

Role of Schools in Creating Earthquake-Safer Environment

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Abstract

Schools play a vital role in the community, and are important elements of the values and culture of the society. A proper education through the schools not only teaches the children, but also reaches deep into the community through the parents and teachers. The School Earthquake Safety Initiative has been undertaken by UNCRD with specific focus on four countries in Asia: India, Indonesia, Nepal and Uzbekistan. The objective of the initiative is to develop disaster-resilient communities through self-help, cooperation and education. The initiative aims to promote earthquake-safer construction practices through retrofitting of school buildings in a participatory way, with the involvement of the local communities, local governments and non-government organizations. It also aims to promote disaster education among the children, teachers, and parents. A safer school can save valuable lives of the children, can be used as a temporary shelter after the earthquake, and can promote the culture of prevention and mitigation through community activities. Thus, the importance of school in every aspect of disaster cycle from pre-disaster mitigation to post-disaster rehabilitation can be recognized. Significant success have been achieved, and many important lessons have been learned, which can and should be applicable to different other earthquake prone cities and countries.

Introduction

Earthquakes are considered as one of the most destructive natural disasters and can produce many types of losses, including physical, socio-economic and cultural losses. Although physical losses such as lives, buildings and social infrastructures will most directly affect the victims, other types of losses might trigger the social unrest and aggravate poverty level. It has severe impact on the development stages of the country and in many cases it has been observed that one single event does affect significant percent of the national Growth Domestic Product (GDP). To live in a safer environment is a basic human need. To make the development process sustainable, it is important to emphasize on the prevention and pre-disaster mitigation aspects. The most significant

issue in this regard is to have a proper education training and perspective regarding the earthquake risk and its consequences.

UNCRD's Disaster Management Planning (DMP) Program was initiated in 1985. Progress in regional development has led to a better and safer living environment, but it has also made the environment more vulnerable to natural hazards. The program's research and training projects aim to support local government, non-government, and academic institutions in creating partnership with communities in developing countries for disaster management. The goal of this program is two-fold: 1) improve the capacity of communities to develop and implement disaster management plans, and 2) strengthen public awareness of natural hazards.

The School Earthquake Safety Initiative (henceforth termed as 'SESI') is aimed to promote self-help and education for disaster mitigation by building safe and sustainable community. The participatory approach in the community development and capacity building among the local people are the key focus areas of the initiative. Schools have been found as the key element for the community involvement in Japan and other countries worldwide. School not only provides education to the children, a strong school also helps in emergency shelters immediately after the earthquake. Through this school-strengthening program, a community based training program is formulated to spread the knowledge of earthquake resistant traditional technologies rooted in culture and heritage. In this paper, a brief outline of the SESI is presented, and the activities in different countries are described briefly.

Why Focusing on Schools?

In the next decade, there will be a dramatic change in the socio-economic structure of developing countries as many of them transform themselves from predominantly agrarian economies into industrial based urban societies. Rapid urbanization in these countries is due to the policy of the developing countries that has emphasized industrial and urban growth and this urban biased policy has encouraged migrants to flock into cities to take advantages of the relatively better economic conditions. However, cities have weakened the potential of urban regions to absorb the growing urban population and provide them with necessary employment opportunity and service. As a result in most of the cities of developing countries, informal settlements are developing in the urban periphery. This population pressure combining with many other factors, compels improper construction, and many important buildings like schools are built rapidly without proper seismic design that drastically increase population's vulnerability from earthquake disaster. The United Nations International Decade for Natural Disaster Reduction (IDNDR: 1990-1999) has been able to make a significant progress in raising awareness among diverse communities regarding risks and effects of natural disasters. A strong shift has been observed from post-disaster rehabilitation and reconstruction to pre-disaster mitigation and preparedness policy. As a part of the preparedness process, strengthening the school buildings and disaster education has been emphasized.

Earthquake-threatened communities need earthquake-resistant schools to protect their children and teachers. Moreover, earthquake-resistant schools can be used as relief and rehabilitation shelters during earthquakes. Also, a strong leadership of teachers has been proven very useful in dealing with emergency situations. Thus, schools can play an important role in community training, and building partnership among various community groups. This is important not only during emergency situations, but also before and after the disasters. The school safety issues have several dimensions. The physical one is strengthening the schools and transferring earthquake-safer construction technology to the communities. The second aspect is education, for students, teachers and communities. The third aspect is socialization of the effort, by creating awareness and capacity building among the communities. These issues are very much inter-related and have been addressed in an integrated manner in SESI.

Goal and Objectives of the School Earthquake Safety Initiative

Under the overall framework of 'Human Security', the goal of the initiative is to attain safer and sustainable livelihood for the people in the developing countries. Disaster affects both the safety and sustainability, in terms of lives and livelihood. To achieve the goal stated above, the initiative will focus on community development and empowerment activities in some of the selected cities and towns of developing countries. The overall objectives of this project are:

- (a) To empower the community with know-how and technology for earthquake safer construction, and
- (b) To make a disaster resilient, self-reliant community.

