set up Press Release Center
- Provide security team to in charge victims’ lives and properties etc.

National Level
Practices to alleviate drought impacts

single command system by 2P and 2R

- Prevention
- Preparation
- Response
- Recovery
Practices to alleviate drought impacts

Measures for Drought response

1. Maximum Water Utilization especially for consumption
2. Water Accessibility such as groundwater and water distribution
3. Operation system under the 2P2R measures
4. The Provincial Governor is in charge as the commander under single command system
 Practices to alleviate drought impacts

In short term (90 days)

- Approved 21 million dollars
- Collaborated with private sector for water distribution in remote areas
- Established the data warehouse of water management
The need for knowledge and skills on drought management

- The database for drought management
- Standard warning about drought
- Making awareness of the people about important factor for drought
Thank you for your attention

Mr. Varat Marpraneet
Tel. : 662 637 3571
Email : varatma05@gmail.com