

## TECHNICAL COLLABORATION BETWEEN NBRO AND NORWEGIAN GEOTECHNICAL INSTITUTE (NGI)

### Project highlights - 2013

NBRO in collaboration with Norwegian Geotechnical Institute commenced the project "NBRO-NGI Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change". This co-operation permitted the two parties (NBRO and NGI) to share each other's experiences in geo-hazards with emphasis on landslides and make collaborative efforts in finding solutions to the various problems caused by landslides in Sri Lanka. The financial assistance received through the Royal Norwegian Embassy (RNE) in Colombo. Several automatic rain gauges were installed under this project.

The NBRO - NGI jointly conducted investigation under this technical corporation for development of possible mitigation strategy for the ground subsidence occurred in Matale district. The Government of Norway trained NBRO staff in the NGI and extended grants for a Ground Penetration Radar (GPR) equipment to study the ground subsidence in Matale district. They further assisted in providing latest techniques like using INSAR satellite images and aerial maps to study plausible subsidence of important places. This project is continuing up to June 2014.



### Project highlights - 2014

NBRO commenced the project "Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change" in collaboration with the Norwegian Geotechnical Institute (NGI) a world-renowned geotechnical institute with extensive experience in global studies. This project promotes sharing experience in geo-hazards and enables NBRO staff to learn about NGI experience on landslides and land subsidence.

Initially the technical cooperation project enabled NBRO and NGI to study landslide studies during which period the NGI donated 3 automated rain gauges to the rain gauge network of the Landslide Early Warning System of NBRO. Then NGI assisted in land subsidence studies that NBRO conducts in Matale district and donated NBRO Ground Penetrating Radar equipment to NBRO and trained the staff on the use of this equipment in ground subsidence studies. The technical cooperation project continues with NGI in association with Geological Survey of Norway assisting in interpretation of INSAR satellite imagery and aerial maps in the trend analysis of ground subsidence in affected areas. Royal Norwegian Embassy (RNE) in Colombo provides financial assistance to this project.



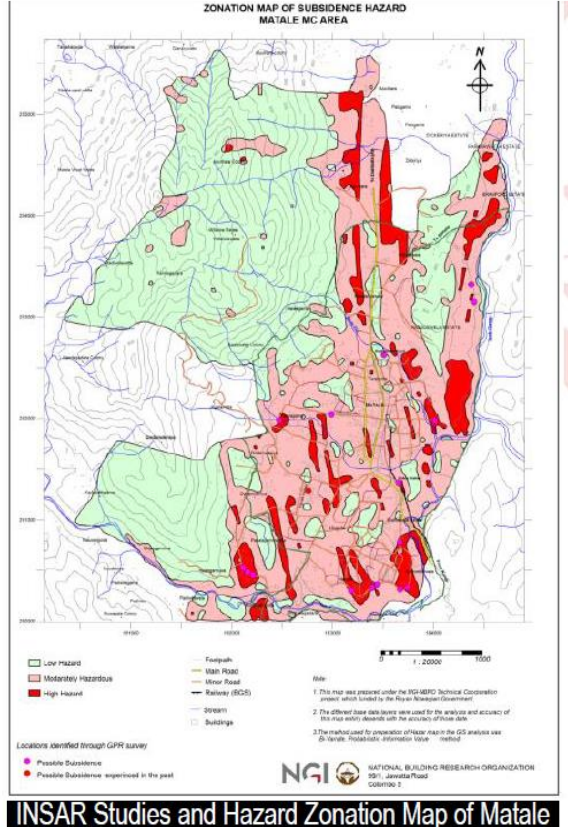
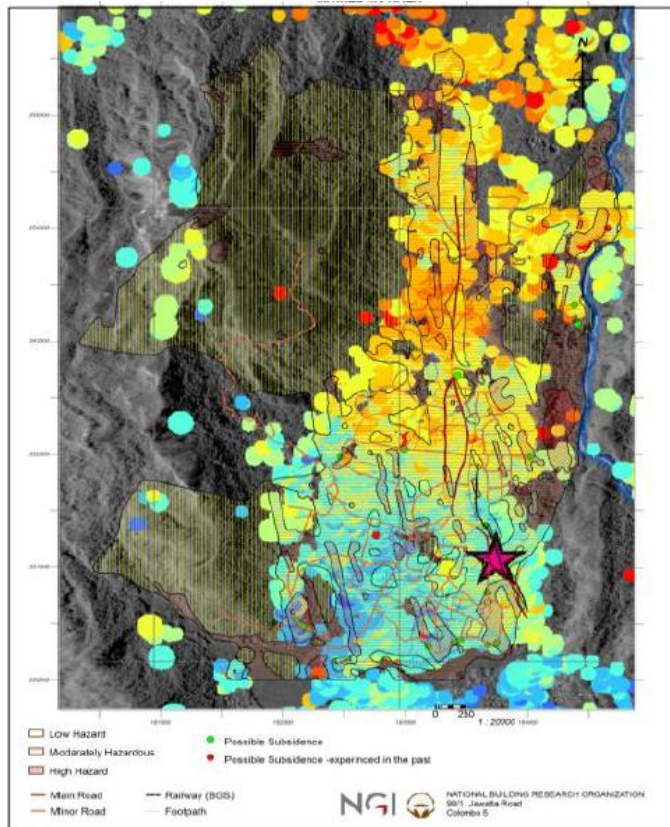
Commissioning automated rain Gauge



GPR Training



GPR survey in progress



## Project highlights - 2015



**NBRO staff was trained by the NGI in Norway on ground penetration studies, land subsidence and ground remediation.**

NBRO continued the project "Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change" in collaboration with the Norwegian Geotechnical Institute (NGI) a world-renowned geotechnical institute with extensive experience in global studies.

