Landslide risk management in Thailand

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Outline

- Introduction
- Landslides in Uttaradit
- Landslide risk management
- Landslide best practices
Topography of Thailand

Northern:
- high mountains and steep river valleys

Northeastern:
- upland plateau, arid area

Western:
- high mountains and steep river valleys

Central:
- alluvial plain of the Chao Phraya River

Southern:
- hilly on the west coast, high mountains in the middle and coastal plain on the east

Eastern:
- hilly on the north and coastal plain on the south

Introduction
Landslides in Thailand

- **Sob Moei, Mea Hong Son**, 17 September 2018
- **Mae Rim, Chiang Mai**, 1 July 2016
- **Prao/Mae Rim/Mae Cham/Hod, Chiang Mai**, 23 May 2017
- **Bo Kluea, Nan**, 28 July 2018
- **Laplea/Thapla, Uttaradit**, 22 May 2006
- **Nam Pad, Uttaradit**, 9 Sep 2011
- **Klongmui, Viphawadee, Suratthani**, 11 Dec 2008
- **Khanom, Nakhon Si Thammarat**, 4 Nov 2010
- **Bunnagsatar, Srisakhon, Pattahni**, 6 Nov 2009

Introduction
Landslides in Thailand

May 2006
Uttaradit/Phrea/Sukhothai
- 83 deaths
- 308 billions baht loss

November 2010
Nakhon Si Thammarat
- 2 Districts were affected

March 2011
Krabi/ Nakhon Si Thammarat
- 14 deaths
- 10,000 millions baht loss
Landslides in Thailand

Introduction

May 2017
11 districts of Chiang Mai:
• 213 deaths
• 111 people missing

July 2018
Bo Kluea, Nan:
• 8 deaths

September 2018
Sob Moie, Mae Hong Son:
• 7 people missing
Landslides controlling and triggering factors

1. Topography
   - Slope gradient
   - Slope aspect
   - Elevation
   - Drainage system

2. Geology
   - Lithology
   - Engineering properties
   - Degree of weathering

3. Land-use
   - Cut slope
   - Deforestation

4. Heavy rainfall
   Landslides often occur with or following flash floods generated by the continuous heavy rain which saturates and destabilizes the land mass.

The controlling (intrinsic) factors

The triggering (Extinctive) factors
Uttaradit Province

- Total Area: 7,838 Km²
- Districts: 9
- Sub-districts: 67
- Villages: 562
Landslides in Uttaradit

23 May 2006
Laplae/ Tha Pla/ Muang district were affected.

Causes
- Geology: volcanic rock, mudstone, shale
- Land-use: sparse forest, fruit garden
- Topography: high mountainous areas
- Rainfall: >300 mm/d

Effects
- 83 deaths, 33 missing
- 673 houses destroyed
- 3,478 houses partly destroyed
- Damage cost is ~ 308 million Baht

Effected areas
Landslides in Uttaradit

9 September 2011
5 Villages of Nam Pad district were affected.

Causes

• Geology: volcanic rock, mudstone, shale
• Land-use: sparse forest, fruit garden
• Topography: high mountains / valley areas
• Rainfall: 3 days continuous heavy rainfall

Effects

Flash flood and debris flow effected the area along the river channel
5 deaths, 2 missing
30 houses destroyed
50 houses partly destroyed

Effected areas
Disaster risk management cycle

- Government agencies (DDPM)
- Local authorities
- Academic sectors

Landslide risk management

- Government agencies (DMR, DGW etc.)
- Local authorities
- Academic sectors

Disaster Risk Reduction
- Prevention and Mitigation
- Preparedness
- Response Relief
- Rehabilitation and Reconstruction

Emergency Management
- Government agencies (DDPM)
- Local authorities
Roles of DMR

- Geo-hazards and risk assessment
- Monitoring
- Early warning

- Impact assessment and evaluation

- Supporting information and data
DMR implemented a community-based volunteer training program which focuses on creating safety awareness and building a robust community warning network for geo-hazard prone areas (especially, from flash floods and landslides) in village level.

The main aspect of establishing the Local watch networks for landslides

To minimize damages and to teach people in risky areas how to prevent themselves from disasters
Community-based warning networks

Steps of establishing networks

01
Mapping landslide susceptibility and risk areas
• Landslide susceptibility maps
• Landslide risk maps

02
Providing training course
• Geology of the area
• Landslide susceptibility, hazard and risk potentials

03
Discussing on landslide matter with local people and they are compiling their own early warning and evacuating plans

Landslide best practices
DMR has distributed rain gauges to the networks as a simple tool for landslide early warning system.

Searching for appropriate observatory site and safety places.
Community-based warning networks

Flowchart of Warning System

Disseminate Watch Bulletin (heavy rain)

Catch signs of landslide

DMR

The networks

Catch signs of landslide

Head of village

Inform by phone, SMS, mobile app.

Inform down stream village

Warning

Inform

Village speakers & Sirens

Rainfall monitoring

Stream monitoring

Landslide best practices

Relevant agencies
Recently there are 35,000 volunteers working as networks in 51 out of 54 provinces.

- In 2017, there are 2,146 volunteers in 26 sub-districts, 6 districts in Uttaradit province
Community-based warning networks

To maintain the community networks,

- Provide repeatedly training program for practise early warning and evacuation process every 2-3 year. (5 times during 2013-2018)
- Update the network data such as contact, address, and status.

Community-based

Cooperation with other organizations

Provide work practice on early warning and evacuation process by simulating a disaster situation in operation room for local people.

Provide work practice on early warning and evacuation process by simulating a disaster situation in field with other organizations corresponding to disasters.
To support the networks,

DMR established the Geo-hazards Operation Centre, GOC in the head office to monitor geo-hazard triggering factors.

Example:

Monitoring the weather conditions and precipitation by using data from concerned agencies and from the networks in risk areas integrated with hazard and risk maps to disseminate landslide early warnings to the networks.
DMR will disseminate watch bulletin to many sectors as following:

- Mass media
- Disaster Prevention and Mitigation Regional Center
- Provincial Information Center
- SMS and mobile application to the community networks
DMR has installed 25 landslide monitoring stations, including rain gauges, inclinometers and piezometers in Northern and Southern Thailand for landslide monitoring and early warning.
Geo-hazard learning centres in Thailand

The goal of the centre is

1) to be a geo-hazard learning centre for local communities and other communities
2) to be a geo-hazard monitoring and coordination centre
1. Gathering all information about geohazard in the region
2. Establishing a safe community network
3. Establishing geohazard learning center
4. Creating guidelines and measures to reduce the impact from the disaster
5. Studying and researching about geohazard to support learning centers
6. Continuing improve and develop the geohazard learning Center
7. Using a prototype to extend the knowledge to other community
Geo-hazard learning centres for local communities

The centre provides basic information of geo-hazard prone areas such as geology, hazard and risk maps, and historical disaster areas.
Field trip on 1 – 2 February 2019
Thank you very much

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