



7.8

magnitude earthquake on 25 April 2015, and subsequent aftershocks

20,000

classrooms destroyed and 12,000 heavily damaged

130

engineers trained to use the Structural Integrity and Damage Assessment (SIDA) app

6,000

schools catalogued using the SIDA

The immediate post-disaster challenge facing education infrastructure was a lack of data in relation to the number, location and condition of schools in the damage affected areas.

During the response phase, Arup was asked to assist the World Bank, GFDRR and the Government of Nepal to develop a robust and replicable process to build an inventory of the education infrastructure baseline, and design an analytical framework to understand the magnitude of intervention options.

This was achieved by developing a Structural Integrity and Damage Assessment methodology to survey all schools in the affected districts, and designing an algorithm to analyse the intervention scenarios in order to inform preliminary investment plans.

HOW THIS WAS ACHIEVED

SIDA Methodology

Arup developed an assessment methodology which captured the damage, vulnerability, exposure and functional conditions of education infrastructure. It was calibrated to the local context based on a literature review and consultation with local stakeholders to include local hazards (not just earthquakes), the geographic conditions to which schools may be exposed, and local construction practices including structural typologies of education infrastructure. The SIDA is a detailed assessment to highlight what interventions are required but it does not include the detail required to undertake the design of specific interventions for individual buildings.

Training

Arup developed detailed training material and conducted a training for trainers involving 70 Nepali engineers who subsequently trained teams to conduct assessments in the damage affected districts. In addition, 60 engineers from the Department of Education (DoE) were trained in order for the SIDA methodology to potentially be utilised nationwide. The training material included a guidance manual to be used by trainers that

related to each of the questions in the SIDA form in order to build capacity of local engineers who will undertake the assessments. This approach to training of trainers allows the methodology to cascade to hundreds of engineers and for future utilisation to be managed by the public and private sector in Nepal.

Data Collection

Arup worked with KKL, a Nepalese firm, to develop a SIDA mobile app. The assessment form deliberately limits the engineering judgement required to undertake the assessments in order to minimise uncertainty in the data. Surveyors used this app when they visited each school to record: the location, access, hazards and site planning of each school; the type, configuration, age and builder of each building; structural typologies and vulnerabilities of each building component. All data is logged to a centralised database owned by the DoE which can be easily checked for data quality. Engineering judgement is built into the analysis of the data rather than the collection of data, in response to the range of competencies and skills of surveyors conducting the assessments.

Algorithm Design and Analysis

The data can be easily formatted for high level outputs (e.g. number of partially collapsed schools by region) that do not require complex analysis. An algorithm for systemic analysis of the data was developed by Arup in collaboration with the World Bank, Digicon and Young Innovations in order to allow the DoE to plan beyond the recovery phase and test alternative scenarios. The web-based platform incorporates prioritisation criteria (e.g. location, level of damage) and investment requirements (e.g. cost for retrofit) in order to produce proposed investment plans with preliminary timeframes. Multiple datasets (e.g. GIS demographic data) are integrated into the platform which should allow the DoE to manage their education infrastructure as part of a long term systemic approach to planning, management and disaster risk reduction.



This work was conducted in collaboration with the World Bank and GFDRR as part of the Global Program for Safer Schools in response to a 7.8 magnitude earthquake which struck Nepal on 25 April 2015. The objective was to establish a baseline database on existing education infrastructure and damage to inform a recovery and reconstruction plan. This included a 10 day fact finding mission in August 2015. For more information, please contact:

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