

# Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation

(RECLAIM Phase II)

*Implemented by*

Asian Disaster Preparedness Center (ADPC)

&

Norwegian Geo-technical Institute (NGI)



*Funded by*

The Royal Norwegian Ministry of Foreign Affairs

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**Program Completion Report**

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## Annexes

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## **Acknowledgement**

It is with pleasure that ADPC presents this program completion report of the Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM II). With the aim of building the national capacity on landslide disaster risk mitigation by identifying cost effective methodologies and practices and sharing of experiences at national and regional levels, RECLAIM phase II focused on demonstrating landslide mitigation projects in three countries namely Philippines, Sri Lanka and Thailand and organizing national and regional training workshops to share experiences. During the implementation of the national demonstration projects, there had been continuous building of knowledge and experiences on cost-effective landslide mitigation measures such as community-based risk identification and early warning systems. These projects have produced wealth of knowledge in the form of hazard maps, identification of vulnerable communities, reports, proceedings, documentation of various events and activities etc. These knowledge and experiences were shared among relevant authorities, professionals and communities through national and regional level workshops and making the information available on internet.

We highly recognize the role played by Norwegian Geo-technical Institute (NGI) as the lead Technical Partner of the program in sharing their vast experience in working in Europe and Latin America in programs for landslide risk mitigation. The participating professionals, academia and the institutions of RECLAIM program immensely benefited from NGI's participation. ADPC is grateful for their continued support for implementing the program activities.

ADPC congratulates all the country partner institutions for successfully implementing the demonstration projects and conducting national trainings on landslide mitigation measures. The three demonstration projects exhibited cost effective community-based methodologies for identifying landslide risks, early warning systems and small scale mitigation measures. In addition the project assisted officials to develop improved skills in development planning and risk management.

Landslides in different locations at different times are capable of killing many people collectively. But landslides do not get classified as "mega disaster events" since the fatalities and casualties in one event is much less than other disaster events such as earthquakes, tsunami or cyclones. Thus, landslides attract very limited attention by donors and development partners in funding landslide vulnerability reduction programs.

I take this opportunity to thank the Royal Norwegian Ministry of Foreign Affairs for their timely intervention in funding this initiative to help in demonstrating the landslide risk mitigation measures in Asian countries. I also thank Norwegian Geo-technical Institute (NGI) for their effective collaboration and technical resources provided in successfully implementing the Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation.

We look forward for further collaboration in building disaster resilience of the Asian communities.

Dr. Bhichit Rattakul  
Executive Director

Asian Disaster Preparedness Center

## **Preface**

The incidents of landslides, other types of mass movements and flash flooding have accounted for considerable human losses, damage to social and economic assets, natural resources, and environment in many countries in Asia. During the past few years, such events have had significant negative impact on the development initiatives, poverty reduction goals in countries such as Bhutan, India, Indonesia, Nepal, Philippines, Sri Lanka and Thailand. Despite advances in science and technology, losses continue to result in human sufferings, property losses and sentimental degradation. As population increases and societies become more complex, the economic and societal losses due to such event will continue to rise. Increasing anthropogenic activities in the mountain areas also add to the existing vulnerability of communities living in landslide prone areas.

The limited number of interventions in landslide mitigation activities in Asian region had opted ADPC together with NGI to implement the Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM) with the focus on demonstrating cost effective mitigation measures as well as national and regional level knowledge sharing of best practices on landslide risk mitigation.

The Program Phase I focused in sharing of experience and capacity building among the participants from target countries. Phase II was enriched by the inclusion of landslide demonstration projects as a program activity in addition to the capacity building and sharing of experience at regional and national levels.

The Program Completion Report describes the achievements, lessons learnt and the way forward for further initiatives in landslide risk mitigation in Asia. It also includes the Project Financial Report and proceedings of all the regional and national trainings which were conducted during three years of Program implementation.

