

Development of early warning technology of rain-induced rapid and long-travelling landslides in Sri Lanka

◆ Project RRLN was approved

May 16, 2019

Influenced by the recent global climate change, extreme rainfall events have become more frequent worldwide and resultant hydro-meteorological hazards are creating more deaths and devastations. One of the most remarkable disasters of rain-induced rapid long-travelling landslides (RRLN hereafter) in Sri Lanka took place at Aranayaka, 70 km east of Colombo in 2016. The fluidized debris mass ran over an about 2 km distance claiming the lives of 125 people. This tragic event has thus highlighted the importance of sophisticated early warning system and disaster management mechanism even more than ever, because the presence of these hidden unstable soil masses as well as their run-out distances are very difficult to predict, and once they start sliding, it is almost impossible to stop them. Therefore, considering the necessity both the National Building Research Organisation, Sri Lanka (NBRO hereafter) and the International Consortium on Landslides (ICL hereafter) have jointly compiled a joint research proposal within the framework of SATREPS, and it passed the final round of selection on May 16, 2019.

The early warning technology for RRLNs will be established by integrating cutting-edge technologies including those developed in the international world of academia with the ICL and JAMSTEC as core organizations. These technologies include:

- (1) Time prediction of heavy rainfalls and pore water pressure build-up,
- (2) Site prediction of landslide initiations and motions, and
- (3) Effective risk communication and public education.

This project is implemented by the NBRO of the Ministry of Defense (Formerly, Ministry of Irrigation and Water Resources Management and Disaster Management) with support from Department of Meteorology (DOM) and Disaster Management Centre (DMC), which are coming under the purview of Ministry of Defense and the Department of Irrigation (DOI) under the purview of Ministry of Mahaweli, Agriculture, Irrigation and Rural Development. It is noteworthy that this project is complementary with the



Fig. 1 About 20 officers and experts from NBRO, DOM, DMC, DOI, CECB, Univ. of Moratuwa etc. joined the workshop on June 20, 2018, and expressed their firm willingness to support the proposed SATREPS Project RRLN.

other ongoing JICA projects such as Project SABO for implementing some intangible measures including refining the current hazard maps and public education.

Pilot study sites

Two pilot study sites, Aranayake and Athwelthota, are selected as representatives of two major types of RRLN.

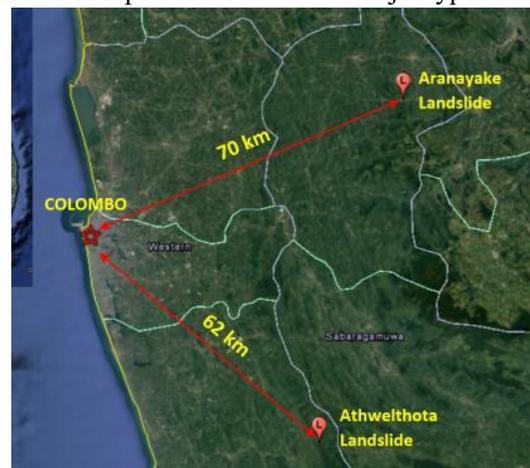


Fig. 2 Locations of two pilot sites, Aranayake and Athwelthota

- ✓ *Aranayake landslide is unique in that it is more massive in size and its runout distance than the others. Though this type of landslides rarely occurs, a large RRLN can surely cause a big disaster.*
- ✓ *Each individual landslide of Athwelthota type will not cause surprisingly large disaster, but the number of landslides of this type can be very large causing extensive losses of human lives and properties.*

SATREPS (Science and Technology Research Partnership for Sustainable Development) is a Japanese government program that promotes international joint research for global issues based on the needs of developing countries. SATREPS has two funding organizations, Japan Science and Technology Agency (JST) that provides funds for Japanese researchers, and the Japan International Cooperation Agency (JICA) that provides Official Development Assistance (ODA) fund for developing countries.

