NATURE BASED LANDSLIDE RISK MANAGEMENT PROJECT IN SRI LANKA

Report on Project Initiated Training

Implemented by:
National Building Research Organization

Technical Assistance by:
Asian Disaster Preparedness Center

Financially Supported by:
The World Bank
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1. Introduction

The main objective of training programs launched under this project is to enhance the capacity and knowledge in application of nature based landslide risk management practices as one of the viable alternatives for landslide risk management.

The training and capacity building program was built around practical aspects of various possible nature based applications (in terms of erosion reduction, shallow or deep-seated land failure stabilization, drainage control, surface water evacuation, water table lowering, capture debris, etc.) and to share experience within and outside the country. This capacity building covers an extensive programme of in-situ and laboratory testing on soils and plants based on different eco-systems. In addition, knowledge on state of the art computer based programs to evaluate the positive impacts of vegetation on slopes were disseminated by the Resource Persons.

2. Training Needs and Gap Assessment survey (TNGA)

The project team initiated a Training Needs and Gaps Assessment survey at the beginning of the project in order to understand existing approaches for landslide disaster risk management, the level of application of nature based landslide risk management activities, as well to identify competencies, knowledge and skill gaps, and organizational expectations for capacity development.

The consultative process undertaken through the TNGA survey has uncovered several key gaps and challenges, which stakeholders consider as main apprehensions. Some of them are common to landslide risk management capacity development and some are particularly important in creating an enabling environment for application of the nature based solutions. According to the survey, in recent years, while there has been a notable progress in the development of general capacities to manage disaster risks within the country, the gains have lagged in relation to specific technical areas such as management of landslide disaster risk. As well, it has become a concern that the landslide disaster risk management related capacity development also not carried out as a regular endeavor, covering the capacity development needs of all stakeholders.

The TNGA also helped in developing a few project based training courses. The training designs for selected thematic areas for conducting project initiated training, essentially will cover the subjects mentioned in the TNGA survey, to improve the theoretical understanding on the subject, meet knowledge gaps and to create competencies needed for promoting nature-based solutions for landslide risk management.

The outcome of the TNGA survey is given under Annex i.
3. Project based Training 1 –
“Application of Google Earth Engine (GEE) Platform for Land Cover Monitoring and Satellite-Based Rainfall Estimation”

ADPC conducted a training workshop on “Application of Google Earth Engine (GEE) Platform for Land Cover Monitoring and Satellite-Based Rainfall Estimation” during 1-4 October 2018 in SLIDA auditorium, Colombo to support effective implementation of landslide risk management interventions. The purpose was to build the capacity of technical officials of NBRO and other stakeholder agencies for better utilization of state-of-the-art technology of remote sensing to analyze land use, land cover and satellite estimated rainfall (Global Precipitation Measurement (GPM)) for reducing landslide risks. Land cover change is important for decision making process of landslide risk management as it can be measured on a regular basis using satellite technology and applying remote sensing (RS) technology. In-situ rainfall data has been used for estimation of rainfall thresholds, which trigger landslides. Since in-situ observation station networks are not much dense in hilly areas or in complex terrains, estimation of rainfall thresholds has been challenging. Therefore, rainfall estimates from satellite-based Global Precipitation Measurement (GPM) mission, which has the horizontal resolution of (10 km x 10 km) is a good supplement dataset for calculating rainfall thresholds to strengthen landslide early warnings systems in countries.