## **Abbreviations and Acronyms**

|            |   |
|------------|---|
| ADPC       | Asian Disaster Preparedness Center  |
| DDPM       | Department of Disaster Prevention and Mitigation, Thailand  |
| DENR       | Department of Environment and Natural Resources, Philippines  |
| DGM        | Department of Geology and Mines, Ministry of Trade and Industry, Bhutan                             |
| DMR        | Department of Mineral Resources, Ministry of Natural Resources and Environment, Thailand            |
| DWIDP      | Department of Water Induced Disaster Prevention, Nepal  |
| GMU        | Gadjah Mada University, Indonesia   |
| GU - DOR   | Geo-environment Unit, Department of Roads, Nepal  |
| IIRS       | Indian Institute of Remote Sensing, India   |
| MOFA       | Ministry of Foreign Affairs, Norway   |
| NBRO       | National Building Research Organization of Sri Lanka  |
| NDCC       | National Disaster Coordinating Council, Philippines   |
| DMC        | Disaster Management Center, Sri Lanka   |
| NDMD       | National Disaster Management Division, Ministry of Home Affairs, India                              |
| NGI        | Norwegian Geotechnical Institute, Norway  |
| RDA        | Road Development Authority, Ministry of Highways, Sri Lanka   |
| KU         | University of Kasetsart, Thailand   |
| UP Diliman | University of the Philippines (Department of Engineering Sciences at the UP College of Engineering) |

## Introduction and Overview

### 1. Introduction

Asia experiences the highest number of disaster events and the highest number of fatalities and affected victims (more than 75%) in the globe (Guha-Sapir et al., 2004, p.29)<sup>1</sup>. According to CRED statistics (2004), though the occurrences of number of major disasters have decreased, small disaster events in isolated areas are increasing causing more damages and fatalities cumulatively<sup>2</sup>. During the last decade, out of the total number of people killed and affected worldwide from avalanches and landslides, more than 71% and 88% respectively are from Asia<sup>3</sup>.

However, little efforts have been made by the stakeholder institutions to understand the social and technical dimensions of this serious issue and thereby to develop cost effective landslide mitigation solutions. Information needed for implementation of such initiatives aimed at understanding the social and technical dimensions, have not yet been fully taken up by the professionals in developing countries of Asia. The reason may well be the inter alia inadequate involvement and encouragement by key players of developmental planning and implementation to obtain the services of technical professionals in decision making and also their reluctance to integrate risk based mitigation practices in the process of development planning and environmental protection.

Moreover, the service sector such as human settlement development, water, power and road development authorities do not have adequate knowledge in landslide mitigation work. As a result the landslide proneness and issues related to reduction of impacts is generally not considered when planning decisions are taken. In most cases, the authorities pay attention to landslide impacts when the services are disrupted and then have to spend a great part of the budget and resources to repair the damaged properties and maintain them. Hence, the traditional ways of imparting training to the three groups, viz. professionals involved in landslide mitigation, service sectors and decision-makers will not be effective. A more effective approach would be to discuss the issues in a comprehensive manner encouraging exchange of knowledge, through face-to-face contact, /discussion in capacity building and knowledge management.

Therefore, ADPC in collaboration with Norwegian Geo-technical Institute (NGI) has developed the program for Asian Program for Regional Capacity Enhancement for Landslide Impact Mitigation (RECLAIM) with the idea of promoting a dialogue between decision makers and professionals about the theoretical and practical aspects and issues related to landslide hazard mitigation. The program activities are designed to be implemented in three-years involving national partners from Bhutan, India, Indonesia, Nepal, the Philippines, Thailand and Sri Lanka.

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<sup>1</sup> Guha-Sapir, D., Hargitt, D., Hoyois, P., (2004). Thirty Years of Natural Disasters 1974-2003: The Numbers, Centre for Research on the Epidemiology of Disasters (CRED), Belgium, p. 29

<sup>2</sup> *ibid.*, p.22

<sup>3</sup> *ibid.*, p.29

The fundamental basis for the phase II of the program is to highlight the need for a gradual change in attitude towards proactive approaches of preventive measures to reduce losses. The regional implementing partners NGI and ADPC have demonstrated the ways of interactive training methodology and have stressed the need for continuity for actions as creating trust and changing attitudes cannot happen overnight. Attitude change is the primary challenge in order for behavioral change to occur subsequently. The curriculum outline for a national training course has been developed and a generic module and training material for national training was developed under the Phase II of the program.