To do this, a specific focus has been given to the school systems, where the vulnerability of the school buildings will be evaluated and technically tested, affordable retrofitting techniques will be provided. Raising the education and awareness level related to earthquake disaster will be another focus area of the project initiative.

There are five direct objectives of the project:

- (a) Evaluate the vulnerability of selected school buildings in each of the selected project city,
- (b) Recommend designs and affordable means of strengthening vulnerable schools,
- (c) Retrofit one or two model demonstration school(s) using appropriate or improved traditional and local technology,
- (d) Provide training to workers from local construction industry who build schools and residential dwellings; and
- (e) Prepare disaster education materials for school children, teachers and communities and use them for training and education purposes.

It is observed from the past experiences that the basic problems related to disaster mitigation and preparedness in the developing countries are attributed to lack of training, awareness, education, and self-reliance within the communities. An appropriately educated and self-trained community is much more capable to cope successfully with natural disasters, and to reduce its impacts. In other words, disaster management and related efforts are very much part of a sustainable development process in developing

countries. The current initiative aims to promote the mitigation culture through community participation and empowerment process tailored to residents with specific needs. There are several completed and/or ongoing-projects in the selected cities/town. Some of these efforts are initiated by the government organizations, some of them are by non-government organizations, and many of them are from the international organizations. The current initiative will complement, enlarge and sustain the on-going efforts. The direct beneficiaries of this initiative will be school children, their families, teachers, school authorities, local engineers, masons, and homeowners. The indirect beneficiaries are the government organizations and the community as a whole.

Activities and Expected Outputs of the Initiatives

The initiative has been formulated based on the initial studies and surveys conducted by the Disaster Management Planning Hyogo Office of the UNCRD; and is designed as per the need and priority at the local level. There has been a wide range of stakeholders, identified as the counterparts. It varies from country to country, and includes the local governments, municipalities, academic institutions and non-government organizations. The initiative has two major phases: Preparation Phase and Implementation Phase.

Preparation Phase: The activities in this phase include detail survey of the schools, retrofit design, and design of the education materials. This Phase has two components, one regarding the school buildings, and the other regarding the education materials. For school buildings, following specific activities will be executed:

- (a) Reconnaissance survey and selection of schools;
- (b) Detailed survey of schools;
- (c) Detailed retrofit design with special emphasis on applying appropriate or improved traditional technology at affordable costs;
- (d) Recommendations based on cost performance analysis.

The selection of schools will have following criteria:

- (1) Usage as per the number of students,
- (2) Location as per the vulnerability of structures and spatial setting,
- (3) Types of construction, to cover common construction practices,
- (4) Priority of the local government and/or local counterparts

For education materials, following activities will be done:

- (a) Preliminary survey of existing disaster related education materials;
- (b) Preparation of preliminary booklets for schools;
- (c) Testing preliminary education materials in schools and getting feedback from children and teachers and;
- (d) Final design of educational materials.

Thus, during this phase, a proto-type of the education materials will be prepared, and its receptiveness will be tested. The initial results will be disseminated through arranging interactive workshops at local levels at different time period of the preparation phase.

Implementation Phase: The purpose of this phase is to prepare demonstration model in a participatory approach. Major activities in this phase will include retrofitting of school

buildings, training of masons, and use of the education materials to raise awareness among the school children. This phase will execute following actions:

- (a) Retrofit one or two model school(s) per agreed design and budget; and;
- (b) Disseminate education materials through special classes in schools with emphasis on disaster education in curriculums. Training at the local level will be performed during this phase. Earthquake drills will also be planned and conducted in selected schools.

Actual retrofitting of school buildings will involve the local masons, teachers and parents in different form. A final workshop will be carried out in each project city/town to disseminate the results to a wider audience, and to ensure sustainability of efforts among the local stakeholders.

The expected outputs have two aspects: one physical, i.e., retrofitting school buildings, and the other social, which is to convert local communities into earthquake resilient communities. The retrofitted school buildings and associated training program will serve as a model for the disaster-prepared community for other parts of the country. On the other hand, educating the school children and the educational materials will serve as the tool for spreading the disaster prevention culture, and to make it sustainable at the community level through educating children, teachers and community members. It is expected that the current initiative will be able to raise the awareness at different levels. As a long-term initiative, it can be perceived that a comprehensive model of community training and capacity building for disaster preparedness will emerge out of this initiative.

Project Cities

Five cities have been selected for this project. These are Bandung and Bengkulu (Indonesia), Chamoli (India), Kathmandu (Nepal) and Tashkent (Uzbekistan). Although these cities vary in size and population, most of them have paid a serious toll on human resources, and physical infrastructure due to earthquakes. In spite of damages due to earthquake and apparent lack of preparedness at different level, the institutions at local, county and national levels have shown keen interest in the mitigation activities, and consequently several programs are currently on-going in these cities with different focus areas. Three out of five cities, Bandung, Tashkent and Kathmandu participated in the RADIUS project of the UN IDNDR.

