

## NEWSLETTER

No. 1 – June 2011

### Responding to the Challenges of Debris Flow—Asian Network on Debris Flow

Debris flows, a kind of gravity-induced mass movement on hill slopes and/or in river channels are usually the most hazardous phenomena. They occur in response to rapid disturbances, such as torrential storms, sudden snow or glacier melting, dam break, volcano eruptions, landslides or slope failures, and earthquakes. The devastation caused by catastrophic debris flows is enormous, yet their causes, occurrences and mechanisms are not completely understood.

Since the start of the 21<sup>st</sup> century, as a result of climate change, debris flow hazards occur more and more frequently. These debris flows are caused by typhoon, by rainfall, by glacial lake breaking or by volcano eruption, etc. Debris flows always cause much more ruinous devastation in the developing regions rather than the developed regions due to the limited hazards research and mitigation level and/or financial support.



It is the responsibility of scientists to investigate the hazards mechanism and improve the mitigation technology.

During the 2010 International Debris Flow Workshop, scientists from about 10 countries and/or regions, proposed an Asian organization to promote multidisciplinary research in special areas. Emphasis is to provide a platform to hold academic conferences and trainings, to promote the project collaboration, to improve the debris flow study and mitigation technology in all Asian countries. A holistic effect on the advancement of debris flow research may be expected through mutual inspiration, when specialists with different background come together.

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#### Missions of ANDF

To promote Asian cooperation, the ANDF may:

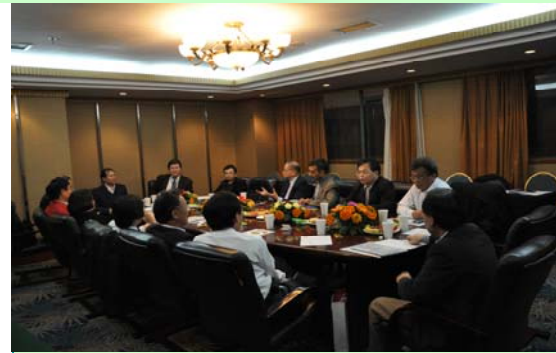
- Organize international seminars, workshops, and conferences;
- Promote research and technical training programmes;
- Publish newsletters and other publications;
- Collaborate with other organizations with similar objectives;
- Others



# 2010 International Debris Flow Workshop, November 27-28, 2010 - A Summary

The workshop was held at the Institute of Mountain Hazards and Environment (IMHE) in Chengdu, Sichuan, China, to provide an open forum for debris-flow researchers in Asia to exchange ideas on how to cope with debris-flow hazards. Sixty scientists from more than 10 countries and/or regions gathered at the venue with the following intentions: show the newest research achievement relevant to the debris flow, display the countermeasures for the extraordinarily serious debris-flow events, discuss current and past scientific investigations on debris flow, prioritize future research directions, and articulate the direction of cooperation between scientists and organizations in Asia.

The workshop was organized to be as the 1st of the series of debris-flow scientific exchange workshop among scientists in Asia. Successful academic exchanges, discussions and the post-workshop field trip resulted from the efforts of all participants and the ideas from other Asian scientists who could not attend. To strengthen the cooperation among Asian scientists further, all workshop participants agreed to establish an organization called Asian Network on Debris Flow (ANDF), with its office located at IMHE. The ANDF can act as a scientific exchange platform for debris-flow researchers in Asia, and it will benefit in reducing damages from many debris-flow disasters that tend to occur more frequently at this time.



Workshop was hosted by:

- Institute of Mountain Hazards and Environment (IMHE), CAS
- Key Laboratory of Mountain Hazards and Surficial Process

And supported by:

- Chinese Academy of Sciences
- International Centre for Integrated Mountain Development (ICIMOD)
- Chinese Committee on ICIMOD
- World Association for Sedimentation and Erosion Research (WASER)

To make the network set up smoothly and become useful, a preparation group made up by scientists from about 10 countries-regions in Asia was established (The list of the preparation group members is on the last page).

The ANDF will be formally set up on the second workshop to be held in 2012. Prior to that, we hope scientists will actively participate and make efforts to strengthen the function of our organization.