RECLAIM Phase I paved the way to identify the importance of undertaking demonstration projects (LMDPs) to enhance the knowledge and skills of local professionals on investigation, instrumentation and structural mitigation of areas identified to be landslide prone. Especially this is a very important aspect for human settlements threatened by landslides in terms of reducing the casualties and destructions due to potential events in future.

In light of the Phase I experience, the program under Phase II expanded its scope and size to provide hands on experience to professional staff attached to local partner agencies, while continue to provide a platform for having further interaction and discussions between decision makers, planners and professionals with theoretical and practical knowledge on the issues related to landslide risk minimization. Training is only a first step and more value has to be added to the skills gained through practical experience and should make use of other tools such as simulations, risk mapping, and more interactive dialogues between stakeholders including potential at risk communities, for value addition and to enhance the learning process.

## **2. Overview of the Project**

### 2.1 Program Goal

The goal of the RECLAIM program is to reduce the landslide disaster vulnerability of human settlements, infrastructure, and critical facilities in the targeted countries of Bhutan, India, Indonesia, Nepal, Philippines, Sri Lanka, and Thailand.

### 2.2 Program Objectives

#### **Long-term objective:**

The main long-term objective of the program is “**Reduction of landslide disaster vulnerability and prevention of loss of lives and damages to properties, human settlements, infrastructure, and critical facilities in the target countries**”.

#### **Short-term objectives:**

- **The first short-term objective**

To provide target countries with a cadre of specialists and decision makers with up-to-date knowledge on landslide disaster mitigation practices and to integrate this knowledge in routine development work initiated by national and local governments

- **Expectations related to the First short-term objective:**
  - To provide the scientists and geo-technical engineers involved in landslide studies and services a forum for practical discussions on landslide disaster mitigation;
  - To promote good practices on landslide mitigation and risk management models in the target countries;
  - To introduce cost effective mitigation and preparedness practices through 2 Landslide Mitigation Demonstration Projects, (LMDPs) in two selected countries, tentatively on Philippines and in Thailand.
  - To facilitate introduction of new concepts into the risk assessment and land use planning process and construction in landslide prone areas
  - To promote participatory approach of all stakeholders including decision makers in the search for solutions for current problems in landslide risk mitigation
  - To promote sustainable development and environmental protection through landslide disaster impact reduction and integration of concepts of risk based mitigation planning in development practice at all levels
  
- **The Second short term Objective**

An increased collaboration between Norwegian Institutes and Institutes in Asia for development of cost effective strategies for landslide risk mitigation through new joint programs for demonstration of practices of landslide mitigation and preparedness and opportunities for sharing of experience and learning applications in the subject area

- **Expectations related to the Second short term Objective**
  - To promote bi-lateral programs and joint research between Norwegian Institutions and Asian Partners for sharing of experience and learning applications in the subject area.
  
  - To initiate a network where the participants facing the same challenges can benefit from interaction with each other during as well as after the program has been completed.

### 2.3 Project Implementing Agencies

#### ***ADPC***

Established in 1986, and with a present staff of 80 employees, ADPC is recognized as a focal point for promoting disaster awareness and fostering institutionalized disaster risk management policies and practices in the Asian region. Asian Urban Disaster Mitigation Program (AUDMP) involving 9 countries in Asia is one of the largest programs undertaken by ADPC. The AUDMP funded by USAID/OFDA and implemented during the period 1995-2005, focused on selected type of hazards in each country with the purpose of capacity building both for individuals and participating organizations. The 9 countries that participated were Bangladesh, Cambodia, India, Indonesia, Loa PDR, Nepal, Philippines, Sri Lanka and Thailand. Since October 2005 ADPC is implementing a Program for hydro-meteorological disaster mitigation in Asia and the program is funded



by USAID/OFDA. It is targeted to be implemented in Bangladesh, Pakistan, Philippines, Sri Lanka and Vietnam. Experience gained in implementing both programs so far was very useful for the implementation of RECLAIM II.