The project has the following three groups:

G1 works as a hub for this joint research, and integrates individual technologies developed at two pilot sites by Groups 2 and 3. Capacities of scientists/ researchers of Sri Lanka are strengthened through this activity.

G2 is in charge of developing technologies for (1) 24 hours in-advance prediction of heavy rainfalls, and (2) assessing groundwater pressure build-up, initiation of an RRL and its flowing dynamics.

G3 strengthens RRL risk communication protocol, developing an augmented reality system for shearing predicted risk information and providing public education to develop capacities of the communities.

◆ Minutes of Meeting

Oct. 15, 2019

A signing ceremony for the Minutes of Meeting (MM) between NBRO, Sri Lanka and JICA, Sri Lanka was held on Oct. 15 at the auditorium of NBRO. Mr. Satoshi Nakamura, Leader, Detailed Planning Survey Team, JICA, Japan, and Eng. (Dr.) Asiri Karunawardena, Director General, NBRO, Sri Lanka, signed the MM toward the implementation of Project RRL.

◆ Collaborative Research Agreement

Oct. 18, 2019

Collaborative Research Agreement (CRA) between NBRO, Sri Lanka and ICL was also signed by Eng. (Dr.) Asiri Karunawardena, Director General, NBRO, Prof. Kazuo Konagai, Leader on the Japanese side of Project RRL, Principal researcher at ICL, Prof. Kyoji Sassa, Secretary-General, ICL in the same signing ceremony and by Dr. Kaoru Takara, Executive Director, ICL, later on Oct. 18.

◆ Record of Discussions

Feb. 5, 2020

Record of Discussions of the Project RRL was signed by the following officers: Mr. Fusato Tanaka, Chief Representative, JICA Sri Lanka Office, Eng. (Dr.) Asiri Karunawardena, Director General, NBRO, Major General (Retired), Kamal Gunaratne, Secretary, Ministry of Defense and Mr. Ajith Abeysekera, Director General, Department of External Resources, Ministry of Finance. The Record of Discussion is an official agreement between both the governments, to confirm implementation of the 05 years Project RRL starting on Feb. 5, 2020.

◆ Implementation of the Technical Cooperation Agreement between JICA and ICL

Feb. 18, 2020

Technical Cooperation Agreement for pursuing the Project RRL over the 5-years period from March 1, 2020 to Feb. 28, 2025 has been implemented between JICA and ICL.

◆ JICA and ICL formed a contract

Feb. 26, 2020

JICA and ICL signed contract for the first year of the Project RRL with the consent of the both parties. The first year starts on March 1, 2020 and ends up on May 31, 2021.

◆ Short-term visit of three scientists from NBRO from March 10 to April 12, 2020

ICL once planned to provide three young scientists at NBRO with an opportunity to have training, discussions and opinion exchanges over a month period (from March 10 to April 12, 2020) with researchers of Project RRL at Japan Agency for Marine-Earth Science and Technology (JAMSTEC), Forestry and Forest Products Research Institute (FFPRI), ICL, Remote Sensing Technology Center of Japan (RESTEC), Kochi University, University of Tokyo and Kyoto University. However, since we have been put in a tight spot in terms of corona-virus disease outbreak, this plan has been canceled. Instead, ICL organizes a web-meeting on April 9, 2020 asking the three young scientists as well as the other researchers of Project RRL to join for sharing the up-to-date information of the project and discussing how we will map out strategies for the project.

◆ Greetings from the project leaders

In the midst of the coronavirus disease outbreak, we are now figuring out how we will pursue firmly Project “RRL” in line with the strategy that we have planned. The good thing is that not only scientists but also all supporters from both governments are united in our common belief that the project will surely contribute to the Sustainable Development Goals (SDGs) of the United Nations, especially Goal 11 “Make cities and human settlements inclusive, safe, resilient and sustainable” through the landslide risk reduction for human settlements in mountainous areas and urban areas close to mountains. We appreciate your continued support.



Project Leaders

Kazuo Konagai
International Consortium on Landslides (ICL)

Asiri Karunawardena
National Building Research Organisation (NBRO)