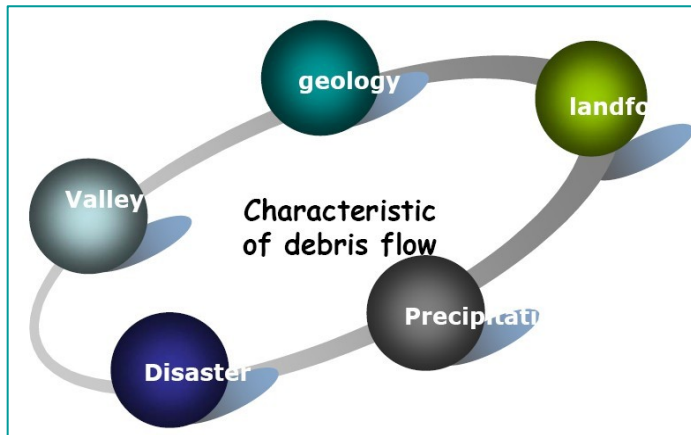
# A Representative Example—Seminar and Training on Debris-Flow Monitoring and Alert Techniques and Demonstration in Southeast Asia

Supported by the international cooperation project “Debris-Flow Monitoring and Alert Techniques and Demonstration in Southeast Asia”, which is proposed for the method study of rainfall- and glacial lake breaking-induced debris flows, with financial support from the Chinese Ministry of Foreign Affairs and the Ministry of Science and Technology, the seminar was held on 24-26 November 2010 at the Institute of Mountain Hazards and Environment (IMHE) in Chengdu, China, to provide an open forum for the Monitoring and Alert Techniques communication, to provide a chance for Chinese scientists to display the study achievements on debris flow monitoring and alert in the 5.12 Wenchuan Earthquake-hit area, to prepare for the 2010 International Debris Flow Workshop and the eventual establishment of ANDF.



Eighteen Chinese scientists, government officers and 17 scientists from Southeast Asia attended the seminar. Eleven reports displayed the top-level monitoring and alert techniques in China and Southeast Asian countries. Attendees discussed on what the government and NGOs could do to promote the alleviation efforts, with emphasis on the feasibility and approaches to cooperation on debris flow mitigation among China and Southeast Asia.

The seminar contributed to the success of 2010 International Debris Flow Workshop.



Several agreements and arrangements were made during this seminar and training:

- to procure the regional cooperative arrangement on debris-flow monitoring and alert techniques study among governments of China and Southeast Asian countries;
- to draw up joint projects and get supports from governments and society;
- to set up liaison office, presently at IMHE;
- to co-build a debris-flow monitoring and alert platform among China and Southeast Asian countries.



# Zhouqu Debris Flow

## Introduction

Under the influence of intense rainfall (77.3 mm in 40 minutes), a giant debris flow occurred in Zhouqu County, Gansu Province, in the evening of 8 August 2010, causing 1,481 deaths, 274 persons missing, with enormous property losses. The debris flow with large boulders and enormous energy destroyed 2 villages and caused 22,667 people homeless.

Debris flow rushed into Bailong river, formed a 700 m long x 100 m wide x 10 m thick dam. A temporary lake with 1.5 M m<sup>3</sup> water storage extended 2.6 km upstream from the dam, submerging half of the city, ruined the roads, and cut off communications.

The event destroyed almost 100 ha farmland, and damaged thousands of houses, which is the most severe debris-flow disaster since 1949.



## Formation of the Zhouqu Debris Flow

### 1. Abundance of unconsolidated materials

- Rich unconsolidated materials in channel
- Rock toppling deposit produced by the Wudu earthquake in 186 BC and Wenxian earthquake in 1879
- Stone cone formed by the strong physical weathering in the upper basin.

There are tens of dammed deposits formed in the Gullies, with the heights ranging from 40 to 280 m. The debris flows only eroded a small part of the deposits.

### 2. Enough channel slope

The average longitudinal slopes of channel bed in two gullies are both larger than 20%. Furthermore, there are several steep steps and cliff sides, which magnified the debris-flow amount and velocity.

### 3. Extreme rainstorm

The recorded rainfall was 77.3 mm in 1 hour from 23 to 24 o'clock, August 7, 2010 in Dongshan. That is the maximum record in Zhouqu County where the annual precipitation is between 400 and 800 mm.