### ***NGI***

Established in 1953, and with a present staff of 200 employees at its headquarter in Oslo, NGI is a well known international centre for research and consulting within geo-technical and geo- environmental engineering. It is organized as a private independent foundation. Within the field of natural hazards like landslides, flooding aspects and earthquake engineering, NGI has served clients in most part of the world. Of particular relevance for the proposed program are the recent projects that NGI has undertaken in Venezuela, Nicaragua, El Salvador, Madagascar, The Caucasus Region, India, Bhutan and Hong Kong to assist on landslide preventive measures. With the newly established International Centre for Geohazards (ICG) at NGI's premises, the resource base within this discipline has grown significantly.

### 2.4 Participating Institutions

Realizing that it is important to have a broad representation of stakeholders from each of the seven countries, ADPC and NGI sought partnership with organizations representing:

- Decision makers in operational disaster management such as national focal points in disaster management
- Infrastructure planning and development agencies such as planning institutions, road authorities, other service sector institutions
- Technical experts representing universities and /or research organizations

The following institutions were selected from the participating countries as lead organization and as a national collaboration partner. MOUs were signed between ADPC and each main partner. The collaboration partners participated in the yearly training programs and also contributed for the execution of national training programs.

|                    |   |
|--------------------|---|
| <b>Bhutan</b>      | <ul style="list-style-type: none"> <li>• Department of Geology and Mines (DGM), Ministry of Trade and Industry (Lead Partner)</li> <li>• Department of Roads and Agriculture</li> </ul>   |
| <b>India</b>       | <ul style="list-style-type: none"> <li>• Indian Institute of Remote Sensing (IIRS) (Lead Partner)</li> <li>• Central Road Research Institute</li> <li>• National Disaster Management Division (NDMD), Ministry of Home Affairs</li> </ul>                                   |
| <b>Indonesia</b>   | <ul style="list-style-type: none"> <li>• Centre for Volcanology and Geological Hazard Mitigation Research and Cooperation Bureau</li> <li>• Gadjah Mada University (GMU)</li> </ul>   |
| <b>Nepal</b>       | <ul style="list-style-type: none"> <li>• Geo-environment Unit, Department of Roads (Lead Partner)</li> <li>• Department of Water Induced Disaster Prevention (DWIDP)</li> <li>• Department of Narcotic Control and Disaster Management, Ministry of Home Affairs</li> </ul> |
| <b>Philippines</b> | <ul style="list-style-type: none"> <li>• University of the Philippines (Department of Engineering Sciences at the UP College of Engineering) (Lead Partner)</li> </ul>  |

|                  |   |
|------------------|---|
|                  | <ul style="list-style-type: none"><li>• National Disaster Coordinating Council (NDCC)</li><li>• Department of Environment and Natural Resources (DENR)</li></ul>  |
| <b>Sri Lanka</b> | <ul style="list-style-type: none"><li>• National Building Research Organization (NBRO) (Lead Partner)</li><li>• Road Development Authority (RDA), Ministry of Highways</li><li>• Disaster Management Center (DMC)</li></ul>                     |
| <b>Thailand</b>  | <ul style="list-style-type: none"><li>• Department of Mineral Resources (DMR), Ministry of Natural Resources and Environment (Lead Partner)</li><li>• Kasetsart University</li><li>• Department of Disaster Prevention and Mitigation</li></ul> |

## Program Activities

### 3. Program Components

The accomplishments of the program are given succinctly below.

#### 3.1 Capacity Building at Regional Level & 3.2 Sharing of Experiences in risk identification and risk reduction

The Regional training workshops were identified as the best platform to build capacity of the professionals, experts and officers in the region working for landslide risk mitigation at regional level as well as to share their experiences and knowledge. The workshops expected to build good networking and communication mechanism to share the success and failures and to learn from each other in the region.