Dr. Ate Poortinga, and Mr. Susantha Jayasinghe from ADPC, Thailand provided resource inputs for conducting this training and 31 participants from 8 agencies attended the four-day training session. Participants were introduced to Earth Engine Code Editor Platform, basic programming concepts and Earth Engine data structures, methods, functions, and algorithms. Furthermore, the participants were provided with training on utilization of innovative GEE platform, which could use for other applications as well. The GEE platform is widely used for writing and executing scripts to share and repeat geospatial analysis and processing workflows, such as land cover mapping.
4. Project Based Training 2 –
“Nature Based Landslide Disaster Risk Management – Part 1”,

In view of building capacity and improving the knowledge on the subject of Nature Based Landslide Risk Management, ADPC organized a training workshop on “Nature Based Landslide Disaster Risk Management – Part 1”, during 12 – 13 November 2018 at the Movenpick Hotel, Colombo. 27 participants from 9 agencies attended the two-day training sessions. The purpose of the training was to build the capacity of technical officials of NBRO and other stakeholders for better utilization of state-of-the-art technology on the subject for effective implementation of Landslide risk management interventions.

The nature-based solutions for landslide risk management is known as a cost effective and environmentally friendly landslide risk management practice, which can be successfully applied with other engineering measures as well as an alternative to such measures in selected locations, where vegetation can be used to improve the slope stability.

The participants were exposed to the following subject areas during the training workshop:

- Bio-engineering methods for mitigation of landslide risk;
- Matric suction as an important soil parameter which influences the behavior of unsaturated soils;
- Ways of improving the mechanical and hydrological properties of soil through vegetation;
- Methodology applied in developing a comprehensive model to compute plant root based suction and the root reinforcement effect;
- Approach for site selection and implementing nature based landslide risk management activities;
- Modelling Root reinforcement in unstable slopes;
- Application aspects of software “KU Slope” for root zone modeling;
- Limitations and challenges through study of selected case studies from the region.
Prof. Athula Kulathilaka, Dr. Udeni Nawagamuwa from University of Moratuwa, Dr. Anurudda Karunarathna from University of Peradeniya, Dr. Muditha Pallewattha from Irrigation Department and ADPC consultant Dr. Suttisak Soralump from Kasetsart University, Bangkok provided resource inputs during the training in making presentations and providing facilitation support during the discussion sessions held.

Concept note and agenda of the 2nd training event is given under Annex iii.

5. Project Based Training 3 – “Nature Based Landslide Disaster Risk Management – Part 2”,

Part 2 of training workshop on “Nature Based Landslide Disaster Risk Management”, was held during 30-31 May 2019 at Hotel Taj Samudra, Colombo. The training was attended by 28 participants from 9 different institutes.

Having covered the theoretical aspects in the 1st training of Nature Based Landslide Risk Management, the 2nd training elaborated on practical aspects as well as the outcome of the research carried out by the project team.

The participants were exposed to following thematic areas:
- Application aspects of Geo-engineering and Bio-engineering methods (and hybrid methods) for mitigation of landslide risk;
- Different methods of improving mechanical and hydrological properties of soil through vegetation;
- Quantitative assessment of impact of bio-engineering applications using a computer model employing limit equilibrium and finite element analysis;
- Practical aspects of analysis of the impact and contributions of vegetation in slope stabilization in a given vulnerable slope;
- Understanding on the approach for site selection, planning and implementation of hybrid (geo-engineering and nature based) solutions for landslide risk management;
- Mechanical consideration of tree root in a slope;
- Contribution of tree root in different compositions of a hill-slope and some idea on modelling root reinforcement in unstable slopes;
- Limitations and challenges in landslide risk management activities including nature based solutions through case studies from Taiwan.

The training was conducted by two professors from Taiwan. They are, Professor Ko-Fei from National Taiwan University and Professor Tien-Chien Chen from National Pingtung University of Science and Technology. In addition, local experts, Dr. Udeni Nawagamuwa from University of Moratuwa and Dr. Anurudda Karunarathna from University of Peradeniya conducted presentation sessions and provided their resource inputs for successful completion of the workshop.

*Few photos of the 2 day training event*
Group photo of the participants

Concept note and agenda of Training 3 is attached under Annex iv.

Encl.

Annex i – Report on TNGA survey
Annex ii - Concept note and agenda of Training 1
Annex iii - Concept note and agenda of Training 2
Annex iv - Concept note and agenda of Training 3