## What shall we do?

- Taking stabilization as the main governance style, building control system for debris-flow formation and motion such as stabilize-hinder-discharge-cease
- Combining civil engineering and ecological measures
- Combining with engineering treatment, monitoring and early warning, and constructing urban hazard mitigation system

# Debris-Flow Hazard Events in Asia in 2010 and 2011

In the rounds of continuous heavy rainfall in South Asia in summer of 2010, at least 48 died in Bangladesh, 46 people died in Burma, and 20 died in Sri Lanka.

Heavy rainfall hit South Asia, 28 people died in the flood and debris flow induced by the rainfall in Indonesia and Vietnam on 26<sup>th</sup> July 2010.

Debris flow caused 65 deaths in Ankang City. The whole death number rose up to 337 in the summer of 2010 in Shaanxi Province, China.

Flood and debris flow caused at least 166 deaths and about 400 missing in Kashmir on 6<sup>th</sup> August 2010.

As a result of the continuous rainfall, Pakistan suffered the most severe flood in the recent 80 years in the summer of 2010. At the same time, all kinds of secondary disasters like debris flow and landslides occurred and caused thousands of casualties. At least 30 millions people suffered.

The 8.8 Zhouqu debris flow that caused 1,765 deaths on 8<sup>th</sup> August 2010 has been considered the most severe debris flow hazard in Chinese history since 1949. This event has been reported as one of the 10 most catastrophic natural hazards in 2010 in the world.

Under the continuous rainfall, debris flows occurred in many locations in Sichuan Province, China in August 2010. They ruined the roads, cut off the communication, blocked the rivers, destroyed villages and resettlement sites in Wenchuan earthquake hit area, affected tens of thousands of lives and caused huge losses of properties.

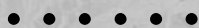
Debris flow occurred in Gongshan County, Yunnan Province, China on 18<sup>th</sup> August 2010 and caused at least 112 deaths.

The rainstorm hit East Indonesia in October 2010 and caused at least 75 deaths and thousands homeless.

The rainstorm in October 2010 caused 19 people losing their lives in Vietnam, at least 11 of them died because of the mountain landslide.

By 14<sup>th</sup> January 2011, at least 27 deaths and 11 missing were caused by the rainstorm since December 2010 in Sri Lanka. Over 1 million people suffered in this hazard.

At least 53 people died and 19 missed in the rainstorm before 5<sup>th</sup> January 2011. Most of the casualties were caused by the floods and debris flows induced by the rainstorm.



We would like to thank all of our supporters and workshop participants for making this network under smooth preparation. We hope this organization will contribute substantially in Asian Debris Flow study area!

June 2011



### Upcoming Events/Things to Consider

Planning for Second International Debris Flow Workshop in August 2012 in Chengdu, China and the formal establishment of the Asian Network on Debris Flow is undergoing. Topics, agendas, ideas and network operation suggestions are welcome. Please send your contribution to the Secretariat.

### Preparatory Group Members

Chack Fen Lee (Chair)	Hong Kong, China
Cui Peng	China
Su-Chin Chen	Chinese Taipei
Haruyuki Hashimoto	Japan
Mahar Lagmey	Philippines
Winai Wangpimool	Thailand
Habibah Lateh	Malaysia
Soon Keat Tan	Singapore
Balmukunda Regmi	Nepal
Prabir Dasgupta	India
Roza Yafyazova	Kazakhstan
Aaron Guo	China - Secretary
Samran Sombatpanit	Thailand - Advisor

### NOTES

- Δ ANDF Newsletter is a biannual publication of the Asian Network on Debris Flow (DF) dedicated to the study of its nature and how to avoid its effect and dissemination of DF knowledge widely. It welcomes articles related to every aspect of debris flow from countries in Asia as well as other continents. Scientists interested in Debris Flow are invited/encouraged to send your articles to Aaron Guo at mhsp@imde.ac.cn.
- Δ ANDF Newsletter is a FREE digital/online newsletter. Anyone interested in obtaining it may subscribe with Aaron Guo. Please tell him your name, address, profession, institution and country. Kindly inform your colleagues about this newsletter and invite them to contribute articles and subscribe.

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