##### A. 2nd Regional Training Course, Phuket-Thailand, 2007

Under the RECLAIM Phase II, the second regional training was held in Phuket Thailand where the international participants learned about the flash flooding and landslide issues in Thailand with a field exposure in Patong where floods and landslides continue to be the biggest threat to development and human lives. During the training, the participants were given a good background and understanding on the Landslide Mitigation Demonstration Project (LMDP) in Patong under RECLAIM II. All the country representatives shared their experiences and the new technologies they use in trying to mitigate landslide risks in their countries (Refer Annex **4.1.A** for the full Proceedings). The training was attended by 28 participants from Norway, India, Indonesia, Nepal, Philippines, Sri Lanka and Thailand. It was successful in achieving the goal of sharing experiences, technologies and building networks around the Asian Region.

##### B. 3rd Regional Training Course, Manila-Philippines, 2008

The Third Regional Training under RECLAIM II was held in Manila, Philippines where the second LMDP under RECLAIM II is implemented by ADPC together with the University of Philippines, Diliman. The main purpose of this activity is to enhance the capacity of professionals involved in landslide risk mitigation and to promote a dialogue between decision makers and professionals about the theoretical and practical aspects and issues related to landslide hazard mitigation. The idea of this activity is to expose the encountered problems, share the considered alternative approaches to mitigation and preparedness measures and expose the lessons learned by partners of the demonstration projects (Refer Annex **4.1.B** for the Proceedings). There were 27 participants from Norway, India, Indonesia, Nepal, Philippines, Sri Lanka and Thailand.

#### 3.3 Development of national training capacity

With the expectation of helping to enrich the capacity and bring about changes in attitude and practice in promoting the collaborative efforts in landslide risk management through training/skills development and building the partnerships between professionals and decision making community, the national trainings were conducted in all seven countries

with representatives from the respective Government institutions and authorities, academia, private sector and the community.

### 3.4 Organize and facilitate Landslide Mitigation Demonstration Projects (LMDPs)

The LDMPs were included in the Phase II with the experiences and suggestions during Phase I where it was highlighted the need for demonstration projects in order to enhance the knowledge and skills of local professionals on investigation, instrumentation and structural mitigation of areas identified to be landslide prone. Especially this is a very important aspect for human settlements threatened by landslides in terms of reducing the casualties and destructions due to potential events in future. Two major LDMPs were implemented in Philippines and Thailand with the assistance of University of Philippines, Diliman and Department of Mineral Resources, Ministry of Natural Resources and Environment, Kasetsart University of Thailand.

#### **4. Deviations from the planned activities**

There were no major deviations from planned activities. Exact location for implementation of some of the proposed program activities were not been finalized at the time of project proposal submission and hence the assumptions were made in the budget estimates by using appropriate average costs. However after finalization of the locations some of the budget line items have to be realigned and some of the savings from activities had to be used in organizing additional activities. The deviations are connected with that and the specific instances are given below:

1. At the initial stage of the project, the Baguio city administration (city selected for implementing the Landslide Mitigation Demonstration project in Philippines) has shown interest in contributing to implement the Structural Mitigation interventions in the selected site in Baguio city. During the course of the project the city administration has been re-elected and the new administration has taken longer time to make a final decision. The process of approval was lengthy and it could not be concluded before the end of the project. Hence the Implementing partner in Philippines decided to return the amount budgeted for implementing Mitigation actions to ADPC.
2. The venue of the 2<sup>nd</sup> Regional Training has been decided after submitting the project proposal. Since the 2<sup>nd</sup> Regional Training was held in Patong, Thailand it created savings in travel budget as the ADPC team's expenditure was less than the amount budgeted.
3. The location for implementing one of the LMDPs has been finalized to be in Thailand. This has created less utilization of funds on travel but more professional inputs to help project implementation.
4. The savings from above activities were used in organizing additional National training events in Sri Lanka, Nepal and Indonesia on the request of the implementing partners.
5. Part of the savings from other activities (as explained above) was used in implementing a small school based demonstration activity for landslide risk mitigation in Sri Lanka