The technical cooperation project continued with the NGI in association with Geological Survey of Norway and assisted in the interpretation of INSAR satellite imagery and aerial maps in the trend analysis of ground subsidence in affected areas.

In 2015 the NGI assisted NBRO in conducting a study on the suspected oil contamination of ground water in Jaffna Peninsula by sending a team of NGI experts. The report on findings was given to the relevant authorities in the Northern Province.

Another NGI team visited NBRO and conducted aerial 3D mapping exercise with NBRO staff using a camera drone. They also donated an automated rain gauge coupled with instruments to measure soil moisture etc. installed at Matale and connected to the rain gauge network of the Landslide Early Warning System of NBRO.

Under the technical cooperation project a team of NBRO staff were trained by the NGI in Norway on ground penetration studies, land subsidence and ground remediation.

Royal Norwegian Embassy (RNE) in Colombo provides financial assistance to this project.



**Project highlights - 2016**



NBRO continued the project "Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change" in collaboration with the Norwegian Geotechnical Institute (NGI) a world-renowned geotechnical institute with extensive experience in global studies.

The technical cooperation project continued with the NGI in association with Geological Survey of Norway and assisted in the interpretation of INSAR satellite imagery and aerial maps in the trend analysis of ground subsidence in affected areas.

NGI experts conducted a workshop to train NBRO staff and stakeholders in digital map preparation using photogrammetry and provided a fast computer with multiple processors and dedicated software to NBRO, to facilitate enhanced speeds in computing needed in such work. NGI in addition provided a bore-hole antenna to vertically scan subsurface through bore-holes and this technique will be used to locate underground cavities in Jaffna peninsula and elsewhere in the country. Royal Norwegian Embassy (RNE) in Colombo provides financial assistance to this project.

## Project highlights - 2017



NBRO and Norwegian Geotechnical Institute (NGI) extended the agreement on cooperation for the next five years (2018-2022) to continue the project "Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change".

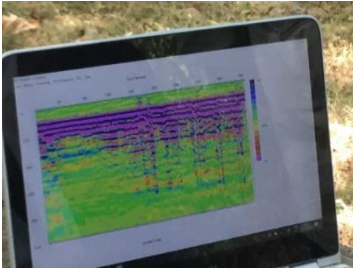
The technical cooperation project continued with the NGI in association with Geological Survey of Norway and the Asian Disaster Preparedness Centre, and expects in future venturing into more diversified areas.

NGI experts conducted many training programs to NBRO staffs and donated a borehole antenna for vertical scanning with Ground Penetrating Radar. NGI also donated to NBRO a fast computer with multiple processors and dedicated AGISOFT software to NBRO for digital map preparation using photogrammetry. Royal Norwegian Embassy (RNE) in Colombo provided financial assistance to this project.

## Project highlights - 2018



NBRO and Norwegian Geotechnical Institute (NGI) have conducted various studies since 2012 and an agreement on cooperation was signed to continue the project "Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change" for the five years from 2018 to 2022. In 2018, NGI experts together with NBRO staff, conducted a GPR survey in Anuradhapura to map the subsurface to locate the inner citadel for the Sacred Cities Development Project.



Dr. Farrok Nadim the Technical Director of Norwegian Geotechnical Institute visited NBRO in December 2018 and expressed interest to conduct nature-based landslide mitigation projects, venturing into more diversified areas in association with Asian Disaster Preparedness Centre. Royal Norwegian Embassy (RNE) in Colombo provided financial assistance to this project.

## Project highlights - 2019

Since 2013, NBRO and Norwegian Geotechnical Institute (NGI) have joined to conduct studies on ground subsidence and landslide studies. The agreement signed then on technical cooperation was extended later to continue the project "Institutional Cooperation on Mitigation of Natural Disasters due to Climate Change" for the five years from 2018 to 2022.

Over the years, the NGI strengthened technical capacity of NBRO by training staff locally and at the NGI. Every year NGI experts visit and together with NBRO staff, conduct advanced surveys. NBRO staff has been trained in GPR techniques and satellite image processing related to landslide and ground subsidence studies. In addition, NGI donated various equipment including an advanced ground penetrating radar system for subsurface mapping, various antennae for horizontal ground scanning and vertical borehole scanning, automated rain gauges, camera drones for aerial mapping and fast computers with dedicated software for image processing.

Royal Norwegian Embassy (RNE) in Colombo provided financial assistance to this project.