Bengkulu was hit by a powerful earthquake in June 2000, with 7.9 Richter scale magnitudes. The area is located in an active seismic zone and future earthquakes at larger magnitudes can be expected in this region. Although more than one year has passed since the earthquake, the rehabilitation and reconstruction have not been completed. The proposed initiative in the city will be a pilot demonstration project where school-building rehabilitation and earthquake risk mitigation techniques will be carried out in an integrated manner.

Bandung has been a case study site for the United Nations IDNDR RADIUS project, which aims to raise awareness and build capacity in the local government. Here, the major focus of the project will be an education campaign. Through the UNESCO

project and the Indonesian Urban Disaster Mitigation Project (IUDMP), the vulnerability of some of the school buildings has already been assessed and a preliminary education campaign has been started. This has been done in close cooperation with the Bandung municipality, and UNCRD played an advisory role in both the projects. By accumulating achievements of the above activities, the main goal of the current initiative in Bandung is to integrate these achievements into a comprehensive training program for school children and local communities.

Chamoli is located in northern India in the foothill of the Himalayas. This region is often hit by strong earthquakes, as evidenced by several past devastating earthquakes, the recent one being in early 1999. The most common residential and school buildings here are stone masonries, with relatively heavy slate roofs. Besides, there is an upcoming trend of non-reinforced brick masonry buildings. Under the initiative, several schools will be selected from two different construction types. Through this initiative, time-tested traditional technology and upcoming appropriate and affordable modern technology will be disseminated through a training program for retrofitting the existing school buildings.

Nepal has a long history of destructive earthquakes. In the twentieth century alone over 11,000 people have lost their lives in four major earthquakes. School children are especially vulnerable to earthquake hazards in the Kathmandu Valley. A recent study conducted by Kathmandu Valley Earthquake Risk Mitigation Program (KVERMP) revealed that the majority of the 644 public school buildings require retrofitting to meet safety standards. The current practice of school construction does not incorporate earthquake resistant elements. In addition, none of the public schools have any emergency response plans. The current initiative will focus on the training of local masons for the earthquake resistant non-engineered construction and preparing the risk management plans for the schools.

The city of Tashkent is located in one of the most intensive seismic zones of Uzbekistan, and experienced several earthquakes. A preliminary analysis of the seismic risk for Tashkent shows that more than 25% of school buildings might be completely destroyed and 30% might be heavily damaged in case of a forthcoming earthquake of magnitude 6.5. The situation is aggravated by the absence of simple and efficient methods of increasing seismic safety of existing school buildings. Training of school administration for proper use of school buildings in earthquake regions and educational materials describing how to behave before, during and after an earthquake will help increase awareness and understanding of children, teachers and local communities.

As observed from the above description, each city has its own perspective and need at the local level. Therefore, the activities in each city are formulated based on the local priorities and problems. In some cities, school retrofit is a key focus area, where in some other cities, more emphasis is given on the training and capacity building among the masons and disaster education for children, teachers and their parents. The levels of interventions are also different from city to city.

Dissemination of the Concept of the School Earthquake Safety Initiative

The concept of the SESI is non-scale, non-regional and therefore can be applied to anywhere and for any type of disaster. After the recent earthquake of Gujarat, India (January 26, 2001), the Hyogo Prefecture of Japan had made a fund raising campaign from the citizen of Hyogo, and has been able to raise an amount of 1.7 million USD. Hyogo prefecture had experienced devastating earthquake in 1995, and during the disaster, many schools were used as temporary shelter for the citizens. Schools play a very important role in the Japanese scenario of the disaster management, and therefore the Hyogo prefecture has been very keen to support the concept of SESI in India, for the victims of the Gujarat Earthquake.

The overall objective of the proposed project is to conduct the comprehensive earthquake disaster mitigation training cum capacity building program for community development and long-term sustainability with special focus on the school system and the non-engineered construction procedures in Gujarat and other parts of India. The scope of work will include the following:

1. Construction of new schools
2. Retrofitting of damaged schools
3. Training, Dissemination
4. Preparation of education materials for the school children and
5. Monitor and Evaluation of the activities

In the process, 10 schools will be either newly constructed, reconstructed and/or retrofitted. An educational document will be prepared for the school children. The direct beneficiaries of the school retrofit and training program will be school children, their families, teachers, school authorities, local engineers and masons. The indirect beneficiaries are the government, non-governmental organizations and the community as a whole.

Conclusion

School Earthquake Safety Initiative uses the basic tools of disaster mitigation: self-help, cooperation and education, and is aimed to the sustainable future of the people through community involvement at an appropriate level. Retrofitting of schools, training of masons, awareness raising among different sectors, and disaster education are different elements of this initiative. It is recognized that this initiative is irrespective of region, hazard and scale of application, and therefore can be applied to wide range of disasters. It is hoped that the SESI can be global model for the successful disaster mitigation at the community level.