The project completion reports for National training events and landslide mitigation demonstration projects are attached as follows;

| <b>Country</b> | <b>Name of LDMP</b>  | <b>Annex</b> |
|----------------|--|--------------|
| Philippines    | Slope Failure Monitoring and Intervention in Baguio City and community based approaches for landslide vulnerability reduction in Philippines   | <b>3.A</b>   |
| Thailand       | Demonstration of landslide risk reduction measures through landslide hazard zonation, early warning and flood modeling: Experiences of Landslide Demonstration Project in Patong, Thailand | <b>3.B</b>   |
| Sri Lanka      | Community/School based Rainfall data collection system for landslide early warning and dissemination - Demonstration Project in Kaluthara District, Sri Lanka                              | <b>3.C</b>   |

#### National Trainings:

| <b>Country</b> | <b>Location</b>        | <b>Dates of Training</b> | <b>Annex No.</b> |
|----------------|------------------------|--------------------------|------------------|
| Thailand       | Uttaradit province     | 25-26 February 2009      | <b>2.A</b>       |
| Indonesia      | Bandung                | 05 & 8 February 2009     | <b>2.B</b>       |
| Bhutan         | Thimpu                 | 22 – 24 December 2008    | <b>2.C</b>       |
| Nepal          | Kathmandu              | 22 – 24 December 2008    | <b>2.D</b>       |
| Nepal          | Kathmandu              | 17 – 22 June 2008        | <b>2.E</b>       |
| India          | Dehradun               | 03 – 19 January 2008     | <b>2.F</b>       |
| Indonesia      | Gadjah Mada University | 23 – 25 April 2008       | <b>2.G</b>       |
| Philippines    | Baguio City            | 17 - 19 October 2007     | <b>2.H</b>       |
| Sri Lanka      | Kandy & Galle          | 4 & 6 December 2007      | <b>2.I</b>       |

## Achievements

The achievements of RECLAIM can be briefly summarized as follows

- In each of the 7 participating countries the RECLAIM has served as an important facilitator in bringing national organizations, which are usually scattered and non-interactive, into a common platform for discussion and coordination for landslide risk mitigation measures. Development of a network of professionals in Asia working in the landslide risk reduction field was a major achievement of the program.
- A forum for discussions at national level was created among partners. This is a fulfillment of a long felt need as decision makers often need assistance from the technical specialists to take appropriate action for landslide vulnerability reduction in undertaking development programs in mountainous areas.
- Participating countries have learned from each other and shared their good practices.
- Participants have been trained and convinced about the advantage of being proactive in landslide risk mitigation rather than being reactive after a disaster have occurred. Largely this was possible through the interventions by the technical partner NGI. They could share the latest techniques as well as proven and cost effective practices from European and Latin American countries.
- Participants have been trained in state of the art methods for hazard and risk assessment and use of different solutions for risk reduction measurers.
- The program has created a valuable Regional network among landslide professionals that would continue its existence even after the termination of the

Program. The partners who are networked as a regional forum to facilitate interaction at regional level has ensured the continuity of the network during the discussions held in the last regional training. This is important for experience sharing and as a problem solving mechanism as they can interact through emails and other interactive means

- The network is extended to incorporate landslide professionals from Europe for example NGI, International Institute for Geo-Information Science and Earth Observation (ITC) Netherlands and Swiss Federal Institute of Technology (ETH Zurich) Switzerland through their participation in regional training programs and introduction of their initiatives elsewhere.
- National workshops were arranged in each of the countries, where different state agencies have participated. These workshops have served as an effective mechanism for raising awareness about what can be done for effective landslide risk reduction.
- Documentation of the Landslide Mitigation Demonstration Projects will be useful to serve as good practice for later application in other landslide risk prone areas.
- The World Landslide Forum has recognized ADPC as a “Center of Excellence” in landslide risk management in its meeting held in Japan in 2008. This largely can be attributed to ADPC’s involvement in RECLAIM as the implementing partner.

## Way forward

One of the main lesson learnt during RECLAIM Phases I & II is that early warning systems on landslides are rare in the Region and that there is a huge gap of communication of early warnings to the concerned communities. This gap had resulted in creating more damage, harm and casualties. A communication gap in early warnings is a disaster which disaster managers can prevent. ADPC’s Regional Early Warning System has highlighted the importance of early warning as a decision support rule and recognized the need for packaging information tailored to fit the user needs in the following manner (CRM strategy paper integrating climate change adaptation and DRR, ADPC, 2008):

- a. Weather forecast, with 3 days lead time, for saving lives (disaster management)
- b. Extended weather forecast, with 10 days lead time, for early mitigation decision (disaster management)
- c. Medium-term forecast, with 20-25 days lead-time, for logistics planning (disaster management, agriculture and water sectors)
- d. Seasonal forecast, with 1-6 months lead time, for resource management planning (agriculture and water sectors)
- e. Long-term trends, for evaluating how decision and investments today can withstand future extremes (infrastructure, environment and planning sectors)

In light of the above, the participants during the 3<sup>rd</sup> Regional Training in Manila made a declaration requesting for an extension of the project focusing on early warning, methodology for developing threshold limits for initiation of landslides, landslide early warning in earthquake prone areas etc. This request has been followed up a proposal which was submitted to the Royal Norwegian Embassy in Bangkok, with a cover letter dated 9 July 2008. A brief summary of the content of the proposal is described below.

### *Proposed RECLAIM Phase III*

The proposal addresses the best practices for early warning of landslides in a changing climate scenario. For natural hazards such as cyclones and typhoons use of early warning systems have advanced fairly rapidly over the last years. Successful use of such systems has helped save the lives of the people residing in the effected areas for instance in Bangladesh and China. Use of early warning systems for alerting people from landslide hazards is lagging behind. There is a need for a joint effort in the Asian Region to share experience on this matter and to establish good practices for efficient landslide early warning systems. Moreover, this project has the potential to provide valuable input to the multi hazard early warnings platforms that are under development on regional and national level as a following up of the 2004 Indian Ocean Tsunami Disaster.

The main goal of the project is to share, enhance and develop best practices for early warning of landslides for sustainable development in areas affected by landslides. This will be achieved through gathering data from existing approaches and through formation of joint working groups to identify critical factors and disseminate knowledge from participating countries.

With the above mentioned goal, the main objectives of the project are to:

- a) Develop best practices for early warning of landslides.
- b) Form joint working groups to address the critical factors responsible for destabilisation for landslides.
- c) Collect data from participating countries on a local and national level.
- d) Introduce and develop existing and new concepts pertaining to precipitation threshold values for landslides in different geological materials.
- e) Provide input to strengthen the regional multi hazard early warning centre at ADPC in Bangkok where landslides are one of the priority hazards to be dealt with. The input will also serve as a platform for the national agencies in their efforts to issue national warnings.

The above objectives will be achieved through collaboration between the representatives of participating countries, working under different organisational cultures. Thus, the participants in the joint working groups may gain knowledge and confidence that the best practices for early warning of landslides are applicable and achievable in different geological conditions.



## Manila Declaration

*We have agreed upon the importance of land slide management through RECLAIM-II and would like the project to continue for the below given reasons:*

- *Climate change and variability in weather have increased the occurrence of landslides*
- *There is an urgent need for intense advocacy of land slide management among various stakeholders*
- *Need for multi agency partnership for disaster risk reduction*
- *Need for advanced technological and cost-effective innovations in mitigation projects and their effective implementation*
- *Exchange of advance state of art technology in investigation, mitigation tools and implementation among member countries*

*1. In view of importance of establishing early warning system, capacity building of stakeholders for mitigation, involvement of community and cost effective mitigation techniques, we would like to include these issues in next Phase of RECLAIM project i.e. RECLAIM-III.*

*2. We anticipate that the continuation of the project will foster networking between various involved agencies / organizations, which will exchange current practices and methodology to meet the mitigation requirements.*